

IN THIS ISSUE:

Household consumption expenditure in Thailand during the first COVID-19 lockdown
Oudom Hean and Nattanicha Chairassamee

Estimating the effects of Internet exchange points on fixed-broadband speed and latency
Siope Vakataki ‘Ofa

Securing green development: Can Asia-Pacific central banks and financial supervisory authorities do more?
Xiang-li Lim and Vatcharin Sirimaneetham

Digital economy integration in Asia and the Pacific: insights from DigiSRII 1.0
Witada Anukoonwattaka, Pedro Romao, Preety Bhogal, Thomas Bentze, Richard S. Lobo and Arushi Vaishnav

Addressing sovereign debt challenges in the era of COVID-19 and beyond: the role of the United Nations
Alberto Isgut



ASIA-PACIFIC SUSTAINABLE DEVELOPMENT JOURNAL



United Nations
New York, 2022

ASIA-PACIFIC SUSTAINABLE DEVELOPMENT JOURNAL

Vol. 28, No. 2, December 2021

United Nations publication

Sales No. E.22.II.F.4

Copyright © United Nations 2022

All rights reserved

Printed in Thailand

ISBN: 9789211208368

e-ISBN: 9789210013611

ISSN (print): 2617-8400

ISSN (online): 2617-8419

ST/ESCAP/2991

Cover design: Nina Loncar

This publication may be reproduced in whole or in part for educational or non-profit purposes without special permission from the copyright holder, provided that the source is acknowledged. The ESCAP Publications Office would appreciate receiving a copy of any publication that uses this publication as a source.

No use may be made of this publication for resale or any other commercial purpose whatsoever without prior permission. Applications for such permission, with a statement of the purpose and extent of reproduction, should be addressed to the Secretary of the Publications Board, United Nations, New York.

Editorial Advisory Board

Kaushik Basu

Professor of Economics and C. Marks Professor of International Studies
Department of Economics, Cornell University

Martin Ravallion

Edmond D. Villani Professor of Economics
Georgetown University

Sabina Alkire

Director of the Oxford Poverty and Human Development Initiative (OPHI)
Oxford Department of International Development, University of Oxford

Naila Kabeer

Professor of Gender and Development, Department of Gender Studies
London School of Economics and Political Science

Li Xiaoyun

Chief Senior Advisor at the International Poverty Reduction Centre in China, and
Director of OECD/China-DAC Study Group, Chair of the Network of Southern
Think Tanks (NeST) and Chair of China International Development Research Network

Shigeo Katsu

President, Nazarbayev University

Ehtisham Ahmad

Visiting Senior Fellow

Asia Research Centre, London School of Economics and Political Science

Myrna S. Austria

School of Economics, De La Salle University

Chief Editors

Srinivas Tata

Director, Social Development Division (SDD) of ESCAP

Hamza Ali Malik

Director, Macroeconomic Policy and Financing for Development Division (MPFD)
of ESCAP

Editors

Patrik Andersson

Chief, Sustainable Socioeconomic Transformation Section, SDD

Cai Cai

Chief, Gender Equality and Social Inclusion Section, SDD

Sabine Henning

Chief, Sustainable Demographic Transition Section, SDD

Alberto Isgut

Acting Section Chief, Financing for Development Section, MPFD

Oliver Paddison

Chief, Countries in Special Situations Section, Office of the Executive Secretary

Sweta Saxena

Chief, Macroeconomic Policy and Analysis Section, MPFD

Editorial Assistants

Pannipa Jangvithaya

Gabriela Spaizmann

EDITORIAL STATEMENT

The *Asia-Pacific Sustainable Development Journal* (APSDJ) is published twice a year by the Economic and Social Commission for Asia and the Pacific. It aims to stimulate and enrich research in the formulation of policy in the Asia-Pacific region towards the fulfillment of the 2030 Agenda for Sustainable Development.

APSDJ welcomes the submission of original contributions on themes and issues related to sustainable development that are policy-oriented and relevant to Asia and the Pacific. Articles should be centred on discussing challenges pertinent to one or more dimensions of sustainable development, policy options and implications and/or policy experiences that may be of benefit to the region.

Manuscripts should be sent to:

Chief Editors
Asia-Pacific Sustainable Development Journal

Social Development Division and
Macroeconomic Policy and Financing for Development Division
United Nations Economic and Social Commission for Asia and the Pacific

United Nations Building, Rajadamnern Nok Avenue
Bangkok 10200, Thailand
Email: escap-apsdj@un.org

For more details, please visit www.unescap.org/publication-series/APSDJ.

The Editorial Board of the *Asia-Pacific Sustainable Development Journal* wishes to express its gratitude and appreciation to all of the reviewers for their invaluable contributions to the 2021 issues of the *Journal*.

Shahid Ahmed

Sajid Amin

Chaiti Sharma Biswas

Hui Chen

Prabir De

Yann Duval

Martina Francesca Ferracane

Nick Freeman

Daniel Gay

Zorikto Gomboin

Reiko Hayashi

Wassana Im-em

Ajay Jagannath

Zheng Jian

Olga Joos

Mahmood Khan

Kishore Kulkarni

Bram Peters

Monica Pinilla-Roncancio

Govinda Rao

Napaphat Satchanawakul

Tanja B. Sejersen

Vatcharin Sirimaneetham

Ermina Sokou

Vanessa Steinmayer

Abid Suleri

Felix Suntheim

Bishwa Nath Tiwari

Paul Vandenberg

Upali Wickramasinghe

ASIA-PACIFIC SUSTAINABLE DEVELOPMENT JOURNAL

Vol. 28, No. 2, December 2021

CONTENTS

		<i>Page</i>
Oudom Hean and Nattanicha Chairassamee	Household consumption expenditure in Thailand during the first COVID-19 lockdown	1
Siope Vakataki 'Ofa	Estimating the effects of Internet exchange points on fixed-broadband speed and latency	39
Xiang-li Lim and Vatcharin Sirimaneetham	Securing green development: Can Asia- Pacific central banks and financial supervisory authorities do more?	69
Witada Anukoonwattaka, Pedro Romao, Preeti Bhogal, Thomas Bentze, Richard S. Lobo and Arushi Vaishnav	Digital economy integration in Asia and the Pacific: insights from DigiSRII 1.0	113
Alberto Isgut	Addressing sovereign debt challenges in the era of COVID-19 and beyond: the role of the United Nations	149

Explanatory notes

References to dollars (\$) are to United States dollars, unless otherwise stated.

References to “tons” are to metric tons, unless otherwise specified.

A solidus (/) between dates (e.g. 1980/81) indicates a financial year, a crop year or an academic year.

Use of a hyphen between dates (e.g. 1980-1985) indicates the full period involved, including the beginning and end years.

The following symbols have been used in the tables throughout the journal:

Two dots (..) indicate that data are not available or are not separately reported.

An em-dash (—) indicates that the amount is nil or negligible.

A hyphen (-) indicates that the item is not applicable.

A point (.) is used to indicate decimals.

A space is used to distinguish thousands and millions.

Totals may not add precisely because of rounding.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Where the designation “country or area” appears, it covers countries, territories, cities or areas.

Bibliographical and other references have, wherever possible, been verified. The United Nations bears no responsibility for the availability or functioning of URLs belonging to outside entities.

The opinions, figures and estimates set forth in this publication are the responsibility of the authors and should not necessarily be considered as reflecting the views or carrying the endorsement of the United Nations. Mention of firm names and commercial products does not imply the endorsement of the United Nations.

HOUSEHOLD CONSUMPTION EXPENDITURE IN THAILAND DURING THE FIRST COVID-19 LOCKDOWN

*Oudom Hean and Nattanicha Chairassamee**

The COVID-19 pandemic has been particularly challenging to developing countries, such as Thailand. Although the country has managed to control the outbreak relatively well, changes in the consumer spending behaviour could affect the whole economy. In this study, household consumption expenditure in Thailand during the first COVID-19 lockdown is examined by using descriptive and empirical analyses. The findings of this study indicate that total consumption declined drastically during the first two quarters of 2020. Consumer spending on services dropped significantly during that time, but spending on non-durable goods, durable goods and housing-related expenses increased. These expenditure patterns are similar to those in developed countries in which consumers increased their spending on at-home activities, but reduced their expenditures outside the home.

JEL classification: O11, O15, O57

Keywords: household, consumption expenditure, developing countries, COVID-19 pandemic, Thailand

* Oudom Hean, College of Business and the Challey Institute for Global Innovation and Growth, North Dakota State University, United States of America (email: oudom.hean@ndsu.edu; ORCID: 0000-0001-5903-2742); Nattanicha Chairassamee, corresponding author, Department of Economics, Kasetsart University, Thailand (email: nattanicha.chai@ku.th; ORCID: 0000-0001-9663-2878).

I. INTRODUCTION

The unprecedented COVID-19 pandemic has been a challenge to mankind. Many countries around the world have had to impose economic lockdowns in order to curb the spread of the virus. Despite the resulting economic uncertainty, governments have been mandating that their citizens stay home. These COVID-19-related policies, while affecting the world economy, are particularly challenging for developing countries, where a large number of their populations live in poverty.

In the present paper, the effect of the first COVID-19 lockdown on aggregated household consumption expenditure in Thailand is examined.^{1,2} Consumer spending based on total consumption, non-durable goods, durable goods and housing-related expenses, services, and other expenditures are analysed. The findings indicated that total consumption had declined drastically during the lockdown, resulting from a significant drop in spending on services, including restaurants, hotels, transportation, recreation, and culture, because these activities were restricted. On the other hand, consumers increased their spending on durable goods, non-durable goods, and housing-related expenses.³

This study is intended to explore the economic impact of the COVID-19 lockdown on private consumption, which is a key measure of consumer well-being, but has not received full consideration in the literature. It provides estimated effects of the lockdown, which can be used to forecast consumption and economic declines for future containment policies. These estimates are also helpful in assessing the magnitudes of the stimuli needed to revitalize the economy. In addition, some light is shed on industries heavily affected by this demand shock by disaggregating consumption expenditure into different components. The selection of Thailand was because of three particular reasons. First, Thailand is a developing country. Most studies covering the topic of this paper focus on developed economies, such the United States of America or European countries. This study provides insights into consumer behaviour during the pandemic and policy implications in other developing countries, especially in Asia and the Pacific. Second, because the economy of Thailand depends heavily on the service sector, the economic lockdown is likely to have had a significant impact on consumer behaviour. Third, the Government of Thailand collects detailed data on consumption expenditure, which are usually unavailable in less-developed countries.

¹ "The first COVID-19 lockdown", "lockdown", and "stay-at-home order" are used interchangeably in this paper.

² According to the United Nations and Oxford Policy Management (2020) and Djalante and others (2020), the first lockdown in Thailand was categorized as a partial lockdown, as people were required to stay at home only at night, and travel across provinces was strictly restricted.

³ Durable goods and housing-related expenses include furniture and furnishings, household equipment, and electricity, while non-durable goods consist of foods, beverages, and clothing.

In the service sector, employment rates and gross domestic product (GDP) values are concentrated in food production and accommodations, and in related activities, such as the wholesale and retail industries. While the Government has been making efforts to reduce poverty, the poverty rate in Thailand remains high, approximately 10 per cent in 2018 (World Bank, 2020a).

During the COVID-19 pandemic, the Government of Thailand implemented strict policies to reduce the viral spread, including a partial stay-at-home order and a prohibition on incoming international flights. The non-agricultural sector, which accounts for approximately 50 per cent of total employment (Bank of Thailand, 2020), and more than 90 per cent of total output (Office of the National Economic and Social Development Council, 2020a), was severely hit by these policies, especially the tourism sector. As a result, the poverty rate and job losses most likely increased sharply during the containment policies. World Bank (2020a) projected that the number of people earning less than \$5.50 daily potentially doubled to 9.7 million in the second quarter of 2020, compared to the first quarter of 2020. To support vulnerable populations and firms, the Government introduced COVID-19 response packages, which amounted to 12.9 per cent of GDP (World Bank, 2020a). These packages mainly included cash transfers to low-income families, regional infrastructure projects, tax relief, and debt restructuring. In addition, the Bank of Thailand established a fund to stabilize the corporate bond market and to fund soft loans to small- and medium-sized enterprises.

Although Thailand has managed to control the pandemic during the initial stages, the findings of the study show that the expenditure patterns of Thai consumers are similar to those in developed countries.⁴ During the first lockdown, households increased their spending on at-home activities and reduced their spending on activities outside their homes. Similar to these findings, Chen, Qian and Wen (2020) show that services, dining, entertainment, and travel were the most severely affected industries in China during a COVID-related lockdown in that country. These demand shocks from the COVID-19 pandemic and the lockdown could harm the economy and employment (del Rio-Chanona and others, 2020).

This study is related to previous studies on the economic effects of natural disasters. Notably, however, consumers may respond differently to different types

⁴ Examples of works studying the effects of COVID-19 on consumer spending in developed countries are Abraham and Arnoldsén (2020), Baker and others (2020), Goolsbee and Syverson (2020), and Andersen and others (2020).

of disasters. Most research on the economic effects of natural disasters and other external shocks, especially those in developing countries, focuses on economic growth, and the findings are mixed (Cuaresma, Hlouskova and Obersteiner, 2008; Noy and Vu, 2010).⁵ For example, Skidmore and Toya (2002) and Loayza and others (2012) find that natural disasters have positive effects on human capital accumulation, total factor productivity and economic growth. On the other hand, Strobl (2012) finds that hurricane strikes have a significant negative impact on the output produced in the Central American and Caribbean subregions, while Raddatz (2007) finds that external shocks have a small economic effect in low-income countries. Shabnam (2014), who studies the effect of flooding on GDP growth around the world, shows that the number of people affected by this disaster has a significant effect on GDP per capita growth; the death toll, however, has no significant effect on economic growth.

Other studies focus on the effects of natural disasters on the productivity and survival of firms. The findings in this strand of the literature are also mixed. De Mel, McKenzie and Woodruff (2011) find that the 2004 tsunami in Sri Lanka significantly affected firms by reducing their profits, sales, and capital stock. Similarly, Cole and others (2013) and Tanaka (2015) find that the 1995 Kobe earthquake had negative effects on employment growth and gross value added. In contrast, Leiter, Oberhofer and Raschky (2009) find that European firms affected by major floods in 2000 were able to expand their total assets and employment faster than unaffected firms; these findings are consistent with the creative destruction hypothesis. Similarly, Hosono and others (2016) find evidence supporting the creative destruction hypothesis. Their study, which is on the Kobe earthquake, shows a higher investment in the affected area, compared to the unaffected regions (Hosono and others, 2016).

This paper is also related to the emerging literature focusing on the effects of the COVID-19 pandemic on consumer well-being. This strand of the literature is growing at an incredible speed. Martin and others (2020) calibrate a model to predict the impacts of the pandemic on household consumption and poverty in the San Francisco Bay area. They project that in the absence of social protection programmes, and with a three-month shelter-in-place period, the poverty rate would increase by approximately 9 per cent, from 17.1 per cent, and lower-income people would suffer the most (Martin and others, 2020). However, they also show that with unemployment insurance and the Coronavirus Aid, Relief, and Economic Security (CARE) Act stimulus package,⁶ the increase in the poverty rate would be close to zero. Baker and others (2020) find that families, especially those with lower incomes, greater income reductions, and

⁵ As this strand of the literature is vast, only a few selected studies are mentioned in this paper.

⁶ For more details of the U.S. CARE Act, see <https://home.treasury.gov/policy-issues/coronavirus/about-the-cares-act>.

lower levels of liquidity, are very responsive to the stimulus payments provided by the Government of the United States of America. They observe that households quickly spent about 25 per cent to 35 per cent of stimulus payments during the first 10 days after receiving them (Baker and others, 2020). Using high-frequency data, Andersen and others (2020) show that a lockdown imposed during the COVID-19 pandemic in Denmark had reduced aggregated consumption by 27 per cent and find that the reduction in expenditure was especially large for individuals who lost jobs due to the crisis. Similarly, Chen, Qian and Wen (2020) find that expenditures on goods and services in China dropped significantly during the beginning of the pandemic, with the service, restaurant, entertainment, and travel sectors suffering the most.

Examples of other topics covered in papers on effects of the COVID-19 pandemic are industrialization of developing countries (Sato, 2021), global value chains (Hayakawa and Mukunoki, 2021), economic and social activities (Keola and Hayakawa, 2021), and financial markets (Hoshikawa and Yoshimi, 2021).

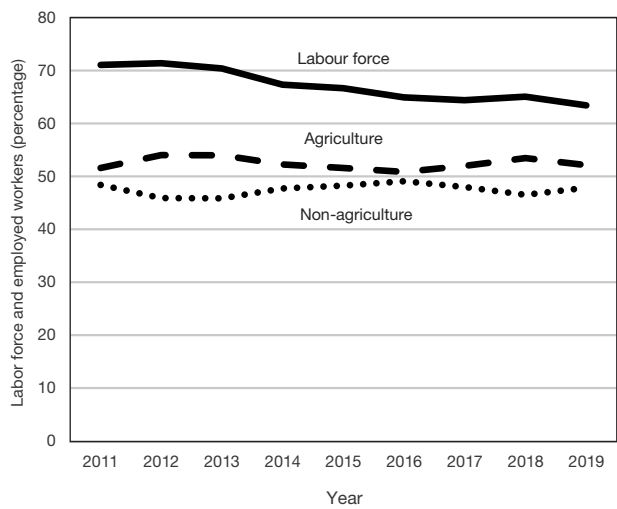
The rest of the paper is structured as follows. Section II presents stylized facts of economy of Thailand, especially during COVID-19, while section III contains a discussion on the data set and provides a descriptive analysis of consumption expenditure in Thailand. Sections IV and V include explanations on the empirical strategy and estimated results. To test the robustness of the baseline results, Section VI provides a sensitivity analysis. Finally, sections VII and VIII contain policy insights and conclusions, respectively.

II. BACKGROUND OF THE ECONOMY OF THAILAND

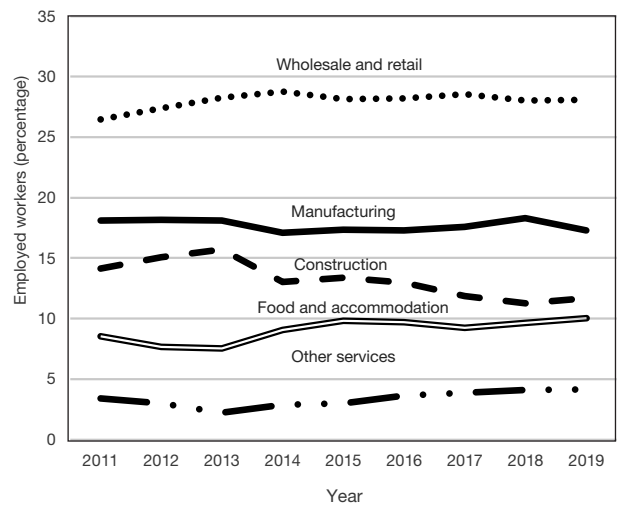
Figure 1a shows that the labour force rate in Thailand declined from 71 per cent to 63 per cent between 2011 and 2019. The employment rates for the non-agricultural sector were slightly lower than those for the agricultural sector, which indicates the important roles played by both sectors in the country's employment. As shown in figure 1b, employment in the non-agricultural sector has been more concentrated in the wholesale and retail industries; these industries are progressively employing more workers over time. The employment rates in foods and accommodations, and other services, have also increased. By contrast, the percentages of workers in manufacturing and construction have decreased since 2011.

Figure 1. Labour force and employment of Thailand

(a) Labour force rates and percentages of employed workers by sector



(b) Percentage of workers employed in the non-agricultural sector



Source: Bank of Thailand (2020).

Even though the agricultural sector has employed about 50 per cent of the total labour force, this sector's contribution to the country's economic growth is small and declining. Figure 2a shows that while total output in Thailand has grown steadily, the value of the agricultural output has been relatively stable. Accordingly, the percentage of the country's GDP resulting from the agricultural sector has been decreasing over time; the contribution made by this sector to the economy declined by approximately 2 per cent between 2011 and 2019. On the other hand, the economy has increasingly relied on non-agricultural industries. As shown in figure 2a, the non-agricultural sector generally accounted for more than 95 per cent of the total output during that time.

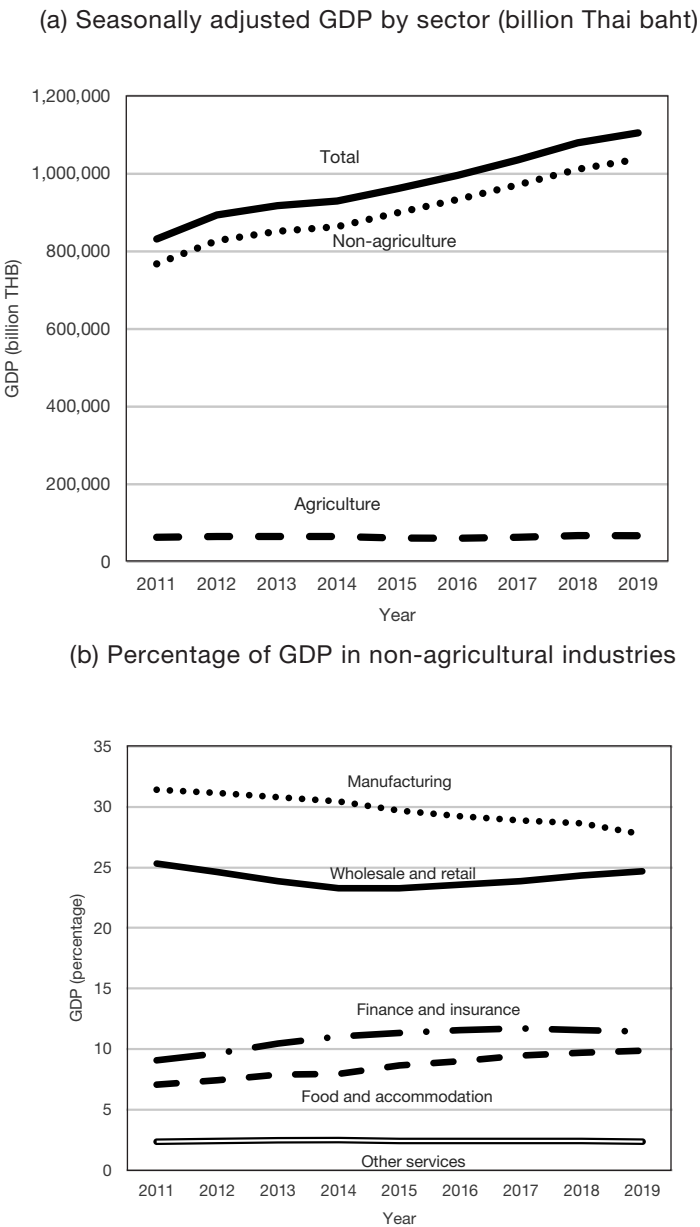
Figure 2b shows that the gross output in food production and accommodations, and financial and insurance activities in Thailand steadily increased by approximately 2 per cent from 2011 to 2019. This is unsurprising, because the tourism industry has grown rapidly, attracting tourists from all around the world. Consequently, non-manufacturing industries including food, accommodation, wholesale, and retail industries, have increasingly become key driving forces of the country's economic growth. By contrast, the manufacturing industry has been declining. The gross output in the manufacturing industry dropped by approximately 4 per cent from 2011 to 2019 (figure 2b), while employment in this industry declined by almost 1 per cent during the same period (figure 1b).

Given the importance to the Thai economy of the non-agricultural sector, the Government of Thailand has been increasingly promoting non-agricultural firms by offering, for example, tax exemption and other tax incentives for foreign investors, which motivates Thai workers to work in the non-agricultural sector.

The poverty rate in Thailand has declined significantly, but despite this, many families and individuals are still living in poverty. Figures 3a and 3b show that the individual and the household poverty rates decreased by about 50 per cent from 2011 to 2019.⁷ By 2019, the overall poverty rate was approximately 6 per cent. The poverty rate in rural areas is higher than that in urban areas; however, the differential between the rural and urban poverty rates has decreased. It remains to be seen whether the rural and urban poverty rates will continue to converge when they are measured during and after the COVID-19 pandemic era.

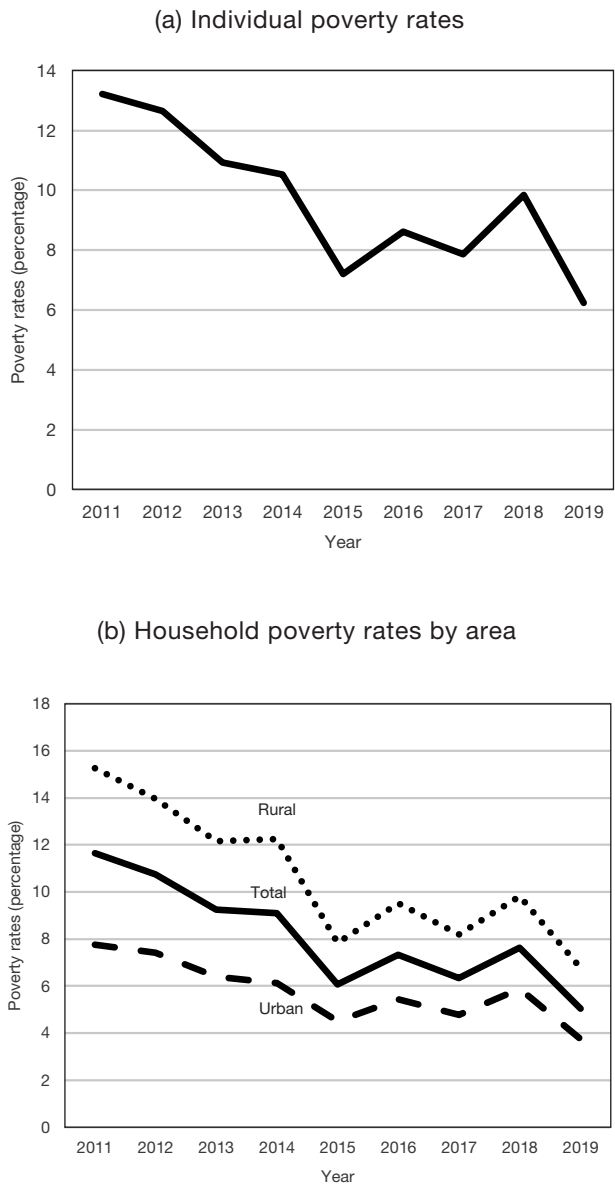
⁷ The poverty line in Thailand was approximately \$80 per person per month in 2011 and increased to \$89.78 per person per month in 2018 (Office of the National Economic and Social Development Council, 2020b). This is calculated based on the Thai–U.S. exchange rate as of 12 December 2020, which was 30.186 Thai baht per 1 United States dollar.

Figure 2. Gross domestic product values by sector of Thailand



Source: Office of the National Economic and Social Development Council (2020a).

Figure 3. Poverty rates in Thailand



Source: Thailand, National Statistical Office (2020).

Due to the COVID-19 pandemic, on 21 March 2020, the Government of Thailand imposed a partial lockdown in Bangkok. This caused migratory workers to move from Bangkok to their hometowns. Reacting to a high infection rate, on 26 March 2020, the Government ordered a partial lockdown in the whole country, including staying at home, no trips across provinces, no international or domestic flight arrivals, and no group gatherings. This lockdown order was relaxed in May 2020.

In the early stages, Thailand was able to control the spread of the COVID-19 pandemic relatively well. As of 15 November 2020, the country had approximately 3,900 cases and 60 related deaths.⁸ Nevertheless, there are economic consequence due to the restrictions.

Strictly implementing the lockdown quickly raised the unemployment rate in Thailand, from 1.03 per cent in March 2020 to 2.15 per cent in July 2020 (Bank of Thailand, 2020). The World Bank (2020a) forecasts that Thailand may have suffered from a GDP contraction of 8.3 per cent by the end of 2020, which could perhaps be the highest decline in GDP attributed to the COVID-19 virus among the countries in East Asia and the Pacific. The tourism and the manufacturing industries were most likely severely affected. Given the importance of the non-agricultural sector to employment and economic growth, the ongoing pandemic could lead to increased job loss and heightened poverty.

To stimulate the economy, the Government of Thailand has been implementing policies, such as stimulus checks for low-income individuals, corporate loans, regional infrastructure projects, tax relief, and debt restructuring. To alleviate unemployment, the Government has also hired recent college graduates. Starting in October 2020, the Government relaxed the international flight restrictions to resuscitate the tourism industry and the economy.

III. DATA AND DESCRIPTIVE ANALYSIS

For this study, quarterly individual consumption expenditure of households from the Office of the National Economic and Social Development Council is used. This consumption spending is obtained through the expenditure approach. All data are seasonal-adjusted and inflation-corrected by chained volume measures (with 2002 as the reference year). Data from the first quarter of 2011 to the second quarter of

⁸ As of 29 November 2021, Thailand had approximately 2 million confirmed COVID-19 cases and 20,000 related deaths. Those high numbers were due to the COVID-19 second wave in December 2020, leading to the second partial lockdown in July 2021. The second lockdown completely ended in September 2021. Currently, the new confirmed COVID-19 cases are less than 10,000 cases per day (Department of Disease Control, 2021).

2020 were selected. The data on COVID-19 cases are sourced from Roser and others (2020). Table 1 provides descriptive statistics for the data.

Table 1. Descriptive statistics

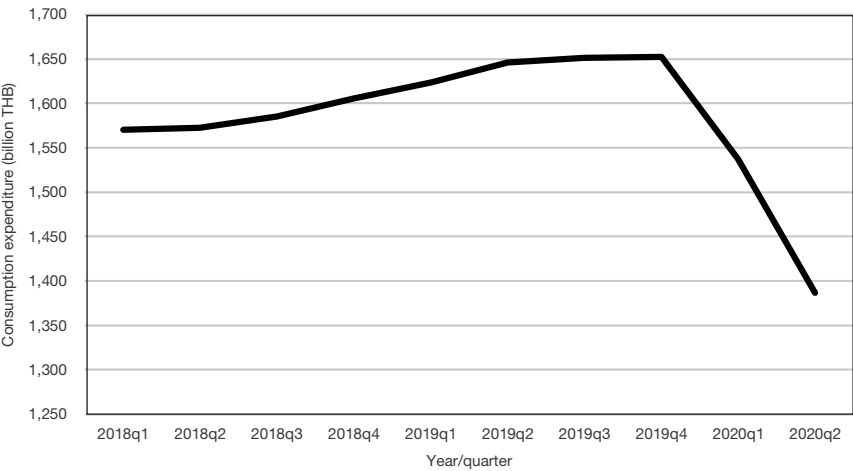
Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Total consumption	38	1 416.779	140.22	1 154.477	1 652.435
Food and non-alcoholic products	38	235.79	11.829	222.099	262.257
Alcohol and tobacco	38	51.005	2.011	46.368	55.295
Clothing	38	73.937	2.946	61.918	78.555
Utilities	38	158.06	17.321	128.204	188.416
Furniture	38	76.056	5.544	65.873	86.402
Health	38	82.950	10.007	67.880	105.120
Transportation	38	195.352	21.165	141.992	227.638
Communication	38	57.096	8.462	41.752	69.759
Recreation	38	100.893	16.891	72.455	125.393
Restaurants and hotels	38	226.47	44.961	154.781	308.691
Education	38	23.657	1.777	20.939	26.849
Miscellaneous	38	163.419	28.077	115.686	200.606
Confirmed COVID-19 cases	38	46.605	287.294	0	1 771

Source: Office of the National Economic and Social Development Council (2020a). All expenditures are expressed in billion Thai baht. Confirmed COVID-19 cases are the number of confirmed COVID-19 patients at the beginning of each quarter.

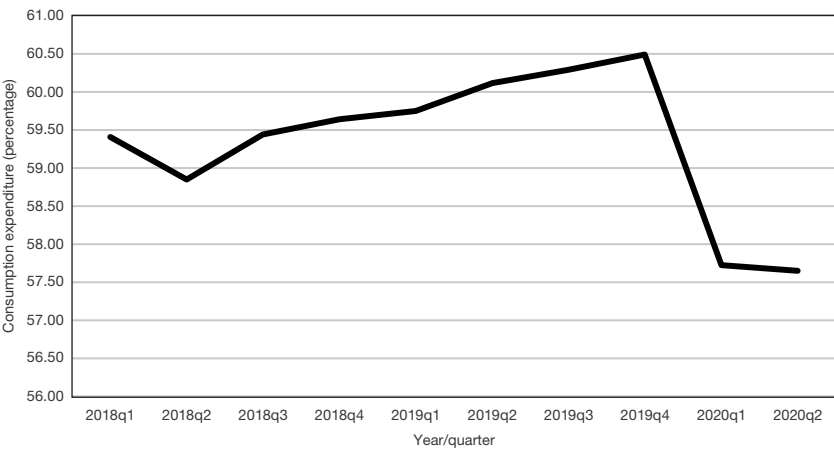
Figure 4 shows total household consumption expenditure in Thailand. One key observation from the figure is a significant decline of approximately 16 per cent in consumer spending in the second quarter of 2020, relative to the total consumption expenditure in the last quarter of 2019. In the second quarter of 2020, consumption as a percentage of GDP dropped to 57.6 per cent. These figures indicate that individuals and households were strongly affected by the economic crisis induced by the COVID-19 lockdown.

Figure 4. Individual consumption expenditure of households in Thailand

(a) Seasonally adjusted consumption expenditure (billion Thai baht)



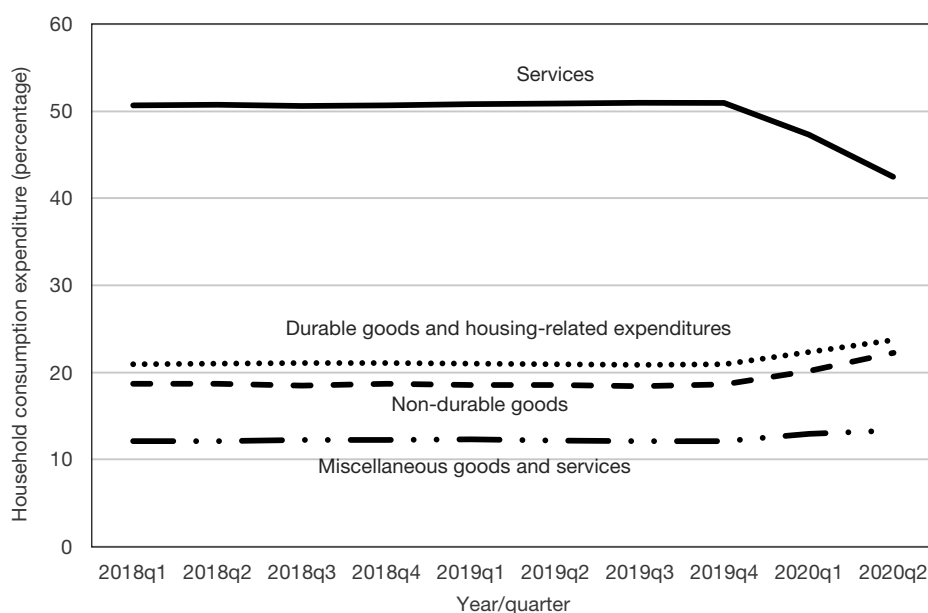
(b) Consumption expenditure (percentage of GDP)



Source: Office of the National Economic and Social Development Council (2020a).

Figure 5 shows household consumption expenditure by components, namely non-durable goods, durable goods and housing-related expenses, services and miscellaneous spending. In this study, non-durable goods consist of food, beverages, tobacco products, clothing, and footwear. Durable goods and housing-related expenditures are housing, water, electricity, gas, and other fuels and furnishings, household equipment, and the routine maintenance of the house. Spending on services covers health, transportation, communication, education, recreation and culture, and restaurants and hotels.

Figure 5. Household consumption expenditure by component



Source: Office of the National Economic and Social Development Council (2020a).

As shown in figure 5, expenditures on all goods, but not on services, moderately increased. The percentage of spending on non-durable goods reached approximately 22 per cent in the second quarter of 2020, while the durable goods expenditure and housing-related spending grew to almost 24 per cent. The increased spending on non-durable goods could have been due to the hoarding of essential goods, such as food and other staples. Meanwhile, during the stay-at-home order, individuals increased their housing-related expenses, such as utility usage. These consumption patterns are very similar to what has been observed in developed countries, such as the United States (Federal Reserve Bank of St. Louis, 2020; Kang and Gasparro, 2020).

On the other hand, the service sector has been significantly affected by the pandemic lockdown; consumer spending on services declined drastically, to approximately 42 per cent. This represents an 8.5 per cent drop relative to the spending on services in the last quarter of 2019. The empirical analysis for the study of this paper indicates that the first COVID-19 lockdown significantly affected specific Thai industries, such as restaurants and hotels. In developed nations, these industries have also suffered similar economic consequences.

Overall, these results are in line with the behaviour of consumers in developed countries. Consumers in Thailand, and in most developed countries, increased their spending during the lockdown on at-home activities, such as cooking, entertainment, and home improvement (Baker and others, 2020). In contrast, due to the lockdown, consumers reduced their spending on out-of-home activities, including traveling, dining in restaurants, and recreational activities (Andersen and others, 2020; Baker and others, 2020; Goolsbee and Syverson, 2020).

IV. THE IMPACT OF THE COVID-19 LOCKDOWN ON CONSUMPTION EXPENDITURE: EMPIRICAL MODEL

To estimate the effect of the COVID-19 pandemic on consumption, the following ordinary least square (OLS) regression specification is applied:

$$Consumption_t = \beta_0 + \beta_1 Restriction_t + \beta_2 GDP_{t-1} + \beta_3 COVID19_t + t + \epsilon_t, \quad (1)$$

where $Consumption_t$ - represents seasonal-adjusted and inflation-corrected consumption expenditure (in billion Thai baht) at time t . Consumption components are also analysed to understand the heterogeneity in consumers' spending. That is, studying these components provides information on how consumers managed their budgets during this economic crisis. In this case, $Consumption_t$ is an expenditure in the consumption component as a percentage of total consumption at date t . By expressing consumption as a share of total expenditure, how consumers allocated their budgets during the pandemic is effectively analysed.

$Restriction_t$ is an indicator variable representing the period of partial economic lockdown. As the lockdown was an economic shock, it could be considered as an exogenous shock, similar to other natural disaster shocks (Martin and others, 2020). The pre-lockdown period extends from 2011 to 2019, while the lockdown period covers the first and second quarters of 2020. Accordingly, the study provides estimates of the short-run effects of the pandemic lockdown on consumption expenditure in Thailand.

One-quarter-lagged, seasonal-adjusted, and inflation-corrected GDP (in billion Thai baht) are controlled. By controlling GDP, it is possible to interpret the estimated coefficient of the variable in regression model (1) as the impact of the pandemic lockdown on consumption, holding income fixed. As a robustness check, the two-quarter-lagged GDP is controlled, and the estimated coefficients of the variable $Restriction_t$ in this analysis resembles the baseline estimates. Finally, to capture pre-existing trends of household expenditure, the linear time trend in the regression specification is controlled.

The estimated effects of the lockdown policies could be downward biased when households voluntarily reduce spending on out-of-home activities due to the fear of the spread of COVID-19 virus. These estimates are also downward biased when the Government of Thailand implements stimulus packages in response to increased viral transmission. Accordingly, the estimates are the lower bounds. To reduce this downward bias, in the specification, confirmed COVID-19 cases in Thailand are controlled. $COVID19_t$ is the number of cumulative COVID-19 cases at the beginning of each quarter. However, as shown in the sensitivity analysis, using the number of reported cases in the middle of each quarter does not significantly change the baseline estimates.

To reiterate, the variable of interest is $Restriction_t$, which captures the effect of the pandemic lockdown on consumption spending, holding income fixed. Additionally, the effects of the lockdown on household budget allocation are analysed by studying consumption components expressed as percentages of the total expenditure on consumption. In the future, it would be interesting to study the consumption expenditure using disaggregated data. By employing individual-level data, one could attempt to disentangle two channels: first, the limited access to services and goods due to the lockdown; second, the reduction in income due to the pandemic. Unfortunately, in the case of Thailand, these data are not widely available and time sensitive. Future studies could focus on this issue, once the data are available.

V. THAILAND CONSUMPTION EXPENDITURE DURING THE COVID-19 LOCKDOWN: EMPIRICAL FINDINGS

Table 2 presents the estimated effects of the lockdown on consumption expenditure in Thailand and the estimated coefficient of other variables in regression specification (1) are shown in table A.1 of appendix A. As shown in column (1), the estimated impact of the lockdown on total spending on consumption is extensive. The lockdown reduced the country's total consumption by more than THB117 billion (\$3.8 billion), which

accounted for 7.11 per cent of the fourth quarter spending on total consumption in 2019.⁹ Notably, however, the economic lockdown affected consumption components unevenly.

Table 2. Consumption expenditure in Thailand during the COVID-19 lockdown

	Total consumption	Non-durable goods	Durable goods and housing	Services	Miscellaneous
	(1)	(2)	(3)	(4)	(5)
<i>Restriction_t</i>	-117.54*** (7.10)	2.39*** (0.34)	1.42*** (0.07)	-4.03*** (0.29)	0.07 (0.20)
Controls					
<i>GDP_{t-1}</i>	Yes	Yes	Yes	Yes	Yes
<i>COVID19_t</i>	Yes	Yes	Yes	Yes	Yes
Linear trend	Yes	Yes	Yes	Yes	Yes
Observations	37	37	37	37	37
R-squared	0.97	0.91	0.86	0.91	0.97

Notes: Newey-West standard errors are in parentheses. Each component is expressed as a percentage of the total household expenditure. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Columns (2) to (5) of table 2 show the estimated effects of the lockdown on consumption components as percentages of total consumption. These components are non-durable goods; durable goods and housing-related expenditure; services; and miscellaneous spending. While the estimated effects of the lockdown on the spending on services are significantly negative, the estimated effects of the COVID-19 lockdown on expenditures of other components, including non-durable goods, durable goods, and housing-related expenses, are positive.

Because of the lockdown, non-durable expenditure was significantly increased, by approximately 2.4 per cent. Table 3 shows that among non-durable goods, consumers predominantly increased their spending on food and non-alcoholic drinks. As a result of the lockdown, the expenditure on these goods increased by approximately 2 per

⁹ The seasonal-adjusted, inflation-corrected, total consumer spending in the last quarter of 2019 was THB1.652 trillion.

cent. Additionally, the spending on alcoholic beverages and tobacco was roughly stable; during the lockdown household spending on these goods increased by 0.43 per cent. On the other hand, the findings indicate that the lockdown had a significant effect on the percentage of household spending on clothing and footwear. Figure B.1, in appendix B, shows that total household spending on clothing and footwear declined by approximately THB16 billion in the first two quarters of 2020. These spending patterns are consistent with the scenario that consumers stockpiled food and non-alcoholic beverages during the pandemic; similar pandemic-related hoarding was observed in the United States and in European countries (Kang and Gasparro, 2020). In contrast, the lockdowns and working from home lowered the demand for new clothing.

Table 3. Expenditures on household consumption: components
(percentage of total household spending)

	Food and non-alcoholic products (1)	Alcohol and tobacco (2)	Clothing (3)	Utility (4)	Furniture (5)	Health (6)
<i>Restriction_t</i>	1.83*** (0.21)	0.43*** (0.05)	0.14 (0.09)	0.90*** (0.04)	0.52*** (0.06)	0.68*** (0.04)
Controls						
<i>GDP_{t-1}</i>	Yes	Yes	Yes	Yes	Yes	Yes
<i>COVID19_t</i>	Yes	Yes	Yes	Yes	Yes	Yes
Linear trend	Yes	Yes	Yes	Yes	Yes	Yes
Observations	37	37	37	37	37	37
R-squared	0.88	0.95	0.89	0.91	0.67	0.89

Notes: Newey-West standard errors are in parentheses. Each component is expressed as a percentage of total household expenditure. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Table A.2 in appendix A shows estimated coefficients of other variables presented in regression specification (1).

Due to the lockdown, the expenses for durable goods and housing-related spending increased by approximately 1.4 per cent. Table 2 and figure B.2 in the appendix provide detailed information about expenditures on durable goods and housing-related expenses. Unsurprisingly, household utility expenses increased substantially during the stay-at-home order. Spending on furniture and home improvement grew slightly in the first quarter of 2020, but it declined in the second quarter. In developed

countries, such as the United States, spending on durable goods, especially home improvement, substantially increased, as the lockdowns and working from home motivated individuals to upgrade their homes (Carpenter, 2020).

**Table 4. Expenditures on household consumption: components
(percentage of total household spending)**

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
<i>Restriction_t</i>	0.04 (0.26)	0.14*** (0.04)	-0.06 (0.12)	-4.95*** (0.18)	0.11*** (0.02)
Controls					
<i>GDP_{t-1}</i>	Yes	Yes	Yes	Yes	Yes
<i>COVID19_t</i>	Yes	Yes	Yes	Yes	Yes
Linear trend	Yes	Yes	Yes	Yes	Yes
Observations	37	37	37	37	37
R-squared	0.63	0.83	0.85	0.94	0.64

Notes: Newey-West standard errors are in parentheses. Each component is expressed as a percentage of total household expenditure. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01. Table A.3 in appendix A shows estimated coefficients of other variables presented in regression specification (1).

Finally, expenditures for services declined drastically during the pandemic lockdown. Column (4) in table 2 shows that the lockdown reduced spending on services by about 4 per cent. Particularly, as presented in table 4, the effect of the lockdown on the household expenditure for hotels and restaurants is about -5 per cent. Additionally, figure B.3 in appendix B shows that the decline in total service spending also comes from decreases in the total expenditures for transportation, recreation and cultural activities.

To reiterate, tourism and the related service industries play an important role in the economy of Thailand and households’ sources of income. During the lockdown, expenditures on restaurants and hotels, transportation, and recreation and cultural activities declined drastically. Even in the second quarter of 2020, during which the Government of Thailand lessened the lockdown restrictions, expenditures in these industries were still very low.

VI. SENSITIVITY ANALYSIS

A sensitivity analysis was conducted by adding the second-quarter-lagged GDP into regression specification (1). The results, shown in appendix C, are similar to those of the baseline estimates. Finally, the number of COVID-19 cases reported in the middle of each quarter was used, instead of those cases reported at the beginning of each quarter. Under this scenario, the estimates reported in appendix D resemble the baseline results.

VII. POLICY INSIGHTS

Similar to other countries, the Government of Thailand has been implementing stimulus packages to stimulate the economy, such as providing low-interest loans to small and medium-sized enterprises and cash handouts to workers not covered by social security, temporary workers, contract workers and self-employed persons. Moreover, it is investing in infrastructure and creating jobs.

The first individual stimulus packages were launched in March 2020. The individual financial support was perceived to have had a positive impact on consumer spending. Bui and others (2020) find that the fiscal stimulus was more likely to have immediately increased consumption of durable goods by 13 per cent and raised the probability of future consumption by 6 per cent.¹⁰ The findings from this study are consistent with Bui and others (2020), which shows that Thai household consumption in durable goods did not decrease during the lockdown. Bui and others (2020), however, find that fiscal stimulus could temporarily boost the economy, which is consistent with the report of the United Nations and Oxford Policy Management (2020).

Additionally, the Government initiated the half-half co-payment stimulus programme in October 2020, which was intended to stimulate consumer spending during the pandemic. In the first round of the programme, under the co-payment programme, the Government subsidized half of the purchases made by registered individuals at small shops. Purchases were allowed up to a maximum of THB150 per person per day, with the total subsidy capped at THB3,000 per person for the duration of the programme. According to a report by the Fiscal Policy Office (2020), of the THB502.9 million in total spending, 259.4 million was spent by registered consumers, while the Government shelled out THB243.5 million. The average daily spending was THB234 per transaction. While the results of this study show that expenditures in durable and

¹⁰ Bui and others (2020) carried out a survey in May 2020 to collect the individual consumption data of 713 respondents. Perhaps, due to the small number of observations, their estimated individual consumption was higher than the estimated from this study.

non-durable goods were not negatively affected by the lockdown, this Government programme could sustain high expenditures for these particular goods. Accordingly, spending on durable and non-durable goods could remain highly elevated after the lockdown.

In Thailand, moreover, tourism and the related service industries play an important role in the economy and households' sources of income. During the lockdown, expenditures on restaurants and hotels, transportation, and recreation and culture declined significantly. Even in the second quarter of 2020, during which the Government lessened the lockdown restrictions, expenditures in these industries were still very low.

To boost domestic tourism and related service activities, the Government allocated THB20 billion to implement stimulus tourism packages called "We Travel Together". It paid 40 per cent of the total travel cost, including airfare, for Thais who enrolled in the programme, with a fifteen-night limit for each person. On top of that, the Government provided a free THB600 to THB900 voucher for each enrolled person to spend at restaurants and retail shops per night.

Even though the Government relaxed the stay-at-home order and implemented stimulus packages, the number of local visitors in 2020 was still far lower than in 2019. The Thailand's Ministry of Tourism and Sports (2020) reports that the number of Thai visitors sharply decreased by more than 70 per cent from May to June 2020, compared to the same period in the previous year. The stimulus tourism packages could partially alleviate the impact of the pandemic by generating revenue of approximately THB360 billion to 620 billion (Krungthai Compass, 2020), but this amount is only 3.7 to 6.4 per cent of the estimated total revenue from foreign visitors in 2020 (Krungthai Compass, 2020). Moreover, local visitors were disproportionately concentrated in certain provinces, while other provinces continued to suffer from the contraction in tourism (Krungthai Compass, 2020). Relaxing the international flight arrivals and the creation of travel zones in some provinces of Thailand are expected to help alleviate the contraction. In Phuket province, for example, the Government has implemented the travel zones, called "sandbox programme," since July 2021. During the first two months of this programme, there were approximately 26,400 tourist arrivals and could generate THB163 billion (Chuenniran, 2021).

The findings of this study are consistent with the World Bank (2020a; 2020b), which indicates that the economy of Thailand could be severely affected by the lockdown and the overall pandemic situation due to the following reasons: the economy relies heavily on the service sector, particularly foreign tourism; the Government's tourism stimulus packages cannot compensate for the economic decline resulting from the prohibition on all international arrivals in air travel; concern about COVID-19 infection

is the main cause for the reduction in domestic tourism (Kasikorn Research Center, 2020); Thais tend to be cost-conscious about their spending (Sachamuneewongse, 2020); and a high proportion of Thais pay attention to products' prices and believe that they need to be proactive about financial planning (Sachamuneewongse, 2020). Taken together, all of these reasons could present obstacles to government efforts to stimulate the economy through consumer spending.

The findings of this study indicate that, during the COVID-19 lockdown, the spending of Thais increased for non-durable goods, durable goods and housing-related expenses. During this first lockdown period, these expenditure patterns are similar to those in developed countries, where consumers increased their spending on at-home activities but reduced their expenditures outside the home. The economy of Thailand is reliant on the service sector and is negatively affected by a prolonged border closure. COVID-19 testing, vaccination passports, and travel bubbles could be effective ways to curb the spread of the virus and keep the economy open safely.

VIII. CONCLUSIONS

Thailand was relatively successful in controlling the spread of the COVID-19 pandemic during the initial stages; however, the pandemic has not spared its economy. As a developing country with many households living in poverty, this pandemic is significantly affecting economic growth and individual welfare.

In this paper, the effect of the COVID-19 pandemic on household consumption spending in Thailand is examined. How the lockdown policies affect total consumption, non-durable goods, durable goods and housing-related expenses, and services is analysed. The findings indicate that during the first pandemic lockdown, total consumption dropped dramatically; the estimated effect of the pandemic on total consumption was approximately THB177 billion, which amounted to 7.11 per cent of the last quarter expenditure of 2019 total consumption. This decline in total consumption comes from a substantial dip in the spending on services, including restaurants, hotels, transportation, recreation and cultural activities. In contrast, the findings show that households increased their spending on durable goods, non-durable goods and housing-related expenses. These spending patterns are consistent with those found in developed countries, where households increased their spending on at-home activities but reduced out-of-home expenditures.

The economy of Thailand has been strongly dependent on the service industries, which have been significantly affected by the pandemic. Many households were put at risk by the lockdown and could fall into poverty. To resuscitate the economy, the Government has implemented policies targeting the service sector. Facing low

demand for domestic travel, it has decided to open the borders to foreign tourists, to boost tourism activities overall. Moreover, the Government has also offered stimulus packages for domestic visitors, such as subsidies for hotel rooms. It remains to be seen whether this implementation will reduce the impacts of the pandemic on employment and spur an economic recovery. It also remains to be seen whether Thailand can escape this global economic crisis, and whether the consumption of services will rebound.

While this study focuses on the impact of the initial lockdown on consumption expenditure in Thailand, there are other several interesting issues. Future research could be conducted to analyse the impact of the lockdowns on consumption spending over the medium-to-long term. Additionally, the degree of the lockdown could differentially affect consumption behaviour; therefore, it is important to compare the effects of partial and complete lockdowns. Also of note, in this paper, aggregated data are used to study consumption expenditure in Thailand. However, it would be interesting to study consumer behaviour in less-developed countries using individual-level data. Finally, it would also be interesting to examine the impacts of fiscal stimuli on the economy and labour markets over the short-to-long term.

REFERENCES

- Abraham, Mark, and Aaron Arnoldsen (2020). BCG consumer spend pulse #1: COVID-19 impact on US vs. Seattle, 15 March. Available at www.linkedin.com/pulse/covid-19-impact-us-vs-seattle-consumer-spend-mark-abraham/?trackingId=0UwE%2B2ZGEXoMP7hXmREQ6Q%3D%3D.
- Andersen, Asger, and others (2020). Consumer responses to the COVID-19 crisis: evidence from bank account transaction data. Center for Economic Behavior and Inequality. Working Paper, 18/20. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3609814.
- Baker, Scott, and others (2020). Income, liquidity, and the consumption response to the 2020 economic stimulus. Working Paper, No. 27097. National Bureau of Economic Research. Available at www.nber.org/papers/w27097.
- Bank of Thailand (2020). Employment of Thailand by industries, 21 May. Available at www.bot.or.th/App/BTWS_STAT/statistics/BOTWEBSTAT.aspx?reportID=638&language=th.
- Bui, Dzung, and others (2021). The effects of fiscal policy on households during the COVID-19 pandemic: evidence from emerging economies. MAGKS Joint Discussion Paper Series in Economics, No. 20-2021. Marburg, Germany: Phillips University-Marburg.
- Carpenter, Julia (2020). Home-improvement stocks stay the course amid nesting during COVID-19. *The Wall Street Journal*, 21 August. Available at www.wsj.com/articles/home-improvement-stocks-stay-the-course-amid-nesting-during-covid-19-11598011211.
- Chen, Haiqiang, Wenlan Qian, and Qiang Wen (2020). The impact of the COVID-19 pandemic on consumption: learning from high frequency transaction data. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3568574.
- Chuenniran, Achadhaya (2021). Phuket Sandbox generates B1,634m in two months. *Bangkok Post*, 5 September. Available at www.bangkokpost.com/business/2176731/phuket-sandbox-generates-b1-634m-in-two-months.
- Cole, Matthew, and others (2013). Natural disasters and plant survival: the impact of the Kobe earthquake. RIETI Discussion Paper Series, 13-E-063. Available at www.rieti.go.jp/jp/publications/dp/13e063.pdf.
- Cuaresma, Jesús, Jaroslava Hlouskova, and Michael Obersteiner (2008). Natural disasters as creative destruction? Evidence from developing countries. *Economic Inquiry*, vol. 46, No. 2, pp. 214-226.
- del Rio-Chanona, R. Maria, and others (2020). Supply and demand shocks in the COVID-19 pandemic: an industry and occupation perspective. *Oxford Review of Economic Policy*, vol. 36 (Supplement_1), pp. S94-S137.
- De Mel, Suresh, David McKenzie, and Christopher Woodruff (2011). Enterprise recovery following natural disasters. *The Economic Journal*, vol. 122, No. 559. pp. 1-28.
- Department of Disease Control (2021). Corona virus disease (COVID-19). Available at <https://ddc.moph.go.th/viralpneumonia/eng/index.php>.
- Djalante, Rivanti, and others (2020). COVID-19 and ASEAN responses: comparative policy analysis. *Progress in Disaster Science*, vol. 8, pp. 1-12.

- Federal Reserve Bank of St. Louis (2020). Consumption of goods and service during the COVID-19 recession. The FRED® blog, 10 August. Available at <https://fredblog.stlouisfed.org/2020/08/consumption-of-goods-and-services-during-the-covid-19-recession/>.
- Fiscal Policy Office (2020). News from the Ministry of Finance: the co-payment stimulus program No. 116/2563. Available at www.xn--42caj4e6bk1f5b1j.com/announcement (In Thai).
- Goolsbee, Austan, and Chad Syverson (2020). Fear, lockdown, and diversion: comparing drivers of pandemic economic decline 2020. Working Paper, No. 27432. National Bureau of Economic Research. Available at www.nber.org/papers/w27432.
- Hayakawa, Kazunobu, and Hiroshi Mukunoki (2021). Impacts of COVID-19 on global value chains. *The Developing Economies*, vol. 59, No. 2, pp. 154-177.
- Hoshikawa, Takeshi, and Taiyo Yoshimi (2021). The effect of the COVID-19 pandemic on South Korea's Stock Market and exchange rate. *The Developing Economies*, vol. 59, No. 2, pp. 206-222.
- Hosono, Kaoru, and others (2016). Natural disasters, damage to banks, and firm investment. *International Economic Review*, vol. 57, No. 4, pp. 1335-1370.
- Kang, Jaewon, and Annie Gasparro (2020). Some grocers bring back purchase limits as COVID-19 cases rise. *The Wall Street Journal*, 13 November. Available at www.wsj.com/articles/some-grocers-bring-back-purchase-limits-as-covid-19-cases-rise-11605263401.
- Kasikorn Research Center (2020). Domestic travel market in the final stretch of 2020; Thais have travel plans but also worry over COVID-19, the economy and politics. Current Issue, No. 3512. Available at <https://kasikornresearch.com/en/analysis/k-econ/business/Pages/z3152--Thai-Travel.aspx>.
- Keola, Souknilanh, and Kazunobu Hayakawa (2021). Do lockdown policies reduce economic and social activities? Evidence from NO2 emissions. *The Developing Economies*, vol. 59, No. 2, pp. 178-205.
- Krungthai Compass (2020). Travel behaviors in Thailand during COVID-19 Available at https://krungthai.com/Download/economyresources/EconomyResourcesDownload_31_08_63.pdf (In Thai).
- Leiter, Andrea, Harald Oberhofer, and Paul Raschky (2009). Creative disasters? Flooding effects on capital, labour and productivity within European firms. *Environmental and Resource Economics*, vol. 43, pp. 333-350.
- Loayza, Normal, and others (2012). Natural disasters and growth: going beyond the averages. *World Development*, vol. 40, No. 7, pp. 1317-1336.
- Martin, Amory, and others (2020). Socio-economic impacts of COVID-19 on household consumption and poverty. *Economics of Disasters and Climate Change*, vol. 4, pp. 453-479.
- Noy, I., and T. B. Vu (2010). The economics of natural disasters in a developing country: the case of Viet Nam. *Journal of Asian Economics*, vol. 21, No. 4, pp. 345-354.
- Office of the National Economic and Social Development Council (2020a). Gross domestic product chain volume measures. Available at www.nesdc.go.th/nesdb_en/main.php?filename=national_account.

- _____ (2020b). Poverty line. Available at http://social.nesdc.go.th/SocialStat/StatReport_Final.aspx?reportid=854&template=2R1C&yeartype=M&subcatid=59.
- Raddatz, Claudio (2007). Are external shocks responsible for the instability of output in low-income countries? *Journal of Development Economics*, vol. 84, No. 1, pp. 155-187.
- Roser, Max, and others (2020). Coronavirus pandemic (COVID-19). Available at <https://ourworldindata.org/coronavirus>.
- Sachamuneewongse, Siriporn (2020). Survey finds shifts in spending habits. *Bangkok Post*, 21 May. Available at www.bangkokpost.com/business/1921904/survey-finds-shifts-in-spending-habits.
- Sato, Hitoshi (2021). Industrialization of developing economies in the global economy with an infectious disease. *The Developing Economies*, vol. 59, No. 2, pp. 126-153.
- Shabnam, Nourin (2014). Natural disaster and economic growth: a review. *International Journal of Disaster Risk Science*, vol. 5, pp. 157-163.
- Skidmore, Mark, and Hideki Toya (2002). Do natural disasters promote long-run growth? *Economic Inquiry*, vol. 40, No. 4, pp. 664-687.
- Strobl, Eric (2012). The economic growth impact of natural disasters in developing countries: evidence from hurricane strikes in the Central American and Caribbean regions. *Journal of Development Economics*, vol. 97, No. 1, pp. 130-141.
- Tanaka, Ayumu (2015). The impacts of natural disasters on plants' growth: evidence from the Great Hanshin-Awaji (Kobe) earthquake. *Regional Science and Urban Economics*, vol. 50, pp. 31-41.
- Thailand, Ministry of Tourism and Sports (2020). Tourism statistics 2020. Available at www.mots.go.th/more_news_new.php?cid=592.
- Thailand, National Statistical Office (2020). Revenue and household expenditure. Available at <http://statbbi.nso.go.th/staticreport/page/sector/en/08.aspx>.
- United Nations, and Oxford Policy Management (2020). Social impact assessment of COVID-19 in Thailand. Available at www.unicef.org/thailand/media/5071/file/Social%20Impact%20Assessment%20of%20COVID-19%20in%20Thailand.pdf.
- World Bank (2020a). *Thailand Economic Monitor June 2020: Thailand in the Time of COVID-19*. Washington, D.C.
- _____ (2020b). The World Bank in Thailand: overview. Available from www.worldbank.org/en/country/thailand/overview.

APPENDICES

Appendix A

Table A.1. Thailand consumption expenditure during the COVID-19 pandemic

	Total consumption (1)	Non-durable goods (2)	Durable goods and housing (3)	Services (4)	Miscellaneous (5)
<i>Restriction_t</i>	-117.54***	2.39***	1.42***	-4.03***	0.07
Controls	(7.10)	(0.34)	(0.07)	(0.29)	(0.20)
<i>GDP_{t-1}</i>	0.4** (0.170)	-0.004 (0.00311)	-0.004*** (0.00110)	0.009** (0.003)	-0.003 (0.003)
<i>COVID19_t</i>	-0.0754*** (0.00844)	0.001*** (0.000157)	0.0007*** (5.56e-05)	-0.002*** (0.0002)	-1.07e-05 (0.0001)
Linear trend	6.68* (3.34)	-0.10 (0.07)	0.06** (0.02)	-0.01 (0.08)	0.14** (0.05)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Table A.2. Expenditures on household consumption: components
(percentage of total household spending)

	Food and non-alcoholic products (1)	Alcohol and tobacco (2)	Clothing (3)	Utilities (4)	Furniture (5)	Health (6)
<i>Restriction_t</i>	1.829*** (0.208)	0.429*** (0.0536)	0.135 (0.0941)	0.901*** (0.0360)	0.522*** (0.0577)	0.680*** (0.0386)
<i>GDP_{t-1}</i>	-0.00223 (0.00218)	0.00110*** (0.000349)	-0.000501 (0.00108)	-0.003*** (0.000643)	-0.000554 (0.000610)	-0.001*** (0.000304)
<i>COVID19_t</i>	0.00110*** (0.000112)	-2.33e-05 (1.68e-05)	-9.23e-05* (5.33e-05)	0.00067*** (3.23e-05)	2.80e-05 (3.07e-05)	0.0005*** (1.55e-05)
Linear trend	-0.0476 (0.0499)	-0.0208*** (0.00626)	-0.0343 (0.0209)	0.0697*** (0.0133)	-0.00566 (0.0129)	0.0304*** (0.00686)
Observations	37	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled.
*p<0.10, **p<0.05, and ***p<0.01.

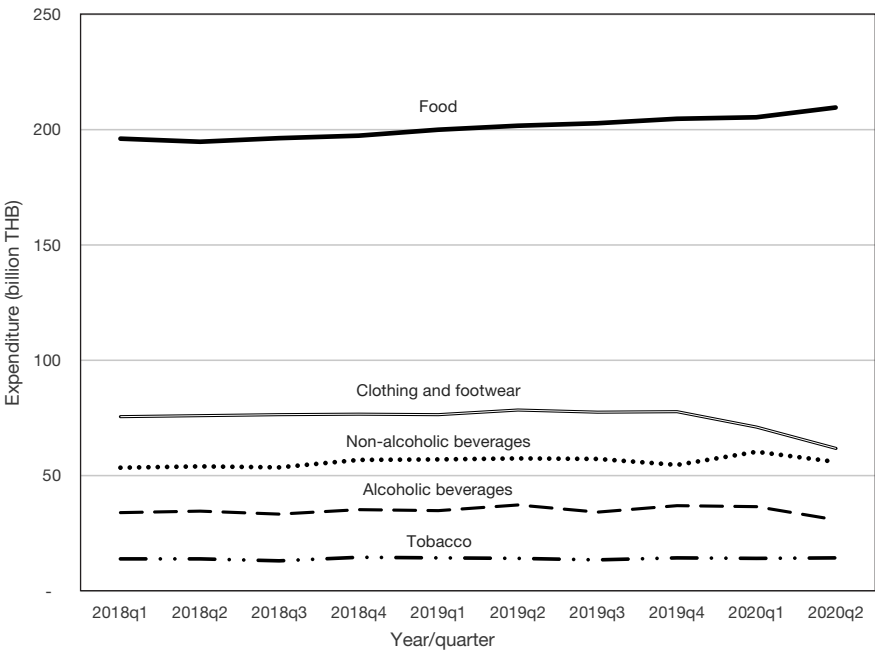
**Table A.3. Expenditures on household consumption: components
(percentage of total household spending)**

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
<i>Restriction_t</i>	0.0373 (0.261)	0.144*** (0.0400)	-0.0568 (0.122)	-4.946*** (0.180)	0.110*** (0.0189)
<i>GDP_{t-1}</i>	0.0140*** (0.00483)	-0.00218** (0.000920)	0.000787 (0.00112)	-0.00196 (0.00204)	-0.000282 (0.000240)
<i>COVID19_t</i>	-0.000615** (0.000245)	0.000196*** (4.53e-05)	-0.00113*** (5.54e-05)	-0.00141*** (9.88e-05)	6.52e-05*** (1.24e-05)
Linear trend	-0.311*** (0.105)	0.0591*** (0.0174)	0.0263 (0.0221)	0.185*** (0.0364)	0.00122 (0.00559)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

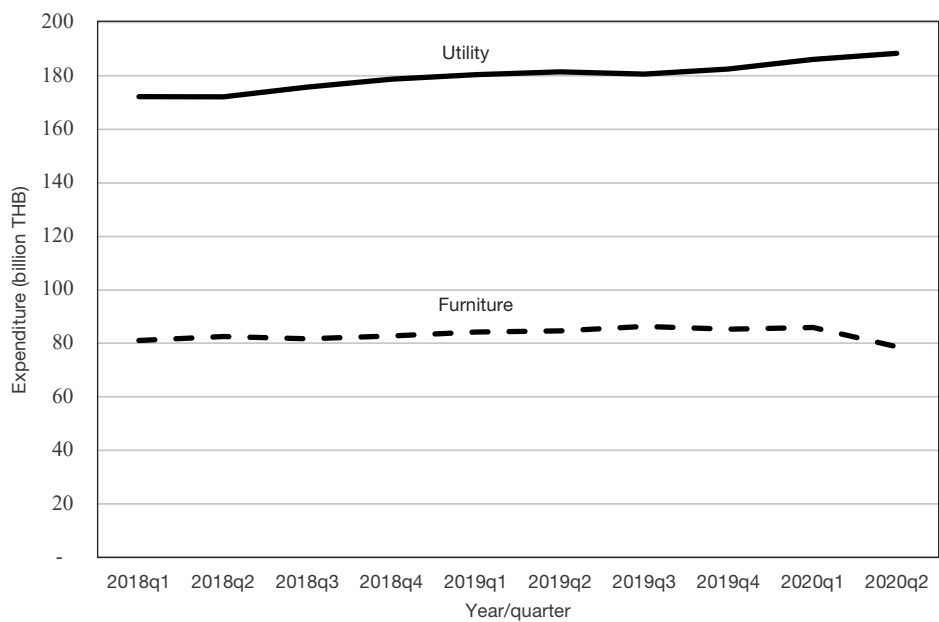
Appendix B

Figure B.1. Expenditure on non-durable goods (billion Thai baht)



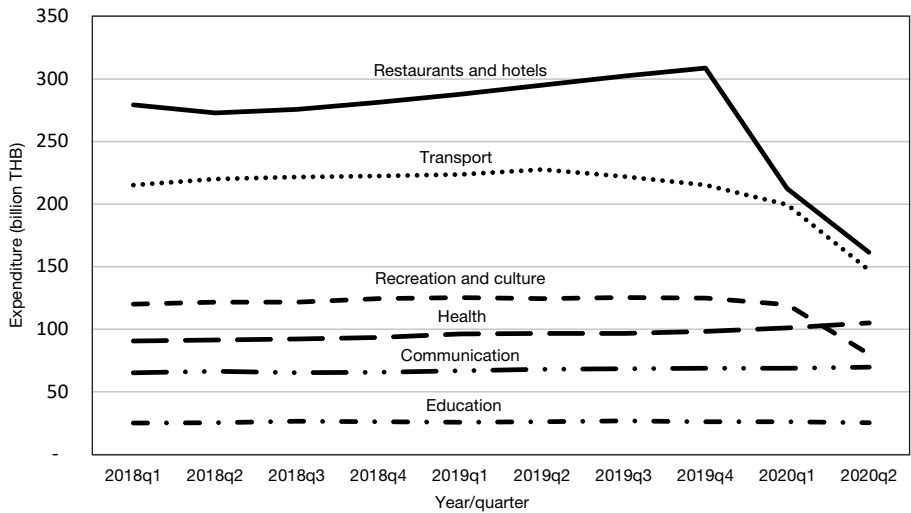
Source: The Office of the National Economic and Social Development Council (2020a).

**Figure B.2. Expenditure on durable goods and housing-related expenses
(billion Thai baht)**



Source: The Office of the National Economic and Social Development Council (2020a).

Figure B.3. Expenditure on services (billion Thai baht)



Source: The Office of the National Economic and Social Development Council (2020a).

Appendix C

Table C.1. Thailand consumption expenditure during the COVID-19 pandemic

	Total consumption (1)	Non-durable goods (2)	Durable goods and housing (3)	Services (4)	Miscellaneous (5)
<i>Restriction_t</i>	-119.2*** (8.042)	2.306*** (0.325)	1.468*** (0.0923)	-4.007*** (0.304)	0.124 (0.210)
<i>GDP_{t-1}</i>	0.301* (0.161)	-0.00475*** (0.00168)	-0.00289*** (0.000846)	0.00863*** (0.00238)	-0.00239 (0.00260)
<i>GDP_{t-2}</i>	0.119 (0.0792)	-0.000291 (0.00232)	-0.00249*** (0.000709)	0.00312* (0.00174)	-0.00155 (0.00266)
<i>COVID19_t^{middle}</i>	-0.0759*** (0.00759)	0.000934*** (0.000113)	0.000711*** (4.36e-05)	-0.0024*** (0.000126)	1.39e-05 (0.000127)
Linear trend	5.273* (2.910)	-0.0732 (0.0759)	0.0910*** (0.0223)	-0.0656 (0.0651)	0.154** (0.0607)
Observations	36	36	36	36	36

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

**Table C.2. Expenditures on household consumption: components
(percentage of total household spending)**

	Food and non-alcoholic products (1)	Alcohol and tobacco (2)	Clothing (3)	Utility (4)	Furniture (5)	Health (6)
<i>Restriction_t</i>	1.695*** (0.193)	0.430*** (0.0586)	0.115 (0.0902)	0.880*** (0.0409)	0.539*** (0.0722)	0.619*** (0.0308)
<i>GDP_{t-1}</i>	-0.00283** (0.00123)	-0.00108*** (0.000341)	-0.000840 (0.000707)	-0.0029*** (0.000645)	4.21e-05 (0.000447)	-0.0019*** (0.000464)
<i>GDP_{t-2}</i>	-0.000337 (0.00140)	-9.76e-05 (0.000322)	0.000144 (0.000809)	-0.000832* (0.000474)	-0.00166** (0.000718)	0.00140*** (0.000324)
<i>COVID19_t</i>	0.000649*** (4.94e-05)	-1.46e-05 (1.07e-05)	-6.6e-05** (2.53e-05)	0.0004*** (1.81e-05)	1.99e-05 (1.67e-05)	0.0003*** (1.33e-05)
Linear trend	-0.0252 (0.0526)	-0.0191** (0.00898)	-0.0290 (0.0249)	0.0756*** (0.0123)	0.0154 (0.0183)	0.0158* (0.00887)
Observations	36	36	36	36	36	36

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

**Table C.3. Expenditures on household consumption: components
(percentage of total household spending)**

	Transportation	Communication	Recreation	Restaurants and hotels	Education
	(1)	(2)	(3)	(4)	(5)
<i>Restriction_t</i>	0.124 (0.236)	0.151*** (0.0450)	0.0268 (0.117)	-4.857*** (0.185)	0.0951*** (0.0152)
<i>GDP_{t-1}</i>	0.0138*** (0.00402)	-0.00182** (0.000845)	0.000906 (0.000867)	-0.00191 (0.00154)	-0.000465** (0.000209)
<i>GDP_{t-2}</i>	0.00300 (0.00184)	-0.000554 (0.000481)	-0.000244 (0.000918)	-0.000748 (0.00173)	0.000266** (0.000127)
<i>COVID19_t</i>	-0.000350*** (0.000119)	0.000126*** (2.63e-05)	-0.00068*** (3.29e-05)	-0.00087*** (5.40e-05)	3.64e-05*** (6.78e-06)
Linear trend	-0.372*** (0.0820)	0.0620*** (0.0198)	0.0286 (0.0328)	0.200*** (0.0510)	3.03e-05 (0.00578)
Observations	36	36	36	36	36

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

Appendix D

Table D.1. Thailand consumption expenditure during the COVID-19 pandemic

	Total consumption (1)	Non-durable goods (2)	Durable goods and housing (3)	Services (4)	Miscellaneous (5)
$Restriction_t$	-112.3*** (6.793)	2.324*** (0.332)	1.375*** (0.0699)	-3.866*** (0.284)	0.0729 (0.203)
GDP_{t-1}	0.348** (0.170)	-0.00383 (0.00311)	-0.00397*** (0.00110)	0.00906** (0.00343)	-0.00333 (0.00316)
$COVID19_t^{middle}$	-0.0459*** (0.00513)	0.000601*** (9.54e-05)	0.000423*** (3.38e-05)	-0.0015*** (0.000107)	-6.50e-06 (9.21e-05)
Linear trend	6.682* (3.337)	-0.103 (0.0679)	0.0640** (0.0235)	-0.00867 (0.0777)	0.144** (0.0529)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

**Table D.2. Expenditures on household consumption: components
(percentage of total household spending)**

	Food and non-alcoholic Products (1)	Alcohol and tobacco (2)	Clothing (3)	Utilities (4)	Furniture (5)	Health (6)
<i>Restriction_t</i>	1.752*** (0.204)	0.431*** (0.0537)	0.141 (0.0936)	0.855*** (0.0347)	0.520*** (0.0569)	0.645*** (0.0380)
<i>GDP_{t-1}</i>	-0.00223 (0.00218)	-0.00110*** (0.000349)	-0.000501 (0.00108)	-0.0034*** (0.0006)	-0.000554 (0.000610)	-0.0013*** (0.00030)
<i>COVID19_t</i>	0.000671*** (6.80e-05)	-1.42e-05 (1.02e-05)	-5.62e-05* (3.24e-05)	0.0004*** (1.96e-05)	1.71e-05 (1.87e-05)	0.0003*** (9.43e-06)
Linear trend	-0.0476 (0.0499)	-0.0208*** (0.00626)	-0.0343 (0.0209)	0.0697*** (0.0133)	-0.00566 (0.0129)	0.0304*** (0.00686)
Observations	37	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. *p<0.10, **p<0.05, and ***p<0.01.

**Table D.3. Expenditures on household consumption: components
(percentage of total household spending)**

	Transportation (1)	Communication (2)	Recreation (3)	Restaurants and hotels (4)	Education (5)
$Restriction_t$	0.0800 (0.247)	0.130*** (0.0387)	0.0213 (0.120)	-4.848*** (0.179)	0.105*** (0.0183)
GDP_{t-1}	0.0140*** (0.00483)	-0.00218** (0.000920)	0.000787 (0.00112)	-0.00196 (0.00204)	-0.000282 (0.000240)
$COVID19_t$	-0.000374** (0.000149)	0.000119*** (2.75e-05)	-0.0007*** (3.37e-05)	-0.0009*** (6.01e-05)	3.97e-05*** (7.55e-06)
Linear trend	-0.311*** (0.105)	0.0591*** (0.0174)	0.0263 (0.0221)	0.185*** (0.0364)	0.00122 (0.00559)
Observations	37	37	37	37	37

Notes: Newey-West standard errors are in parentheses. Four lags are set as the maximum lag order of autocorrelation; however, the results are not sensitive to the choice of this maximum lag order. In these regressions, one-quarter-lagged GDP, the cumulative COVID-19 cases, and the linear time trend are controlled. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

ESTIMATING THE EFFECTS OF INTERNET EXCHANGE POINTS ON FIXED-BROADBAND SPEED AND LATENCY

*Siope Vakataki 'Ofa**

The present paper provides estimates of the relationship between the number of Internet exchange points (IXPs) and fixed-broadband speed and latency in 74 countries from 2016 to 2019, using a balanced panel data set developed by the Economist Intelligence Unit for its “Inclusive Internet Index”. While in several studies, a positive role of IXPs on Internet speed and latency is established, a majority of the earlier ones are technical studies examining the traffic routes in specific networks. This paper contributes to this literature by triangulating earlier findings using an econometric model. The recent availability of the panel data set on IXPs, speed and latency by the Economist Intelligence Unit has made this exercise possible.

The preliminary findings highlighted a statistically significant and positive relationship between the number of IXPs and fixed-broadband speed. For every 1 per cent increase in the number of IXPs per 10 million inhabitants, the fixed-broadband download speed (Kbps) is expected to increase by approximately 0.8 per cent. Despite the benefits of IXPs, challenges remain in establishing them, and collaboration and trust among several stakeholders (national and international) is required. These challenges pose important policy implications for policymakers in ensuring the sustainability of IXPs.

JEL classification: L96

Keywords: Internet exchange point, Internet speed and latency, panel data set, Asia and the Pacific

* Siope Vakataki 'Ofa, ICT and Development Section, ICT and Disaster Risk Reduction Division, United Nations Economic and Social Commission for Asia and the Pacific, Bangkok. An earlier version of the paper benefited from useful comments from the participants of the Pacific Working Group on “Strengthening efficient Internet traffic management through a subregional Internet exchange point (IXP) in Pacific Island countries”, held in Suva, from 3 to 5 December 2019. In addition, external ICT experts and two anonymous reviewers provided useful inputs. The views expressed in this paper are those of the author and should not necessarily be considered as reflecting the views or carrying the endorsement of the United Nations. All errors and omissions are the author's sole responsibility.

I. INTRODUCTION

Access to the Internet contributes to socioeconomic development (Grace and others, 2004; Qiang, Pitt and Ayers, 2004; ITU, 2012; Minges, 2015; Lubis and Febrianty, 2018, among others). However, access to affordable and reliable broadband connectivity is not universal and particularly challenging in countries with special needs (least developed countries, landlocked developing countries and small island developing States).

According to the information and communications technology (ICT) statistics from the Inclusive Internet Index 2020¹ of the Economist Intelligence Unit on fixed-broadband access, speed (Kbps), latency² (ms), and the affordability,³ the average access to fixed and mobile broadband subscriptions are the highest in high-income countries (33 per cent and 121 per cent, respectively), compared to low-income countries (2 per cent and 88 per cent, respectively). ESCAP (2016; 2017) highlighted the widening digital divide, not only by income but also by geographic region. The average monthly fixed-broadband upload (36,127 Kbps) and download (64,112 Kbps) speeds are the highest in high-income countries, compared to lower Internet speeds in low-income countries (13,005 Kbps and 14,521 Kbps, respectively).

Latency on fixed-broadband (31 ms) and mobile-broadband (51 ms) are, on average, lower in high-income countries compared to low-income countries (45 ms and 82 ms, respectively). On average, fixed-broadband (1 per cent)⁴ and mobile-broadband services (0.7 per cent) are affordable in high-income countries, compared to low-income countries (13 per cent and 2 per cent, respectively). ESCAP and National Information Society Agency (2016, p. 33) measured the Internet speed and traffic in CLMV (Cambodia, the Lao People's Democratic Republic, Myanmar, and Viet Nam) countries and highlighted that most of the international traffic of these countries have been exchanged outside the region (in North America or Europe).

¹ Economist Intelligence Unit, Internet Inclusive Index webpage (<https://theinclusiveinternet.eiu.com/>).

² Delay it takes to send information from one point to another in milliseconds (ms).

³ Monthly expenditure on broadband services as a percentage of gross national income per capita.

⁴ According to the United Nations Broadband Commission, a target of broadband services should be made affordable in developing countries at less than 2 per cent of monthly gross national income per capita by 2025. For further details, refer to www.broadbandcommission.org/broadband-targets/.

A national Internet exchange point (IXP) facilitates access of users to online services and improves the affordability and quality of Internet services. It is a physical location where different Internet provider networks connect to exchange traffic with each other using a copper or fibre-optic cable through one or more Ethernet switches or servers (Internet Society, 2014, p. 6). The key role of a national IXP is to improve the national Internet traffic network performance (Internet speed in Kbps and latency – delay it takes to send digital information⁵ from one point to another in milliseconds (ms), by keeping local Internet traffic local and to reduce the costs (transit price (US\$/Mbps)) associated with traffic exchange between networks.

A national IXP significantly improves the efficiency of Internet traffic, resulting in cost savings. This is made possible by eliminating the routing of Internet traffic through expensive long-distance traffic routes outside the country before returning back to the country. Consolidating national traffic from different networks significantly improves national Internet traffic network management and eliminates the need for multiple physical links between local network operators and international operators. In addition, download speed for websites improves significantly, thereby encouraging the development of new local content and services and providing opportunities for productive use of Internet for other purposes (for example, e-commerce or e-government services).⁶

Past research literature (mostly from the technology side) has pointed to the positive effects of IXPs on improving Internet speed and latency. After testing the latency of Internet traffic going through IXPs, Ahmad and Guha (2012, p. 10) found that the traffic encountered lesser delays than normal links, even though the presence of IXPs did not decrease the length of an Internet network path. Galperin (2013, p. 21) analysed IXPs in Latin America and the Caribbean and concluded that they reduced access costs, increased Internet quality, encouraged infrastructure investments in isolated communities and promoted knowledge transfer. Indeed, policymakers in Latin America and the Caribbean, as well as in Africa, recognize the important role of IXPs as a national asset with clear benefits to a country's Internet network architecture (ITU, 2013a, p. 18; 2013b, p. 37).

⁵ For example, if one person sends an email (digital information) from Bangkok to another person in Chiang Mai (within Thailand), the delay (measured in milliseconds) that takes for the digital information (email) to be received by the person in Chiang Mai is affected by the presence of a national Internet exchange point.

⁶ For a discussion on the benefits of IXPs, refer to Internet Society (2014).

Internet Society (2015, p. 2) noted the benefits of IXPs:

- (a) Lowers Internet-access costs for end users by decreasing Internet service provider (ISP) operating costs and making Internet access more affordable for a greater number of local Internet users in a country or region;
- (b) Ensures that Internet traffic between local senders and local recipients use cheap local connections, rather than expensive international links. In some countries, up to 20 per cent of local Internet traffic can make up a significant portion of the overall Internet traffic of an ISP;
- (c) Creates efficient interconnection points that encourage network operators to connect in the same location in search of beneficial peering arrangements, cheaper and better traffic exchange, and other information and communication services;
- (d) Attracts out-of-country service operators. A single connection to an IXP provides out-of-country service operators with lower collective access costs to multiple potential local customers;
- (e) Contributes to the development of the local Internet ecosystem and local service hosting/local content development. An IXP creates a local environment that attracts a variety of other services, including domain name servers and content and web caches;
- (f) Improves local users' quality of access by providing more-direct network connections for local content producers and consumers;
- (g) Enhances the level of stability and continuity of access, namely the IXP switching, capability by providing additional flexibility in redirecting Internet traffic when there are connectivity problems on the network. For example, if there is a breakdown in international connectivity, an IXP can keep local traffic flowing within the country;
- (h) Internet exchange points are not expensive to establish. The cost of the equipment required to establish an IXP is usually minimal, making the establishment of an IXP an affordable local project. Under a sustainable funding and management model, ISPs and other network operators, which benefit from using IXPs, can often cover the initial start-up and monthly operating costs.

ESCAP and National Information Society Agency (2016, p. 54) highlighted that IXPs should be designed to identify the best way to connect traffic routes to each destination. In particular, IXPs should be neutral and open to any operator. In addition,

they stressed that all stakeholders should be involved in the establishment of IXPs to agree on a common principle on the traffic management. The principle may include the following: the requirement for exchanging of routing information with all Internet service providers connected to the IXPs; and the need to establish a neutral organization capable of operating and managing IXPs.

While recognizing the technical benefits of IXPs, establishing one, especially when it involves operators from several countries to connect, is not clear cut. Many IXPs are set up for public service (non-commercial reasons), requiring the collaboration of all ISPs in a country. However, its subsequent success relies on the willingness of ISPs to cooperate and connect their respective traffic through a common IXP. In many cases, these ISPs are often competitors with each other. Accordingly, a great deal of time and resources are required to consolidate and build trust among several actors who may be competitors in a market. This challenge is further complicated when ISPs from several countries need to agree on interconnection through a common IXP.

Other challenges on establishing an IXP are the difficulty in establishing (a) a neutral physical location and operation of an IXP which is agreed upon by all IXP parties and is not in a government office or private sector facility and (b) a neutral operation/governance by a non-governmental organization not linked to government or a private sector (Internet service provider).

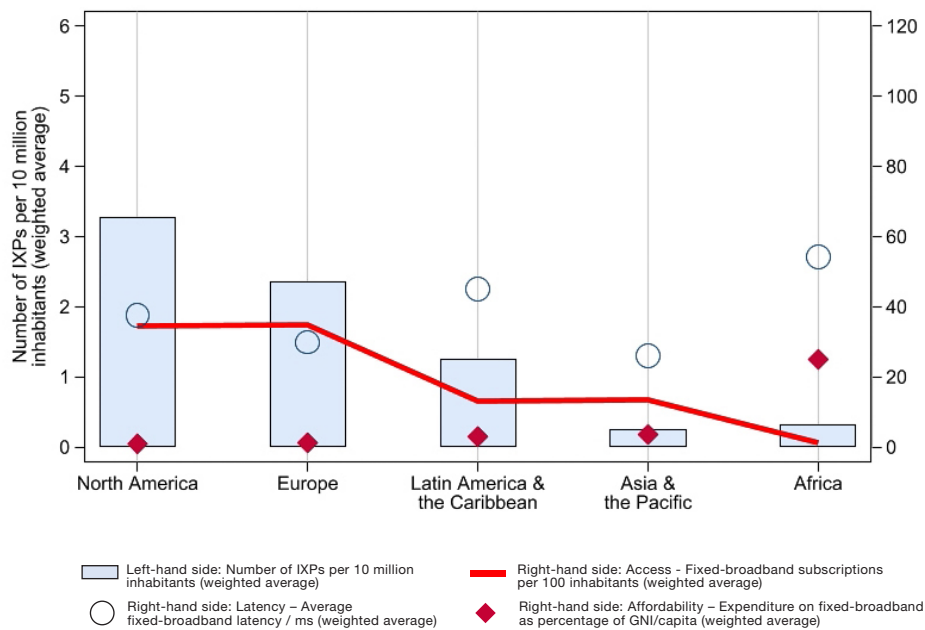
II. INTERNET EXCHANGE POINT (IXP) TRENDS

National IXPs have been deployed in many countries around the world. North America (driven by the United States of America) and Europe are the two major regions with the highest number of IXPs per 10 million inhabitants.⁷ This is followed by Latin America and the Caribbean, Asia and the Pacific, and Africa (see figure 1). The development of IXPs is also prevalent in high-income countries, as compared to low-income countries (see figure 2). As a result, the development of IXPs (per 10 million inhabitants)⁸ are severely lacking in the low-income countries of Africa, and Asia and the Pacific.

⁷ Further discussion on this variable reported by the Inclusive Internet Index database (<https://theinclusiveinternet.eiu.com/>) of the Economist Intelligence Unit, for better reflection of the level of IXPs within countries/regions, is in the next section.

⁸ The conversion of the raw number of IXPs into a rate (per 10 million inhabitants) for each country allows for comparison across countries. In general, the greater the population (or population rate in 10 million inhabitants) of a country, the more market (or potential) to be served, the more ISPs are present to benefit from such a large market, and the more need for IXPs to be established to ensure Internet efficiency.

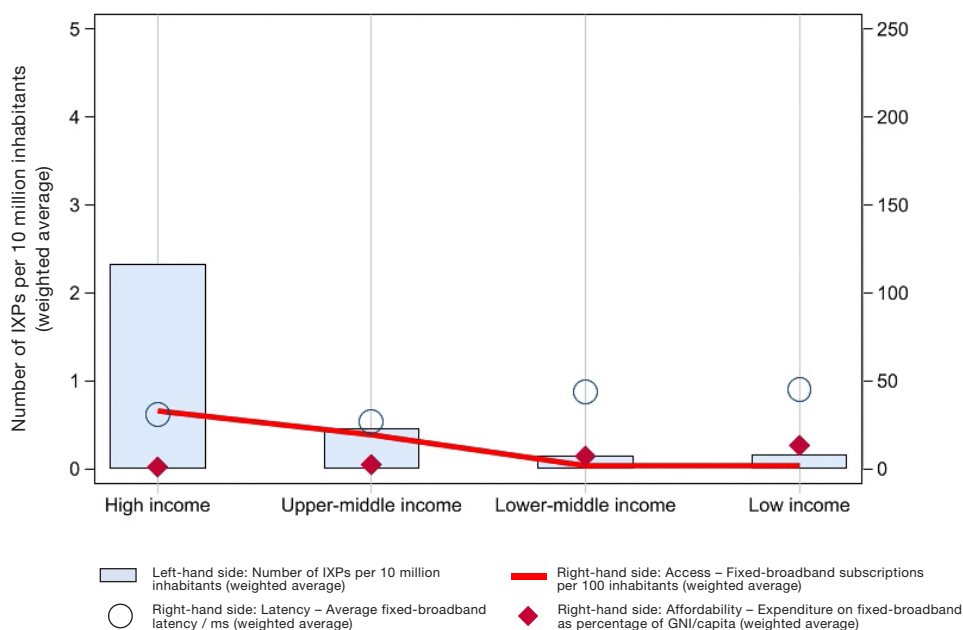
Figure 1. Internet exchange points by major regions



Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

For a better understanding on the role of IXPs and the efficiency of fixed-broadband speed and latency in countries across the world, IXP developments can be assessed against broadband efficiency indicators, namely access to fixed-broadband and its latency and affordability. When the trend on access to fixed-broadband subscriptions per 100 inhabitants is compared against the IXP trend for major regions, a similar pattern follows. This is, access to fixed-broadband subscription is higher in North America and Europe, as compared to Asia and the Pacific, and Africa. This pattern is also found across different countries' income-levels (figure 2). High-income countries with the highest number of IXPs (per 10 million inhabitants) have experienced the highest access to fixed-broadband subscription. On the other hand, low-income countries with the lowest access to fixed-broadband subscription experienced the lowest number of IXPs.

Figure 2. Internet exchange points by income group



Source: Economist Intelligence Unit, Inclusive Internet Index database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

Affordability (monthly expenditure on fixed broadband as a percentage of gross national income per capita)⁹ of fixed-broadband subscription is the lowest (very affordable) in high-income countries, as compared to low-income countries (figure 2). A majority of these low-income countries are in Africa, and Asia and the Pacific, while affordable fixed-broadband subscriptions are available in North America and Europe.

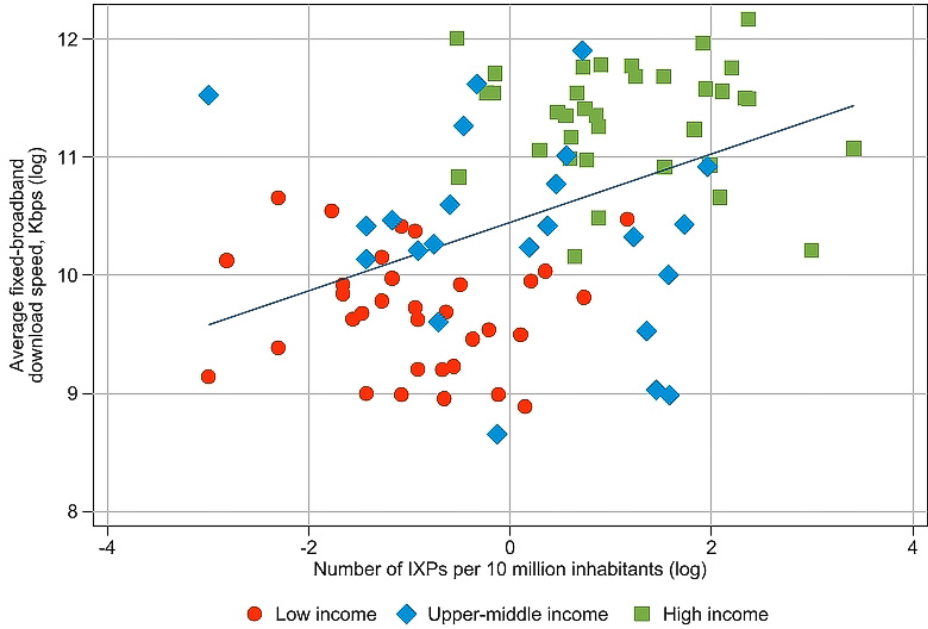
At the country level, the number of IXPs per 10 million inhabitants varies significantly among countries (see annex figure A.1). The top 10 countries with the highest number of IXPs per 10 million inhabitants are Estonia, Bahrain, Lithuania, Singapore, Latvia, Sweden, New Zealand, Australia, Trinidad and Tobago, and Bulgaria. The majority (four countries) of them are in Europe, followed by the Asia-Pacific region (three countries). The 10 countries with the lowest IXPs per 10 million inhabitants are Algeria,

⁹ The United Nations Broadband Commission considers a target of less than 2 per cent as affordable.

Azerbaijan, El Salvador, Ethiopia, Guatemala, Nicaragua, Oman, Venezuela, Qatar and China. The majority of these countries (four) are in South America, followed by Africa (two) and Asia (two). The IXP variable is, therefore, a useful indicator for producing a holistic picture of the development of IXPs in each country.

In terms of fixed-broadband speed (upload and download, Kbps), speed is faster in high-income countries, as compared to low-income countries (see figures 2 and 3). High-income countries have invested more on modern ICT infrastructure connectivity, resulting in faster fixed-broadband speed.

Figure 3. Fixed-broadband speed (Kbps)



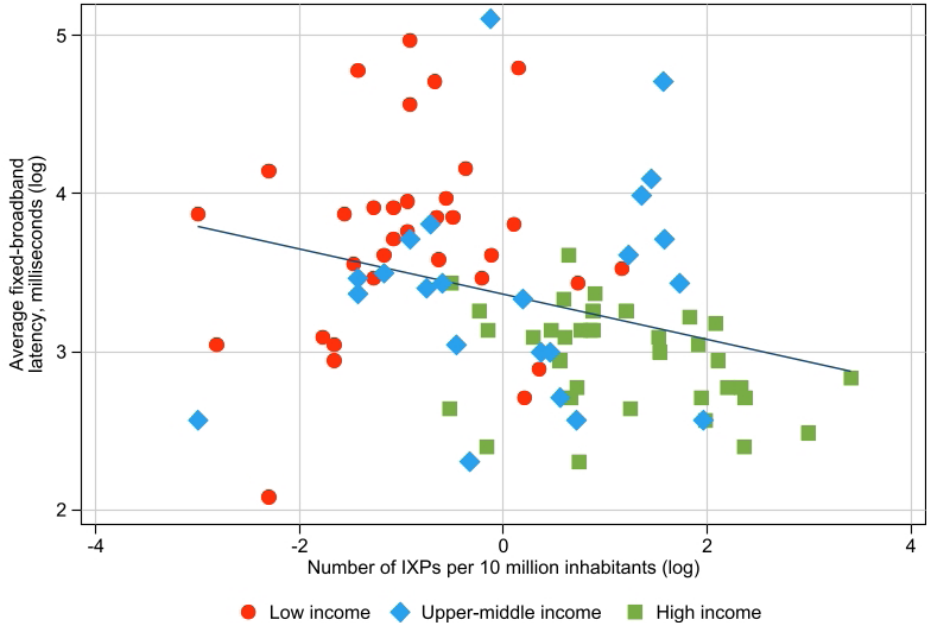
Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

On the other hand, low-income countries have less advanced ICT infrastructure connectivity and as a result, fixed-broadband speed is low. This trend is consistent on both connectivity technologies (mobile-broadband and fixed-broadband) commonly used for communications.

The latency (ms) trend shows a reverse relationship with the IXP trend. This is, high-income countries have the lowest Internet latency, as compared to the low-income countries, which tend to have the highest Internet latency (figures 2 and 4). Similarly, at the region level, Africa has a lower number of IXPs and a higher Internet latency compared to North America and Europe.

There are similar trends related to fixed-broadband latency (ms); shorter delays were experienced in networks of high-income countries compared to low-income countries in 2020 (figure 4). Fixed-broadband latency (ms) is a complex challenge with multidimensional causes. Zaki and others (2014, p. 244) highlighted that slow Internet in developing countries was due to geographic locations (further distances create higher latency); infrastructure challenges (low bandwidth links and high network contents); and routing problems (inefficient protocols and architectural issues, such as content distribution networks server placement).

Figure 4. Fixed-broadband latency (ms)



According to the Inclusive Internet Index 2020 statistics, the average latency (ms) on fixed-broadband subscriptions is the highest in Africa (56 ms), followed by Latin America and the Caribbean (38 ms), North America (25 ms), Europe (22 ms) and Asia and the Pacific (21 ms). As for broadband subscriptions, latency is the shortest in Europe (39 ms), North America (49 ms), Asia and the Pacific (48 ms), Latin America and the Caribbean (51 ms), and Africa (52 ms). Africa is the major group with highest delays on broadband subscriptions. In addition, latency (ms) is lowest in fixed-broadband technology compared to mobile-broadband technology.

In summary, the development of IXPs is prominent in higher-income countries and vice versa. In addition, countries with a higher number of IXPs per 10 million inhabitants also tend to have greater access to broadband subscriptions, less broadband latency, and more affordable broadband. These trends raise important policy questions about the role of IXPs on fixed-broadband efficiency (in terms of latency and speed), particularly, in countries where IXPs are predominantly missing, namely low-income countries with less access to broadband Internet, higher latency, and unaffordable broadband access).

III. ANALYTICAL FRAMEWORK

The literatures from technology and communications discussed in an earlier section point to a positive relationship between the presence of an IXP and efficiency of Internet traffic in countries. Most of these studies are technical and focus on assessing the relationship between the two variables using national surveys or online tools to measure traffic routes. Limited attention, however, has been given to statistically evaluating this relationship. In this present paper, attempts were made to fill that gap by empirically testing the relationship between the number of national IXPs and fixed-broadband speed and latency.

Accordingly, in the present paper, the efficiency (speed and latency) of fixed-broadband traffic flow exchanged between different ISPs within a country improve, namely speed increases result in a decrease in latency as the number of IXPs increases is hypothesized. The hypothesized relationships between the main independent and dependent variables are summarized in table 1.

Table 1. Main independent and dependent variables

Independent variable	Dependent variables
Presence of Internet exchange points	Efficient fixed-broadband traffic flow
Quantitative measures:	Quantitative measures:
<ul style="list-style-type: none"> Number of IXPs per 10 million inhabitants (+) 	<ul style="list-style-type: none"> Fixed-broadband download speed (Kbps) (+) Latency (fixed-broadband latency) (average, ms) (-)

Source: Author's consolidation.

Notes: (+) positive correlation (increasing); (-) negative correlation (decreasing).

The relationships between the efficiency (speed and latency) of fixed-broadband and the number of IXPs assume the following model specification:

$$\begin{aligned}
 \text{FixBroEff}_{i,t} = & \alpha_i + \beta_1 \text{Ixp}_{i,t} + \beta_2 \text{FixBro}_{i,t} + \beta_3 \text{CabSta}_{i,t} + \beta_4 \text{NetCov}_{i,t} + \quad (1) \\
 & \beta_5 \text{NeuPol}_{i,t} + \beta_6 \text{Gdp}_{i,t} + \beta_7 \text{Pop}_{i,t} + \varepsilon_{i,t} \\
 & i = 1, 2, \dots, N; t = 1, 2, \dots, T,
 \end{aligned}$$

where $\text{FixBroEff}_{i,t}$ is the natural logarithm of the efficiency of fixed-broadband speed (Dep. Var 1) and latency (Dep. Var 2) in country i at time t . The coefficient α_i is the unknown intercept for country i , while $\varepsilon_{i,t}$ is the error term representing the effect of the variables that were omitted by the model in country i at year t . The number of countries included are $N = 74$ countries with number of time-series $T = 4$ years. $\text{Ixp}_{i,t}$ is the independent variable (natural logarithm of number of IXPs per 10 million inhabitants) in country i in year t . It is, therefore, expected that an increase in the number of IXPs is also associated with an improvement in efficient fixed-broadband traffic flow (positive correlation with speed, and negative correlation with latency).

As discussed in the previous section, the presence of the independent variable (number of IXPs per 10 million inhabitants) is common in higher-income countries. In addition, countries with higher IXPs also tend to have higher fixed-broadband access, lower latency and more affordable broadband access.

Other control variables are the log-transformed¹⁰ of the following: access to fixed-broadband subscriptions per 100 inhabitants (*FixBro*); cross-border connectivity – number of cable landing stations per 10 million inhabitants (*CabSta*); last-mile ICT infrastructure connectivity – percentage of population covered by 3G network; (*NetCov*); economic development – GDP (US\$ billions) (*Gdp*); and market size – population (millions) (*Pop*). In addition, a technology-neutrality policy for spectrum use – qualitative rating (0-1, 1 = best) (*NeuPol*), was used to control for the sector's policy environment.

Relationships between dependent, independent and control variables were tested using the fixed effects method. Baltagi (2005, p. 1) best captured the benefits of fixed effects by highlighting that the fixed-effects method is effective when the question of interest controls for individual heterogeneity (variable that changes over time but not across entities). Baltagi (2005, p. 4) further stated that panel data give more information, more variability, less collinearity among variables, more degrees of freedom, and more efficiency in estimation. In addition, panel data are more effective in identifying and measuring the effects that are not detectable in non-panel structured data sets. However, Baltagi (2005, p. 13) also highlighted the limitations of the fixed-effects method linked to the collection of data for the panel data set (problems with designing and data collection, missing observation and high costs of data collection).

With respect to the appropriateness of the use of fixed-effect method, the Sargan-Hansen statistics¹¹ had rejected the null hypothesis that the errors are correlated with the exogenous variables in the model, and therefore, the fixed-effect method is the preferred method. The modified Wald test¹² indicated the presence of heteroskedasticity, and accordingly, the Huber/White estimator was used to obtain heteroskedasticity-robust standard errors.

An objective of this paper is to assess the relationship between IXPs and fixed-broadband speed and latency in 74 countries between 2016 and 2019. The fixed-effect method is, therefore, ideal in analysing the impact of a particular variable that varies over time. In addition, the fixed-effect method controls for any potential correlation within the country and between the independent/dependent variables that may render the estimation bias, by removing the effect of those time-invariant biases.¹³

¹⁰ Variables' distributions were not symmetric, hence the need for log-transformation.

¹¹ Sargan-Hansen statistic = 18.523, Chi-sq(7), P-value = 0.009.

¹² Modified Wald test $\chi^2(85) = 9.5$, Prob> $\chi^2 = 0.0000$.

¹³ For further details, refer to Baltagi (2005).

IV. DATA

For this paper, a balanced short panel of 74 countries from 2016 to 2019 is used. The panel data set was developed and maintained by the Economist Intelligence Unit (EIU), for computing the Inclusive Internet Index.¹⁴

The Inclusive Internet Index is comprised of 53 indicators categorized under four key areas: availability, affordability, relevance, and readiness. “Availability” consolidates the scores from indicators that measures the quality and depth of infrastructure for access, including Internet use, the quality of the Internet connection, and the type and quality of infrastructure available for Internet and electricity access. “Affordability” consolidates scores on indicators for cost of access relative to income level and competition in the ICT market. “Relevance” looks at the existence and extent of local language content. This key area measures the perceptions on the value of being connected to the Internet by users in terms of useful local contents and services. “Readiness” measures the capacity of users to take advantage of access to the Internet for productive use.

Each of the four key areas receives a score calculated from a weighted average of the underlying indicator scores and then scaled from 0 to 100 (100 indicates the highest/strongest). The overall country score (adjusted) is a weighted average of the four key areas’ scores. Further details on the methodology for calculating the Index can be accessed from the Methodology Report.¹⁵ Variables categorized under each key area are listed in table 2. A list of all variables is shown in annex table A.1.

¹⁴ The Economist Intelligence Unit (EIU), The Inclusive Internet Index 2019. Available at <https://theinclusiveinternet.eiu.com> (accessed on 28 October 2020).

¹⁵ Ibid.

Table 2. The Inclusive Internet Index 2019 – key areas of focus

1. Availability (20)	2. Affordability (7)	3. Relevance (10)	4. Readiness (21)	Background variables (25)
1.1. Usage (5)	2.1. Price (4)	3.1. Local content (3)	4.1. Literacy (4)	Social, economic & political variables (25)
1.2. Quality (7)	2.2. Competitive environment (3)	3.2. Relevant content (7)	4.2. Trust & safety (6)	
1.3. Infrastructure (6)			4.3. Policy (11)	
1.4. Electricity (2)				

Source: Author’s consolidation based on the Economist Intelligence Unit (EIU), The Inclusive Internet Index 2019. Available at <https://theinclusiveinternet.eiu.com> (accessed on 28 October 2019).

Note: Numbers in brackets show the number of variables under each category and subcategory.

The data set is extremely useful for this study, as it is the first of its kind to collect statistics for most countries (100 countries in the 2020 version) on the number of IXPs per 10 million inhabitants on a yearly basis, allowing for a format that can be used for econometric testing. While the International Telecommunications Union (ITU) collects most of the ICT statistics through its annual World Telecommunication/ ICT Indicators database,¹⁶ it does not include statistics on IXPs.

Other credible data sets with ICT indicators, such as World Development Indicators from the World Bank¹⁷ and the Networked Readiness Index from the World Economic Forum,¹⁸ do not collect statistics on the number of IXPs per population. While many online platforms, such as the TeleGeography Internet Exchange Map,¹⁹ and the Internet Society IXP platform,²⁰ provide statistics on the number of IXPs in each

¹⁶ ITU, World Telecommunication/ICT Indicators database. Available at www.itu.int/en/publications/ITU-D/pages/publications.aspx?parent=D-IND-WTID.OL-2019&media=electronic (accessed on 28 October 2019).

¹⁷ World Bank, World Development Indicators. Available at <https://data.worldbank.org/> (accessed on 28 October 2019).

¹⁸ World Economic Forum, Networked Readiness Index. Available at http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/?doing_wp_cron=1572941503.7552540302276611328125 (accessed on 28 October 2019).

¹⁹ TeleGeography, Internet Exchange Map. Available at www.internetexchangemap.com/ (accessed on 28 October 2019).

²⁰ Internet Society, IXP platform. Available at www.internetsociety.org/issues/ixps/ (accessed on 28 October 2019).

country. These online sources do not provide panel data with changes on a yearly basis, namely on how many IXPs are established in each country every year.

In addition, the Inclusive Internet Index data set collects statistics on other policy variables that allows for testing of fixed-broadband speed and latency and other interesting policy variables for future research, such as Internet affordability, local content, trust and safety, policies on female e-inclusion, female STEM education, spectrum policy and national digital identification policy.

Limitations of the Inclusive Internet Index data set however are the following.

First, as the data set is relatively new (2016–2019), it provides limited observations for a stable estimation result. Consequently, the results of this paper may need to be revisited in three to five years to allow for additional years with observations in the estimation. Nunnally and Bernstein (1967) suggested that in multiple regression modelling, for each independent variable (X), there should be at least 10 observations (namely for $Y = B_0 + B_1X_1 + B_2X_2$, then there should be 10 observations for X_1 , and 10 observations for X_2 , and 10 observations for Y , or total of 30 observations). In the case of the estimation in this paper, there are seven variables (excluding the constant) with observations of around 189 (double the acceptable level).

Second, the 2020 version of the data set only included 100 countries with several least developed countries, landlocked developing countries and small island developing States noticeably missing.²¹ However, the countries that are included represent well the global trend through the inclusion of the ten largest economies in the world: the United States, China, Japan, Germany, the United Kingdom, India, France, Brazil, Italy and Canada. By population, more than 75 per cent of the world's population are controlled for with the inclusion of major populous countries, such as China, India, the United States, Indonesia, Brazil, Pakistan, Nigeria, Bangladesh, the Russian Federation and Mexico. As a result, the overall results of the estimations generated from the paper are indeed representative of the global trend.

²¹ Controlling for smaller countries in the data set is also a challenge considering that the variable required for computing a new control variable (such as one million per inhabitants) for smaller countries is not available at the Economic Intelligence Unit data set. This missing variable is the number of IXPs established in each of the years.

V. RESULTS

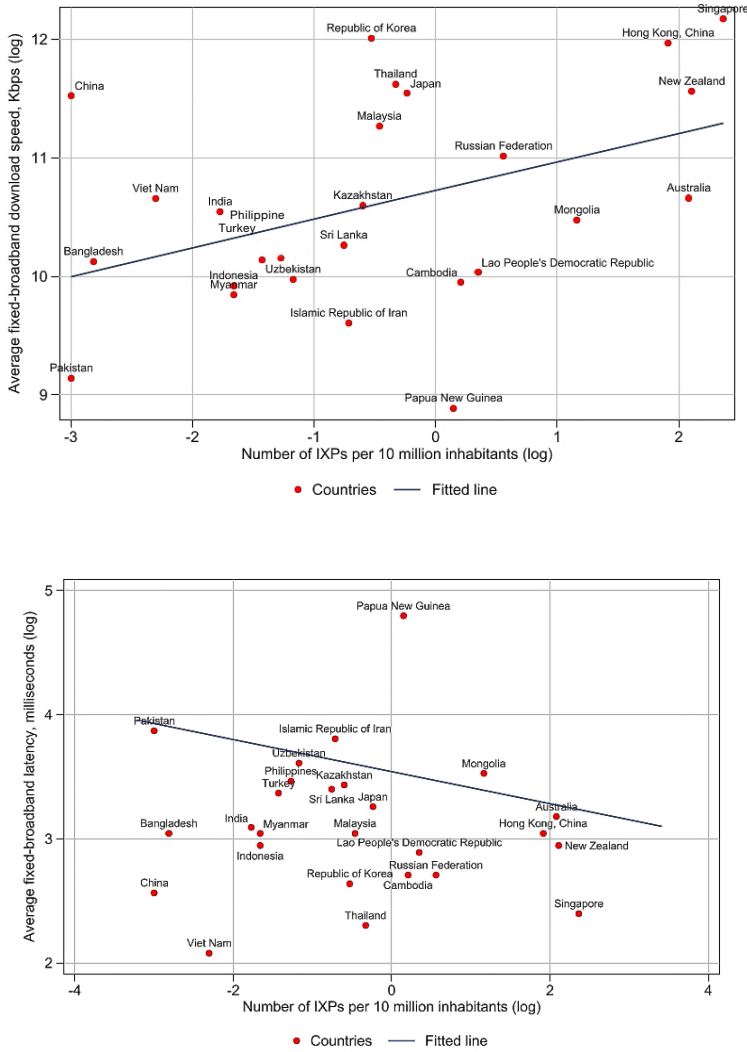
The relationship between the number of IXPs per 10 million inhabitants and fixed-broadband speed and latency, was first checked using a simple scatter plot. When assessed by geographic regions, a positive correlation between IXPs and fixed-broadband speed was found, while there appears to be a negative correlation between IXPs and fixed-broadband latency for Asia and the Pacific (figure 5).

Singapore and Australia, are among the leading countries with high fixed-broadband speed and number of IXPs per 10 inhabitants (figure 5). Similarly, Singapore and Australia are the leading countries with the lowest fixed-broadband latency.

In the case of Europe, a similar IXP correlation pattern is found with respect to fixed-broadband speed and latency (annex figure A.2). Estonia and Lithuania are the leading countries in Europe for high fixed-broadband speed and number of IXPs per 10 inhabitants. Similarly, Estonia and Lithuania are the leading countries with the lowest fixed-broadband latency.

Moving on to Latin America and the Caribbean, a similar pattern is found with a positive correlation between the number of IXPs and fixed-broadband speed, while negatively correlated with fixed-broadband latency. Argentina, and Trinidad and Tobago are the two leading countries with respect to positive correlation between the number of IXPs and fixed-broadband speed, while negatively correlated with fixed-broadband latency (annex figure A.3). A similar pattern is also found for Africa (annex figure A.4).

Figure 5. Internet exchange points versus fixed-broadband speed and latency (Asia-Pacific region)



Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

Note: IXPs: Internet exchange points.

The relationship between the number of IXPs and fixed-broadband speed and latency was further assessed through an econometric model that controls for the effects of other variables. The results of the fixed-effects method are presented in table 4.

The results of the fixed-effects estimation indicate that the number of IXPs per 10 million inhabitants is positively correlated and statistically significant with fixed-broadband download speed (Kbps) (Dep. Var 1). In other words, for every 1 per cent increase in the number of IXPs per 10 inhabitants, the speed of fixed-broadband download speed (Kbps) is associated with an increase by approximately 0.8 per cent.²²

In addition, the results indicate that the number of IXPs per 10 million inhabitants is statistically significant and negatively correlated with fixed-broadband latency (ms) (Dep. Var 2). For every 1 per cent increase in the number of IXPs per 10 inhabitants, fixed-broadband latency (ms) is associated with a decrease of approximately 0.4 per cent. Overall, the preliminary results from the fixed-effects estimation provide empirical evidence to support the important role of IXPs in improving fixed-broadband speed and latency in countries.

The remaining control variables behaved as expected. The fitness of the estimate for fixed-broadband speed (Dep. Var 1) and fixed-broadband latency (Dep. Var 2) are fairly robust, as indicated by the statistical significance of many control variables. With regard to the access of subscribers to fixed-broadband services (*FixBro*), a positive relationship is found between an increase in access to fixed-broadband services and an increase in fixed-broadband speed. On the other hand, an increase in access to fixed-broadband services is associated with a decrease in fixed-broadband latency (ms). This finding is aligned with the literature on digital divide in such countries as Australia, Japan, the Republic of Korea and Singapore, which showed a very high rate of access to fixed-broadband Internet and higher fixed-broadband speed and lower latency (ms), compared to low-income countries.

When controlling for the level of cross-border connectivity²³ in each country, the number of cable landing stations per 10 million inhabitants (*CabSta*) shows a positive and statistically significant relationship with fixed-broadband speed (Kbps), and negative correlation with fixed-broadband latency. The more cable landing stations per population, the better and more stable the fixed-broadband connection will be;

²² Or for every 10 per cent increase in the number of IXPs per 10 inhabitants, it is associated with a fixed download speed (Kbps) increase of about $(1.10^{0.8} - 1) * 100 = 8$ per cent.

²³ Considering that more than 70 per cent of global Internet traffic are routed through fibre-optic cables.

this provides a strong foundation for increased fixed-broadband speed. In addition, the increasing number of cable stations also demonstrates a country's resilience to natural disasters. In particular, if one cable is broken due to a natural disaster, the second cable could provide the broadband lifeline to the country. Access to multiple cable stations (multiple cross-border fibre cables) implies higher chances of being able to connect to more efficient shorter traffic routes, which can improve fixed-broadband latency.

Table 4. Fixed-effects estimation results

Independent variables	Dep. Var 1 Fixed-broadband download speed - Kbps (log)	Dep. Var 2 Fixed-broadband latency (avg, ms) (log)
Number of Internet exchange points per 10 million inhabitants (log)	0.773*** (0.125)	-0.319*** (0.0722)
Fixed-broadband subscribers per 100 inhabitants (log)	0.557*** (0.162)	-0.408*** (0.129)
Number of fibre-optic cable landing stations per 10 million inhabitants (log)	0.499*** (0.136)	-0.266*** (0.0820)
Percentage of population covered by 3G network (Log)	0.435 (0.370)	0.236 (0.182)
Technology-neutrality policy for spectrum use; qualitative rating 0-1, (1 = best)	0.242 (0.152)	-0.135 (0.0877)
GDP, US\$ billions (log)	2.028*** (0.345)	-0.858*** (0.145)
Population, millions (log)	7.052*** (1.000)	-1.250** (0.562)
Constant	-29.49*** (4.515)	12.73*** (2.621)
Observations	189	189
R-squared (within)	0.697	0.501
Number of countries	74	74

Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Last-mile broadband infrastructure connectivity as a percentage of population covered by 3G mobile network (*NetCov*), is positively correlated with fixed-broadband speed and negatively correlated with fixed-broadband latency (ms). Both coefficients are statistically significant. This result is in line with existing literature on private investment in broadband infrastructure. When investment and deployment of 3G network infrastructure increases to cover most of the population, a business case is, therefore, warranted for network operators to provide efficient Internet traffic to current and new customers for generating higher revenue.

ICT conducive policy, proxied by the quality²⁴ of technology-neutrality policy for spectrum use (*NeuPol*), was used to control for the sector's policy environment although no statistically significant results came out from the model. GDP (US\$ billions) (*Gdp*) is a proxy for income levels in countries. A positive and statistically significant relationship is found between the income level of countries and Internet speed. Higher-income countries also experience higher Internet speed. This finding is aligned with earlier studies by ESCAP (2016, p. 13; 2017, p. 72) in which population (millions) (*Pop*) was used as a proxy of country/market size. A positive relationship²⁵ was found with fixed-broadband speed, while a negative relationship was found with fixed-broadband latency. This finding suggests the presence of economies of scale. In particular, as market size increases, demand for Internet services which incentivizes network operators to invest in improving Internet speed and latency increases.

VI. CONCLUSION AND POLICY IMPLICATIONS

The preliminary findings of this paper provide econometric evidence towards the important role of IXPs in improving fixed-broadband speed and latency. In particular, the number of IXPs per 10 million inhabitants is positively correlated and statistically significant with fixed-broadband download speed (Kbps). For every 1 per cent increase in the number of IXPs per 10 million inhabitants, the speed of fixed-broadband download (Kbps) is associated with an increase of 0.8 per cent. In addition, the presence of IXPs is common in high-income countries and vice versa. Countries with a higher number of IXPs also tend to have greater access to broadband Internet,²⁶ and the costs are more affordable.

Despite the benefits of IXPs, challenges remain on establishing IXPs. In particular, the need for collaboration and building trust between several stakeholders (national and international), a neutral location and management of IXPs as a platform for all

²⁴ Qualitative rating (0-1, 1 = best).

²⁵ Statistically significant in both cases.

²⁶ Mobile service providers will play an increasingly important role going forward, with the transitioning from 4G to 5G.

operators to connect and a conducive regulatory environment that supports an open market for telecommunication services.²⁷

As a result, these challenges pose three important policy implications for policymakers in ensuring the sustainability of IXPs. First, strong political support is needed. Governments that champion the process need to ensure that existing and new regulatory policies facilitate an enabling regulatory environment for interconnectivity between operators (local and international). Second, governments and regulators need to offer incentives to encourage investment in establishing IXP (such as tax incentives on equipment for IXPs or operator network equipment). Third, in the light of the key findings of this paper on the important role of IXPs in improving fixed-broadband speed and latency, all stakeholders in the process need to cooperate and share information and best practices. National and international organizations, such as Internet Society and the Asia Pacific Network Information Centre, provide expert advice and capacity training in this area.

In Asia and the Pacific, governments recognize the important role of regional cooperation in promoting broadband connectivity through the Asia-Pacific Information Superhighway initiative.²⁸ The Asia-Pacific Information Superhighway initiative is an intergovernmental platform that facilitates a policy dialogue for stakeholders (governments, private sectors, donors, international organizations, non-governmental organizations, civil society and academia, among others) to discuss challenges related to cross-border connectivity. In particular, to identify tangible solutions for regional cooperation. The Asia-Pacific Information Superhighway initiative focuses on four pillars: infrastructure connectivity (promoting investment in infrastructure connectivity); efficient Internet traffic and network management (including the establishment of IXPs, among others); e-resilience (resilient ICT infrastructure from natural disasters); and affordable broadband access for all. As a result, promoting national and subregional IXPs under the Asia-Pacific Information Superhighway initiative framework would improve Internet speed and latency in countries with special needs (least developed countries, landlocked developing countries and small island developing States).

²⁷ In particular, in markets with a dominant ISP (for example, 60 per cent of market share), smaller ISPs may be required to pay for local connectivity. As a result, setting up a local IXP in that context could be challenging. A potential solution would be for smaller ISPs in a country to connect to a neutral IXP, which would increase market share and leverage for negotiating traffic flow with other dominant ISPs.

²⁸ For further details, visit www.unescap.org/our-work/ict-disaster-risk-reduction/asia-pacific-information-superhighway.

REFERENCES

- Ahmad, Mohammad, and Ratan Guha (2012). Studying the effects of Internet exchange points on Internet topology. *Journal of Information Technology & Software Engineering*, vol. 2, No. 5, pp. 1-12.
- Baltagi, Badi (2005). *Econometric Analysis of Panel Data*, 3rd ed. West Sussex, United Kingdom: John Wiley and Sons.
- Economist Intelligence Unit (2020). The Inclusive Internet Index 2019. Available at <https://theinclusiveinternet.eiu.com/>.
- (2021). *The Inclusive Internet Index 2019, Methodology Report*. Available at <https://theinclusiveinternet.eiu.com/assets/external/downloads/3i-methodology.pdf>.
- Galperin, Hernán (2013). Connectivity in Latin America and the Caribbean: the role of Internet exchange points. Documento de Trabajo 2013, Number 14. Universidad de San Andres. Available at <http://repositorio.udes.edu.ar/jspui/bitstream/10908/15563/1/%5BP%5D%5BW%5D%20DT14-Galperin%20%28eng%29.pdf>.
- Grace, Jeremy, and others (2004). Information and communication technologies and broad-based development – a partial review of the evidence. World Bank Working Paper, No. 12. Washington, D.C.: The International Bank for Reconstruction and Development and World Bank.
- Internet Society (2014). *The Internet Exchange Point Toolkit & Best Practices Guide*. Available at www.ixptoolkit.org/wp-content/uploads/2016/08/Global-IXPTToolkit_Collaborative-Draft_Feb-24.pdf.
- (2015). Internet exchange points, an internet society public policy briefing. Available at www.internetsociety.org/wp-content/uploads/2015/10/ISOC-PolicyBrief-IXPs-20151030_nb.pdf.
- International Telecommunication Union (ITU) (2012). *Impact of Broadband on the Economy. Broadband Series*. Available at www.itu.int/ITU-D/treg/broadband/ITU-BB-Reports_Impact-of-Broadband-on-the-Economy.pdf.
- (2013a). Study on international internet connectivity: focus on Internet connectivity in Latin America and the Caribbean. Available at www.itu.int/en/ITU-D/Regulatory-Market/Documents/International%20Internet%20Connectivity%20in%20Latin%20America%20and%20the%20Caribbean.pdf.
- (2013b). Study on international Internet connectivity in sub-Saharan Africa. Available at www.itu.int/en/ITU-D/Regulatory-Market/Documents/IIC_Africa_Final-en.pdf.
- Lubis, Nurchaliza, and Helda Febrianty (2018). Internet influencing economic growth: what and how much? A case study of Indonesia using time series data (2001–2016). 3rd International Conference of Integrated Intellectual Community (ICONIC). Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3216419.
- Minges, Michael (2015). Exploring the relationship between broadband and economic growth. Background paper prepared for the World Development Report 2016: Digital Divide. Washington, D.C.: World Bank.
- Nunnally, Jum, and Ira Bernstein (1967). *Psychometric Theory*. New York: McGraw-Hill.

- Qiang, Christine Zhen-Wei, Alexander Pitt, and Seth Ayers (2004). *Contribution of Information and Communication Technologies to Growth*. World Bank Working Paper, No. 24. Washington, D. C.: International Bank for Reconstruction and Development/World Bank.
- TeleGeography (2020). Internet Exchange Map. Available at www.internetexchangemap.com/.
- United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2016). State of ICT in Asia and the Pacific 2016: uncovering the widening broadband divide. Working paper by the Information Communications and Technology Disaster Risk Division. Available at www.unescap.org/resources/state-ict-asia-and-pacific-2016-uncovering-widening-broadband-divide.
- (2017). *Artificial Intelligence and Broadband Divide: State of ICT Connectivity in Asia and the Pacific 2017*. Available at www.unescap.org/resources/artificial-intelligence-and-broadband-divide-state-ict-connectivity-asia-and-pacific-2017.
- United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP), and National Information Society Agency (2016). A pre-feasibility study on the Asia-Pacific Information Superhighway in the ASEAN Sub-region: international traffic and quality analysis, network topography design and implementation model. Technical Report (draft). Available at www.unescap.org/resources/pre-feasibility-study-asia-pacific-information-superhighway-asean-sub-region.
- Zaki, Yasir, and others (2014). Dissecting web latency in Ghana. Conference Paper, IMC 2014. Vancouver, Canada, 5–7 November. Available at <https://conferences2.sigcomm.org/imc/2014/papers/p241.pdf>.

ANNEX

Figure A.1. Internet exchange points by economy, 2019



Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

Note: IXPs: Internet exchange points.

Table A.1. Internet Inclusive Index 2020 – variables

1. AVAILABILITY
1.1. USAGE
1.1.1. Internet users; % of households
1.1.2. Fixed-line broadband subscribers; Per 100 inhabitants
1.1.3. Mobile subscribers; Per 100 inhabitants
1.1.4. Gender gap in internet access; % difference
1.1.5. Gender gap in mobile phone access; % difference
1.2. QUALITY
1.2.1. Average fixed broadband upload speed; Kbps
1.2.2. Average fixed broadband download speed; Kbps
1.2.3. Average fixed broadband latency; ms
1.2.4. Average mobile upload speed; Kbps
1.2.5. Average mobile download speed; Kbps
1.2.6. Average mobile latency; ms
1.2.7. Bandwidth capacity; Bit/s per Internet user
1.3. INFRASTRUCTURE
1.3.1. Network coverage (min. 2G); % of population
1.3.2. Network coverage (min. 3G); % of population
1.3.3. Network coverage (min. 4G); % of population
1.3.4. Government initiatives to make Wi-Fi available; Qualitative rating 0-2, 2 = best
1.3.5. Private sector initiatives to make Wi-Fi available; Qualitative rating 0-2, 2 = best
1.3.6. Internet exchange points; Number of IXPs per 10 million inhabitants
1.4. ELECTRICITY
1.4.1. Urban electricity access; % of population
1.4.2. Rural electricity access; % of population
2. AFFORDABILITY
2.1. PRICE
2.1.1. Smartphone cost (handset); Score of 0-100, 100 = most affordable
2.1.2. Mobile phone cost (prepaid tariff); % of monthly GNI per capita
2.1.3. Mobile phone cost (postpaid tariff); % of monthly GNI per capita
2.1.4. Fixed-line monthly broadband cost; % of monthly GNI per capita
2.2. COMPETITIVE ENVIRONMENT
2.2.1. Average revenue per user (ARPU, annualized); US\$
2.2.2. Wireless operators' market share; HHI score (0-10,000)
2.2.3. Broadband operators' market share; HHI score (0-10,000)

Table A.1. (continued)

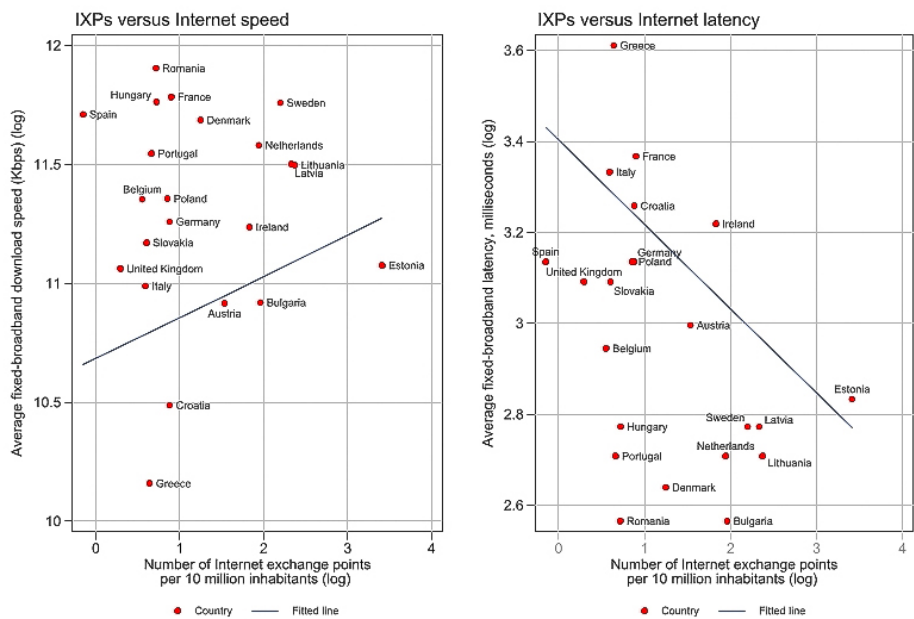
3. RELEVANCE
3.1. LOCAL CONTENT
3.1.1. Availability of basic information in the local language; Qualitative rating 0-2, 2 = best
3.1.2. Concentration of websites using country-level domains; Qualitative rating 0-3, 3 = best
3.1.3. Availability of e-Government services in the local language; Qualitative rating 0-2, 2 = best
3.2. RELEVANT CONTENT
3.2.1. e-Finance content; Qualitative rating 0-2, 2 = best
3.2.2. Value of e-finance; %
3.2.3. e-Health content; Qualitative rating 0-3, 3 = best
3.2.4. Value of e-health; %
3.2.5. e-Entertainment usage; %
3.2.6. e-Commerce content; Score of 0-100, 100 = best
3.2.7. Value of e-Commerce; %
4. READINESS
4.1. LITERACY
4.1.1. Level of literacy; % of population
4.1.2. Educational attainment; Years of schooling
4.1.3. Support for digital literacy; Qualitative rating 0-3, 3 = best
4.1.4. Level of web accessibility; Qualitative rating 0-4, 4 = best
4.2. TRUST & SAFETY
4.2.1. Privacy regulations; Qualitative rating 0-2, 2 = best
4.2.2. Trust in online privacy; %
4.2.3. Trust in government websites and apps; %
4.2.4. Trust in non-government websites and apps; %
4.2.5. Trust in information from social media; %
4.2.6. e-Commerce safety; %
4.3. POLICY
4.3.1. National female e-inclusion policies; Qualitative rating 0-4, 4 = best
4.3.1.1. Comprehensive female e-inclusion plan; Qualitative rating 0-2, 2 = best
4.3.1.2. Female digital skills training plan; Qualitative rating 0-1, 1 = best
4.3.1.3. Female STEM education plan; Qualitative rating 0-1, 1 = best
4.3.2. Government e-inclusion strategy; Qualitative rating 0-2, 2 = best
4.3.3. Broadband strategy; Qualitative rating 0-2, 2 = best

Table A.1. (continued)

4.3.4.	Funding for broadband buildout; Qualitative rating 0-1, 1 = best
4.3.5.	Spectrum policy approach; Qualitative rating 0-2, 2 = best
4.3.5.1.	Technology-neutrality policy for spectrum use; Qualitative rating 0-1, 1 = best
4.3.5.2.	Unlicensed spectrum policy; Qualitative rating 0-1, 1 = best
4.3.6.	National digital identification system; Qualitative rating 0-2, 2 = best
BACKGROUND VARIABLES	
BG1.	Nominal GDP; US\$ billions
BG2.	Population; Millions
BG3.	Urbanization rate; % of population
BG4.	GNI per capita; US\$ per person
BG5.	GINI coefficient; Score, 0-100; 0 is perfect equality; 100 is perfect inequality
BG6.	Population under the poverty line; % of population
BG7.	Total electricity access; % of population
BG8.	Cable landing stations; Number of cable landing stations per 10 million inhabitants
BG9.	Percentage of schools with Internet access; % of schools
BG10.	Global Peace Index; Score, 1-5; 1 = best
BG11.	Democracy Index; Score, 0-10; 10 = best
BG12.	Corruption Perceptions Index; Score, 0-100; 100 = best
BG13.	EIU Business Environment Rankings; Score, 1-10, 10 = high
BG14.	UN E-Government Development Index; Score, 0-1; 1 = best
BG15.	Internet users (population); Millions
BG16.	Offline population; Millions
BG17.	Plan addressing female-driven innovation and women-owned businesses; Qualitative rating 0-1, 1 = best
BG18.	Internet access gender gap; Difference in percentage points
BG19.	Mobile phone access gender gap; Difference in percentage points
BG20.	Internet users (percent of population); % of population
BG21.	Male Internet users; % of male population
BG22.	Female Internet users; % of female population
BG23.	Male mobile phone subscribers; % of male population
BG24.	Female mobile phone subscribers; % of female population
BG25.	Total fixed line broadband subscribers; Number of subscriptions

Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

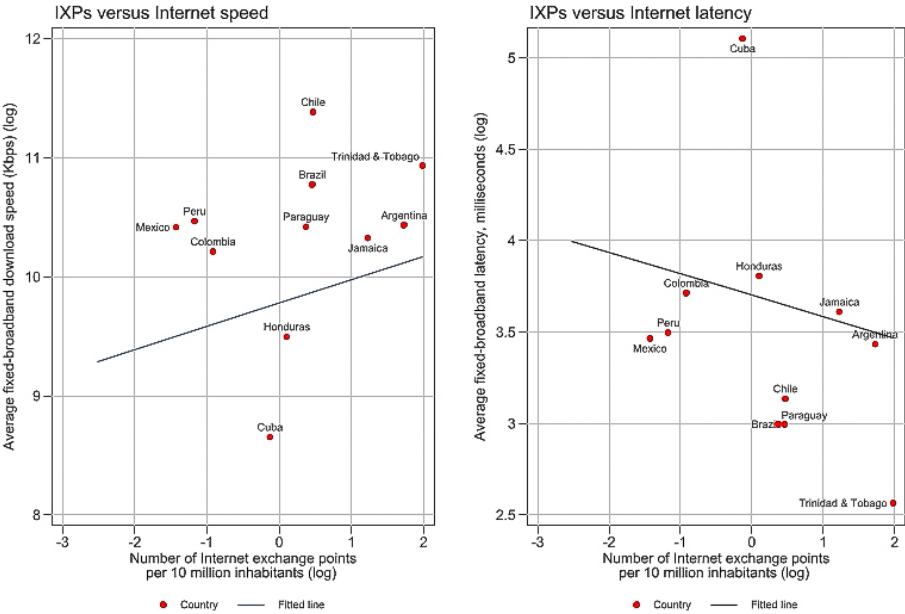
Figure A.2. Internet exchange points versus fixed-broadband speed and latency, Europe 2019



Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

Note: IXPs: Internet exchange points.

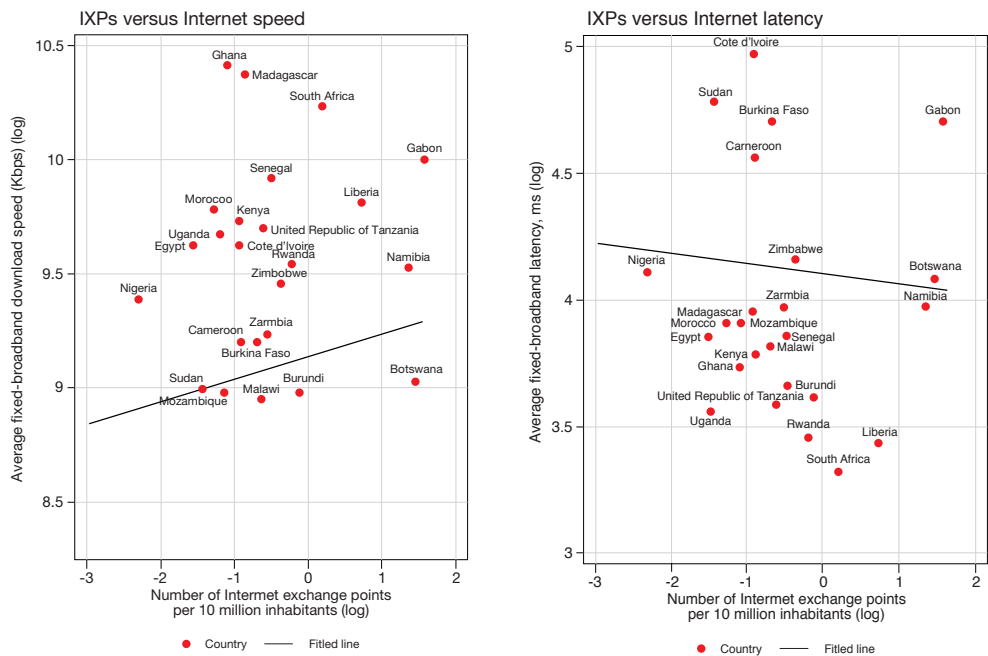
Figure A.3. Internet exchange points versus fixed-broadband speed and latency, Latin America and the Caribbean 2019



Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

Note: IXPs: Internet exchange points.

Figure A.4. Internet exchange points versus fixed-broadband speed and latency, Africa 2019



Source: Economist Intelligence Unit, Inclusive Internet Index 2020 database. Available at <https://theinclusiveinternet.eiu.com/> (accessed on 27 February 2020).

Note: IXPs: Internet exchange points.

SECURING GREEN DEVELOPMENT: CAN ASIA-PACIFIC CENTRAL BANKS AND FINANCIAL SUPERVISORY AUTHORITIES DO MORE?

*Xiang-li Lim and Vatcharin Sirimaneetham**

The present paper contains a discussion on how central banks and financial supervisory authorities can foster green development in Asia and the Pacific. It is based on the argument that while fiscal policy has received much attention, central banks and financial supervisory authorities can certainly play a complementary role in accelerating the transition towards low-carbon, climate-resilient economies. Indeed, these institutions are obliged to act as inaction could compromise their mandate to maintain economic and price stability given that climate change poses an emerging risk to the financial system. The first point made in the paper is that approximately half of the Asia-Pacific central banks either have sustainability-oriented mandates or have begun to integrate climate issues into their policy conduct. The following discussion points out that while the region remains at the early stage of implementing green monetary and financial policies, some central banks and financial supervisory authorities are at the forefront in deploying monetary policy tools, prudential measures and broader initiatives to support green finance. To further promote green central banking, having clear guiding principles, effective communication and adequate technical capacity to customize the green approach is critical. Moving forward, these institutions should be mindful of possible unintended, adverse impacts of sustainable central banking, such as interfering with market neutrality, supporting green washing and crowding out green private investments.

JEL classification: E52, E58

Keywords: central banking, monetary policy, green development, green finance, climate risks

* Xiang-li Lim, Green Templeton College, and Saïd Business School, University of Oxford (email: Xiang-li.Lim.MBA20@said.oxford.edu). Vatcharin Sirimaneetham, Macroeconomic Policy and Financing for Development Division, ESCAP (email: sirimaneetham@un.org).

I. INTRODUCTION

Asia and the Pacific has made insufficient progress towards achieving low-carbon, climate-resilient green economies. Compared to other regions of the world, it is more exposed to the impacts of climate change, such as rising temperatures, rising sea levels, and weather-related natural disasters. Yet, despite abundant evidence that climate change is causing large economic and human costs, the region has either regressed or made limited progress toward achieving the environmental-related Sustainable Development Goals¹ (ESCAP, 2021a). China, India and the Russian Federation remain among the world's top carbon emitters and emissions per capita is high in other countries in the region, including, among them, Brunei Darussalam, Kazakhstan and Mongolia. Meanwhile, there is large room to make the region's response to the COVID-19 pandemic greener, as funds committed to fossil fuels dominate public spending on energy in several countries (ESCAP, 2021b).

To date, fiscal policy has been the focus in promoting green development. For example, to reduce carbon emissions, carbon taxes were introduced in Japan and Singapore and are being considered in several other Asia-Pacific economies. Countries, such as China, India, Thailand and Viet Nam, are also offering various fiscal incentives to promote clean and renewable energy and green activities carried out by non-environmental private companies. Regarding governments' own operations, public procurement practices in China, India and the Republic of Korea provide insight on how purchases of goods and services made by governments can be made more environmentally friendly (OECD, 2015).

Compared to fiscal policy, the role of monetary and financial policies in promoting green development is discussed infrequently. In most developing countries, it is not fully recognized that lack of or inadequate actions taken by central banks and financial supervisory authorities to address climate change risks could compromise their primary mandate to maintain macroeconomic and price stability. This is mainly because climate change constitutes an emerging material risk to the financial sector with direct consequences on economic stability. For example, during the period 1980–2012, headline inflation, especially food inflation, remained persistently high in the three years that followed natural disasters in developing countries caused by disruptions in food, housing and energy prices (Parker, 2018). Moreover, central banks and financial supervisory authorities arguably have a wide

¹ These include limited progress on sustainable cities and communities (Goal 11), responsible consumption and production (Goal 12), and life on land (Goal 15), and regressing trends in climate action (Goal 13) and life below water (Goal 14).

range of policy tools that can remedy market failures that have contributed to climate change, such as inefficient pricing of environmental externalities. Finally, with prudential and regulatory oversight, central banks and financial supervisory authorities can also play a critical role in addressing climate change on a systemic level, such as by examining the implications of inactions by market participants and formulating appropriate mitigation measures that can be implemented.

Against this background, this paper presents the case on how Asia-Pacific central banks and financial supervisory authorities could further promote green development. After examining some considerations for these institutions' involvement in climate action, in tandem with their respective mandates, and assessing the extent of Asia-Pacific central banks and financial supervisory authorities' current engagements, selected concepts on how climate elements can be embedded into existing monetary policy tools and prudential measures are examined. Mainstreaming this at economy-wide and institutional levels is stressed in this paper and later a description of the wide range of sustainability-oriented monetary and financial policy tools that have been introduced is given. To realize the potential of these tools, which remains largely untapped in Asia and the Pacific, there are different sets of policy and implementation issues central banks and financial supervisory authorities can consider based on their level of experience in this regard.

This paper contains three key messages. First, given that approximately half of the central banks in Asia and the Pacific already have sustainability-oriented mandates or are considering climate change issues as part of their policy conduct, monetary and financial policies have potential roles in mitigating macroeconomic and financial instability emanating from climate change. Second, while the region as a whole remains at the early stage of implementing sustainable monetary and financial policies, central banks and financial supervisory authorities in some of the more developed Asia-Pacific economies are at the forefront in deploying monetary policy tools, prudential measures and broader initiatives to foster green finance. Third, going forward, these institutions should have clear guiding principles and mandates that ensure the legitimacy of green actions, actively participate in multilateral forums on sustainable finance and be mindful about possible unintended, adverse impacts of green central banking.

This paper is organized as follows. Section II presents some arguments for and against the involvement of central banks and financial supervisory authorities in climate initiatives. Section III then examines the extent of Asia-Pacific central banks and financial supervisory authorities' commitment to green development, while section IV explores some conceptual frameworks on how central banks and financial supervisory authorities can further promote green initiatives. Section V includes a review of some

recent green policy measures adopted by these institutions in the Asia-Pacific region and beyond. Section VI is focused on selected policy and implementations issues that central banks and financial supervisory authorities could consider in moving forward. Section VII provides concluding remarks.

II. SHOULD CENTRAL BANKS AND FINANCIAL SUPERVISORY AUTHORITIES BE INVOLVED IN CLIMATE ACTION?

Amid the significant economic and human costs of climate change (box 1), a debate on green policy conduct by central banks and financial supervisory authorities has gained momentum. While an increasing number of analysts have urged these institutions to play a more active role in promoting green development, others still question the legitimacy of sustainable monetary and financial policies. In sections 2.1 and 2.2, some arguments for and those that caution against central banks and financial supervisory authorities' green policy interventions, respectively, are briefly highlighted.

2.1. Arguments in favour of the engagement of central banks and financial supervisory authorities

Climate change poses imminent risks to macroeconomic and financial stability. There are at least three types of such risks (Bailey, 2021). First, a physical risk or direct losses from climate-related natural disasters, such as damaged infrastructure and disruption of business supply chains. These losses impair asset values of businesses and erode household wealth, which, in turn, not only adversely affect businesses and households' ability to repay loans but also the public finances and underwriting cost for insurers. Second, a transition risk arising from changes in government's climate policies, climate-related disruptive technology, and shifts in consumer preferences, all of which require reassessment of carbon-intensive asset values. As these "stranded assets" could be devalued, businesses would incur higher operating costs, thus pushing up credit risk for debt holders and market risks for insurers and equity investors. Third, a liability risk stemming from materialization of climate insurance payments, contingency funds and compensation for losses due to the physical and transition risks. In addition to these risks, natural disasters induced by climate change could undermine price stability. Empirical evidence has shown that events, such as floods and storms, have elevated inflation rates in both developed and developing countries (Heinen, Khandan and Strobl, 2018; Dafermos and others, 2021b; and Beirne and others, 2021), with more notable impacts in developing economies (Parker, 2018).

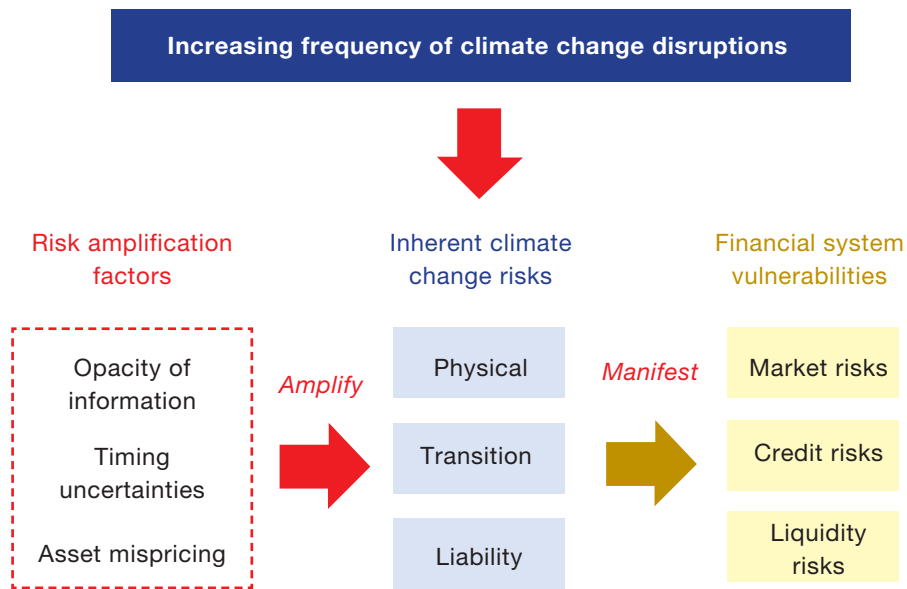
Box 1. The impacts of climate change in Asia and the Pacific

Asia and the Pacific is more exposed to climate change impacts than any other region in the world. Partly because of its large land mass, temperatures in the Asia-Pacific region have risen two times faster than the world average (Dabla-Norris and others, 2021). This is more pronounced in the Northern part of the region where temperatures have risen by up to 0.5°C over the past decade. Moreover, low-lying territories, many small islands and extensive coastlines make the region highly susceptible to rising sea levels and severe weather conditions (UNDP, 2019). Driven by these conditions, the region has suffered more from weather-related disasters, which account for 37 per cent of all disaster occurrences during the period 2000–2019 (Dabla-Norris and others, 2021). In addition to more frequent floods and droughts, greater monsoon variability in South and South-West Asia and South-East Asia has also led to more extreme rainfalls in some areas and droughts in others. At the same time, the warmer oceans have intensified tropical storms, making them harder to predict.

Climate change has incurred large economic and human costs. At a global level, under the current trajectory, which suggests a temperature rise of between 2.0 and 2.6°C by 2050, the output loss is estimated at between 11.0 and 13.9 per cent of global gross domestic product (GDP) (Swiss Re, 2021). For Asia and the Pacific, the loss is estimated to be approximately \$50 billion annually over the period 2010–2019, mainly driven by increases in the frequency and severity of weather-linked disasters (Dabla-Norris and others, 2021). During this same period, the region also incurred significant human cost, with more than three billion people being affected. Moreover, approximately 200 million people in the region depend on healthy oceans, which are increasingly exposed to acidifying and coral bleaching (UNDP, 2019). The impact of climate change on workers' incomes and employment can also be sizeable, as the livelihood of more than 60 per cent of the Asia-Pacific population is susceptible to changing weather patterns.

Central banks and financial supervisory authorities that do not consider climate change risks may fall short in fulfilling the mandate of maintaining price and financial stability. The manifestation of the physical, transition and liability risks can result in financial shocks. This is mainly because of the large sudden shifts in risk perceptions posed by climate change, as demonstrated by more frequent climate-related hazards, could lead to abrupt repricing events. Financial system vulnerabilities could also arise due to several other factors, including, among them, opacity of exposure amid limited information, time uncertainties over the emergence of risk, mispricing owing to underestimation of climate risks and risk asset exposure from a synchronous shock. All these factors reduce the accuracy of existing risk models and make financial risk forecasting challenging. Overall, financial instability can be compromised from the sudden repricing of assets and liabilities within the financial system, and further exacerbated by a liquidity crunch (figure 1).

Figure 1. Possible transmission channels from climate-related risks to financial system vulnerabilities



Source: Authors, adapted from Brunetti and others (2021).

Climate-related disruptions in the real economy sectors could also compromise price and monetary stability. Traditionally, need for monetary policy responses is determined by events that affect prices and/or price expectations, as these responses are aimed at adjusting aggregate demand to achieve long-term price stability. Regarding climate risk, climate-related demand and supply shocks and the transition process can affect not only macroeconomic variables, such as good prices, but also the natural interest and unemployment rates (Bailey, 2021). As a result, the ability of central banks to deliver price and monetary stability may be hampered.

Finally, analysts have called for the engagement of central banks and financial supervisory authorities in green development because climate risk can pose challenges to the effectiveness of monetary policy. The irreversibility of climate change and its long-term economic impact can influence monetary policy effectiveness through different channels (Bolton and others, 2020). First, climate change can cause “stagflationary” supply shocks (low economic growth and high inflation), which monetary policy may be unable to fully reverse because climate change is likely to persist for a long period of time. Second, tackling climate change requires coordination across countries, thus potentially undermining the effectiveness and relevance of monetary policy actions introduced by individual central banks and financial supervisory authorities. Third, there are concerns over these institutions’ ability to take pre-emptive measures to mitigate “green swan” events, which can be described as rare, unexpected events with wide-ranging or extreme impacts.

2.2. Arguments cautioning the engagement of central banks and financial supervisory authorities

Some analysts have argued that central banks and financial supervisory authorities are not omnipotent and should not go beyond their core mandates. For example, Issing (2019) notes that the responsibility of addressing climate change should be assumed by publicly elected entities, such as governments. In addition, in counterarguing that climate change poses a systemic risk to financial stability, some point out that many other events, such as social unrest and territorial wars, could pose similar risk, but it is not possible to justify these institutions’ active engagements in all these events. In this vein, central banks and financial supervisory authorities should focus effectively on a specific important goal, rather than a wide range of goals that are considered good for social development and the environment (Viner, 1964). Nonetheless, this argument may be weakened by recent evidence that climate change can jeopardize price stability, which is the core mandate of central banks.

It may also be undesirable to allocate much authority and broad mandates to unelected institutions. For example, central banks and financial supervisory authorities have been criticized for implementing unconventional policies by acting as the lender of last resort for the financial system during the 2007–2008 global financial crisis (Volz, 2017). A quasi-fiscal role of these institutions, such as buying government securities in the secondary market, also raises concerns, as such actions do not have political legitimacy in a strict sense. Meanwhile, in countries where these institutions strongly focus on price stability and policy independence, they tend to be less involved in developmental financial policy (Dikau and Ryan-Collins, 2017). For example, the Korea Development Bank began investing in green industries in 2009, while the Export-Import Bank of Korea is the first Asian financial institution to issue green bonds. More broadly, Sindreu (2021) notes that deviations of central banks and financial supervisory authorities from their key mandates have been minor historically. Although central banks in countries, such as Japan and the Republic of Korea, had channelled credit to favoured business sectors, this was always carried out as supplements to government policy.

III. TO WHAT EXTENT ARE ASIA-PACIFIC CENTRAL BANKS AND FINANCIAL SUPERVISORY AUTHORITIES COMMITTED TO GREEN DEVELOPMENT?

This section provides an assessment of the extent that Asia-Pacific central banks and financial supervisory authorities are committed to and engage in green monetary and financial policies. This can be proxied by reviewing their mandates, policy actions and survey-based perspectives (section 3.1) and memberships in international initiatives that call for a greener financial system (section 3.2).

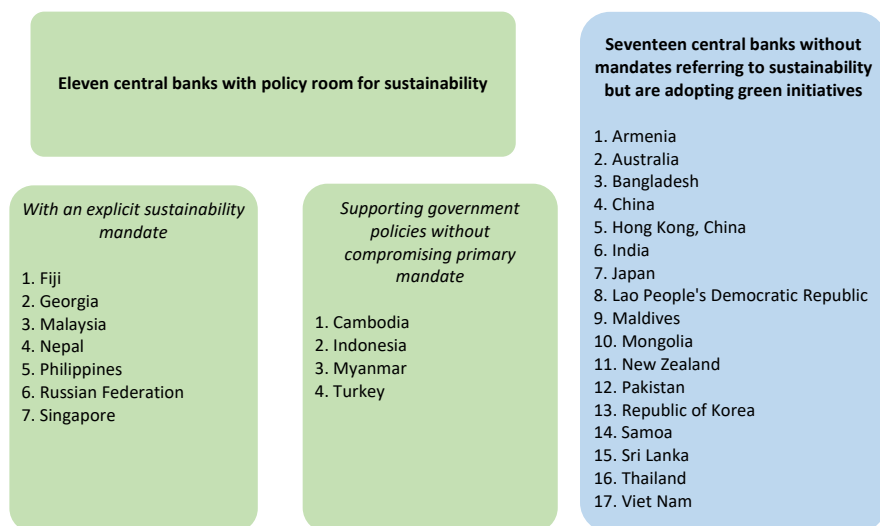
3.1. Mandates and policy initiatives

The extent of a central bank's commitment to green finance can be gauged from its mandate and objectives. According to Dikau and Volz (2020), a central bank is deemed to have policy room to accommodate green development if its mandate or one of its objectives is to (a) enhance, promote or support "sustainability" or "sustainable development/growth", or (b) support government's economic objectives or policy goals, which may comprise sustainability elements. This contrasts with central banks with mandates to promote only "sustained" growth or development.

Approximately half of the central banks in Asia and the Pacific either have room within their mandates or have introduced green monetary policy tools. At the global level, 70 out of 135 central banks are given mandates to enhance sustainability or

economic growth/development (Dikau and Volz, 2020).² Out of these 70 central banks, 11 are from the Asia-Pacific region. These 11 central banks can be further grouped into seven central banks with an explicit sustainability mandate, and the remaining four as those supporting government policies if their actions do not compromise their primary mandate of maintaining price stability (figure 2). Table 1 shows how “sustainability” is referred to by the seven central banks with explicit sustainability mandates. Meanwhile, there are also many central banks around the world whose mandates do not refer to sustainability but have introduced initiatives to promote green development, including being members in international forums on green finance. In the Asia-Pacific region, 15 central banks belong to this group (figure 2). Table 2 shows examples of green policies carried out by these central banks that go beyond forum membership. Some of these policy examples are discussed in more detail in section V.

Figure 2. Asia-Pacific central banks that have policy room for or are already engaged in sustainable central banking



Source: Authors, based on Dikau and Volz (2020).

Note: Armenia and Maldives are added as those adopting green initiatives as the central banks joined the Network for Greening the Financial System in late 2020 and 2021, respectively.

² The analysis is based on the Central Bank Legislation Database of the International Monetary Fund (IMF), which covers 126 central banks. Dikau and Volz (2020) supplemented this with an additional nine central banks that have adopted green finance policies, namely the central banks of Australia, Bangladesh, India, Lebanon, Mongolia, Nigeria, Pakistan, Samoa and Singapore.

Table 1. Sustainability objective statements of Asia-Pacific central banks with explicit mandates on sustainability

Country	Sustainability statements
Fiji	“...to protect the value of the currency in the interest of balanced and sustainable economic growth...”
Georgia	“...shall ensure stability and transparency of the financial system and facilitate sustainable economic growth...”
Malaysia	“...to promote monetary stability and financial stability conducive to the sustainable growth...”
Nepal	“...to maintain the stability of price and balance of payment for sustainable development of economy...”
Philippines	“...to maintain price stability conducive to a balanced and sustainable growth...”
Russian Federation	“...to protect and ensure stability of the rouble by way of maintaining price stability, including for the creation of conditions for balanced and sustainable economic development.”
Singapore	“...to maintain price stability conducive to sustainable growth...”

Source: Authors, based on Dikau and Volz (2020).

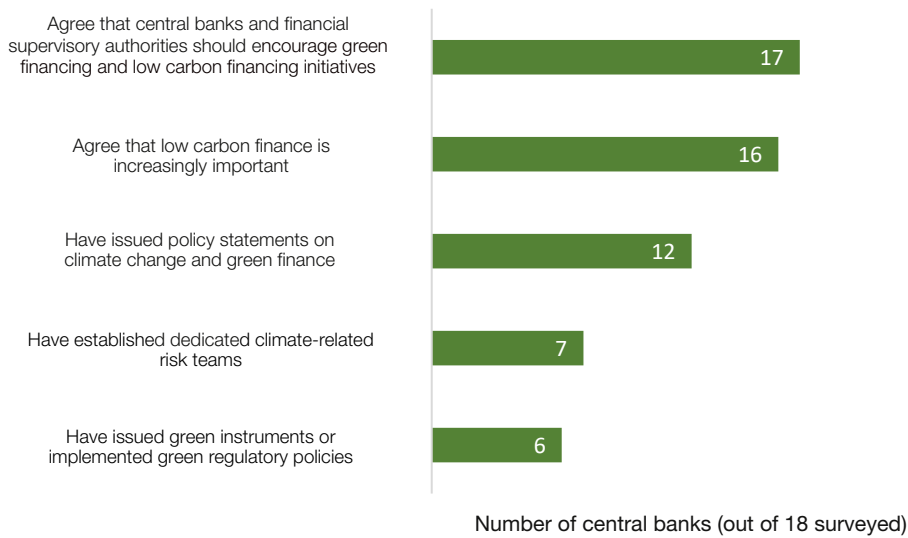
While Asia-Pacific central banks generally value green development, only a few of them have introduced tangible measures to achieve this. In a recent survey of 18 Asia-Pacific central banks (mostly in East and North-East Asia, and South-East Asia), virtually all of them agree that central banks and financial supervisory authorities should encourage green financing and that low-carbon finance is increasingly important (Durrani, Volz and Rosmin, 2020) (figure 3). Two thirds of the respondents note that they have issued policy statements on green finance. Such statements take various forms, such as announcements on sustainable finance frameworks and guidelines to incorporate positive climate actions and speeches by central bank governors. Meanwhile, implementing tangible actions on green finance is less common. Only about one third of the respondents have set up dedicated teams or special task forces to work on mainstreaming climate issues into monetary policy. Their host units are also diverse, ranging from units working on banking supervision, financial inclusion, and risk management to those working on corporate social responsibility and the environment. Finally, approximately one third of the respondents have issued green financial instruments or implemented regulatory policies that encourage private financing for green investments. This includes green-supporting and brown-penalizing factors to enhance the Basel regulatory framework.

Table 2. Examples of green initiatives taken by Asia-Pacific central banks without mandates referring to sustainability

Economy	Examples of initiatives
Australia	2019: Began discussion on incorporating climate models into economic modelling
Bangladesh	2017: Issued Guidelines on Environmental and Social Risk Management for Financial Institutions 2019: Expanded the Green Transformation Fund to include all export-oriented sectors
China	2017: Incorporated green finance into macroprudential assessment system; issued Financial Industry Standardization System Construction Development Plan
Hong Kong, China	2019: Established Centre for Green Finance; announced green finance development measures
India	2019: Revised guidelines for Priority Sectors Lending programme, including renewable energy
Mongolia	2014: Issued Sustainable Finance Principles and Sector Guidelines
New Zealand	2019: Reviewed Act to consider how climate risks could affect financial stability
Pakistan	2017: Issued Green Banking Guidelines; outlined Environmental Risk Management Guidelines
Thailand	2019: Launched Guidelines for Responsible Lending Institutions
Viet Nam	2016: Issued circular on environment, social and governance factors; required lending to take into account the environment 2017: Renewed commitment to implement Green Growth Programme

Source: Authors, based on Dikau and Volz (2020).

Figure 3. Survey results on perspectives and actions on green central banking



Source: Authors, based on Durrani, Volz and Rosmin (2020).

3.2. Participation in multilateral initiatives on green finance

The Network for Greening the Financial System facilitates discussions on how best to address climate risks and scale up sustainable finance. Asia-Pacific central banks and financial supervisory authorities can benefit from lessons learned from more experienced peers to effectively implement new mandates or adapt existing policies to support green development. In particular, the six workstreams of the Network encourage its members to (a) integrate climate risks into financial stability monitoring and microsupervision; (b) integrate sustainability factors into own-portfolio management; (c) bridge data gaps; (d) build awareness and intellectual capacity and encourage technical assistance and knowledge-sharing; (e) achieve robust and internationally consistent climate and environment-related disclosure; and (f) support the development of a taxonomy of economic activities (Network for Greening the Financial System, 2019a). Moreover, the Network for Greening the Financial System conducts periodic surveys to gauge members’ progress on green initiatives. These surveys could motivate Asia-Pacific central banks and financial supervisory authorities to benchmark themselves against peers. As of June 2021, of the 95 members of the Network, 19 are from the Asia-Pacific region (table 3). All these central banks and financial supervisory authorities are in developed and emerging economies, except for the central bank of Cambodia.

Table 3. Asia-Pacific central banks and financial supervisory authorities that are members of the Network for Greening the Financial System and/or the Sustainable Banking Network

	Network for Greening the Financial System	Sustainable Banking Network
Australia	•	
Armenia	•	
Bangladesh		•
Cambodia	•	•
China	•	•
Fiji		•
Georgia	•	•
Hong Kong, China	•	
India	•	•
Indonesia*	•	•
Japan*	•	
Kazakhstan		•
Kyrgyzstan		•
Lao People's Democratic Republic		•
Maldives		•
Malaysia	•	
Mongolia		•
Nepal		•
New Zealand	•	
Pakistan		•
Philippines	•	•
Republic of Korea*	•	
Russian Federation	•	
Samoa		•
Singapore	•	
Sri Lanka		•
Thailand	•	•
Turkey		•
Viet Nam		•
Total	19	20

Source: Authors, based on Network for Greening the Financial System (2021b) and IFC (2021b).

Note: *Denotes a country where both the central bank and a financial supervisory authority are members of the Network for Greening the Financial System. These authorities are the Financial Services Authority of Indonesia, the Financial Services Agency of Japan and the Financial Services Commission of the Republic of Korea.

The Sustainable Banking Network promotes the transition of financial sectors towards environmental sustainability. It is a community of financial sector regulatory agencies and banking associations from developing countries that are committed to advancing sustainable finance (IFC, 2021a). The twin goals are to improve risk management that takes into account environmental, social and governance (ESG) factors, and to mobilize additional capital flows for activities with positive climate impacts. With support from the International Finance Corporation (IFC), the Network aims to (a) provide technical assistance to members in developing and implementing national sustainable finance frameworks; (b) convene a global platform for practitioners to benefit from best practices and collective learning; and (c) provide capacity-building and knowledge-sharing that focus on peer-to-peer exchanges among the members. Of the 43 member countries, 20 are from Asia and the Pacific, including four least developed countries (Bangladesh, Cambodia, the Lao People's Democratic Republic and Nepal) (table 3).

The United Nations Principles for Responsible Investments urges central banks to employ responsible investment strategies for official reserves management. While safeguarding investment returns, central banks can also help foster sustainability by establishing responsible investment frameworks for reserves management at the strategy, policy and asset-class levels (Gerritsen, 2019). Signatories of the United Nations Principle for Responsible Investments are committed to six core principles, namely (a) incorporating ESG issues into investment analyses and decisions; (b) integrating ESG issues into ownership policies and practices; (c) seeking appropriate disclosure on ESG issues by investee entities; (d) promoting acceptance and implementation of the Principles within the investment industry; (e) working together to enhance effectiveness in implementing the Principles; and (f) reporting on activities and progress towards implementing the Principles (United Nations Principles for Responsible Investments, 2021). As of June 2021, the Hong Kong Monetary Authority is the only Asia-Pacific central bank and financial supervisory authority signatory of the Principles. Generally, central banks in the region are reluctant to become signatories due to the sensitivity for disclosing the breakdown of and management processes for public assets.

The Sustainable Insurance Forum helps countries to integrate sustainability factors into the regulation and supervision of insurance companies. Partly based on the United Nations Environment Programme (UNEP) Principles for Sustainable Insurance, the Forum aims to equip its members with practices in climate risks in the insurability of assets, sustainability beyond climate change (such as habitat loss and biodiversity changes), and incorporation of climate risks into actuarial processes. Together with the International Association for Insurance Supervisor, the Forum has

set out broad principles on various areas, such as roles of supervisory agencies and corporate senior management, specific climate risk considerations to enhance corporate governance's control functions (such as pricing and underwriting of risks), asset and liability management, investment risk assessment, and public disclosure (Sustainable Insurance Forum, 2021a). In this regard, Asia-Pacific central banks and financial supervisory authorities can adapt some of these principles to existing insurance regulatory and supervisory frameworks and influence a common industry policy. As of June 2021, however, only 4 out of 30 Sustainable Insurance Forum members are from Asia and the Pacific (Sustainable Insurance Forum, 2021b). All of them represent more developed countries of the region, namely, the central banks in New Zealand and Singapore and financial supervisory authorities in Australia and Japan.

IV. HOW CAN CENTRAL BANKS AND FINANCIAL SUPERVISORY AUTHORITIES PROMOTE GREEN DEVELOPMENT? – SELECTED PRINCIPLES AND FRAMEWORKS

This section presents some principles and conceptual frameworks that have been proposed to facilitate central banks and financial supervisory authorities' effort in incorporating climate risk mitigation measures into their policy conduct. These include broad principles and guidance (section 4.1) and a specific sustainability-enhanced toolbox (section 4.2). While these measures may not be sufficient to address climate transition risks, they can be tailored to complement existing fiscal tools in each country.

4.1. Broad principles and guidance

Climate-related risks are distinct from the risks that central banks and financial supervisory authorities are typically exposed to, measure, control and manage. These risks can be characterized by a deep or radical level of uncertainty (Bolton and others, 2020) intertwined with multiple and interacting dynamics that could lead to unexpected, uneven and possibly unlimited downside liability on damage (Weitzman, 2011). This could potentially translate into extreme events with systemic impacts. Accordingly, conventional approaches taken by central banks and financial supervisory authorities to manage financial risks may not be able to effectively deal with the complexity and uncertainty associated with climate risks. This may be partly because existing frameworks are generally based on current estimation of risk likelihood and stress testing using backward-looking scenarios. On balance, forward-looking risk assessments that incorporate climate risks should be considered to manage financial stability.

There are various ways that central banks and financial supervisory authorities can integrate climate issues into their operations and policy conducts. For example, these institutions can incorporate climate risks into regulatory frameworks, adopt prudential policies that recognize systemic climate risk and introduce monetary policy tools to address climate change within the limits of existing mandates (Grippa, Schmittmann and Suntheim, 2019). To support this, the International Monetary Fund (IMF) has conducted studies to enhance understanding of risks, vulnerabilities and the transmission mechanism arising from climate change along with initiatives to close data gaps. For instance, one of its recent policy guidance discusses emerging climate risks, exposure to brown assets, policy options to diversify carbon-intensive economies, and approaches to mitigate the adverse social impact of a transition to a low-carbon economy (IMF, 2021). Meanwhile, the Bank for International Settlements (BIS) proposes that central banks and financial supervisory authorities serve as coordinating agents and advocates to combat climate risks (Bolton and others, 2020). Possible considerations for them are to integrate climate risks into prudential regulation and financial stability monitoring; integrate the ESG principles into reserves management; explore potential impacts of green policy measures on financial stability; and examine approaches to better capture the complex and uncertain interactions between climate and socioeconomic systems.

Asia-Pacific central banks and financial supervisory authorities can also learn from actions taken by multilateral financial organizations to tackle climate change. Among other initiatives, IMF has started to integrate climate issues and risks into its economic assessment and financial sector surveillance and scale up capacity development programmes on climate issues (Georgieva, 2021). Meanwhile, the Basel Committee on Banking Supervision (BCBS) has established the Task Force on Climate-related Financial Risks, which is tasked to study the transmission channels of climate risk and methodologies to measure and assess climate risks (Stiroh, 2020). Based on its inaugural reports released in April 2021, BCBS plans to further examine which climate-related financial risks can be addressed within the existing Basel Framework and identify potential gaps in the current framework (BIS, 2021).

4.2. Sustainability-enhanced toolbox

Dikau, Robins and Volz (2020) have proposed a specific toolbox to guide the incorporation of sustainability factors into the operations of central banks and financial supervisory authorities. The following is suggested in the toolbox: (a) ensuring that climate risks are accurately reflected in central banks' balance sheets and operations; (b) reducing climate risks faced by regulated financial institutions through prudential supervision; (c) avoiding the build-up of climate risks at the level of the financial

system; and (d) supporting governments' efforts to scale up sustainable finance. To implement these principles, a toolbox groups different types of policy tools into monetary policy, prudential measures, and other means, shown in table 4.

Table 4. Sustainability-enhanced toolbox

Central banks and financial supervisory authorities tools	Potential sustainability-oriented measures
A. Monetary policy	
Collateral frameworks	<ul style="list-style-type: none"> • Instead of solely relying on credit quality, collateral frameworks can be tailored to be carbon neutral, take climate- and other sustainability-related financial risks into account and apply haircuts to account for these risks. • Exclude asset classes that do not align with the Paris Agreement.
Indirect monetary policy instruments	<ul style="list-style-type: none"> • Recalibrate standard instruments to include climate-related considerations, with differentiated reserve requirements and risk weights to account for climate-related financial risk. • Align refinancing operations to account for haircuts and/or negative exclusion criteria. • Differentiated interest rates on financial instruments based on climate-related criteria.
Non-standard instruments	<ul style="list-style-type: none"> • Asset-purchase programme to exclude carbon-intensive assets. • Direct short-term credit to government to support sustainable fiscal policies, possibly with limits on the scope and scale of the fund. • Purchase of green sovereign bonds, issued by the government, in the secondary market.
Direct monetary policy instruments	<ul style="list-style-type: none"> • Interest rate ceilings for sustainable priority sectors, asset classes, or corporations. • Minimum/maximum allocation of credit through credit ceilings or quotas to restrict/promote lending to carbon intensive/sustainable sectors. • Targeted refinancing lines to promote credit for green sectors. • Window guidance/moral suasion to promote lending to sustainable sectors.
B. Prudential measures	
Microprudential instruments	<ul style="list-style-type: none"> • Stress testing frameworks that acknowledge climate risks and help firms consider longer-term risks. • Mandatory disclosure requirements for climate-related financial risks. • Supervisory review process that highlights management of climate-related financial risks. • Climate risk-sensitive calibration of other Basel III instruments, distinguishing between low-carbon and carbon intensive/high-exposure assets to create buffers against climate-related losses.^a

Table 4. (continued)

Central banks and financial supervisory authorities tools	Potential sustainability-oriented measures
	<ul style="list-style-type: none">• System-wide stress testing that acknowledges and assesses systemic climate-related financial risks.• Pro-cyclical instruments calibrated to account for and mitigate systemic risk implications of climate change and restrain build-up of risk-taking activities.^b• Cross-sectional instruments calibrated to account for and mitigate systemic risk implications of climate change and to mitigate individual institutions' contribution to systemic risk.^c
C. Other policy tools ^d	
Financing schemes and other initiatives	<ul style="list-style-type: none">• Financing or loan guarantees with conditions for reduction of carbon emissions or other sustainability elements.• Incorporation of climate-related considerations into bail-out packages.• Funding sustainable lending/investment schemes through refinancing credit lines via development finance institutions or purchase of bonds in the secondary market or direct refinancing operations.• Tailoring supervisory frameworks for development banks that are regulated by financial supervisory agencies to enhance their public policy capacity to assume more risk and promote economic transformation.
Management of central banks' portfolio	<ul style="list-style-type: none">• Disclosure of climate-related financial risks in own portfolios or adopting sustainable and responsible investment principles for portfolio management.^e
Supporting sustainable finance	<ul style="list-style-type: none">• Sustainable finance taxonomy/roadmaps/guidance for financial institutions.• Advice and dialogue with other parts of the government.• Research and publication of handbooks and resources, such as reference scenarios, risk assessment methodologies.• Capacity-building programmes in sustainable finance for the financial sector.

Source: Dikau, Robins and Volz (2020).

Notes: ^a Examples are differential risk-based capital requirements and lower required stable funding factor for green loans.

^b These include counter-cyclical and higher capital buffer to prevent prolonged periods of excessive carbon-intensive credit growth, and loan-to-value and loan-to-income ratios to limit credit provided to carbon-intensive industries.

^c Examples are restrictions to limit financial institutions' exposure to highly carbon-intensive sectors, and capital surcharges to financial institutions with high exposure to carbon-intensive assets.

^d Unlike monetary policy tools, these auxiliary tools are designed to meet developmental mandates, rather than to achieve financial stability.

^e The Network for Greening the Financial System has set out guidelines for a central bank's portfolio management to incorporate sustainability and responsible elements, including strategies, monitoring, and reporting.

4.2.1. Monetary policy

Collateral framework. At least two practical approaches can be used to develop climate-aligned collateral frameworks (Dafermos and others, 2021a). The first is a climate footprint approach, which applies different valuations or haircut adjustments to sustainability-oriented bonds, such as blue, brown and green bonds. The second method is a climate-risk approach to reflect the expected default rates of bond issuers under different climate-transition scenarios. Examples are exclusion or inclusion of financial instruments and assets based on sustainability assessments. These adjustments are operationally feasible, as past experiences point to some adaptability of central banks and financial supervisory authorities' collateral frameworks. For example, in response to the COVID-19 pandemic, approximately 55 central banks worldwide have amended their collateral frameworks (Dikau, Robins and Volz, 2020).

Indirect monetary policy operations. Central banks can consider differentiating reserve requirements and risk weights based on carbon footprint and climate-related financial risks. Among others, the objective for indirect monetary policy operations is to ensure adequate market liquidity and that effective interest rates are in line with policy interest rates. This can be executed through the buying and selling of central bank and government securities. Certain central banks also use standing facilities and reserves requirements to manage available market liquidity. Similar to collateral frameworks, central banks and financial supervisory authorities open market operations, standing facilities, reserve requirements and refinancing operations are often calibrated without sustainability considerations, and consequently leading to carbon bias (Dikau, Robins and Volz, 2020). This can be changed to support climate action.

Non-standard instruments. Unconventional monetary policy, particularly asset purchase programmes, can be geared towards green assets. Largely introduced after the 2007–2008 global financial crisis, these central banks' asset purchase programmes provide monetary stimulus by lowering financing costs on corporate and government bonds. The purchases can also stimulate portfolio rebalancing and spur new issuances (Bank of England, 2021). As such, central banks and financial supervisory authorities can consider green asset purchases that are aimed at subsidizing green assets, incentivizing investors to hold green assets without compromising financial stability and excluding carbon-intensive assets from asset purchases.

Direct monetary policy instruments. Central banks and financial supervisory authorities can offer subsidized lending rates for green sectors. One of the common direct monetary policy instruments is direct credit allocation, which aims to promote priority sectors by inducing lower financing rates or increased liquidity. To achieve

this, available policy tools are subsidized loan rates, differential rediscount rates, direct budgetary subsidies, credit floors and ceilings, and proliferation of specialized financial institutions (Fry, 1995). Among these instruments, the most conventional is subsidized loan rates for priority sectors (Volz, 2017).³ Moreover, central banks and financial supervisory authorities can accept sustainability-linked instruments, such as carbon certificates, as part of commercial banks' legal reserves, and introduce green refinancing lines with preferential terms for specified green assets to compensate financial institutions for lending to carbon-absorption projects (Dikau and Volz, 2020).

4.2.2. Prudential measures

Microprudential measures. Disclosure requirements, supervisory review and stress testing can be used as microprudential measures to support green development. As standardized methodologies for quantifying climate risks are still being developed, central banks and financial supervisory authorities can take a wide range of qualitative measures to assist regulated entities in mitigating climate risks (Network for Greening the Financial System, 2020). For example, central banks and financial supervisory authorities can issue disclosure requirements for climate-related financial risks, which include regulated entities' plans to integrate climate risks into their business strategy and risk management frameworks, as well as actions to mitigate any detected vulnerabilities. Central banks and financial supervisory authorities can also carry out a supervisory review process to identify climate risks being faced by regulated entities and evaluate how these risks may affect their business model, capital and liquidity. Meanwhile, stress testing to assess the implications of climate risks and effectiveness of mitigation measures should be carried out under different climate scenarios. Finally, moving from voluntary to mandatory environmental reporting strengthens the information base, which helps enhance the assessment of default likelihood and the design of prudential instruments (Dikau, Robins and Volz, 2020).

Macroprudential measures. Improving risk monitoring and developing a national green taxonomy can help reduce systemic risk. Central banks and financial supervisory authorities can amend existing risk monitoring and mitigation measures to avoid the build-up of transition risks on the balance sheets of financial institutions, which could translate into a system-wide vulnerability. They could also recalibrate regulatory tools to account for and mitigate systemic risk implications of climate change and restrain the accumulation of risk-taking in carbon-intensive sectors. Among other policy measures, these institutions could establish a common principle-based taxonomy for market participants as a guidance for stress testing and regulatory reporting.

³ To ensure its effectiveness, direct credit allocation may be subject to clearly defined and monitored performance targets.

This is especially relevant for the insurance sector, which is often most exposed to climate liability risks. Moreover, raising awareness among market participants about emerging climate risks could make regulated entities more proactive, as systemic risk could eventually hamper individual institutions. Finally, conducting a system-wide assessment and stress testing would prompt corporations to rethink their commitments to climate change and the impact of climate change on their business models (Beau, 2021).

4.2.3. Other policy tools

Targeted financing scheme. Existing financing schemes can be amended to include sustainability conditionality. Central banks and financial supervisory authorities can influence the broad financial sector to increase capital allocation to climate-related projects through conditional lending facilities, such as loan guarantees requiring reduction in carbon emissions, and targeted funding to promote climate-related economic transformation activities, such as asset purchase programmes in the secondary market and refinancing operations with sustainability conditionality. Central banks and financial supervisory authorities could also prioritize the financial sector's credit allocation and/or moral suasion to increase climate financing through direct decree via financial intermediaries.

Management of central bank's portfolio. Central banks' portfolio management could benefit from ESG integration. The Network for Greening the Financial System outlines two sustainable and responsible investment objectives for the portfolio management of central banks and financial supervisory authorities. The first is to deal with the impact of climate risks on the portfolio, while the second objective aims to address the impact of the portfolio on the environment and society alongside financial returns (Network for Greening the Financial System, 2019b). In this regard, the Network for the Greening the Financial System proposes five strategies: (a) negative screening excluding undesired exposure; (b) best-in-class or positive screening and/or index-adjusted weighting to account for climate impacts; (c) ESG integration into investment process to improve the risk-return profile of the portfolio; (d) impact investing to generate an intentional and quantifiable positive climate impact alongside financial returns; and (e) voting and engagement, which involves exercising ownership rights with an intention of influencing a company's behavior.⁴ Meanwhile, when central banks and financial supervisory authorities outsource their

⁴ Negative screening and green bond investments are currently the two most common strategies largely because both activities do not require significant adjustment to the asset allocation or investment process.

portfolio management function to external fund managers, they can also introduce internal ESG guidelines encompassing the selection process, appointment, and performance monitoring.

Supporting sustainable finance. A variety of policy tools are available for promoting sustainable finance. Among others, central banks and financial supervisory authorities can consider auxiliary measures, such as introducing a sustainable finance road map as guidance for financial institutions, holding regular policy dialogues with government agencies and offering training on sustainable finance for financial sector participants. Central banks and financial supervisory authorities can also provide fund managers with seed capital to support an issuance of climate funds and innovation funds that seek to enhance green technologies. By attracting additional capital, this initial capital is expected to enhance the quality of green infrastructure and boost green economic activities over time.

V. HOW HAVE CENTRAL BANKS AND FINANCIAL SUPERVISORY AUTHORITIES PROMOTED GREEN DEVELOPMENT? – SELECTED CASE EXAMPLES

This section contains examples of green monetary and financial policy tools that have been introduced in the Asia-Pacific region and beyond. Based on the toolbox proposed by Dikau, Robins and Volz (2020), which is discussed in the preceding section, these examples are grouped into monetary policy (section 5.1), prudential measures (section 5.2), and other policy tools (section 5.3). Fifteen cases are discussed, including 12 from the Asia-Pacific region.

5.1. Monetary policy

Collateral framework: The collateral framework of the European Central Bank. In July 2021, the European Central Bank published a road map on integrating climate change into its monetary policy (table 5) (European Central Bank, 2021), which includes a collateral plan to consider climate risks when reviewing the valuation and risk control for assets mobilized as counterparties' collateral for the Eurosystem credit operations.⁵ It also intends to introduce green disclosure requirements for private assets as new eligibility criterion or as a basis for differential treatments for collateral. Meanwhile, the European Central Bank announced in September 2020 that it would accept sustainability-linked bonds as collateral for Eurosystem credit

⁵ Amendments to collateral framework account for three out of the nine measures outlined by the European Central Bank detailed road map of climate change-related actions.

operations (European Central Bank, 2020). These instruments may also be eligible for asset purchases programmes. Such bonds have coupons linked to sustainability performance targets with reference to the European Union Taxonomy Regulation or the Sustainable Development Goals relating to climate change and environmental degradation.

Table 5. The European Central Bank road map to incorporate sustainability elements into collateral framework

Climate-related Measures	2021	2022	2023	2024
Disclosures in line with European Union policies as an eligibility requirement in collateral framework and asset purchases	-	Design policies and conduct legal and operational preparations	Adaptation period for issuers	In force
Climate change risks in credit ratings for collateral and asset purchases	- Assess rating agencies' disclosures - Understand how rating agencies incorporate climate risk in ratings - Develop minimum standards for internal credit rating		- Introduce requirements into the Eurosystem Credit Assessment Framework targeted to climate change risk	
Climate change risks in the collateral framework	- Review collateral valuation and risk control framework to ensure incorporation of climate risks - Assess financial innovation related to environmental sustainability		- Monitor the adequacy of the collateral valuation and risk control framework to ensure that climate change risks are properly reflected	

Source: European Central Bank (2021).

Indirect monetary policy operations: market liquidity management facilities in China. The People's Bank of China announced in 2018 that plans to broaden the asset classes being accepted as collateral for the medium-term lending facility (MLF), which offers 3-, 6-, and 12-month lending facilities to financial institutions. In effect, this set forth a green refinancing policy, as the enhanced the medium-term lending facility allows commercial banks to use green loans and bonds as well as bonds issued to finance micro and small enterprises and agricultural corporations as collaterals

for borrowing from the Bank at discounted rates (Durrani, Volz and Rosmin, 2020). Moreover, to encourage financial institutions to increase support to green economy and small and medium-sized enterprises (SMEs), the Bank has also prioritized green and SME bonds over other financial bonds (People's Bank of China, 2018).⁶

Non-standard instruments: corporate asset purchase programmes in Sweden.

The Sveriges Riksbank implemented a norm-based negative screening for its corporate bond purchase programme in January 2021. This screening limits the corporate asset purchases of the Riksbank to only bonds issued by companies that comply with international standards and norms for sustainability (Andersson and Stenström, 2021). The exclusion is largely based on the assumption that climate risks are insufficiently incorporated into the existing asset purchase framework. In particular, measuring climate-related financial risks is challenging because of the unavailability of standardized methods and, financial information on climate risks faced by companies is either inadequate, incomplete or inconsistent. In cases in which the Riksbank already has exposure to bonds issued by companies that do not meet this norm, it might sell the bonds and refrain from making further purchases. Meanwhile, beyond corporate asset purchases, the Riksbank also applies negative screening to manage government funds based on certain core values, such as human rights, environment and anti-corruption.

Direct monetary policy instruments (1): green refinancing scheme in Bangladesh.

Over the past few years, Bangladesh Bank has offered several refinancing schemes for green projects. One example is the revolving relending facility, introduced in 2014, to promote environment friendly brick kilns by reducing carbon emissions and refining particulate pollution from brick kilns (Bangladesh Bank, 2020b). This \$50 million facility was fully disbursed and funded by excess liquidity of locally incorporated Islamic banks, thus promoting Islamic banks' contribution to green finance. Another initiative is the Green Transformation Fund, introduced in 2016. This long-term refinancing scheme initially aimed to make export-oriented textile, leather and jute sectors more sustainable (Bangladesh Bank, 2020a). In 2019, the scope of the fund was broadened to cover all export-oriented sectors, while the fund size also increased from \$200 million to 200 million euro (€) (\$225 million) in 2020. The fund covers projects that promote more efficient water use, sustainable waste management and efficient temperature management. Despite the low financing rate, however, the uptake rate was at a relatively low level of 21 per cent at end-2020. This

⁶ Macaire and Naef (2021) note that this policy measure has helped reduce the yields of green financial bonds by 46 basis points relative to non-green financial bonds, with a pass-through effect to the primary market and a reduction in spread at issuance by 53.8 basis points.

can be partly attributed to insufficient industry's technical knowledge/competencies related to it and strict fund requirements (Hossain, 2021).

Direct monetary policy instruments (2): green direct lending scheme in Japan.

The Bank of Japan announced in July 2021 that it would provide no-interest loans to commercial banks to support green lending activities (Fujikawa, 2021). Eligible instruments are green and sustainability-linked loans and bonds with performance targets related to climate change and transition finance (Bank of Japan, 2021a). The decision to lend to commercial banks, rather than directly to corporations, stems from market neutrality considerations that aim to avoid resource allocation at a micro level (Bank of Japan, 2021b). The target duration of the fund is one year in principle, with options for counterparties to unlimited rollovers subject to the amount outstanding. The scheme also allows financial institutions to reduce the amount of deposits with the Bank of Japan, which currently earn a negative interest rate, on the condition that they disclose specific information on their efforts to address climate change.

5.2. Prudential measures

Microprudential measures (1): framework guidance on climate-related financial risks in Australia. In April 2021, the Australian Prudential Regulation Authority released a draft guidance on assessing climate vulnerability for banks, insurers and superannuation trustees (Australian Prudential Regulation Authority, 2021). The draft lays out the Authority's expectations for the regulatory standards encompassing risk identification and monitoring, scenario analysis, risk management, reporting and disclosure. These standards are flexible and designed to allow each regulated entity to adopt an approach that fits its size, customer base, business strategy and complexity of operations. In cases in which financial institutions lack the data or expertise to conduct quantitative stress testing, they may consider narrative-driven scenarios that provide insights into their operations and channels of risk transmission. Meanwhile, the regulated entities are encouraged to work with customers, counterparties and organizations to improve their risk profile. When such stakeholder engagement is, however, deemed insufficient in addressing climate risks, the regulated entities should consider mitigation options, such as adopting risk-based pricing measures and applying limits on their exposure to such an entity or sector.

Microprudential measures (2): climate-risk assessment taxonomy for financial institutions in Malaysia. Bank Negara Malaysia issued, in April 2021, the Climate Change and Principle-Based Taxonomy as a guiding document for financial institutions to assess climate risks. The taxonomy specifically aims to (a) provide an overview of the economic impact of climate change; (b) introduce a taxonomy for financial institutions to assess and categorize activities, based on the extent that

these activities meet climate objectives and promote the low-carbon transition; and (c) facilitate standardized classification and reporting of climate-related exposures in order to support risk assessments, enhance transparency and encourage financial flows towards climate objectives (Bank Negara Malaysia, 2021). The taxonomy also provides an outline of a relevant national environmental policy agenda to assist financial institutions in aligning their actions with the government's transition pathway. To support an orderly transition, the taxonomy introduces a progressive system of transition categories, which classifies economic activities as climate supporting, in transition or on a watchlist. The classification is based on assessments on climate change adaptation and mitigation measures and remedial efforts to promote the low-carbon transition.

Macroprudential measures (1): relaxing macroprudential limits for green financing in Indonesia. In late 2019, Bank Indonesia allowed the cap on the loan-to-value ratio for green property loans to increase by 5 per cent and reduced the minimum down payment required to purchase electric vehicles by 5 to 10 per cent, depending on vehicle types. From October 2020, this minimum down payment was further reduced to zero per cent. To maintain financial stability, financial institutions are eligible to participate in the scheme if their non-performing loan ratios for total loans and automotive loans are below 5 per cent. These policy amendments were made to support green development and mitigate potential disruptions to financial stability resulting from environmental degradation (Bank Indonesia, 2021). More broadly, these policy adjustments are aligned with the national agenda for Indonesia to become a major producer of electric vehicles and complement favourable tax rates on locally manufactured electric vehicles.

Macroprudential measures (2): climate pilot exercise in France. In May 2021, the Autorité de Contrôle Prudentiel et de Résolution published the inaugural system-wide report that assesses the exposure and contemplated response to the transition and physical risks of climate change. The assessment covers a long 30-year time horizon, multiple scenario analyses with a breakdown by economic sector and an innovative hypothesis (Autorité de Contrôle Prudentiel et de Résolution, 2021). The assessment also identifies the most detrimental climate risk and/or transition sensitive factors, which go beyond carbon emissions and accounting for the negative demand shocks of carbon tax implementation. In addition to the objective of assessing the exposure and response to climate risks, this pilot exercise was designed to raise understanding among banks and insurance companies on the transmission channels of climate risks (Beau, 2021). A critical element of the assessment is the implementation of an innovative dynamic balance sheet assumption from 2025 to 2050, which complements standard static balance sheet assumptions applied for

the first five years of the exercise.⁷ Overall, this innovative approach helps inform participating institutions on how to mobilize a cross-disciplinary team to integrate a climate risk assessment and demonstrates the limits of the current models related to climate change.

5.3. Other policy tools

Targeted financing scheme (1): priority sector lending in India. The financing policy of the Reserve Bank of India is anchored around the priority sector lending guideline, which aims to harmonize various directives issued to financial institutions, ensure alignment with emerging national priorities and bring sharper focus on inclusive development (Reserve Bank of India, 2021a). According to this guideline, financial institutions should allocate 40 per cent of their lending to areas deemed socially important, such as agriculture and SMEs. In 2015, the Bank amended the priority sector lending guideline to include social infrastructure and small renewable energy projects in order to support green financing (Durrani, Volz and Rosmin, 2020). In the renewable energy segment, loans for solar- and biomass-based power generators, windmills and micro-hydel plants are considered within the priority sector lending requirements. Under this scheme, firms engaged in renewable energy sector are eligible for loans of up to 300 million Indian rupee (Rs) (\$4 million), which has been raised from 150 million rupee since September 2020 (Reserve Bank of India, 2021b). Households are also eligible for loans up to one million rupee for investing in renewables. As a result of these measures, the total outstanding bank credit to the unconventional energy sector was 7.9 per cent of outstanding bank credit to power generation as of March 2020, up from 5.4 per cent in March 2015 (Reserve Bank of India, 2021b).

Targeted financing scheme (2): moral suasion to promote green credits and capacity-building in Viet Nam. In 2015, the State Bank of Vietnam issued a directive requiring financial institutions to ensure sustainable development while providing loans and to review, adjust and complete their operation frameworks that are aligned with green growth (State Bank of Viet Nam, 2015). In late 2016, it explicitly required that all financing activities carried out by the regulated entities conform to environmental regulations (State Bank of Viet Nam, 2016). Moreover, following the 2017 launch of the Green Project Catalogue, under which the classification of green activities in Viet Nam is standardized, the Bank introduced the green banking development scheme in

⁷ Unlike the static capital structure approach, the dynamic balance sheet assumption considers how corporations can react to the materialization of climate-related risks. This approach also considers possible changes in corporate strategies and their impact on capital structure when complying with commitments to address climate change.

2018 (State Bank of Viet Nam, 2018). This scheme is intended to gradually increase lending to priority green projects; accelerate the application of green technologies and practices among the banks' clients, such as electronic financial transactions; and ensure that by 2025 all banks have internal frameworks to manage environmental and social risks for their lending activities.⁸ On its part, the Bank set out incentives and preferential mechanisms to support green lending activities and promote capacity-building on green banking. Partly driven by these policy changes, the balance of green loans in Viet Nam reached \$3.8 billion by mid-2019, up by 32 per cent from 2018 (Huong, 2021).

Management of central bank's portfolio (1): responsible portfolio investment in Hong Kong, China. In May 2019, the Hong Kong Monetary Authority introduced several key measures on sustainable banking and finance, including the establishment of a centre for green finance. One important measure was to adopt responsible investment principles for its Exchange Fund under which priority is given to ESG investment if the long-term return is comparable to other investments on a risk-adjusted basis (Hong Kong Monetary Authority, 2019). To support this, the Authority incorporated ESG factors into its credit risk analysis, required external managers to comply with the principles of responsible ownership promulgated by the Hong Kong Securities and Futures Commission, and planned to expand its green bond portfolio and participate in ESG-themed public equities investments. For private market investments, the Authority has invested in renewables since 2013 and included green accreditation as a predominant factor for real estate investments (Hong Kong Monetary Authority, 2021).

Management of central bank's portfolio (2): increasing central bank's investments into ESG assets in the Republic of Korea. As part of an effort to conduct sustainability-oriented central banking practices, the Bank of Korea has gradually expanded its investments in ESG assets. At end-2020, investment in ESG equities and fixed-income securities, including through the external fund management programme, was at \$5.46 billion or approximately 1.2 per cent of the foreign exchange reserve value (table 6). The Bank of Korea aims to increase its ESG investment further to strengthen the public accountability of official reserve management and enhance the overall investment performance (Bank of Korea, 2021).

⁸ The State Bank of Viet Nam has also set a target of at least 10 banks to establish specialized units for managing social and environmental risks, and at least 60 per cent of all banks to have access to green capital resources and provide green credits.

Table 6. Investment in environmental, social and governance (ESG) assets by the Bank of Korea

Fund managers	Financial instruments	Market value (\$ billion)	Share of foreign exchange reserves (per cent)
Internal	Bonds	3.49	0.8
External	Bonds	0.89	0.2
	Equities	1.08	0.2
Total		5.46	1.2

Source: Bank of Korea (2021).

Supporting sustainable finance (1): supporting sustainable financial market development in Singapore. One of the goals of the Monetary Authority of Singapore is to support the financial sector in mitigating climate risks and promoting green projects to foster a diverse ecosystem of green financing capabilities and promote green development in Asia and the Pacific. To this end, the Authority set up the \$2 billion Green Investment Programme in 2019 to invest in sustainability-oriented public market investment strategies (Monetary Authority of Singapore, 2019). The first investment under the Programme is a \$100 million placement with the BIS Green Bond Investment Pool. As of June 2021, \$1.8 billion has been allocated to five asset managers who are tasked with establishing their sustainability hubs in Singapore and launching new ESG-thematic funds for the Asia-Pacific region (Menon, 2021). The Authority also expects these managers to exercise their shareholder rights to influence their investee companies to address climate risks and move towards more sustainable practices.

Supporting sustainable finance (2): coordinating financial sector initiatives in Thailand. In August 2021, the Working Group on Sustainable Finance, consisting of the Bank of Thailand, the Fiscal Policy Office, the Securities and Exchange Commission, the Office of Insurance Commission and the Stock Exchange of Thailand, jointly published an initiative on sustainable finance that sets the direction and framework for sustainable finance for the financial sector (Working Group on Sustainable Finance, 2021). The initiative has five key strategic objectives: (a) developing a practical economy, which serves as a common definition and classification system of economic activities; (b) improving data environment and quality for disclosure and transparency; (c) implementing effective incentives for fundraisers and investors; (d) creating demand-led sustainable financial products and services; and (e) building human capital to accelerate the sustainability transformation of the financial sector. On its part, the Bank of Thailand has incorporated sustainability into its strategic plan and organizational culture (Bank of Thailand, 2019a). Moreover, it is working with the

International Finance Corporation to develop a sustainability road map and tools that help strengthen ESG risk management practices among financial sector participants (Bank of Thailand, 2019b). This partnership will also facilitate knowledge-sharing with other central banks and financial supervisory authorities in the Association of Southeast Asian Nations (ASEAN) and Sustainable Banking Network members.

VI. GOING FORWARD: SELECTED POLICY AND IMPLEMENTATION ISSUES

While section V shows that several Asia-Pacific central banks and financial supervisory authorities have pioneered green policy initiatives, the conduct of green monetary and financial policies in the region remains in its infancy stage. The discussion in this section is on fundamental policy actions that Asia-Pacific central bank and financial supervisory authorities could take at this initial stage (section 6.1) and highlights several policy and operational issues that central banks and financial supervisory authorities should be mindful of as they further pursue green finance policies (section 6.2).

6.1. Desirable policy actions at the initial stage

Clear guiding principles and effective communications are critical for central bank and financial supervisory authorities to establish the legitimacy of their green actions. As these institutions pursue green development journey, they may face legal and operational challenges when considering existing mandates (Groepe, 2016). In addition to having in place clear guiding operating principles and solid climate risk assessments, an effective communication strategy with relevant stakeholders (such as government agencies, business sectors and the public at large) is important (Volz, 2017). A carefully planned communication strategy can shield central banks and financial supervisory authorities to some extent, from credibility risks that may arise from trying to pursue too many objectives with limited instruments. Such stakeholder consultations also promote transparency, which helps refrain these institutions' temptations to deviate from their primary policy commitments (Robinson, 2020). Moreover, effective communications also increase the predictability of actions taken by central banks and financial supervisory authorities, which, in turn, enhances the pass-through from their policy announcements to market expectations and reduce the magnitude of policy interventions required to achieve desired outcome.

Building technical capacity in integrating climate issues into policy conduct can be achieved through different mechanisms. First, internally, central banks and financial supervisory authorities could provide technical training to improve understanding of

best practices. Some examples are practices in designing disclosure requirements and using a common taxonomy to assess economic activities and financial instruments. Second, participation in multilateral initiatives and dialogues on green finance can be increased. As shown in section 3.2, the participation of Asia-Pacific central banks and financial supervisory authorities in these global forums remain generally limited and concentrated among richer economies of the region. Active engagement with these platforms and regular regional dialogues on climate trends, recent green initiatives and policy lessons would help in developing fresh policy ideas. Third, Asia-Pacific central banks and financial supervisory authorities can work bilaterally with their advanced counterparts. For example, the climate pilot exercise of the *Autorité de Contrôle Prudentiel et de Résolution* may be used as a benchmark to implement similar assessment in other countries.

Individual central bank and financial supervisory authorities should seek to achieve a practical and tailored approach in promoting green development. At a basic level, available guidelines on sustainable monetary and financial policies should help increase understanding on how to integrate climate risks into their operations. These institutions, however, are subject to diverse operational and governing principles, such as those relating to market neutrality, efficiency and risks. Technical capacity to carry out climate modelling also varies notably. At a broader level, there is great diversity in the direction of national environmental policies and the availability of national climate-related data. In this regard, each central bank and financial supervisory authority should (a) diligently consider both existing and potential policy tools in their specific context; (b) ensure consistency among national green fiscal, monetary and financial policies; and (c) carefully assess policy space to integrate climate initiatives.

Asia-Pacific central banks and financial supervisory authorities can collaborate further to create regional initiatives on green finance and central banking. A good example in this regard is the Green Bond Standards, which benefits from cooperation among these institutions in ASEAN member countries. This initiative aims to ensure cross-boundary consistency on certain areas of standards, such as eligibility of issuers and projects, use of proceeds, evaluation process, disclosure, and reporting frequency (ASEAN, 2018).⁹ Such comparability across green bond issuers helps attract global investors to increase green investment in the region.

⁹ ASEAN also established common standards for sustainability and social bonds, which are based on principles set out by the International Capital Markets Association.

6.2. Policy and operational issues as central banks and financial supervisory authorities move forward

Central banks and financial supervisory authorities should carefully consider the risk of overstressing their current mandates, particularly when certain objectives entail trade-offs (Volz, 2017). The extent to which each of these institutions can deploy tools to support green development and penalize environmentally harmful activities depends primarily on its existing mandates and willingness to act (Campiglio and others, 2018). Nonetheless, changes to the authorities' mandates are not uncommon, and their objectives have evolved over time. While initially some central banks were established to provide financing to support sovereigns during military conflicts,¹⁰ their responsibilities have evolved into more specific objectives of supporting payment systems and ensuring price and exchange rate stability and/or full employment. In countries in which government policies are clearly geared towards green development, the role of central banks and financial supervisory authorities can be enhanced by amending their legislative remits. This would equip them with new tools, such as green lending facilities or asset purchase programmes. For example, the mandate of the Bank of England was revised in March 2021 to reflect the government's strategy to achieve economic growth that is "environmentally sustainable and consistent with the transition to a net zero economy" (Sunak, 2021). Based on this revision, the Bank of England can avoid legal liabilities from pursuing green monetary policy objectives.

Central banks and financial supervisory authorities should not interfere with market neutrality. For example, they should only consider potential solutions for factoring climate risks without prejudice to the different interpretations of an institution's mandate (Oustry and others, 2020). Their principles should make a clear distinction between what they are required to do and what they could do. These principles could also consider the limits of the authorities' responsibility to address future development challenges, including climate change, in the context of their legislation (Elderson, 2021). In this regard, central banks and financial supervisory authorities should respect and implement legitimate decisions, as monetary policy effectiveness is bolstered when they abstain from making normative judgements on market morality (Mersch, 2018). For example, as deviations from market neutrality can expose these institutions to litigations, the European Central Bank clearly defined that it must act "in accordance with the principle of an open market economy with free competition, favouring an efficient allocation of resources".

¹⁰ The first central bank was established in Sweden in 1668 and was involved in financing a war against Denmark (Groepe, 2016). In this context, Sheng (2015) argues that if central banks and financial supervisory authorities were originally created to solve large-scale social needs, such as wars, then the most predominant task today is tackling climate change.

Central banks should be mindful of the possible impacts of their climate policies on the effectiveness of monetary policy. Such impacts can be in terms of lending and purchasing capacity by central banks, market distortion and institutional credibility. Among the several climate policy options that central banks can consider, Network for Greening the Financial System (2021a) notes that making access to lending facilities conditional on a counterparty's disclosure of climate information or on its green investment can have a "strongly negative" impact on monetary policy effectiveness. Other policy options that could reduce monetary policy effectiveness are charging a lower interest rate to counterparties that pledge a higher proportion of low-carbon assets as collateral and excluding some assets or issuers from asset purchases that fail to meet certain climate criteria. However, any assessment at this early stage remains tentative while central banking practices in the context of developing countries can be further taken into account (Couppey-Soubeyran and Kalinowski, 2021).

Central banks and financial supervisory authorities should not support "greenwashing". Amid growing demand for environmentally friendly products, many business entities market their products as green even though they fail to meet the required environmental standards. As a result, these institutions could be misled into investing in such assets, resulting in increased liability risks and weaker credibility. To mitigate greenwashing-related implications, various policy actions can be taken. Among them are establishing a transparent green taxonomy, ensuring timely and transparent disclosure by market participants and introducing punitive supervisory actions. The monitoring process conducted by central banks and financial supervisory authorities should also consider evolving market conditions and uncertainties, such as more complex financial instruments and more fragmented trading avenues. To address greenwashing, the Central Bank of Ireland is considering a regulatory change that would strengthen its ability to identify financial instruments that are truly eco-friendly (Central Bank of Ireland, 2021). This includes closely scrutinizing applications for issuing green funds and securities in cases in which prospectus approval is required. Meanwhile, the BIS Innovation Hub is developing tokenized green bonds that integrate real-time tracking and disclosure of green outputs to improve transparency (Carstens, 2021). Also of note, the voluntary European Green Bond Standard sets out high-quality ("gold") standards for eligible private and sovereign issuers (European Commission, 2021).

Central banks and financial supervisory authorities should avoid financial repression and/or crowding out private market participants from financing green projects (Schnabel, 2020). Financial repression may arise when green lending programmes offer heavily subsidized interest rates and crowding out can occur when a large part of a central bank's asset purchases or portfolio investment focus on green bonds and assets. By excessively suppressing rate of returns, central banks and financial supervisory

authorities could disincentivize commercial banks and other investors from financing green activities, and ultimately discourage engaging in green activities that do not meet their funding requirements. Similarly, corporations may be deterred from engaging with green activities unless they are able to obtain financing from central banks and financial supervisory authorities that tend to only consider specific instruments with minimum threshold requirements given liquidity consideration. More broadly, when public entities including central banks and financial supervisory authorities dominate a country's green assets, private investors may view these assets as unattractive due to lack of market-making activities and price discovery. To avoid financial repression and crowding out, central banks and financial supervisory authorities could take several policy actions, such as limiting the scale of subsidized lending programmes for green assets, placing a cap on holdings for each bonds' issue size and carrying out asset purchase programmes that consider market liquidity.

Excess policy interventions by central banks and financial supervisory authorities could also lead to a green asset bubble. This is especially the case for small, illiquid green financial markets with limited number of market participants. As more capital is channelled to green financing, artificially low interest rates could result in overvalued green assets and give rise to unsustainable rates of returns for green activities. Moreover, cheap financing could result in unreasonable expectations for equity gains, which are exposed to exuberant market speculations and severe revaluation following a sudden shock to the financing system. Meanwhile, reduced capital requirements and relaxation of other macroprudential measures for financing green activities may exacerbate risk-taking behaviour and compromise financial market stability. As such, central banks and financial supervisory authorities must be cognizant of the potential implications of their green actions. They should also ensure that capital is mobilized to green activities that translate directly to net-zero emissions initiatives. Failure to address these concerns could jeopardize the main objective of these authorities in promoting price and financial stability.¹¹

¹¹ For example, analysts pointed out that the collapse of the housing sector in the United States of America in 2008 was partly driven by financial sector deregulation and unregulated instruments. This includes regulatory changes in the 1990s that weakened mortgage standards and capital market interventions led by public enterprises (Hanke and Lepre, 2021).

VII. CONCLUDING REMARKS

The objective of this paper is to explain how central banks and financial supervisory authorities can foster green development in Asia and the Pacific. Overall, it is noted that while fiscal policy has received much attention, these institutions can certainly play a complementary role in accelerating the transition towards low-carbon, climate-resilient economies. Indeed, inadequate green actions by central banks and financial supervisory authorities can compromise their mandate on maintaining economic, price and financial stability because climate change poses an emerging risk to the financial system.

While the Asia-Pacific region remains at the early stage of sustainable monetary and financial policies, several central banks and financial supervisory authorities have introduced green initiatives. These include (a) monetary policy tools, such as varying reserve requirements and risk weights based on carbon footprint, and subsidized lending rates for green sectors; (b) prudential measures, such as green taxonomy of economic activities and sustainability-oriented disclosure requirements, and supervisory review; and (c) other tools, such as targeted financing schemes for green sectors, introducing ESG considerations for central bank's portfolio management, and broader initiatives to support sustainable finance. In essence, these initiatives can be viewed as complementary to government policies, enablers for climate action, prudential risk management and coordination platforms for sustainable financing.

In the Asia-Pacific region, central banks and financial supervisory authorities that begin to integrate climate issues into their policy conduct can consider various policy actions. At a broad level, clear guiding principles and effective communications can help establish the legitimacy of their green actions. These institutions should also examine available frameworks and toolkits on how to integrate climate issues, as the nature of climate risks is different from other risks that they are familiar with. At the same time, staff training and active participation in global initiatives on sustainable finance could enhance technical capacity, which, in turn, would boost their ability to customize their approach in promoting green development. As central banks and financial supervisory authorities move forward in implementing green initiatives, they should avoid interfering with market neutrality, supporting greenwashing, crowding out private investments in green activities and contributing to a green asset bubble.

Overall, pursuing sustainable monetary and financial policies requires a delicate balance. Currently, several Asia-Pacific central banks and financial supervisory authorities lack mandates that refer to sustainable development, but they have implemented green policy tools. The basis of their actions may be based on strategic focus areas or policy priorities, which tend to be reviewed every few years and

inevitably evolve more rapidly than the official mandates. In countries where central banks and financial supervisory authorities legislation and/or its interpretation is limitative, these institutions should not exploit available policy tools at their disposal, as this could jeopardize their reputation as an autonomous body. Even in countries where the legislation appears more flexible, they should keep in mind their primary objectives and competing priorities. Addressing climate issues should not compromise the operational ability these institutions to achieve existing monetary policy targets.

REFERENCES

- Andersson, M., and M. Stenström (2021). Sustainability considerations when purchasing corporate bonds. *Economic Commentary*, No. 3, 15 March. Stockholm: Sveriges Riksbank.
- Association of Southeast Asian Nations (ASEAN) (2018). ASEAN Green Bond Standards. Available at www.theacmf.org/initiatives/sustainable-finance/asean-green-bond-standards.
- Australian Prudential Regulation Authority (2021). Prudential practice guide: draft CPG 229 climate change financial risks. Available at www.apra.gov.au/sites/default/files/2021-04/Draft%20CPG%20229%20Climate%20Change%20Financial%20Risks_1.pdf.
- Autorité de Contrôle Prudentiel et de Résolution (2021). *A First Assessment of Financial Risks Stemming from Climate Change: the Main Results of the 2020 Climate Pilot Exercise*. Paris: Banque de France.
- Bailey, A. (2021). Tackling climate for real – the role of central banks. Speech by Mr. Andrew Bailey, Governor of the Bank of England at Reuters Events Responsible Business, 1 July. Available at www.bis.org/review/r210602a.pdf.
- Bangladesh Bank (2020a). *Quarterly Review Report on Green Banking Activities of Banks and Financial Institutions and Green Refinance Activities of Bangladesh Bank: October - December 2020*. Dhaka.
- _____ (2020b). Sustainable and inclusive banking. In *Annual Report 2019–2020*. Dhaka.
- Bank for International Settlements (BIS) (2021). Basel Committee publishes analytical reports on climate-related financial risks. Press release. Available at www.bis.org/press/p210414.htm.
- Bank Indonesia (2021). *Republic of Indonesia - Promoting Recovery: Policy Synergy to Maintain Macroeconomic Stability and Growth Momentum*. Jakarta: Investor Relations Unit.
- Bank Negara Malaysia (2021). Climate change and principle-based taxonomy. Available at www.bnm.gov.my/documents/20124/938039/Climate+Change+and+Principle-based+Taxonomy.pdf. Accessed on 25 August 2021.
- Bank of England (2021). Options for greening the Bank of England's corporate bond purchase scheme. Discussion paper, 21 May. Available at www.bankofengland.co.uk/paper/2021/options-for-greening-the-bank-of-englands-corporate-bond-purchase-scheme.
- Bank of Japan (2021a). Bank of Japan statement on monetary policy – Preliminary outline of the fund-provisioning measure to support efforts on climate change, 16 July. Available at www.boj.or.jp/en/announcements/release_2021/k210716a.pdf.
- _____ (2021b). The Bank of Japan's strategy on climate change, 16 July. Available at www.boj.or.jp/en/announcements/release_2021/rel210716b.pdf. Accessed on 12 August 2021.
- Bank of Korea (2021). Bank of Korea's conduct of its business. In *2020 Annual Report*. Seoul.
- Bank of Thailand (2019a). *Bank of Thailand's Strategic Plan 2020–2022: Central Bank in a Transformative World*. Available at www.bot.or.th/English/AboutBOT/RolesAndHistory/DocLib_StrategicPlan/BOT-StrategicPlan2020to2022-eng.pdf.

- _____ (2019b). IFC and Bank of Thailand join hands to accelerate sustainable finance in Thailand, 27 November. Available at www.bot.or.th/English/AboutBOT/Activities/Pages/BOT_IFC.aspx. Accessed on 31 August 2021.
- Beau, D. (2021). France's new step for the supervision of climate-related financial risk. Opinion column, 24 May. Available at www.banque-france.fr/en/intervention/frances-new-step-supervision-climate-related-financial-risk.
- Beirne, John, and others (2021). The effects of natural disasters on price stability in the Euro area. Working paper, No. 244. London: SOAS, University of London.
- Bolton, P., and others (2020). *The Green Swan: Central Banking and Financial Stability*. Basel: Bank for International Settlements.
- Brunetti, C., and others (2021). Climate change and financial stability. Feds Notes. Available at www.federalreserve.gov/econres/notes/feds-notes/climate-change-and-financial-stability-20210319.htm.
- Campiglio, E., and others (2018). Climate change challenges for central banks and financial regulators. *Nature Climate Change*, vol. 8, pp. 462–468.
- Carstens, A. (2021). Transparency and market integrity in green finance. Introduction and opening panel remarks at the Green Swan Conference – Coordinating finance on climate change. Basel, 2 June. Available at www.bis.org/speeches/sp210602.htm.
- Central Bank of Ireland (2021). Securities markets risk outlook report: conduct risk in an uncertain world. Available at www.centralbank.ie/docs/default-source/regulation/industry-market-sectors/securities-markets/risk-outlook-reports/securities-markets-risk-outlook-report-2021.pdf.
- Coupey-Soubeyran, Jezabel, and Wojtek Kalinowski (2021). When central banks outline their options for climate action. Veblen Institute of Economic Reforms. Available at www.veblen-institute.org/IMG/pdf/central_banks_climate_action_option_veblen_paper_may_2021.pdf.
- Dabla-Norris, and others (2021). Fiscal policies to address climate change in Asia and the Pacific. Policy Papers, No 21/07. Washington, D.C.: IMF.
- Dafermos, Y., and others (2021a). *Greening the Eurosystem Collateral Framework: How to Decarbonise the ECB's Monetary Policy*. s.l.: New Economics Foundation.
- _____ (2021b). The price of hesitation: how the climate crisis threatens price stability and what the ECB must do about it.
- Dikau, S., N. Robins, and U. Volz (2020). A toolbox of sustainable crisis response measures for central banks and supervisors, lessons from practice, 2nd ed. Inspire Briefing Paper. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science and SOAS Centre for Sustainable Finance.
- Dikau, S., and J. Ryan-Collins (2017). Green central banking in emerging market and developing country economies, London: New Economics Foundation.
- Dikau, S., and U. Volz (2020). Central bank mandates, sustainability objectives and the promotion of green finance. SOAS Department of Economics Working Paper, No. 232. London: SOAS University of London.

- Durrani, A., U. Volz, and M. Rosmin (2020). The role of central banks in scaling up sustainable finance: What do monetary authorities in Asia and the Pacific think? ADBI Working Paper, No. 1099. Tokyo: Asian Development Bank Institute.
- Elderson, F. (2021). Greening monetary policy. The ECB Blog, 13 February. Available at www.ecb.europa.eu/press/blog/date/2021/html/ecb.blog210213~7e26af8606.en.html. Accessed on 5 August 2021.
- European Central Bank (ECB) (2020). ECB to accept sustainability-linked bonds as collateral. Press release, 22 September. Available at www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200922~482e4a5a90.en.html. Accessed on 9 August 2021.
- _____ (2021). ECB presents action plan to include climate change considerations in its monetary policy strategy. Press release, 8 July. Available at www.ecb.europa.eu/press/pr/date/2021/html/ecb.pr210708_1~f104919225.en.html.
- European Commission (2021). Commission puts forward new strategy to make the EU's financial system more sustainable and proposes new European Green Bond Standard. Press release, 6 July. Available at https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3405. Accessed on 18 August 2021.
- Fry, M. (1995). Flexibility in finance. In *The Flexible Economy: Causes and Consequences of the Adaptability of National Economies*, Tony Killick, ed. London: Routledge.
- Fujikawa, M. (2021). Bank of Japan opens push on climate change in contrast to Fed. *The Wall Street Journal*, 16 July. Available at www.wsj.com/articles/boj-to-offer-banks-zero-rate-loans-to-help-firms-tackle-climate-change-11626406441.
- Georgieva, K. (2021). The IMF is placing climate change at the heart of its work. Remarks by IMF Managing Director at the Climate Adaptation Summit, 25 July. Available at www.imf.org/en/News/Articles/2021/01/25/sp012521-md-remarks-at-the-climate-adaptation-summit.
- Gerritsen, D. (2019). Central banks and responsible investment: three opportunities for global capital markets. Principle for Responsible Investing. Available at www.unpri.org/pri-blog/central-banks-and-responsible-investment-three-opportunities-for-global-capital-markets/4216.article.
- Grippa, P., J. Schmittmann, and F. Suntheim (2019). Climate change and financial risk. *IMF Finance and Development*, vol. 56, No. 4, pp. 26–29.
- Groepe, F. (2016). The changing role of central banks. Address by Mr. François Groepe, Deputy Governor of the South African Reserve Bank at the University of the Free State, Bloemfontein. Available at www.bis.org/review/r160818a.htm. Accessed on 14 August 2021.
- Hanke, Steve H., and Dick Lepre (2021). Learning nothing from the past catastrophe: Will Biden turn back the clock on housing? *National Review*, 11 February. Available at www.nationalreview.com/2021/02/learning-nothing-from-past-catastrophe-will-biden-turn-back-the-clock-on-housing/.
- Heinen, Andreas, Jeetendra Khandan, and Eric Strobl (2018). The price impact of extreme weather in developing countries. *Economic Journal*, vol. 129, No. 619, pp. 1327–1342.

- Hong Kong Monetary Authority (2019). HKMA introduces key measures on sustainable banking and green finance. Press release, 7 May. Available at www.hkma.gov.hk/eng/news-and-media/press-releases/2019/05/20190507-4/.
- _____ (2021). Responsible investment. Available at www.hkma.gov.hk/eng/key-functions/reserves-management/responsible-investment/.
- Hossain, F. (2021). Green Transformation Fund gets poor response. *The Business Standard*, 26 June. Available at www.tbsnews.net/economy/banking/green-transformation-fund-gets-poor-response-266263.
- Huong, Luu (2021). Banks roll out green credits for eco-friendly approach. *Vietnam Investment Review*, 29 April. Available at <https://vir.com.vn/banks-roll-out-green-credits-for-eco-friendly-approach-83919.html>.
- International Finance Corporation (IFC) (2021a). *Accelerating Sustainable Finance Together: Evidence of Policy Innovations and Market Actions across 43 Emerging Markets. Global Progress Report of the Sustainable Banking and Finance Network*. Available at www.ifc.org/sbn.
- _____ (2021b). Sustainable banking network (SBN) - background. Available at www.ifc.org/wps/wcm/connect/b6d741f0-8075-488c-9e04-36c7bd4e714a/SBN+Background+20210507.pdf?MOD=AJPERES&CVID=nB5IsV5.
- International Monetary Fund (IMF) (2021). The IMF and climate change. Available at www.imf.org/en/Topics/climate-change.
- Issing, O. (2019). World Economic Forum: central banks aren't responsible for fighting climate change – governments are. World Economic Forum. Available at www.weforum.org/agenda/2019/12/this-is-the-problem-with-central-banks-fighting-climate-change.
- Macaire, C., and A. Naef (2021). Greeing monetary policy: evidence from the People's Bank of China. Working Paper Series, No. 812. Paris: Banque de France.
- Menon, R. (2021). Being the change we want to see - a sustainable future. Speech given by the managing director of the Monetary Authority of Singapore, at the launch of the inaugural MAS Sustainability Report, 9 June. Available at www.bis.org/review/r210609g.pdf.
- Mersch, Y. (2018). Climate change and central banking. Speech given a member of the Executive Board of the ECB at the Workshop on Sustainability is Becoming Mainstream. Frankfurt, Germany, 27 November. Available at www.ecb.europa.eu/press/key/date/2018/html/ecb.sp181127.en.html.
- Monetary Authority of Singapore (2019). New US\$2 billion investments programme to support growth of green finance in Singapore. Media release, 11 November.
- Network for Greening the Financial System (2019a). A call for action: climate change as a source of financial risk. Executive summary, first comprehensive report. Available at www.ngfs.net/sites/default/files/medias/documents/synthese_ngfs-2019_-_17042019_0.pdf.
- _____ (2019b). A sustainable and responsible investment guide for central banks' portfolio management. Technical document. Available at www.ngfs.net/sites/default/files/medias/documents/ngfs-a-sustainable-and-responsible-investment-guide.pdf.

- _____ (2020). Guide for supervisors: integrating climate-related and environmental risks into prudential supervision. Technical document. Available at www.ngfs.net/sites/default/files/medias/documents/ngfs_guide_for_supervisors.pdf.
- _____ (2021a). Adapting central bank operations to a hotter world: reviewing some options. Technical document. Available at www.ngfs.net/sites/default/files/media/2021/06/17/ngfs_monetary_policy_operations_final.pdf.
- _____ (2021b). NGFS membership. Available at www.ngfs.net/en/about-us/membership.
- Organisation for Economic Co-operation and Development (OECD) (2015). *Going Green: Best Practices for Sustainable Procurement*. Paris.
- Oustry, A., and others (2020). Climate-related risks and central banks' collateral policy: a methodological experiment. Working Paper, No. 790. Paris: Banque de France.
- Parker, M. (2018). The impact of disasters on inflation. ECB Working Paper, No. 1982. Frankfurt, Germany: European Central Bank.
- People's Bank of China (2018). PBC official answered press questions on expanding range of acceptable collaterals of medium-term lending facility (MLF). Available at www.pbc.gov.cn/en/3688110/3688172/4048314/3711516/index.html.
- Reserve Bank of India (2021a). Master directions – priority sector lending (psl) – targets and classification. Available at www.rbi.org.in/Scripts/BS_ViewMasDirections.aspx?id=11959.
- _____ (2021b). Green finance in India: progress and challenges. *RBI Bulletin*. Available at www.rbi.org.in/Scripts/BS_ViewBulletin.aspx?Id=20022.
- Robinson, E. (2020). Central bank communications - evolution in theory and practice. Opening remarks by the deputy managing director and chief economist of the Monetary Authority of Singapore at the IMF High Level Peer-to Peer Forum on Central Bank communications in ASEAN-5 countries: from principles to practice. Singapore, 4 December 2019. Available at www.bis.org/review/r200107b.htm.
- Schnabel, I. (2020). Never waste a crisis: COVID-19, climate change and monetary policy. Speech by a member of the Executive Board of the ECB, at a virtual round-table on sustainable crisis responses in Europe organized by the Inspire research network, 17 July. Available at www.ecb.europa.eu/press/key/date/2020/html/ecb.sp200717~1556b0f988.en.html.
- Sheng, A. (2015). Central banks can and should do their part in funding sustainability. Fixing Climate Governance Series, No. 1. Waterloo, Canada: Centre for International Governance Regulation.
- Sindreu, J. (2021). Fixing climate change isn't the central bank's job. *The Wall Street Journal*, 9 July. Available at www.wsj.com/articles/fixing-climate-change-isnt-the-central-banks-job-11625830610.
- State Bank of Vietnam (2015). SBV issues Directive on promotion of green credit growth and management of environmental and social risks in credit extension. Available at www.sbv.gov.vn/webcenter/portal/en/links/cm409?dDocName=CNTHWEBAP0116211775554.

- _____ (2016). Circular No. 39/2016/TT-NHNN of the State Bank of Vietnam prescribing lending transactions of credit institutions and/or foreign bank branches with customers. Available at www.ifc.org/wps/wcm/connect/e39a6557-4cad-49fc-b00c-c64708a5747b/Vietnam+Circular+Dec+2016.pdf?MOD=AJPERES&CVID=IJ4Edqf.
- _____ (2018). Scheme on green bank development in Vietnam: directing credit flows into eco-friendly projects. Available at www.sbv.gov.vn/webcenter/portal/en/home/sbv/news/news_chitiet?leftWidth=20%25&showFooter=false&showHeader=false&dDocName=SBV350789&rightWidth=0%25¢erWidth=80%25&_afrLoop=48746914125425224#%40%3F_afrLoop%3D48746914125425224%26centerWidth%3D80%2525%26dDocName%3DSBV350789%26leftWidth%3D20%2525%26rightWidth%3D0%2525%26showFooter%3Dfalse%26showHeader%3Dfalse%26_adf.ctrl-state%3Dfk0i4l4mk_19.
- Stiroh, K. (2020). The Basel Committee's initiatives on climate-related financial risks. Speech by the co-chair of the Task Force on Climate-related Financial Risks of the Basel Committee on Banking Supervision and Executive Vice President of the Federal Reserve Bank of New York, at the panel session on "New regulatory and policy landscape for sustainable finance", 2020 IIF Annual Membership Meeting, 14 October. Available at www.bis.org/speeches/sp201014.htm.
- Sunak, R. (2021). Letter to Bank of England's Governor Andrew Bailey on the Remit for the Monetary Policy Committee (MPC). Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/965782/2021_MPC_remit_FINAL_1_March_.pdf.
- Sustainable Insurance Forum (2021a). Application paper on the supervision of climate-related risks in the insurance sector. Available at www.sustainableinsuranceforum.org/view_pdf.php?pdf_file=wp-content/uploads/2021/05/210525-Application-Paper-on-the-Supervision-of-Climate-related-Risks-in-the-Insurance-Sector.pdf.
- _____ (2021b). Sustainable Insurance Forum: members. Available at www.sustainableinsuranceforum.org/members/.
- Swiss Re (2021). The economics of climate change: no action not an option. Available at www.swissre.com/dam/jcr:e73ee7c3-7f83-4c17-a2b8-8ef23a8d3312/swiss-re-institute-expertise-publication-economics-of-climate-change.pdf.
- United Nations Development Programme (UNDP) (2019). Climate change in Asia and the Pacific. What's at stake? Available at www.asia-pacific.undp.org/content/rbap/en/home/presscenter/articles/2019/climate-change-in-asia-and-the-pacific.html.
- United Nations Principles for Responsible Investments (2021). What are the principles for responsible investment? Available at www.unpri.org/pri/what-are-the-principles-for-responsible-investment.
- United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2021a). *Asia and the Pacific SDG Progress Report 2021*. Sales No. E.21.II.F.4.
- _____ (2021b). *Economic and Social Survey of Asia and the Pacific 2021: Towards Post Covid-19 Resilient Economies*. Sales No E.21.II.F.5.
- Viner, J. (1964). On the mandates to the central bank. In *Problems of Monetary Control*, I. F. Section, ed. Princeton, New Jersey: Princeton University Press.

- Volz, U. (2017). On the role of central banks in enhancing green finance. Inquiry Working Paper, 17/01. London: United Nations Environment Programme.
- Weitzman, M. L. (2011). Fat-tailed uncertainty in the economics of catastrophic climate change. *Review of Environmental Economics and Policy*, vol. 5, No. 2, pp. 275–292.
- Working Group on Sustainable Finance (2021). Sustainable finance initiatives for Thailand. Available at www.bot.or.th/Thai/SustainableBanking/Documents/Sustainable_Finance_Initiatives_for_Thailand.pdf.

DIGITAL ECONOMY INTEGRATION IN ASIA AND THE PACIFIC: INSIGHTS FROM DIGISRII 1.0

*Witada Anukoonwattaka, Pedro Romao, Preeti Bhogal, Thomas Bentze, Richard S. Lobo and Arushi Vaishnav**

This paper presents the results from using the Digital and Sustainable Regional Integration Index version 1 (DigiSRII 1.0) framework of ESCAP (2020b) to uncover digital economy integration trends across the Asia-Pacific region. The results show that Asia and the Pacific has made good progress with regard to conventional digital economy integration, especially because of the significant improvements in the digital economy infrastructure and liberalization of trade of information and communications technology (ICT) goods. However, capacity-building of the workforce and investment in infrastructure are required to bridge the digitalization gaps among the digitalized economies in the region. Moreover, the fairly low regulatory uniformity among regional economies further highlights the importance of regional regulatory harmonization in order to foster regional trade in digitally enabled goods and services. From a sustainable development perspective, inclusivity and equity of access to digitalization and required infrastructure remain key challenges. While Internet penetration in the region has been rising, female participation in the digital economy has remained relatively low in general and extremely low in low-income economies. In addition, there is room to enhance cybersecurity in most Asia-Pacific economies. Regional digital policies should focus on harmonizing data protection protocols and building a safer network of servers that would promote economic activity and enable sensitive matters to be conducted online. Fostering a more inclusive digital transformation may considerably boost network-effects and accelerate the transition to a competitive and sustainable regional digital economy.

JEL classification: F15, O24, O53

Keywords: international trade, regional integration, digitalization, digital economy

* Witada Anukoonwattaka, the corresponding author, is an economic affairs officer for the Trade Policy and Facilitation Section of the Trade, Investment and Innovation Division at ESCAP (email: anukoonwattaka@un.org). Pedro Romao and Richard S. Lobo were consultants in the section when writing the paper, while Preeti Bhogal, Thomas Bentze, and Arushi Vaishnav were interns.

I. INTRODUCTION

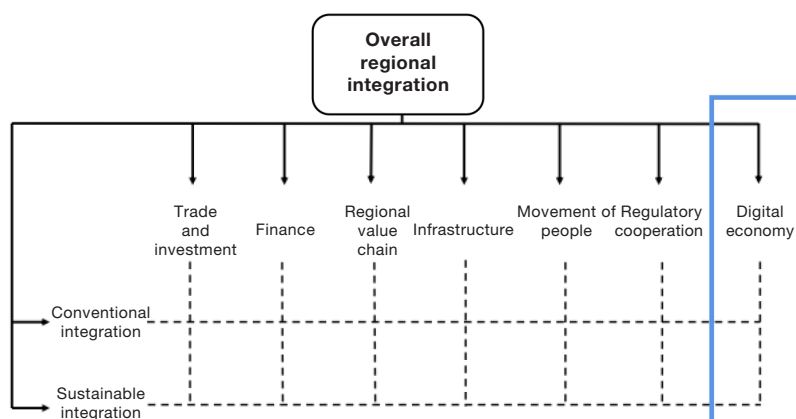
Increased participation in regional trade, investment, labour movement and information flows are expected to bring significant economic development opportunities for regional economies and improve cooperation on a wide array of global issues (ESCAP, 2017). Concomitantly, the rise of the digital economy over the past few decades and its enhanced role during the COVID-19 pandemic have highlighted digitalization as being not only one of the world's most powerful engines for growth and innovation, but also as a key part of developing resilient and sustainable twenty-first-century economies (ESCAP, 2017; OECD, 2017; Ferracane, Makiyama and van der Marel, 2018).

Accordingly, freer flow of digital goods, services and information and communications technology (ICT) products is viewed as one of the most rapid ways to narrow digital capacity gaps among economies (ESCAP, 2020b). This is not only because developing economies can significantly streamline their digital capacity by exchanging knowledge with more advanced economies, but also because regional integration aligns incentives by creating economic opportunities for both developing and developed economies.

For that reason, in 2020, the Economic and Social Commission for Asia and the Pacific (ESCAP) (2020b) rolled out the Digital and Sustainable Regional Integration Index version 1 (DigiSRII 1.0), looking at regional integration in the Asia-Pacific region from 2010 to 2017 across seven core dimensions (figure 1). Compared to other indices of regional integration, such as those associated with Huh and Park (2018), Park and Claveria (2018), ECA, African Union and African Development Bank (2016), ECA (2019) or ESCAP (2020b), the DigiSRII includes for the first-time indicators on digital economy integration and a special index that focuses solely on assessing sustainable regional integration. In DigiSRII, conventional and sustainable regional integration are looked at separately under which conventional integration is comprised of all the indicators most commonly used in regional integration indices, whereas sustainable integration is focused on whether regional integration is likely to contribute towards achieving the Sustainable Development Goals.

The focus of the present paper is to analyse the results of the digital economy integration index of DigiSRII – covering the conventional and sustainable integration perspectives separately – in order to identify digital economy integration trends across the Asia-Pacific region and outline policy recommendations and opportunities to improve the region's digital connectivity. The rest of the paper is organized as follows.

Figure 1. Structure of the ESCAP Digital and Sustainable Regional Integration Index



Source: Author's, based on ESCAP (2020b).

In section II, important conceptual considerations on regional integration and the digital economy are explored. Section III contains a concise description of the methodology behind the construction of regional integration indices. In section IV, the results are analysed by exploring conventional and sustainable digital integration separately through different perspectives across indicators, dimensions, economies, and subregions. Section V concludes with main policy recommendations and insights.

II. CONCEPTUAL FRAMEWORK¹

2.1. Theoretical background – regional integration and the digital economy

Regional integration is a complex, multidimensional concept that is defined based on varied disciplines. International organizations usually resort to broad definitions of this concept in order to measure integration through a framework of engagement, cooperation and entanglement among economies across many different dimensions. For instance, ECLAC (2009) states that “[r]egional integration is the process by which diverse national economies seek mutual gains by complementing one another more”.

¹ For an in-depth technical description of all indicators and indices please refer to ESCAP (2020b). This paper uses the same framework as the original paper while attempting to be more comprehensive by encompassing a larger data set with more economies and years.

In this spirit, DigiSRII builds on other indices, such as the one discussed in Huh and Park (2018), Park and Claveria (2018), ECA, African Union and African Development Bank (2016) and ECA (2019), to define regional integration across seven key dimensions: (a) trade and investment; (b) finance; (c) regional value chains; (d) infrastructure; (e) movement of people; (f) regulatory cooperation; and (g) digital economy. In particular, the digital economy integration dimension of the index – under review in this paper – is understood to entail the freer flow of digital goods and services across regional economies, as well as ICT products that facilitate this trade (ESCAP, 2020b).

While there is no universally accepted definition of the “digital economy”, this paper uses the broad approach taken by OECD (2020) that the digital economy incorporates all economic activity reliant on, or significantly enhanced by the use of digital inputs, including digital technologies, digital infrastructure, digital services and data.²

Naturally, given the ubiquity of platforms and electronic equipment, such as mobile phones and computers, a considerable part of current economic activity is already encompassed within the digital economy. For that reason, judging economies’ conventional regional digital integration requires considerations on economies’ differing levels of digital capability – looking at, for example, infrastructures and financial inclusion, – as well as evaluations of their engagement and cooperation with other regional players – namely, assessing existing trade flows and regulations.

However, as digital economy integration per se does not guarantee an equitable or efficient distribution of “digital dividends” (the benefits accruing from digitalization (World Bank, 2016)), it is necessary to consider further dimensions to understand digitalization’s impact in promoting efforts to achieve the Sustainable Development Goals. In this regard, two major concerns are inclusiveness and security.

An inclusive digital economy is a key characteristic of a sustainable digital transition. Indeed, as poorer and rural communities often record considerably lower Internet access rates, the “yawning gap between the under-connected and the hyper-digitalized” has the potential to further accentuate existing inequalities (UNCTAD, 2019). In particular, women tend to be especially vulnerable to digital exclusion, as income disparities, educational differences and social norms tend to penalize this demographic: in 2017, 250 million more men were estimated to be online than women (OECD, 2018).

² The concept is generally consistent with the literature. For example, according to Barefoot and others (2018), the digital economy encompasses (a) all digital transactions of goods and services (both domestic and cross-border); (b) the infrastructure required to access computer networks, such as software and telecommunications equipment; and (c) all digital media – namely, the content created and accessed through digital devices, as well as all data flows.

On the other hand, digitalization has created additional security and privacy risks that may put its overall benefits at risk. For instance, data breaches have become increasingly common over the past decade. In 2020, they cost companies an average of \$3.9 million per breach (IBM Security, 2020). Furthermore, tech giants' continuous abusive use of power over users' personal information has significantly eroded public trust in the digital economy. Lastly, security concerns regarding the deployment of 5G networks around the globe have slowed this process, which has potentially elevated costs.

2.2. Indicators – measuring regional digital integration

Each of the indicators comprising of the conventional and sustainable indices of digital integration are shown in table 1. Owing to scarce data availability, and in line with the approach taken by ESCAP (2020b) (full DigiSRII report), two different indices for conventional and sustainable integration are calculated: (1) a “comprehensive” index, comprising all the indicators, but including only a few economies for which data are available for all indicators,³ and (2) a “simplified” index encompassing a reduced number of indicators, but covering more economies.⁴ In table 1, indicators highlighted in blue are only considered in the comprehensive index, whereas indicators in white are considered in the simplified and comprehensive indices.

Furthermore, as some indicators vary in nature – some are bilateral, such as exports, whereas some are country-specific, such as the share of the population with Internet access – each has to be suitably adapted to fit the framework of integration. In particular, country-specific indicators are transformed into bilateral indicators first by averaging reporting and partner economies' figures, meaning that not only the overall level of an indicator but its disparity compared to others is considered. This reflects the view that integration is first and foremost a measurement embodied at the economy-pair level and as such it should, therefore, depend on both. Taking a closer look at the composition of each of the integration indices:⁵

³ Only 19 and 32 economies are included in the comprehensive indices of conventional and sustainable digital integration, respectively.

⁴ A total of 46 and 43 economies are included in the simplified indices of conventional and sustainable digital integration, respectively.

⁵ For an in-depth technical description of all indicators and indices please refer to ESCAP (2020b). For this paper the same framework of the original paper is used while attempting to be more comprehensive by encompassing a larger data set with more economies and years.

Table 1. Components of the conventional and sustainable digital integration indices

Index	Description
Conventional digital integration index	1. Share of ICT goods exports in intraregional exports
	2. Share of ICT goods imports in intraregional imports
	3. Average tariff on intraregional imports of ICT goods
	4. Average share of the population with a financial institution or mobile money account
	5. Average share of the population that uses Internet for online purchases
	6. Digital trade regulatory similarity with regional partners
Sustainable digital integration index	7. Average proportion of households with Internet access
	8. Average number of secure Internet servers per million of population
	9. Average share of females with a financial institution or mobile money account
	10. Average share of females that use Internet for online purchases

Source: ESCAP (2020b).

Note: Indicators in blue cells are only considered in the comprehensive index, in addition to the ones in white cells, which are considered in the simplified and comprehensive indices.

The *conventional* regional digital integration index is composed of the share of ICT goods in (1) intraregional exports, (2) intraregional imports, (3) the average tariff on intraregional imports of ICT goods, (4) the average share of the population with a financial institution or mobile money account, (5) the average share of the population that uses the Internet for online purchases and (6) the digital trade regulatory similarity between regional partners. Each of these indicators represents a different sphere of participation in the regional digital economy.

Indicators 1 and 2 on the ICT goods exports and imports intensity⁶ in intraregional trade, respectively, are a direct measurement of economies’ regional integration through trade in hardware that is considered relevant for digital infrastructure and digital transactions. These metrics gauge a country’s digital capacity by measuring its ability to produce ICT exports and its involvement in ICT global value chain via ICT goods imports. Furthermore, higher ICT imports are also associated with higher infrastructural necessities and increased digital activity supported with goods

⁶ Trade intensity, in this case in ICT goods, refers to the share of ICT trade to total trade. A high ICT trade intensity signifies a high share of ICT goods traded to total trade and vice-versa. The terms are applied equivalently when referring solely to exports or imports.

purchased from abroad. Accordingly, the higher the ICT trade intensity in both exports and imports, the higher economies are ranked for regional integration.

Next, indicators 4 and 5 – the share of the population with a financial institution account or online money and the share of the population using the Internet for online purchases, respectively – are aimed at measuring participation in digitally enabled transactions and the physical and digital economies' degree of entanglement. Indicator 4 captures a basic infrastructure needed for e-payment development, which is an essential component for digital economy readiness, while indicator 5 captures specifically the existing level of e-commerce participation. Indeed, the more people have access to online financial services, the more individuals and businesses can conduct transactions online. In addition, as disadvantaged communities are often excluded from conventional financial services, digital financial inclusion – accessing financial services and products online – is regarded as an effective tool to deepen digital economy integration (World Bank, 2017). Moreover, as Jack and Suri (2014) highlight, this can actually contribute to these communities' economic well-being by allowing them to engage in better financial planning, access credit lines and government subsidies or widen their ability to receive payments instantly and securely anywhere. Accordingly, these indicators are considered to contribute to a higher regional integration through digital economy participation.

Lastly, regarding indicators 3 on the average tariff on ICT goods imports and 6 on the digital trade regulatory similarity (looking at convergence and openness in 11 digital trade-relevant regulatory areas),⁷ ESCAP (2020b) directly measures economies' economic integration by assessing regulatory barriers that might add costs to cross-border economic activities or discourage foreign businesses. As the digital economy has brought new kinds of tradable goods and services, popularized cross-border trade in small value products and transformed the understanding on the separation of goods and services – a key distinction often underpinning regional trade agreements – these issues are of particular importance to enhance digital integration across the region. Lower tariffs on ICT goods and higher digital trade regulatory similarity contribute towards achieving a higher integration score.

The sustainable regional digital integration index includes indicators 7 on the average proportion of households with Internet access; 8 on the average number of secure Internet servers per million of population; 9 on the average share of females

⁷ The 11 digital trade-relevant regulatory areas in indicator 6 are trade defense, public procurement, foreign direct investment, intellectual property rights, telecom infrastructure and competition, cross-border data policies, domestic data policies, intermediary liability and content access, quantitative trade restrictions, standards, and online sales and transactions. This indicator was developed by ESCAP for specific use in DigiSRII 1.0 and is defined by ESCAP (2020b) as such. Please refer to the original document for a detailed explanation of how this indicator is calculated.

with a financial account or mobile money account; and 10 on the average share of females that use the Internet for purchases. Notably, many of the indicators selected above are the sustainable counterparts of indicators already included in the conventional index.

Both indicators 9 and 10 – the average share of females with a financial account or mobile money account and that use the Internet for purchases, respectively – deals with digital integration from the same dimensions as captured by their conventional index counterparts – indicators 4 and 5, respectively. The key difference is the focus of indicators 9 and 10 on the perspective of female inclusion, which regularly trails behind men. Furthermore, indicator 7 on the average proportion of households with Internet access – rather than simply population – adds to this inclusivity effort by providing a more realistic approach to a country's overall Internet penetration. Accordingly, a higher inclusiveness through female participation in the digital economy and higher Internet penetration is considered to increase economies sustainable digital integration.

Finally, indicator 8 on the average number of secure Internet servers per million of the population takes into account each country's Internet safety, as accessibility to secure servers determines the overall security consistency of the whole network. More secure servers are considered to contribute to a higher sustainable digital integration index score.

III. METHODOLOGY⁸

To aggregate indicators expressed in different units of measurements into a single composite index, a min-max panel normalization methodology – namely, across all available economies and years – is followed according to the given transformation:

$$I_i^t(x_q) = \frac{x_{q,i}^t - \min(x_q)}{\max(x_q) - \min(x_q)} \quad (1)$$

where $x_{q,i}^t$ is a general indicator x_q for country i in year t and $I_i^t(x_q)$ is the normalized indicator of $x_{q,i}^t$ (varying from 0 to 1) for country i in year t ; $\min(x_q)$ and $\max(x_q)$ are the overall minimum and maximum values across all years and all economies for indicator x_q , respectively. For indicators that have a negative direction of change, higher values indicating a lower level of integration (for instance, the average tariff on intraregional imports of ICT goods), the additive inverse of the normalized indicator is taken – $[1 - I_i^t(x_q)]$ – to ensure that all indicators correlate positively with the integration index.

⁸ For an in-depth technical description of all indicators and indices, please refer to ESCAP (2020b).

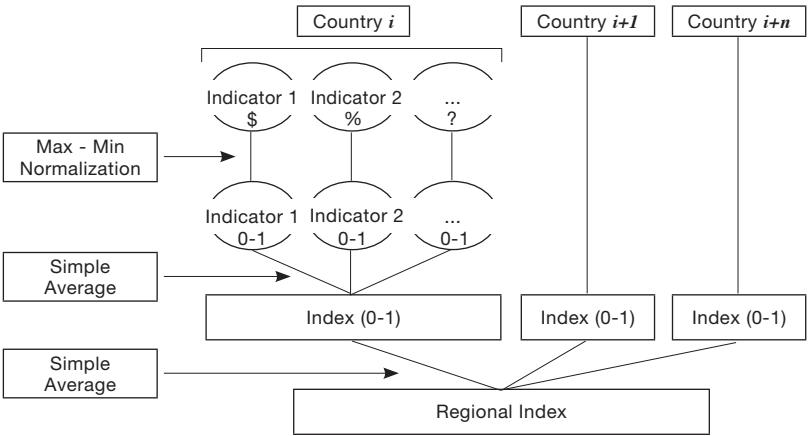
Normalizing all indicators allows comparing progress across dimensions, time and economies. However, this approach comes with the caveat that as new data points become available – potentially setting a new minimum or maximum value – all indicators must be normalized again using the updated sample.

Next, in order to aggregate the normalized indicators onto a single country-wide integration index, a simple average of all indicators is taken, as per the transformation below:

$$Index_i^t = \frac{\sum_q I_i^t(x_q)}{m} \quad (2)$$

where $Index_i^t$ is the desired index (simplified or comprehensive; conventional or sustainable) for country i in period t given by the equal-weighted average of all indicators x_q , where $q = 1, \dots, m$. While there are many different methodologies available to aggregate individual indicators onto a single composite index, such as principal component analysis (PCA) and weighted average, equal weighting is deemed the most appropriate. Accordingly, this method is applied herein for every indicator and every dimension. Furthermore, equal weighting is also applied to further aggregate country indices into regional, subregional or any other desired cluster indices. Figure 2 shows graphically the methodology explained above. Given that equal weighting is used, indicators have equal contributions to the aggregate index. The index results and their changes reflect the difference caused by the average value of the indicators, not the weight of indicators.

Figure 2. DigiSRII (1.0) – digital economy dimension methodology



Source: Author's based on DigiSRII version 1 (ESCAP, 2020b).

IV. RESULTS⁹

In this section, the results of digital regional integration as per DigiSRII 1.0 are reviewed. Discussed first is conventional integration (section 4.1) and then sustainable integration (section 4.2). Within each section, the simplified and comprehensive indices are analysed consecutively to paint a detailed picture of regional integration across countries, subregions and indicators. The results based on conventional and sustainable measurements of digital economy integration are summarized in section 4.3.

4.1. Conventional regional digital integration

4.1.1. Simplified index of conventional regional digital integration

Comparing the average index levels from the period 2010–2013 with the period 2014–2017 for the simplified conventional regional digital integration index for the Asia-Pacific region (including all economies), there was only a mild improvement throughout the period 2010–2017 (figure 3a). Cambodia, the Lao People’s Democratic Republic, the Republic of Korea, Vanuatu and Viet Nam are shown to be the most progressive

⁹ Discrepancies between the original paper’s results and the ones presented herein can be attributed to a differing data set as the methodology calculates regional integration as a cross-country comparison, including a more comprehensive data set, means that all index values have to be recomputed.

economies in the region. Brunei Darussalam; China; Hong Kong, China; India; the Russian Federation and Singapore also fared better than most other economies. Conversely, Macao, China is the significant regressive-performing economy of all, and declines are reported for Timor-Leste and Tuvalu.

Across Asia and the Pacific, digital integration's geographical distribution is highly uneven (colour coding shown in figure 3). For instance, South-East Asia (SEA) (in light blue) and East and North-East Asia (ENEA) (dark blue) completely dominate digital integration, with the top 10 most integrated economies belonging to either of these subregions. Conversely, least developed economies (written in red) – concentrated in the Pacific (PAC) (in yellow) and in South and South-West Asia (SSWA) (in orange), are among the least integrated economies in the region.

In particular, low intraregional tariffs on ICT products are a uniform characteristic among well-integrated countries (figure 3c). This reflects these economies' priority in fostering a fairly liberalized ICT trade environment, with international trade agreements playing a vital role in it. Furthermore, ICT goods play a key role in these countries' economies (figures 3a and 3b). In 2017, East and North-East Asia captured an estimated 70 of the world's value added in ICT manufacturing (UNCTAD, 2019). In Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam, ICT goods represented 4 per cent of their combined exports value; this figure is expected to rise to exceed 8 per cent in 2025 (Google, Tamasek, and Bain and Company, 2019).

In contrast, poorly integrated economies – often least developed countries and landlocked developing countries – are characterized by a lack of digital infrastructure and a restrictive digital trading environment. Indeed, tariffs on imported ICT goods in these economies are among the highest in the region, while both ICT trade intensity indicators are also appearing at the very end of the spectrum. Naturally, by raising the associated costs with importing ICT goods and by underproviding vital ICT infrastructure, domestic businesses in low digitally integrated economies face considerable barriers to digitalize and reap the benefits of connectivity and higher productivity. Moreover, this environment makes it considerably more difficult for economies to attract foreign investment opportunities in ICT-related industries, which are key in accelerating economies' digitalization processes.

Out of all individual indicators in figure 3, Asia and the Pacific is by far the most integrated in terms of tariffs on ICT imports (indicator 3). This pattern reflects the region's relatively liberalized trade environment in ICT goods, highlighting the number of regional initiatives aimed at fostering international cooperation and trade.

For instance, an initiative implemented by the Association of Southeast Asian Nations (ASEAN) was among the first in the world to take concrete and tangible steps to regulating e-commerce and harmonize regulatory frameworks (UNCTAD, 2013).

This initiative successfully reduced tariffs (on all products) among South-East Asian countries, from approximately 13 per cent in 1993 to 0.2 per cent in 2015 (Hoppe, May and Lin, 2020), with tariffs on ICT products following concomitantly. Furthermore, the Information Technology Agreement was another landmark initiative launched in 1996 with the aim of abolishing tariffs on high technology products, such as computers, telecommunication equipment, semiconductors and software. To date, there are 81 signatories to the agreement, many of which are in the Asia-Pacific region; the agreement remains open to the further adherence of interested nations (WTO, 2020).¹⁰

Regarding the 2010–2017 period in particular, the indicator on ICT imports tariffs also progressed the most. In particular, Brunei Darussalam, Cambodia, the Lao People's Democratic Republic, Maldives, the Republic of Korea, the Russian Federation, Thailand and Vanuatu registered the highest increases (largest decline in ICT tariffs). This indicator reflects these economies' continued efforts to further liberalize trade in ICT goods. For instance, in 2015, 53 signatories of the above-mentioned Information Technology Agreement concluded negotiations to considerably expand the range of products encompassed by the agreement (WTO, 2020). China; Hong Kong, China; Japan; Malaysia; New Zealand; the Philippines; the Republic of Korea; Singapore and Thailand were among the Asia-Pacific economies that participated in the agreement. Also in 2015, the creation of the Eurasian Economic Union (EAEU), a single market involving Armenia, Belarus, Kazakhstan, Kyrgyzstan and the Russian Federation, contributed to lower intraregional tariffs on ICT goods, with the Russian Federation benefiting the most. Furthermore, more recently, EAEU has announced plans to implement a digital agenda by 2025 to harmonize legislation to facilitate digital trade and digitalization towards higher regional digital integration (World Bank, 2017). Other noteworthy preferential trade agreements covering ICT goods that entered into force between 2014 and 2017 and that are expected to have eased tariffs on ICT goods are the bilateral agreements between: Australia-China, -Japan and -Republic of Korea; Republic of Korea-Canada, -Colombia, -China and -New Zealand; and Viet Nam-Chile and -Eurasian Economic Union (EAEU) (ESCAP, 2020a).¹¹

¹⁰ Asia and the Pacific signatories of the Information Technology Agreement are Australia; China; Georgia; India; Indonesia; Japan; the Republic of Korea; Kyrgyzstan; Malaysia; New Zealand; the Philippines; Singapore; Thailand; Turkey; Viet Nam; Hong Kong, China; Macao, China; and Taiwan Province of China.

¹¹ Please refer to the ESCAP Asia and the Pacific Trade and Investment Agreements Database for a comprehensive look at agreements being signed where there is at least one ESCAP member. Available at www.unescap.org/content/aptiad/. On an annual basis, ESCAP also publishes the *Asia and the Pacific Trade and Investment Trends* in which a specific report provides a review of the most important developments pertaining to preferential trade agreements in this topic. All reports are available at www.unescap.org/knowledge-products-series/APTIT.

Conversely, the intraregional export intensity in ICT goods (indicator 1) is the region's lowest integrated dimensions and where the least progress has been achieved. This indicator is particularly marked by a stark contrast between exporters and non-exporters of ICT products. Out of 56 economies only nine recorded a significant level of ICT goods exports (score above 0.3 in figure 3b), namely China, Japan, Malaysia, the Philippines, the Republic of Korea, Samoa, Singapore, Thailand and Viet Nam. All other economies registered either marginal or no ICT goods exports whatsoever. Naturally, this dynamic reflects economies' socioeconomic structures, whereby digitalized economies have an enormous comparative advantage over their less developed counterparts. As mentioned above, this is particularly the case for well digitally integrated economies in East and North-East Asia and South-East Asia (UNCTAD, 2019).

In general, economies that are exporting a lot of ICT goods have made considerable progress in this area, capitalizing on the growing global demand for these products. The only two exceptions of major ICT exporters recording declines in indicator 1 are Macao, China; and Hong Kong, China. On the contrary, economies producing very little or no ICT goods have barely registered any improvements in their export capacities, highlighting the need for government policies to reverse this trend and incentivize foreign and domestic investment in digital-related areas. Exceptions to these trends are the South-East Asian economies of Cambodia and the Lao People's Democratic Republic, which have successfully expanded their ICT export intensity from being almost non-existent in 2010. As ASEAN members, these economies have significantly lowered trade barriers on ICT goods. As a result, foreign investment in labor-intensive ICT exports, such as communication equipment and consumer electronic equipment (together representing 65 per cent and 92 per cent of the ICT exports from Cambodia and the Lao People's Democratic Republic, respectively), which have mostly spilled-over from other locations previously offering similar wage conditions.

Regarding indicator 2 on the country's ICT imports share, it is possible to ascertain that the ubiquity of digital technologies is rising everywhere. Results from this indicator also shows the least amount of variability, albeit not by a large margin, as all economies move towards digitalization. Despite considerable differences among the top performers and the rest of the economies in Asia and the Pacific, increases in the share of ICT imports have been more equal when compared to the difference in economies' overall export production. China; Hong Kong, China; India; the Islamic Republic of Iran; the Lao People's Democratic Republic; the Republic of Korea; the Russian Federation; Tonga; Turkey; Vanuatu and Viet Nam are among the economies that have registered the sharpest increases. These are good signs for integration in these economies, as a higher ICT import intensity is associated with a shift towards

digitization and infrastructural investments. Interestingly, increases in the ICT import intensity are strongly and positively correlated with increases in the ICT export intensity, highlighting the need for low integrated economies to kickstart the digitalization process through key infrastructural investments. Macao, China; Malaysia; Maldives; and the Philippines have registered the largest declines in their share of ICT imports.

4.1.2. Comprehensive index of conventional regional digital integration

A first look at the Asia and the Pacific comprehensive digital integration index – comprising of three additional indicators – depicts a more integrated and better improving region than explored above.¹² However, as sample sizes differ (19 compared to 46 economies for the comprehensive and simplified indices, respectively), a direct comparison between both is not correct.¹³ A better suited same-sample comparison between the 19 economies reviewed in both indices indicates that regional integration is actually quite similar across indices.¹⁴ This means that, while country-level integration indices and relative rankings change quite substantially with the addition of new dimensions, the simplified index produces unbiased results at the regional level. Moreover, as dimensions, such as Internet penetration, financial inclusion and regulatory distance are considered, the simplified index's overemphasis on ICT trade intensity (two out of three indicators) becomes evident.

In particular, developed and highly digitalized economies that are not very involved in the production of ICT goods, such as Australia and New Zealand, have logged the largest gains when compared with the simplified index of integration. In fact, New Zealand went from being moderately integrated to being the most digitally integrated economy in Asia and the Pacific. Moreover, integration scores and rankings increased considerably for other advanced economies that enjoy fairly high levels of Internet penetration and have in place strong regulatory frameworks, such as Japan, the Republic of Korea and Singapore.

On the contrary, some of the largest negative changes in integration scores were recorded for China, India, Indonesia, the Philippines, and Viet Nam. This is because while these economies are highly involved in the production and exports

¹² Over the period 2014–2017, the regional comprehensive index was set at 0.49, having increased by 0.05 points since the period 2010–2013 (figure 4). This would be compared with the simplified index's 0.36 score and 0.03 growth during the same period.

¹³ In fact, due to the comprehensive index's inherent bias towards high integration performers – resulting from better data availability – this index will likely yield higher overall integration results than its simplified counterpart when considering full sample sizes.

¹⁴ The simplified index's regional score in the periods 2010–2013 and 2014–2017 for the 19 economies considered in the comprehensive index was 0.44 and 0.48, respectively. This represents only a slight 0.01 increase when compared to the regions' comprehensive index for the period 2014–2017.

of ICT goods, they have yet to achieve the full potential offered by digital economy integration. Indeed, the mentioned economies fared relatively poorly across all newly considered spheres, highlighting the need for complementary policies to accompany these economies' successful business environment digitalization. Exceptions to this trend are good score for the share of population with financial institution (indicator 4) for China and a good score for digital trade regulatory similarity for the Philippines.

Finally, despite maintaining a stable score across both integration indices, the ranking of Hong Kong, China dropped from the first to the fifth place in the region.¹⁵ This can be attributed to the relatively low degree of regulatory similarity (indicator 6). The score for Malaysia put the country three places lower, while for the Lao People's Democratic Republic, it enabled the country to climb two places, and for Cambodia and Thailand, it enabled both countries to rise one place.

Once again, looking at each of the specific indicators in figure 4, it is easily identifiable that between the periods 2010–2013 and 2014–2017 only for indicator 4 – the share of population with an online financial account – there were significant changes; no changes were shown for indicators 5 and 6. This may be due to the data particularities of these indicators, which are not time-variant across sample (calculated once for each economy).¹⁶ As a result, despite weighing on economies' perceived progression in the comprehensive index, the available data points are used to calibrate country's integration levels and to identify potential shortcomings and relevant policy proposals.

Turning towards panel (b) of figure 4 (indicator 4), the share of the population with an online financial account has grown significantly across the whole region, mirroring the Internet's increasing penetration and importance around the world. This is highlighted below in indicator 7 of the sustainable integration index (figure 6) – the share of households with Internet access – and corroborated by the International Telecommunication Union (ITU) (2019), which estimates that the share of the world's population using the Internet has increased from close to 30 per cent in 2010 to almost 50 per cent in 2017. This was made possible by the rising ubiquity of smartphones – even in least developed countries, landlocked developing countries and low digitally integrated economies (World Bank, 2016), which has facilitated Internet access to everyone everywhere and allowed mobile phones to reach vast parts of the population.

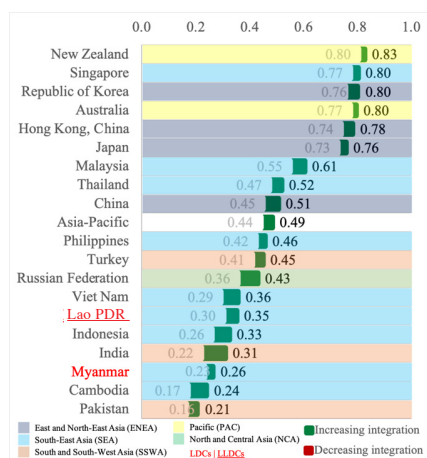
Further analysing the performance of this indicator, it is possible to ascertain that while all economies registered strong growth, economies with a high score in 2010 have made relatively less progress. This is natural since highly connected economies

¹⁵ Relative integration rankings consider only the 19 economies included in the comprehensive index looking at their relative position in the simplified index comparatively to the comprehensive index.

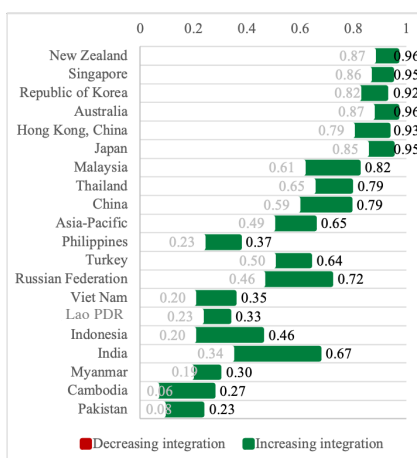
¹⁶ Indicator 5 was calculated for 2017 only; indicator 6 was calculated over the period 2010–2017.

Figure 4. Conventional comprehensive regional digital integration index and additional indicators per economy, 2010-2017

(a) Comprehensive conventional index



(b) Share of population with online financial account (indicator 4)



(c) Share of population using the Internet for purchases (indicator 5)



(d) Digital trade regulatory similarity (indicator 6)



Source: Author's calculations based on data and methodology from ESCAP DigiSRII (ESCAP, 2020b).

Notes: Only additional indicators to the simplified indicator reported in figure 3 are displayed here. Economies' overall comprehensive score is given as the simple average of all the simplified indicators reported above and the comprehensive ones herein. Figures may diverge from the original paper as different sample sizes were used.

had fewer integration room left to progress and vice versa. Exceptions to this trend were the South-East Asia economies of the Lao People's Democratic Republic and Myanmar, which, despite being poorly integrated, still struggled to make progress and those of Cambodia and Pakistan, which despite improvements in their integration scores since 2010, remained the two lowest financially integrated economies in the whole region. India, Indonesia and the Russian Federation, on the contrary, advance rapidly in terms of financial inclusion.

Regarding the share of the population using the Internet for online purchases in 2017 (indicator 5), advanced economies, such as Australia, the Republic of Korea and New Zealand ranked the highest, scoring at very close to the highest level of existing integration. These economies enjoy widespread Internet access and well-developed online payment systems, delivery services and consumer protection frameworks, among other complimentary services and characteristics that are essential for a flourishing digital economy.

However, when reviewing Japan; China; Hong Kong, China; and Singapore – economies where these characteristics are similarly well-developed – it is possible to identify a persistent gap between both groups. This pattern points towards disparities regarding their sustainable integration indices. In particular, looking at indicator 10 – the proportion of the female population using the Internet for online purchases – it is immediately observable that the top performers (Australia, the Republic of Korea and New Zealand) were among the highest ranked in this indicator. Naturally, the correlation between female digital inclusion and overall digital inclusion is close to one, pointing to the need to develop inclusive digital policies towards women in order to widen overall digital accessibility.

Excluding well-integrated economies, the other regional economies performed poorly with regard to the share of the population using the Internet for online purchases in 2017 (indicator 5). In particular, the South-East Asia economies (with the exception of Malaysia) scored particularly badly in this dimension, with Thailand standing out for its poor performance relative to its overall ranking, and Cambodia, Myanmar and the Lao People's Democratic Republic – the subregion's least developed countries – scoring very close to 0.0 (no integration at all). India – a country, which has secured impressive gains in terms of financial inclusion and in ICT imports – also scored very close to 0.0, reflecting that only 1 per cent of all purchases in this country in 2015 were performed online, compared to 60 per cent in developed economies and 16 per cent worldwide. Despite increased accessibility to the Internet across the region (indicator 7), the very limited use of online purchases highlights the need for policies to create safer and more efficient digital markets.

Finally, analysing indicator 6, on the digital regulatory similarity among regional partners, advanced economies, such as Australia; Hong Kong, China; Japan; New Zealand and Singapore are once again among the top performers. This pattern sheds a light on these economies' strong emphasis on maintaining close regulatory relationships with regional partners. An exception to this trend is the Republic of Korea, which scored below other advanced economies due to its tighter restrictions on online sales and transactions from abroad (Ferracane, Makiyama and van der Marel (2018). This is also in line with this country's relatively high tariffs on ICT imports as seen in indicator 3.

Next, South-East Asia economies scored heterogeneously with regard to digital regulatory similarity. Despite many successful preferential trade agreements signed under ASEAN and their impact in lowering import tariffs, more can be done in terms of harmonizing regulatory frameworks within the subregion. Indeed, as Mitchell and Mishra (2020) noted: "the ASEAN model of digital trade integration [provides] a relatively weak form of digital trade integration" due to the lack of strict enforcement mechanisms and binding frameworks of action. Some examples of barriers to the digital economy are quantitative trade restrictions in Viet Nam, foreign direct investment restrictions in Myanmar and an anti-competitive stance in the telecoms sector of the Lao People's Democratic Republic (Ferracane, Makiyama and van der Marel, 2018). As such, South-East Asia economies should push to further deepen and modernize the current ASEAN framework to address issues related to regulatory similarity and non-tariff measures, which are currently dampening intraregional digital trade, similar to what prohibitively high tariffs did in the pre-ASEAN era.

While performing generally well in terms of digital economy integration, the heavily regulated digital economy of China has attained a low score for regulatory openness and similarity (0.0). This finding echoes other indices' results – such as the Digital Services Trade Restrictiveness Index (DSTRI) of the Organization for Economic Co-operation and Development (OECD) and the Digital Trade Restrictiveness Index (DTRI) of the European Centre for International Political Economy (ECIPE) – which ranks China as the most restrictive country in the world when it comes to digital trade regulation (Ferracane, Makiyama and van der Marel, 2018, and box 1).

Box 1. Digital economy regulation in China

The rising importance of China in the global and regional digital economy is hard to understate. China represents 22 per cent of the market capitalization of the world's 70 largest digital platforms (second only to the United States of America, which accounts for 68 per cent), whereas it is estimated that in 2017, China accounted for 42 per cent of the world's online transactions (Hinrich Foundation, 2019; UNCTAD, 2019). In addition, China boasts the highest number of Internet users in the world – despite lagging in overall Internet penetration – and plays a significant part in regional global value chains due to its role as a major ICT exporter and importer (World Bank, 2016).

As a result, the country's strict regulatory regime has a profound impact on the region's trading landscape. As Ferracane, Makiyama and van der Marel (2018) note, China has become a major player in the digital economy, but the provision of digital products was almost exclusively located within its own domestic market. For that reason, relaxing some of its regulatory burdens would offer significant digital trade opportunities for the Asia and the Pacific region and China.

Ferracane, Makiyama and van der Marel (2018) have outlined some of the particularly heavy regulations in China, which can add costs when doing digital trade transactions:

- Public procurement restrictions – in many instances, there are restrictions on procuring digital products from foreign providers.
- Intellectual property rights restrictions – concerns regarding transparent and open process for granting patents, and requirements for companies with secure Internet systems to share confidential information.
- Foreign investment on telecommunication services restrictions, including screenings, licence requirements, and caps on foreign ownership.
- Data flows restrictions – companies can only store data within the country.
- Transparency of procedures in terms of certification, testing and encryption which differ from those of regional partners.

Box 1. (continued)

Additionally, China has recently strengthened its regulations on privacy and data flow, including enacting the Personal Information Protection Law (which came into force in November 2021), the Cybersecurity Law, and the new Data Security Law. These laws now form the main legal framework governing data security and the handling of personal and non-personal data in China.

4.2. Sustainable regional digital integration

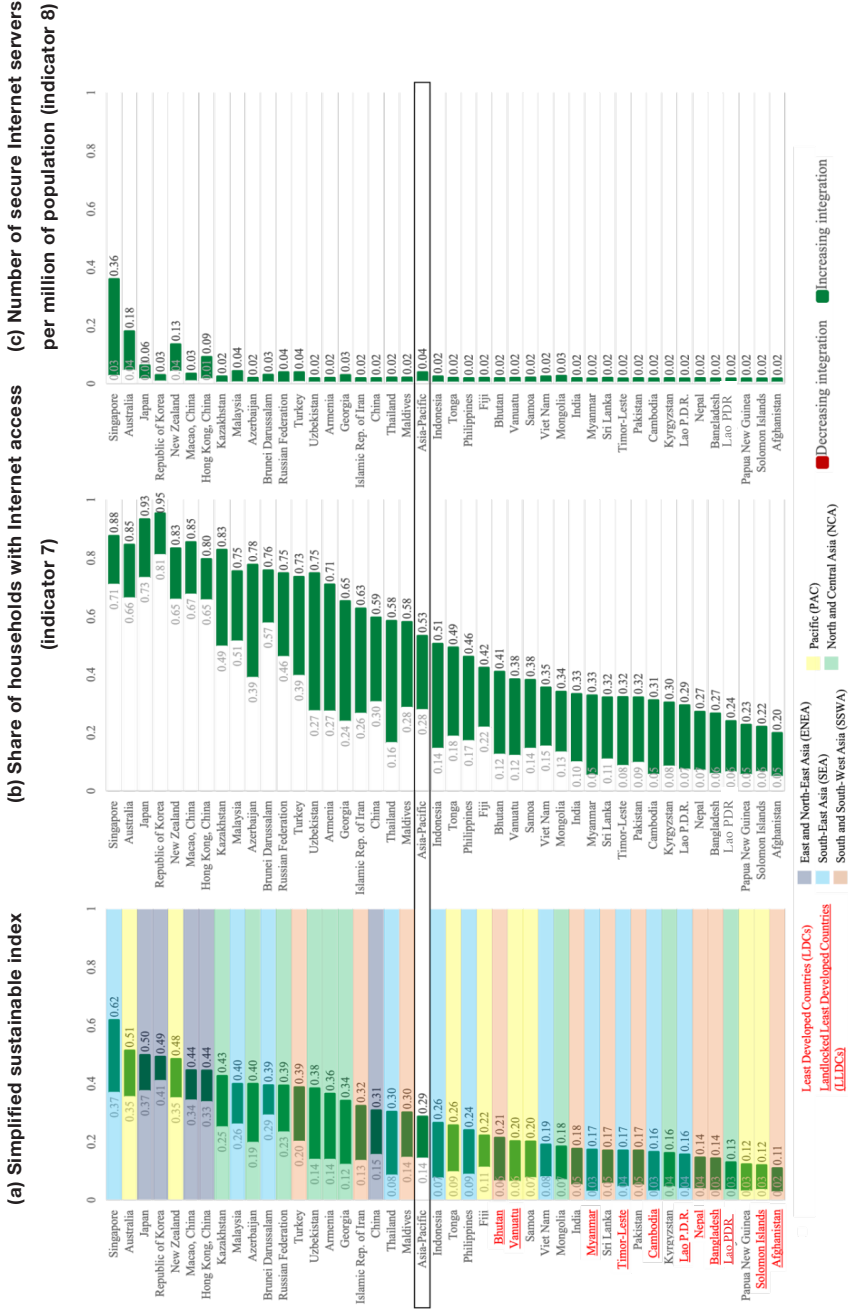
4.2.1. Simplified index of sustainable regional digital integration

Albeit starting from a very low position, over the 2010–2017 period, digital integration has increased considerably based on the simplified sustainable digital integration index. As shown in figure 5, most of the gains can be attributed to an increase in the proportion of households with Internet access across the region, mirroring above-explored trends of rising Internet penetration globally (panel b). In contrast, regionally, little to no progress in the number of secure Internet servers per million of population (panel c) has been made.

At the country and subregional levels, the distribution of the simplified index of sustainable integration is similar to that of the comprehensive index of conventional integration (figure 4). This may be because there is a possible association between the inclusivity of digital trade – a sustainable indicator, and the performance of a country in digital trade integration – a conventional indicator. For example, digital trade readiness, measured by the share of the population that has a financial account or makes purchases online may be affected by the affordability and accessibility of households to Internet network.

Accordingly, advanced economies in South-East Asia (light blue in figure 5) and East and North-East Asia (dark blue) such as Singapore; Hong Kong, China; Japan and the Republic of Korea, along with developed economies in the Pacific (yellow) such as Australia and New Zealand, are the most sustainably digitally integrated. Noteworthy are also North and Central Asia economies (green), which when compared to the simplified index of conventional integration scored relatively higher, with most scoring from below the regional average to above it. In contrast, least developed countries (in red), landlocked developing countries (in red underlined) and other developing economies such as Afghanistan, Bangladesh and Nepal, in South and South-West Asia (in orange), and Papua New Guinea and Solomon Islands in the Pacific subregion are the worst performers on the sustainable digital integration index.

Figure 5. Sustainable simplified regional digital integration index and indicators per economy, 2010-2017



Source: Author's calculations based on data obtained from ESCAP DigISRII database and methodology (ESCAP, 2020b).
Notes: Figures may diverge from the original paper as a different sample size was used. Economies are ordered according to their 2017 scores in panel (a).

Looking at indicator 7 (figure 5, panel b), all countries have secured positive gains with regard to their share of households with Internet access. However, differing dynamics across economies are apparent. For instance, among the poorest performers in the region are the top six most digitally integrated economies in the region: the Republic of Korea; Japan; Singapore; Macao, China; Australia; and New Zealand – in descending order of Internet penetration. In these economies, widespread high-speed Internet connectivity and broadband penetration since 2010 can help explain their top positions across years despite below-average improvements.

In contrast, Afghanistan, Solomon Islands, Papua New Guinea, Tajikistan, Bangladesh, and Nepal, which are among the least integrated economies in the region, also recorded some of the lowest levels of improvements in indicator scores in the region – 30 per cent to 40 per cent lag compared to the regional average. This is a worrying signal for underconnected economies and for the region as a whole, as the digitalization gap widened during this period. Finally, Uzbekistan, Armenia, Thailand, Georgia and Azerbaijan, in descending order, made the most progress, as their percentage share of households with Internet access increased by more than 50 per cent in comparison to the rest of the region.

Regarding indicator 8 on the number of secure Internet servers per million of population, Singapore has considerably outperformed all other economies, expanding at a rate that is more than double of the second-best performer and eightfold the regional average. This can be attributed to the Government's proactive approach to dealing with cybercrimes and securing its digitally enabled economy by building resilient critical information infrastructures, safer cyberspace and strengthening international partnerships, especially with ASEAN member countries (Cyber Security Agency of Singapore, 2016). Australia and New Zealand, followed by Hong Kong, China; and Japan are the second to the fourth in line, respectively, for providing a more secure online environment to its businesses and essential services. Other economies that have performed at par with the regional average are Malaysia, the Russian Federation and Turkey, while all other economies recorded marginal progress and level off secure Internet servers per million. Indeed, the higher availability of secure Internet servers pertains to more sustainable integration in digital trade.

4.2.2 Comprehensive index of sustainable regional digital integration

Further to the indicators on Internet penetration and security, the comprehensive sustainable digital integration index, which is comprised of two additional indicators, gauges a country's digital inclusion by measuring female online participation across different indicators. As UNCTAD (2019) notes, the proportion of women online persistently lags that of men in approximately two thirds of economies around the world, making this a key topic in understanding sustainable digital integration.

As with the conventional indices of integration, the introduction of new indicators has produced significant changes to economies' overall rankings and scores. In general, the integration scores of top performers have risen, while the scores for low performers have either stagnated or declined slightly. Indeed, the top 10 most integrated economies have the nine steepest score increases: the Republic of Korea (now the region's most integrated country), Australia, New Zealand and China rose the most (figure 6). The score for the Islamic Republic of Iran also rose considerably. Despite positive score increases for Singapore; Japan and Hong Kong, China, their poor level of female participation in online purchases adversely effected these economies' performance compared to other highly integrated economies. Meanwhile, 7 out of the 10 worst performances belonged to the bottom 10 least integrated economies in the region. Afghanistan, Nepal and Pakistan were the worst performing countries in this regard, recording a slight decline in their scores (less than 0.01).

As for the indicator of female digital financial inclusion, the results vary greatly. Some frontrunners are Australia; New Zealand; Japan; Singapore; Hong Kong, China; and the Republic of Korea. These economies have made significant progress in including more females in the digital financial systems. The major drivers of formal bank account penetration among females in these economies are greater access to mobile technology, increased ownership of mobiles and smartphones by females, and several government initiatives extending financial services to women. Moreover, other economies, such as China, the Islamic Republic of Iran, Malaysia, Mongolia, Sri Lanka and Thailand, have also made good progress in providing financial services for women online. The gender gap in financial inclusion in these economies is gradually diminishing. On the contrary, Afghanistan, Cambodia, Myanmar and Pakistan appear to have persistent gender disparities in access to digital financial accounts, owing to inadequate digital infrastructure and low ownership of mobile phones by women.

This trend continues for the indicator of the proportion of the female population using the Internet for online purchases in which top and bottom performers are even more segregated. Such factors as greater access to mobile phones, high Internet connection speed, and world-class information technology infrastructure are driving growth in e-commerce purchases by females in Australia, New Zealand and the Republic of Korea. Surprisingly, China has also recorded a very positive integration score for this indicator. As the largest retail e-commerce market in the Asia-Pacific region, the positive integration of females in China for online purchases can be attributed to middle- and high-income female shoppers (Feifei, 2020). On contrary, among the worst performing economies in this regard are Afghanistan, Bangladesh and Nepal. These results indicate that there are persistent and substantial gaps in extending Internet services to the female population, thus hindering their inclusion in the digital space.

4.3. A summary of the performance of the Asia-Pacific region

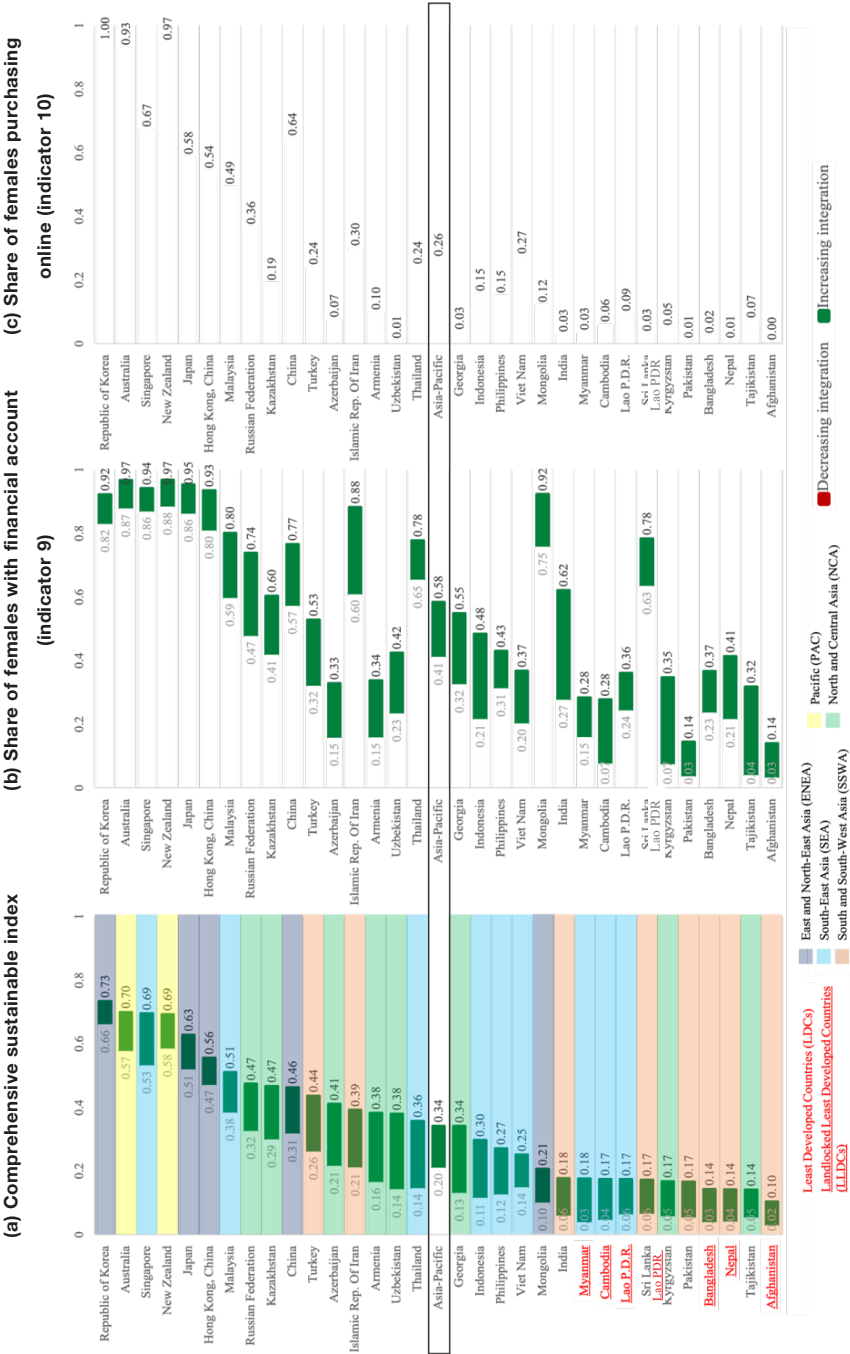
4.3.1. A summary of the performance of Asia-Pacific region based on the conventional measurement of digital integration

Based on conventional indicators, the conventional integration profile of Asia and the Pacific region for the different indicators chosen across years (from light blue in 2010 to darkest in 2017) is plotted in figure 7 for a quick and intuitive look into the state and progression of the region's digital integration. The three indicators used only in the comprehensive index are highlighted in blue, as in table 1, and the average value for the available 19 economies is reported. The three indicators used in both the comprehensive and simplified indices (not highlighted) are reported as per the simplified index's results in order to include the average of all available 46 economies.

At a first glance, in 2017, the indicators on tariffs on ICT imports and the share of the population with a financial institution account, followed by the indicator on the share of the population using the Internet for purchases performed the best. These positive integration indicators reflect a relatively well-connected Asia-Pacific region, bearing the fruits of the global rise in Internet accessibility, new technological possibilities and continued international cooperation efforts that have led to a more open and efficient trading environment.

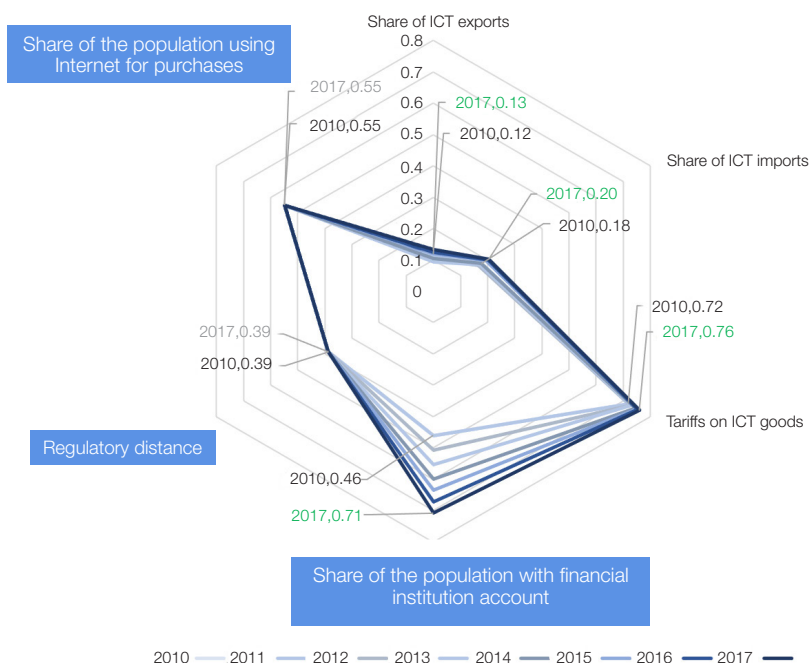
On the contrary, the region's ICT trade intensities and the intraregional digital trade regulatory similarities indicators are trailing. On the one hand, given the region's prominence as a top producer of ICT goods globally, the average low score for both ICT trade intensities highlights a highly concentrated feature among a few economies. As all economies are weighted equally, the region's low score shows that the majority of regional economies remain under digitalized and under capacitated to produce and use digital goods. On the other hand, the fairly low regulatory similarity reveals the need to rethink international cooperation to address non-tariff measures and regulatory measures.

Figure 6. Sustainable comprehensive regional digital integration index and indicators per economy, 2010-2017



Source: Author's calculations based on data obtained from ESCAP DigIRII database and methodology (ESCAP, 2020b).
Notes: Figures may diverge from the original paper as a different sample size was used. Economies are ordered according to their 2017 scores in panel (a).

Figure 7. Asia-Pacific conventional regional digital integration index indicators, 2010-2017



Source: Author's calculations based on ESCAP DigiSRII (ESCAP, 2020b).

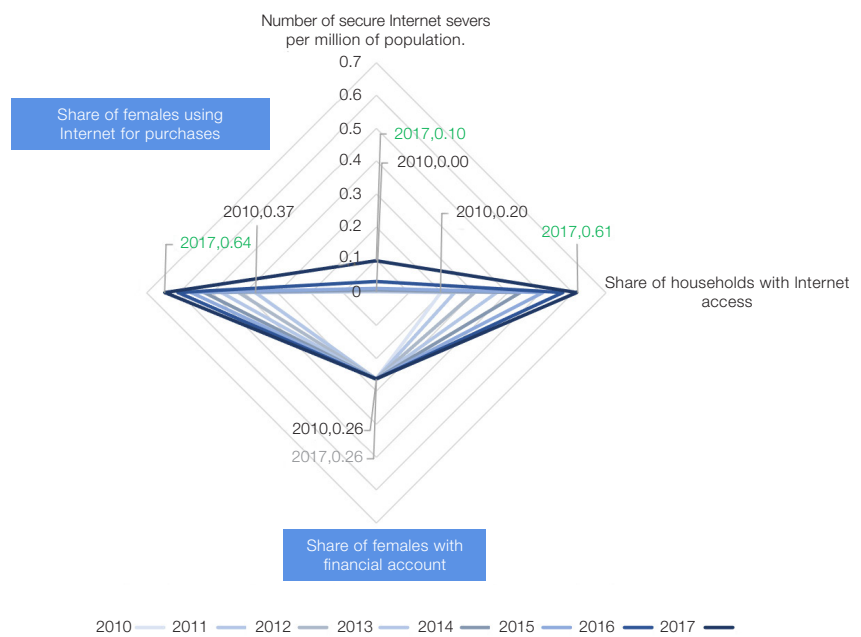
Note: Indicators highlighted in blue are only featured in the comprehensive index of regional digital integration. As such, these include only the 19 economies considered in this index. Indicators not highlighted are considered in both the comprehensive and simplified indices. Herein, the simplified index's values are reported as to include all 46 available economies.

4.3.2. A summary of the performance of the Asia-Pacific region based on the sustainable measurement of digital integration

The sustainable integration profile of Asia and the Pacific for all sustainable indicators across years (from light blue in 2010 to darkest in 2017) is plotted in figure 8 for a quick and intuitive look into the progression and state of the region's sustainable digital integration. The two indicators solely used in the comprehensive index are highlighted in blue, as in table 1, and report the average value for the available 32 economies. The two indicators used in both the comprehensive and simplified indices (not highlighted) report the average of all available 43 economies as per the simplified index's results.

The region’s overall sustainable integration score has largely been driven by substantial progress made in household’s access to the Internet and in female’s access to online purchasing. These indicators mirror the rising ubiquity of the Internet around the world in positive movement towards an inclusive and interconnected region. However, it is important to note that little to no progress has been achieved in increasing the number of secure Internet servers per million of population regionally and in creating a more inclusive digital environment by empowering females to access financial instruments online. These are key points for advancing the region’s sustainable digital integration and underpin success in achieving a long-lasting and successful Asia-Pacific wide digital transformation.

Figure 8. Asia-Pacific sustainable regional digital integration index indicators, 2010-2017



Source: Author’s calculations based on ESCAP DigiSRII (ESCAP, 2020b).

Notes: Indicators highlighted in blue are only featured in the comprehensive index of regional digital integration. The value reported is therefore the average of the available 32 economies available. Indicators not highlighted are considered in both the comprehensive and simplified indices and include 43 economies as per the simplified index’s results.

V. POLICY RECOMMENDATIONS

Mirroring the wide range of indicators included in the regional digital trade integration indices, in this section, key policy recommendations are provided to accelerate economies' digital regional integration from the perspective of both conventional and sustainable integration. These policy recommendations are organized according to four main policy areas linked to the indicators above: (a) facilitating cross-border digital trade; (b) providing safe and widespread digital access; (c) promoting inclusive digital participation; and (d) widening financial inclusion and the usage of digital payments. Together these policies can significantly accelerate economies' digital transformation towards becoming resilient twenty-first century digital economies.

5.1. Facilitating cross-border digital trade

Facilitating cross-border digital trade is essential to streamlining economies' digital transformation. In fact, most of the digitally integrated economies in the Asia-Pacific region have minimal ICT import tariffs (indicator 3) and are highly integrated in terms of digital trade regulatory similarity (indicator 6). This highlights the significance of a low tariff, harmonized digital trade environment for a lasting digital transformation. For underdigitalized economies, there are many reasons why this should be prioritized.

First, as indicators 1 and 2 on the ICT export and import trade intensity show, respectively, ICT global value chains in Asia and the Pacific are concentrated around a few economies, which produce and export a variety of Internet-related technology and equipment supporting digitalization. Accordingly, removing trade barriers to acquire the necessary digital technology and services is an extremely efficient way to reduce technological bottlenecks and decrease overall digital transition costs. Second, as ICT global value chains become increasingly important, developing countries can reap immense economic opportunities by attracting foreign direct investment and building digital production capabilities at home. However, these global value chains often span multiple economies, so seizing this opportunity is contingent on fostering a multilateral liberalized ICT trade environment that can accommodate efficient border crossings with multiple partners. Third, as both consumers and firms can accrue immense benefits from using the Internet, easing cross-border digital trade can further accelerate digitalization by expanding the size and availability of goods and services online. For consumers, liberalized cross-border trade means accessing a vast array of foreign products that can meet every need as efficiently as possible. For businesses, easy cross-border exports are an inexpensive way to access large foreign markets and lower production costs.

Accordingly, working multilaterally to liberalize trade and investment in ICT goods and services is an essential step to build a more resilient and efficient digital transformation. While import tariffs are a key issue that should be addressed, regulatory differences are much more prominent in the region. This calls for strengthening international cooperation in preferential trade agreements and free trade agreements around non-tariff barriers and harmonizing rules, regulations, and standard for digital products. For instance, using existing digital trade facilitation frameworks, such as the United Nations Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific¹⁷ or raising the De Minimis value¹⁸ are efficient ways of encouraging cross-border trade, especially in small-value products which are the most intensively traded digitally. Finally, protecting domestic and foreign firms' intellectual property rights is key to promoting innovation and encouraging entry of foreign firms. Furthermore, facilitating firms' access to capital financing for ICT-related projects and digitalization processes, upgrading workers' skills, and ensuring a diverse and competitive marketplace are other important measures that can help accelerate the digital transition of economies (EBRD, 2020).

5.2. Providing safe and widespread digital access

Many economies in the Asia-Pacific region lack adequate digital infrastructure to provide and/or access a seamless, low-cost and widespread Internet coverage, which is key to streamline economies' digital transformation. Indeed, despite the rising ubiquity of Internet-accessing devices, such as smartphones, that have helped boost Internet connectivity across the world, some of regions' landlocked developing countries, least developed countries and developing countries are still considerably behind. Regarding indicator 7 on the share of households with Internet access, Afghanistan, Bangladesh, Cambodia, Kyrgyzstan, the Lao People's Democratic Republic, Nepal, Papua New Guinea, Solomon Islands, Sri Lanka and Tajikistan, remain underconnected, despite major improvements. On the contrary, Armenia, Azerbaijan, Georgia, Thailand and Uzbekistan are extremely positive examples of economies where Internet access in households have expanded by a rate of 50 per cent higher than the overall regional average. For a digitally connected world, it is essential to improve the availability and affordability of high-speed Internet. Accordingly, governments should adopt various strategies to modernize and extend existing ICT infrastructures. For instance, encouraging public-private partnerships in highly-populated areas can be an efficient way to procure private sector investment in key infrastructural programmes. However, as the telecom sector often tends to

¹⁷ Please refer to www.unescap.org/resources/framework-agreement-facilitation-cross-border-paperless-trade-asia-and-pacific for more information and resources on this multilateral framework agreement.

¹⁸ The De Minimis value refers to the threshold under which goods are not subject to import duties.

turn monopolistic and hurt consumer welfare, specialized legislation focused on maintaining the long-term competitiveness of the sector and on regulating the scope of public-private partnerships is vital for a successful and lasting digital transformation. On the other hand, when market conditions could inhibit private companies from participating in the market – as what occurs in remote areas, where service costs are prohibitively high for the existing demand – national governments should resort to alternative funding mechanisms, such as universal service funds, to ensure access to digital services for rural and sparsely populated regions.

Another issue for establishing a digitally integrated region is to provide a secure Internet environment. As indicator 8 on the number of secure Internet servers per million of population highlights, Asia-Pacific economies have very few secure servers in their Internet networks, apart from a few exceptions, such as Australia, China, Japan, Singapore, and Hong Kong, China.

Establishing strong regulatory frameworks and data protection protocols can spur economic activity to be conducted online, including sensitive matters. In particular, it is essential to set effective regulatory policies in areas related to data flows, data privacy and cybersecurity. A more favourable regulatory environment may require investments in improving the security of hard infrastructure, for instance, by employing encryption technology. As much of the telecommunication equipment is privately owned, governments must engage in public-private partnerships to provide secure physical and digital infrastructure (World Bank, 2016). This could also involve setting up an institutional mechanism for promoting cooperation on e-commerce, cybersecurity matters, and digital trade rules within the ambit of preferential trade agreements, which generally leave out such considerations (Mitchell and Mishra, 2020). Over the years, some regional agreements and bilateral-dialogue mechanisms or agreements that include cybersecurity issues have been proposed or developed. For instance, the Trans-Pacific Partnership states “No party shall require a covered person to use or locate computing facilities in that Party’s territory as a condition for conducting business in that territory.” – with two sectoral exceptions (financial and government services) and two general exceptions (private and essential security) (Huang, Madnick and Johnson, 2019). Similarly, preferential trade agreements can explicitly include provisions for cybersecurity, helping economies achieve a safer environment for a digitalized tomorrow. Ensuring regulatory coherence in consumer protection and cybersecurity laws in the region are important measures to make certain the integration of the digital economy is secure. As cross-border cyberattacks are frequent, further cooperation on exchanging adequate and timely information on cyberthreats among the regional partners is also essential (World Bank, 2016).

5.3. Promoting inclusive digital participation

Several economies around the world are transforming their regional digital integration strategies to make them more inclusive and broad-based by extending digital services and technologies to women and underserved populations. As indicator 10 on the proportion of females doing online purchases and indicator 9 on female digital financial inclusion show, economies such as Australia, New Zealand and the Republic of Korea, have been extremely successful in promoting the digital inclusion of women. Meanwhile, Hong Kong, China; Japan; Mongolia and Singapore have not been very successful in encouraging women to participate more in online purchases, these economies have also done very well in creating an inclusive digital financial environment. On the contrary, females' participation in online purchases is the lowest in Afghanistan, Bangladesh, Georgia, India, Kyrgyzstan, Myanmar, Nepal, Pakistan, Sri Lanka and Uzbekistan (albeit in most of these economies overall Internet access is also extremely low). Similarly, females' participation in online financial services is the lowest in Afghanistan, Armenia, Azerbaijan, Bangladesh, Cambodia, Kyrgyzstan, the Lao People's Democratic Republic, Myanmar, Pakistan and Tajikistan.

One of the priorities for digital integration is to improve digital literacy among females. It is important to train women to develop soft digital skills, which include using smartphones, computer programmes, web applications, online communication and accessing secure networks for storing and exchanging information. Greater digital integration in the region is contingent on creating a more gender-inclusive financial environment. Reforms must also be carried out in education programmes in which more females are encouraged to learn science, technology, engineering and math skills. Moreover, addressing the issue of the widening gender-wage gap is critical to greater participation by women in digital activities. For instance, by introducing more flexible work arrangements to account for childcare, women can remain in the workforce and eventually gain greater access to the Internet and other digital services. Addressing gender stereotypes that may dissuade women from being active players in the digital economy is also particularly important. This can be done by focusing on gender inclusivity in public policy programmes and incentivizing companies to implement gender-neutral hiring policies (OECD, 2018).

5.4. Widening financial inclusion and the usage of digital payments

Financial inclusion is a key characteristic for a strong digital market, as it allows merchants and consumers to safely and efficiently conduct transactions online over an increasingly wider array of products and services. Furthermore, it is a powerful and inexpensive way of boosting growth and economic prosperity among disadvantaged communities by expanding their access to important financial instruments, such as insurances and credit lines, allowing them to receive payments instantly and securely,

and fostering better financial planning (Jack and Suri, 2014; World Bank, 2017). In this regard, indicators 4 and 9 on digital financial access and female digital financial access, respectively, show that Asia and the Pacific has progressed considerably well over the years, with most economies logging substantial gains. In particular, India, Indonesia, the Islamic Republic of Iran, Kyrgyzstan and Tajikistan have evolved the most. Cambodia, the Lao People's Democratic Republic, Myanmar and Pakistan were among the worst performers for both indicators; no relevant data from Afghanistan, Armenia, Azerbaijan, Bangladesh, Kyrgyzstan and Tajikistan are available for indicator 4, which are economies that attained low scores on indicator 9.

Subsequently, to incentivize the use of online bank accounts and increase financial inclusion, governments can begin to transfer payments to public servants, pensions, subsidies and credit lines, digitally. Moreover, encouraging businesses to pay employees and utility bills through bank accounts instead of cash would be vital in transitioning towards a widespread digitization of economic activity (World Bank, 2017). Furthermore, improving existing standards for online payment systems, creating strong legal protections for online consumers, and expanding Internet services to users in remote areas, are a few other recommendations to boost digital financial inclusion. Finally, encouraging the transaction of small value products would provide a significant stimulus to Internet purchases, as these are among the most intensively traded products digitally. Policies aimed at fostering the creation and expansion of digital platforms, such as easing domain names restrictions and online payments restrictions, enforcing a consumer protection framework and improving the speed and reliability of the postal service are effective in bringing a larger share of the population to online shopping (UNCTAD, 2017; Ferracane, Makiyama and van der Marel, 2018).

VI. FUTURE RESEARCH

While the current framework in DigiSRII aims to capture the different spheres of digital integration – especially taking into account the more comprehensive DigiSRII 1.0 methodology probes into six other dimensions, future research on this topic should complement the number and nature of the indicators used both in the conventional and sustainable perspectives. This would allow for a deeper understanding of regional digital integration in Asia and the Pacific and of countries' specific needs.

In terms of conventional integration, fine-tuning the indicators on ICT exports and imports could bring a more nuanced picture to a country's involvement in digital global value chains. For instance, adopting a digital economy measurement framework, such as the one proposed by the Asian Development Bank (ADB) (2021) and moving towards a more value-added oriented approach (instead of gross exports)

would open the door to several indicators that detail a country's value addition and consumption profile in digital goods and services. Other important dimensions that should be considered in the future are, for instance, indicators on digital skills, literacy and education of the workforce and population or on the ease of conducting business across economies for a digital company. More indicators on infrastructural availability, such as broadband speed or Internet prices, could also be considered. However, adding these indicators requires caution due to the limited availability of comparable data across countries and the potentially high correlation of the indicators.

Similarly, in terms of sustainable integration, the trajectory of expansion should naturally mimic the conventional indicators proposed above. Even though the availability of comparable data across countries remains an important challenge, it would be insightful to expand the concept of inclusion to encompass other spheres of society, such as across income groups, age groups and geographies. This wider perspective on inclusion would be important to gain a better understanding of digital penetration in a country. Moreover, understanding specific digitalization gaps is vital to formulate effective policymaking.

Finally, expanding the sample size used in each indicator – in terms of years and number of countries – could also be extremely beneficial. This would not only be useful for increasing comprehensiveness and usability of the index, but also to enhance the quality and accuracy of the index scores. Given that DigiSRII 1.0 uses a min-max transformation to normalize different indicators, results are, by nature, sensitive to the available lower and upper bounds. As more data points are included, the index scores are expected to change. However, expanding the underlying database to include as many and more varied examples of integration as possible would help stabilize scores across updates and get a better picture of the status of regional integration.

REFERENCES

- Asian Development Bank (ADB) (2021). *Capturing the Digital Economy – A Proposed Measurement Framework and Its Applications: A Special Supplement to Key Indicators for Asia and the Pacific 2021*. Manila.
- Barefoot, K., and others (2018). Defining and measuring the digital economy. Bureau of Economic Analysis Working Papers, 15 March. Available at www.bea.gov/system/files/papers/WP2018-4.pdf.
- Cyber Security Agency of Singapore (2016). *Singapore's Cybersecurity Strategy*. Singapore.
- European Bank for Reconstruction and Development (EBRD) (2020). *ICT – Enabling Growth and Development Sector Strategy 2020–2024*. Available at www.ebrd.com/documents/comms-and-bis/ict-strategy.pdf?blobnocache=true.
- Ferracane, M., H. Makiyama, and E. van der Marel (2018). *Digital Trade Restrictiveness Index*. Brussels: European Centre for International Political Economy. Available at https://ecipe.org/wp-content/uploads/2018/05/DTRI_FINAL.pdf.
- Feifei, F. (2020). Lady consumers pack a punch online. *China Daily*, 11 May. Available at www.chinadaily.com.cn/a/202005/11/WS5eb8a846a310a8b241154a81.html.
- Google, Tamasek, and Bain and Company (2019). *e-Economy SEA 2019 – Swipe up and to the Right: Southeast Asia's \$100 Billion Internet Economy*. Available at www.bain.com/globalassets/noindex/2019/google_temasek_bain_e_comony_sea_2019_report.pdf.
- Hinrich Foundation (2019). The data revolution: how the Philippines can capture the digital trade opportunity at home and abroad. Available at https://alphabeta.com/wp-content/uploads/2019/06/digitrade_philippines_1-pg-view.pdf.
- Hoppe, F., T. May, and J. Lin (2020). *Advancing Towards ASEAN Digital Integration: Empowering SMEs to Build ASEAN's Digital Future*. Available at www.bain.com/contentassets/37a730c1f0494b7b8dac3002fde0a900/report_advancing_towards_asean_digital_integration.pdf.
- Huang, K., S. Madnick, and S. Johnson (2019). Framework for understanding cybersecurity impacts on international trade. CISL Working Paper, No. 2019-23. Available at <http://web.mit.edu/smadnick/www/wp/2019-23.pdf>.
- Huh, H.-S., and Cyn-Young Park (2018). Asia-Pacific Regional Integration Index: construction, interpretation, and comparison. *Journal of Asian Economics*, vol. 54, No. 1, pp. 22–38.
- IBM Security (2020). Cost of a data breach report. Available at www.ibm.com/downloads/cas/QMXVZX6R.
- International Telecommunication Union (ITU) (2019). *Measuring digital development: facts and figures 2019*. Geneva.
- Jack, W., and T. Suri (2014). Risk sharing and transactions costs: evidence from Kenya's mobile money revolution. *American Economic Review*, vol. 104, No. 1, pp. 183–223.
- Mitchell, A., and N. Mishra (2020). Digital trade integration in preferential trade agreements. Asia-Pacific Research and Training Network on Trade Working Paper, No. 191. Bangkok: ESCAP.
- Organisation for Economic Co-operation and Development (OECD) (2017). Digital trade. The impact of digitalisation on trade. Available at www.oecd.org/trade/topics/digital-trade/.

- _____ (2018). Bridging the digital gender divide include, upskill, innovate. Available at www.oecd.org/digital/bridging-the-digital-gender-divide.pdf.
- _____ (2020). Roadmap toward a common framework for measuring the digital economy. Report for the G20 Digital Economy Task Force, Saudi Arabia. Available at www.oecd.org/sti/roadmap-toward-a-common-framework-for-measuring-the-digital-economy.pdf.
- Park, C.-Y., and R. Calveria (2018). Constructing the Asia-Pacific Regional Cooperation and Integration Index: a panel approach. ADB Economics Working Paper Series, No. 544. Manila: ADB.
- United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2017). *Digital Trade Facilitation in Asia and the Pacific. Studies in Trade, Investment and Innovation*. Sales No. E.18.II.F.10.
- _____ (2020a). Asia-Pacific Trade and Investment Agreement Database – APTIAD. Available at www.unescap.org/content/aptiad.
- _____ (2020b). *Regional Integration for Sustainable Development in Asia and the Pacific: ESCAP Digital and Sustainable Regional Integration Index and Indicator Framework DigiSRII 1.0*. Available at www.unescap.org/sites/default/d8files/knowledge-products/TIID_DigiSRII%2B%2B%20.pdf.
- United Nations, Economic Commission for Africa (ECA) (2019). *Making Sense of Regional Integration Indexes: A Guide to Better Understand and Use the Information Contained in Regional Integration Indexes*. Available at https://arii.uneca.org/Reports/en-US/ARII_UserGuide_2019.pdf.
- United Nations, Economic Commission for Africa (ECA), African Union, and African Development Bank (2016). *Africa Regional Integration Index Report 2016*. Addis Ababa: ECA.
- United Nations, Economic Commission for Latin America and the Caribbean (ECLAC) (2009). Physical infrastructure and regional integration. *FAL Bulletin*, vol. 12, No. 280, pp. 1–4.
- United Nations Conference on Trade and Development (UNCTAD) (2013). Review of e-commerce legislation harmonization in the Association of Southeast Asian Nations. Available at https://unctad.org/system/files/official-document/dt1stict2013d1_en.pdf.
- _____ (2017). *UNCTAD B2C E-Commerce Index 2017*. UNCTAD Technical Notes on ICT for Development, No. 9. Available at https://unctad.org/system/files/official-document/tn_unctad_ict4d09_en.pdf.
- _____ (2019). *Digital Economy Report Value Creation and Capture: Implications for Developing Countries*. United Nations publication, Sales No. E.19.II.D.17.
- World Bank (2016). *World Development Report 2016: Digital Dividends*. Washington, D.C.
- _____ (2017). *The EAEU 2025 Digital Agenda: Prospects and Recommendations – Overview Report*. Available at <https://documents1.worldbank.org/curated/en/850581522435806724/pdf/EAEU-Overview-Full-ENG-Final.pdf>.
- World Trade Organization (WTO) (2020). Information Technology Agreement – an explanation. Available at www.wto.org/english/tratop_e/inftec_e/itaintro_e.htm.

ADDRESSING SOVEREIGN DEBT CHALLENGES IN THE ERA OF COVID-19 AND BEYOND: THE ROLE OF THE UNITED NATIONS

*Alberto Isgut**

Traditionally, sovereign debt problems of developing countries have been discussed mostly at institutions representing the creditors, such as the Paris Club, and at the International Monetary Fund, but they have also been addressed by the United Nations, mostly in the context of its international conferences on financing for development. Although the views of the United Nations on debt are not widely known, they are highly relevant in the post-COVID-19 context, as inflationary pressures could lead to tightened global financial conditions and exacerbate debt vulnerabilities in developing countries. The present paper provides an overview of sovereign debt restructurings from the 1980s, a summary of the debt situation of Asia and the Pacific as a case study and a review of the views of United Nations on debt issues. It also offers suggestions to improve the global debt architecture based on such views by highlighting the importance of linking debt sustainability with sustainable development in debt restructuring workouts and through a hub-and-spoke institutional arrangement to disseminate prudential debt management practices and promote transparency.

JEL classification: F34, H63, F53, O19

Keywords: debt sustainability, sustainable development, debt restructuring, United Nations

The COVID-19 pandemic has caused an extraordinary socioeconomic crisis throughout the world. To control the spread of the deadly virus and reduce pressure on overwhelmed health systems, governments have imposed unprecedented social distancing policies, including lockdowns, business closures and travel bans. These

* Alberto Isgut, Acting Section Chief, Financing for Development Section, Macroeconomic Policy and Financing for Development Division, ESCAP (email: isgut@un.org). Comments by Mahmoud Mohieldin, Homi Kharas, Benjamin Singer, Hamza Malik, and an anonymous referee are gratefully acknowledged. The opinions expressed in this paper are those of the author and do not necessarily reflect the views of the United Nations Secretariat.

emergency policies have succeeded in flattening the curve of contagion and saved lives, but they also have resulted in the sudden disappearance of millions of jobs, and countless business being brought to be verge of bankruptcy. These socioeconomic consequences have been met with a robust and fast policy response. According to the International Monetary Fund (IMF) (2020a), the global fiscal response as of September 2020 – which included additional spending, temporary tax cuts and liquidity support to businesses through loans, guarantees, and capital injections – amounted to \$11.7 trillion, or close to 12 per cent of global gross domestic product (GDP). The global monetary response has been equally aggressive, with central banks of the G10 countries expanding their balance sheets by \$7.5 trillion, and 20 emerging market central banks deploying asset purchases for the first time (IMF, 2020b).¹

The global fiscal response, however, has been highly uneven across countries, with 85.9 per cent of which coming from advanced economies.² The fiscal policy response of developing countries has been limited due to financial constraints, including the need to continue servicing foreign currency-denominated debts amid sharply diminished inflows of foreign exchange. In addition, while some emerging developing countries were able to issue new debt in international bond markets in the second half of 2020 and in 2021, others were severely hit by the collapse of international travel and tourism and by a significant decline in foreign direct investment, international remittances and commodity prices.

Overall, the increases in government spending and declines in government revenue has resulted in a global increase of the average general government debt over GDP ratio of 15 percentage points, from 83.6 per cent in 2019 to 98.6 per cent in 2020. The increase was higher for advanced economies, 18.9 percentage points, followed by emerging economies, 9.3 percentage points, and low-income developing countries, 5.8 percentage points (IMF, 2021a). The sharp increase in public debt resulting from the COVID-19 pandemic has added to risks that were building up before the pandemic. According to the World Bank, since 2010, the world has experienced the largest, fastest and most broad-based episode of sovereign and corporate debt build-up in the past 50 years (Kose and others, 2021). Going forward, the debt vulnerabilities of low-income developing countries, approximately 60 of which are in debt distress or at high risk of debt distress, are expected to remain high, with less room for further borrowing and with rising debt services compared to tax revenues (IMF, 2021a; Georgieva and Pazarbasioglu, 2021).

¹ The Group of 10 includes Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland and the United Kingdom of Great Britain and Northern Ireland.

² Author's calculations based on data from the IMF Database of fiscal responses to COVID-19. Available at www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19 (updated as of 11 September 2021).

Heavy debt build-ups and the risk of sovereign debt distress among developing countries, in turn, poses serious challenges to economic growth, poverty alleviation and sustainable development. The World Bank estimates that in 2020, the number of extreme poor increased by 97 million or 11.6 per cent compared to 2019 (Mahler and others, 2021).³ Moreover, as the experiences of Latin America in the 1980s or Greece after the global financial crisis of 2008 suggest, debt crises can cause protracted stagnation that lasts for many years. Considering the additional investment requirements needed to achieve the Sustainable Development Goals and implement the Paris Agreement, a debt overhang affecting a large number of developing countries is a worrisome prospect.

To address debt problems caused by the pandemic in developing countries, the Secretary-General of the United Nations (United Nations, 2020) has proposed a three-phase approach: (a) a debt standstill to provide immediate breathing space for all countries that need it; (b) provide additional, targeted debt relief for countries that require support beyond a temporary suspension of debt service; and (c) address structural issues in the international debt architecture to prevent defaults leading to prolonged financial and economic crises in future.

The first phase has been addressed by the Debt Service Suspension Initiative (DSSI) of the G20, launched in April 2020 and closed in December 2021. The initiative provided additional fiscal space to low-income countries by postponing their debt service to official creditors. Of the 73 eligible countries, 48 had joined the initiative as of 23 November 2021.⁴ While the temporary relief provided by the initiative has been welcome, the beneficiaries will likely need additional support going forward. In this regard, the G20 Riyadh Leaders Summit endorsed the Paris Club agreement to launch a “Common Framework for Debt Treatments beyond the DSSI” (Paris Club, 2020).⁵ The purpose of the Common Framework is to coordinate Paris Club and non-Paris Club creditors in the provision of debt relief to DSSI eligible countries on a case-by-case basis. The Common Framework has the potential to address phases 2 and 3 of the Secretary-General’s approach but its implementation to date has been rather slow, with only three countries – Chad, Ethiopia and Zambia – having requested debt relief under it.

³ Extreme poverty is measured using the international poverty line of \$1.90/day.

⁴ www.worldbank.org/en/topic/debt/brief/covid-19-debt-service-suspension-initiative. Accessed on 11 December 2021. Eligible countries to DSSI include the 72 countries eligible to borrow from the International Development Association (IDA) of the World Bank plus Angola.

⁵ See also annex 1 of the statement released after the Extraordinary G20 Finance Ministers and Central Bank Governors’ Meeting on 13 November 2020. Available at www.imf.org/-/media/Files/News/news-articles/english-extraordinary-g20-fmcbg-statement-november-13.ashx.

Traditionally, sovereign debt problems of developing countries have been discussed mostly at institutions representing the creditors, such as the Paris Club, and at the International Monetary Fund (IMF). They have also been addressed by the United Nations, mostly in the context of its international conferences on financing for development. The views of the United Nations on debt are not widely known, but they are highly relevant in the post-COVID-19 context, specifically because potential tightened global financial conditions in response to inflationary pressures could further exacerbate debt vulnerabilities in developing countries.

The rest of the paper is organized as follows: section I provides an overview of sovereign debt restructurings from the 1980s leading to the latest developments. Section II contains a discussion on the debt situation of Asia and the Pacific as a case study to assess the suitability of the current global debt architecture to solve debt difficulties going forward. Section III provides a review of the views of the United Nations on debt issues, including debt restructuring, and in section IV, some ideas to improve the global debt architecture based on such views are offered.

I. AN OVERVIEW OF SOVEREIGN DEBT RESTRUCTURINGS SINCE THE 1980S

A sovereign debt restructuring can be defined as an exchange of outstanding sovereign debt instruments, such as loans or bonds, for new debt instruments or cash. Sovereign restructurings were unusual before the 1980s, and most of them involved the rescheduling of sovereign debts with official bilateral creditors through the Paris Club. This is because sovereign debt with commercial creditors was rare until the 1970s. During that decade, the breakdown of the Bretton Woods system, the OPEC oil shocks, and the recycling of petrodollars resulted in a major increase in global liquidity, part of which was channelled as loans from commercial banks to developing countries (Lissakers, 1991).

The debt crisis of the 1980s

A debt crisis began in 1982 when a number of middle-income countries were unable to service their debts with commercial banks as a result of a jump in interest rates and a drop in commodities prices in the previous years. As a result of the crisis, the number of restructuring deals leaped to 268 in the 1980s, compared to only 45 in the twenty-five years between 1955 and 1980. The total value of these debt restructurings increased even more substantially, from \$20 billion between 1955 and 1980 to \$600 billion in the 1980s.⁶

⁶ Author's calculations based on data from Das, Papaioannou and Trebesch (2012).

The restructuring of developing countries' sovereign debts with their commercial bank creditors during that decade was a complex and drawn-out process in which borrowers and commercial banks engaged in repeated negotiations to reschedule debt services. Although the borrowers were clearly facing a problem of solvency and not just liquidity, it was only at the end of the decade, through the Brady Plan of 1989, that a resolution was attained. This inefficient debt restructuring process resulted in a "lost decade" for the borrowers, characterized by an interruption in their access to capital markets, limited investment, and stagnant growth and development.

The Brady Plan provided options for the exchange of outstanding bank debt for long-term bonds. While the characteristics of the so-called Brady bonds varied from country to country, two basic bond options were par bonds and discount bonds. Par bonds had the same face value as the outstanding bank debt, but the interest rate was fixed and below the market rate. Discount bonds had a lower face value than the debt outstanding, generally with a discount of between 30 and 50 per cent, and market-based, floating interest rates. The principal of par and discount bonds was secured at final maturity through zero-coupon instruments.⁷

The Highly Indebted Poor Countries (HIPC) Initiative

While the debt crisis of the 1980s was renowned for the protracted negotiations between middle-income countries and commercial banks, low-income countries indebted with bilateral official creditors were also facing difficulties. In fact, between 1955 and 2010, most of the debt restructuring episodes were with bilateral official creditors. In the 1980s, there was a total of 268 debt restructurings of which 167 were through the Paris Club, compared to 101 with commercial creditors.⁸

Until the late 1980s, restructuring negotiations with the Paris Club only rarely included reductions in the face value of debts. This started to change in 1988, when the Paris Club adopted the Toronto terms, which allowed for a reduction of 33.33 per cent in the stock of debt of poor countries. These were replaced in 1991 by the London terms, which allowed for a debt reduction of 50 percent, and in 1994 by the Naples terms, which allowed countries eligible to receive loans from the International Development Agency (IDA) of the World Bank to have between 50 and 67 per cent of their debts cancelled. Subsequently, in 1999, the Cologne terms allowed countries

⁷ In the case of United States dollar-denominated debt, issuing countries purchased from the United States Treasury zero-coupon bonds with a maturity corresponding to the maturity of the individual Brady bond. The zero-coupon bonds were held in escrow at the Federal Reserve until the bond matured, at which point the zero-coupons would be sold to make the principal repayments. For more details on the Brady Plan, see Trade Association for the Emerging Markets (EMTA) (2021).

⁸ Author's calculations based on data from Das, Papaioannou and Trebesch (2012).

eligible to the Highly Indebted Poor Countries (HIPC) Initiative to have 90 per cent of their debts cancelled (Paris Club, n.d.). See also Weiss (2013).

The HIPC debt relief programme was created by the World Bank and IMF in 1996 to reduce some multilateral debts as a complement to the bilateral debt forgiveness offered by the Paris Club (Weiss, 2006). The initiative is ongoing. As of March 2021, 37 countries, 31 of which are in Africa, received debt relief through it (IMF, 2021b). Between 1998 and 2010, members of the Paris Club engaged in 82 debt restructuring episodes with countries participating in the HIPC Initiative.⁹ As of March 2021, two additional countries – Eritrea and Sudan – became eligible for HIPC Initiative assistance.

Eligible countries for HIPC Initiative assistance must also be eligible to borrow from IDA and fulfil the following conditions: (a) have a strong track record of economic reforms under World Bank and IMF-sponsored programmes; (b) possess a debt burden that is unsustainable after bilateral debt relief has been applied; and (c) have developed a poverty reduction strategy paper (Weiss, 2006; IMF, 2021b). Unsustainable debt was initially defined as a debt service-to-exports ratio exceeding 250 per cent, but the threshold was lowered to 150 per cent in 1999.

The provision of debt relief under HIPC Initiative involves two stages. In the first stage, a candidate country for debt cancellation establishes a three-year track record of good economic performance under existing IMF and World Bank lending arrangements. During this period, the country receives debt reduction from Paris Club official creditors under the Naples Terms. Other bilateral and commercial creditors are expected by Paris Club members to offer similar or better debt restructuring deals. This stage culminates in a “decision point,” in which it is determined whether the country requires additional debt relief and how much it should receive. During the second stage, the country must continue to establish a track record of good economic policies and implement its poverty reduction strategy. During that stage, the country’s bilateral debts are rescheduled under the Cologne terms of the Paris Club. The second stage ends at a “completion point,” in which countries’ debts are permanently cancelled according to the debt relief determined at the “decision point” (IMF, 2021b).

In 2005, the HIPC Initiative was supplemented by the Multilateral Debt Relief Initiative with the goal of accelerating progress towards achieving the Millennium Development Goals. This initiative allowed for 100 per cent relief on eligible debts by three multilateral institutions – IMF, the World Bank, and the African Development Fund – for countries completing the HIPC Initiative process. In 2007, the Inter-American Development Bank decided to provide additional debt relief to the five HIPCs in the Western Hemisphere (Weiss, 2006).

⁹ Author’s calculations based on data from Das, Papaioannou and Trebesch (2012).

A global statutory approach: the sovereign debt restructuring mechanism

By the time that the Paris Club and HIPC Initiative provided debt relief to low-income countries through partial debt cancellations, bondholders had replaced commercial banks as the main creditors of middle-income developing countries, a consequence of the Brady Plan. However, this change did not reduce the need for debt restructurings: between 1991 and 2000, there were 53 commercial debt restructuring deals for a total value of \$242 billion.¹⁰

The emergence of sovereign bonds as the leading source of private finance of developing countries brought new complexities to debt restructuring processes. As Krueger (2001) noted, the sovereign debt restructurings of the 1980s were “protracted but generally orderly processes.” At that time the major creditors were commercial banks, which negotiated with a debtor through a steering committee representing a large percentage of the total debt to be restructured. The banks had incentives to be cooperative, to safeguard future business with the debtor and to comply with bank regulations in their home country (Krueger, 2001).

In contrast, bondholders are a heterogeneous group with diverse goals in debt restructuring processes. While some will be interested in a rapid and orderly restructuring that will preserve the value of their claims, others will prefer a disorderly process that will allow them to buy distressed debt cheaply in secondary markets in the hope of making a large speculative profit (Krueger, 2001). Individual bondholders also have the recourse of litigation with a defaulting sovereign and are not bound by financial regulators. The unfortunate consequence of this situation is that debtor countries will, in the words of Anne Krueger (2001), “go to extraordinary lengths to avoid restructuring their debts to [...] private creditors.”

To address these complex collective action problems, IMF launched a proposal to set up a sovereign debt restructuring mechanism in November 2001, which was endorsed by most, but not all, of the IMF executive directors by April 2003. The proposal, as described by Hagan (2005, p. 336), focused on addressing the problem of holdout creditors through “a legal framework that would enable a qualified majority of creditors to make critical decisions, including, but not limited to the acceptance of the final restructuring terms, that would be binding on all private creditors holding external claims”.

Three important characteristics of the proposed sovereign debt restructuring mechanism were the following (Hagan, 2005):

¹⁰ In comparison, there were 101 commercial debt restructurings in the 1980s for a total value of \$200 billion. Author’s calculations based on data from Das, Papaioannou and Trebesch (2012).

- (a) The aggregation of claims across different instruments, regardless of whether there is a contractual voting framework that links these instruments;
- (b) A centralized dispute resolution forum would be given exclusive jurisdiction over all disputes that may arise during a restructuring proceeding;
- (c) Both contractual and judgment creditors would be included in restructuring processes under the sovereign debt restructuring mechanism.¹¹

The sovereign debt restructuring mechanism proposal required an amendment to the IMF Articles of Agreement, for which the support of a minimum of three fifths of its members holding 85 per cent of the voting power was needed. Although the United States of America, which at that time held 17.14 percent of the IMF voting power, was initially favourable to the proposal, in April 2003 the country withdrew its support for it. Hagan (2005) suggested that an important reason for the withdrawal of support for the sovereign debt restructuring mechanism by the United States was a strong preference for resolving debt restructurings through market-based, contractual approaches. The successful introduction of collective action clauses in bonds issued under New York law in early 2003, to be discussed in the next section, provided an opportunity to improve such approaches.

Market-based contractual approaches strengthened: collective action clauses

Because of the failure of the proposed sovereign debt restructuring mechanism, direct negotiations between debtors and bondholders continued to be the main modality of debt resolution between sovereign States and their commercial creditors. A bond is a legally binding contract between the issuer and the bondholders, and any modification of its terms requires agreement among all the parties in accordance with the terms of the contract. Collective actions clauses are contractual provisions that permit a majority or supermajority of holders of a multi-creditor debt instrument such as a bond to make decisions that bind all holders of the instrument (Buchheit and Gulati, 2020).

Collection actions clauses were introduced in 1879 in corporate bonds governed by English law. The clauses allowed a modification of the terms of the bond for all holders provided that a voting threshold, typically 75 per cent of the principal, is reached. These clauses were largely absent in bonds issued in the United States until 2003, when majority restructuring provisions became standard in bonds governed by New York law. According to Hagan (2005, p. 320), this breakthrough was attributable to concerns among both market participants and emerging-market issuers that in

¹¹ A judgement creditor is defined by the Cambridge Dictionary as “a person or company that a court of law has decided has the legal right to receive money from another person or company”.

the absence of a market-based instrument to facilitate debt restructurings, “there was a greater likelihood that the official sector would proceed with more forceful intervention, i.e. the establishment of some form of statutory debt restructuring framework.”

A weakness of both the English law collective actions clauses and the ones introduced under New York law in 2003 is that they operate individually for each series of a bond. If, for instance, the clause requires holders to hold a minimum of 75 per cent of the outstanding principal to agree to a restructuring proposed by the issuer, a holdout creditor or group of creditors could buy up more than 25 per cent of a particular series of a bond to block the restructuring proposal. To address this problem, a new generation of collective actions clauses introduced an aggregated voting procedure for restructuring decisions, along with the traditional series-by-series votes. The so-called “two-limb” collective actions clauses were first included in a bond issued by Uruguay in 2003. It required an affirmative vote of the holders of 85 per cent of the outstanding principal of all series of affected bonds plus a vote of $66\frac{2}{3}$ per cent of each individual series of bonds to be considered in the restructuring.

The rationale for including both series-by-series votes and an aggregate vote was to avoid the so-called “ganging up” problem, by which a majority of holders can force a restructuring that offers a bad deal to holders of one or a few specific series. To illustrate this, Buchheit and Gulati (2020) consider a hypothetical example under which the issuer proposes to restructure series 1 through 9 of a 10-series bond on very generous terms while offering the holders of series 10 to a 90 per cent write off of the principal. If there is only a collective vote by the holders of the 10 series, they will agree to a deal that would be very detrimental to holders of series 10 of the bond.

While “two-limb” collective actions clauses are effective in protecting minority holders from a detrimental restructuring, the per-series vote can still be subject to holdout creditors who could block a multi-series restructuring deal by buying 34 per cent of a single series. The importance of the “holdout problem” was clear in the Greek debt restructuring of 2012. Of the 36 series of bonds governed by English law, the holders of only 17 series voted to accept the restructuring proposal, while holdout creditors who had acquired blocking positions derailed the restructuring of the remaining 19 series. It is unlikely that this problem would have been completely solved with Uruguay-style “two-limb” collective actions clauses. To reduce the influence of holdout bondholders, in 2013 “two-limb” collective actions clauses were introduced and made mandatory for all eurozone sovereign bonds issues, but with lower voting thresholds: $66\frac{2}{3}$ per cent for the aggregate vote and 50 per cent for the series-to-series vote (Buchheit and Gulati, 2020).

The latest generation of collective actions clauses proposed by the International Capital Markets Association in 2014, known as “enhanced” collective action clauses allow for modifications in the terms of a sovereign bond in three possible ways (Buchheit and Gulati, 2020):

- (a) Pursuant to a series-by-series vote with a 75 per cent voting threshold;
- (b) On an aggregated basis by a two-tier vote with a $66\frac{2}{3}$ per cent vote of the entire aggregated universe of bondholders and a 50 per cent vote of each series in the aggregated pool, similar to the model eurozone collective actions clauses;
- (c) Pursuant to a single, 75 per cent vote of the entire aggregated universe if and only if the proposed modification is uniformly applicable to all affected series.

The debt restructurings of Ecuador and Argentina in 2020 used the second option of enhanced collective actions clauses. The third option, which allows for a “single limb” voting procedure, is an important innovation in collective actions clauses, which has received support from IMF (2014). The requirement that any modification of the bond terms should be uniformly applicable across series aims at avoiding the “ganging up” problem discussed above, while reliance on a single vote to all series being restructured prevents holdout bondholders to block a deal by acquiring more than 50 per cent of a single series. As of December 2021, however, there had not been any sovereign bond restructurings based on the single limb option of the International Capital Market Association’s enhanced collective actions clauses.

Overall, the introduction of collective actions clauses in the early 2000s seems to have had a favourable effect on the efficacy of sovereign debt restructurings with bondholders. According to data compiled by Asonuma and Trebesch (2016), the median duration of debt restructurings declined from 60 months over the period 1991–2000 to 37 months over the period 2001–2010 and 10 months over the period 2011–2020.¹² In addition, the proportion of debt restructurings that occurred post-default also decreased, from 83 per cent over the period 1991–2000 to 68 per cent over the period 2001–2010 and 29 per cent over the period 2011–2020. This improvement, however, hides important differences across countries. During the period 2001–2010 debt restructurings that occurred post-default had a median duration of 136 months. In addition, the percentage of sovereign debt restructurings that involved creditor litigation increased from approximately 25 per cent to 50 per cent throughout this decade (Schuhmacher, Trebesch and Enderlein, 2018).

¹² Author’s calculations based on the database of Asonuma and Trebesch (2016). Available at <https://sites.google.com/site/christophtrebesch/data>. The data for 2020 is as of September of that year.

Recent views and developments in debt restructuring

In an evaluation of the experience of debt restructurings with private creditors since 2014, IMF (2020c) pointed out that they tended to proceed smoothly, were largely pre-emptive and had shorter average duration and higher average creditor participation than in the past, although not for all countries. Although it considered collective actions clauses to have been largely effective in resolving sovereign debt cases, the IMF assessment notes some gaps that could pose challenges in future, including the following:

- (a) The large outstanding stock of international sovereign bonds that lack enhanced collective actions clauses, making them more vulnerable to holdout creditors;
- (b) The existence of other forms of debt, such as syndicated loans or sub-sovereign debt, which often lack majority restructuring provisions for payment terms;
- (c) Increased use of collateral and collateral-like instruments, which has the potential to complicate sovereign debt restructurings;
- (d) The perennial issue of information asymmetry preventing common understandings of the perimeter of the restructuring operation and how each claim will be classified.

The International Monetary Fund proposes various options to address these challenges. These include strengthening contractual arrangements, expanding the use of enhanced collective actions clauses, adding majority restructuring provisions in loan agreements and considering state-contingent clauses to protect sovereigns from exogenous downside risks. The report mentions the potential usefulness of the so-called “anti-vulture funds” legislation to provide additional protection against holdout creditors and makes a strong call to the international community to enhance debt transparency and help borrowing countries strengthen their debt management capacity through technical assistance. Finally, the report points out that current instruments may not be sufficient in a major global debt crisis affecting many countries. Accordingly, additional financial and statutory instruments may be required. Among the latter, the report mentions international law options, such as a United Nations Security Council resolution, which could be used to limit creditor recovery or the timing of suits or to immunize specified assets from attachment by creditors.¹³

¹³ The only precedent of a United Nations resolution used to that effect is described in section III.

The possibility of a global debt crisis is not farfetched.¹⁴ A recent article by Bulow and others (2020) warns that “there is brewing in the background a growing need for debt restructurings in numbers not seen since the debt crisis of the 1980s” and calls official creditors to “be prepared to act as needed.” The authors note that, historically, official lenders have taken much larger losses than private lenders in sovereign debt restructurings, contradicting the assumption that the official sector is senior to the private sector. They also note the very long time to resolve default episodes, which historically has averaged seven years and involved multiple restructurings. One reason for such long resolution times is that both debtors and creditors have expected that delays will help both sides bargain for larger infusions from official creditors.

For debt restructuring processes to be fairer and more efficient, a greater degree of inter-creditor equity and fair burden sharing, especially between official and private creditors, is called for in the report. Also suggested in the report are the following: an increase in the transparency of debt data and debt contracts to facilitate more expedient creditor-debtor negotiations and allow both parties to identify which bonds are at risk of holdout or litigation tactics; and the preparation of realistic economic forecasts that incorporate downside risks to facilitate an earlier identification of cases in which large write-downs will be necessary.

In response to these concerns, the Common Framework for Debt Treatments beyond the DSSI was proposed at an extraordinary meeting of the G20 finance ministers and central bank governors on 13 November 2020 as a mechanism to restructure debt obligations of selected developing countries. Its main characteristics are the following:

- (a) *Eligibility*: All countries eligible to participate in the Debt Service Suspension Initiative (DSSI);
- (b) *Initiation of the process*: Upon request of debtor countries;
- (c) *Assessment*: The need for debt restructuring will be assessed through the IMF-World Bank debt sustainability analysis and the collective assessment of the bilateral creditors;
- (d) *Eligible debt*: Public and publicly guaranteed debt with a maturity of at least one year;
- (e) *Data disclosure*: Applying debtors will provide the necessary information regarding all public sector debt, “while respecting commercially sensitive information”;

¹⁴ See, for example, Kharas (2020) and Spiegel, Schwank and Obaidy (2020).

- (f) *Participation of bilateral creditors:* All bilateral creditors, including members of the G20 and the Paris Club plus others on a voluntary basis, will participate in restructuring exercises;
- (g) *IMF programme:* Debtors receiving support will engage in an upper credit tranche (UCT) IMF-supported programme;
- (h) *Debt write-offs:* Although discouraged, they will be considered if needed;
- (i) *Burden-sharing:* There will be fair burden-sharing among official creditors. Private creditors will be expected to offer a treatment at least as favourable as what is offered by official creditors.
- (j) *Creditor coordination:* The debtor will sign a memorandum of understanding with participating creditors. The debtor will be required to seek from all its other official bilateral creditors and private creditors a treatment at least as favorable as the one agreed in the memorandum of understanding. The debtor will be required to provide signatories of the memorandum of understanding regular updates on the progress of its negotiations with its other creditors.

As was noted in the introduction, as of December 2021 only three countries – Chad, Ethiopia, and Zambia – have requested debt relief through the Common Framework, all of them between the end of January and the beginning of February of 2021. In June 2021 a creditor’s committee for Chad, comprised of China, India, France, and Saudi Arabia, was established (Jubilee Debt Campaign, 2021). The 12-member creditors’ committee for Ethiopia, led by China and India, was established in September 2021 (Paris Club, 2021), and the creditor’s committee for Zambia still needed to be established as of the end of 2021 (Georgieva and Pazarbasioglu, 2021).

Chad is important as a test case of the success of the Common Framework in bringing private creditors to the negotiating table and having them agree to offer a deal at least as favourable as the one offered by official creditors. The country’s private debt of \$1 billion is owed to a syndicate led by Glencore, an Anglo-Swiss commodities trading company (Jubilee Debt Campaign, 2021). Because the debt is collateralized with future oil shipments, the creditors are in no hurry to commit to a restructuring deal, as they will get paid as long as the country continues to export oil.

Based on the initial experience of the Common Framework, Georgieva and Pazarbasioglu (2021) propose four areas for improvement: (a) clarify the different steps and timelines of the process; (b) consider a comprehensive and sustained debt service payment standstill during the duration of the negotiations to provide relief to the debtor at a time of distress and incentivize creditors to speed up progress and

the creditor's committee for Zambia still needed to be established as of the end of 2021 (Georgieva and Pazarbasioglu, 2021). towards a debt restructuring deal; (c) clarify further how the comparability of treatment of official and private creditors will be effectively enforced, including through the implementation of the IMF arrears policies; and (d) expand the Common Framework to other, currently non-eligible highly indebted countries that can benefit from creditor coordination.

On the third point, the IMF "lending into arrears" policy has allowed the organization to lend to a sovereign with arrears to external private creditors, only if the country is making a "good faith effort" to reach a collaborative agreement with its private creditors (Buchheit and others, 2019). This policy provides financial space for debtors to take more time, if needed, to negotiate an appropriate debt restructuring deal.

II. DEBT IN ASIA AND THE PACIFIC IN THE AFTERMATH OF THE COVID-19 PANDEMIC: A CASE STUDY

To assess the suitability of the current debt architecture, recent debt data from the Asia-Pacific developing countries were analysed. Following ESCAP (2021a), the countries are grouped into three categories: (a) countries that are eligible for Common Framework treatment, (b) countries not eligible for Common Framework treatment with below investment grade credit ratings, and (c) countries not eligible for Common Framework treatment with investment grade credit ratings. Table 1 shows the composition of the three groups of countries.

The rationale for the classification is that countries eligible for Common Framework treatment are expected to access that debt restructuring mechanism under the aegis of IMF. Of the 34 Asia-Pacific countries included in the World Bank International Debt Statistics database, the majority, 20 countries, fall into this category.¹⁵ The other two categories, which include seven countries each, group countries not eligible for Common Framework treatment, dividing them according to whether their credit ratings are investment grade. The rationale for distinguishing between them is that countries with investment grade credit ratings have access to global capital markets on better terms than those that do not.

¹⁵ The World Bank International Debt Statistics database includes an additional Asian country, the Islamic Republic of Iran. This country is not included in the analysis because of its very low access to foreign exchange and external debt due to political sanctions.

Table 1. Country groups for debt analysis

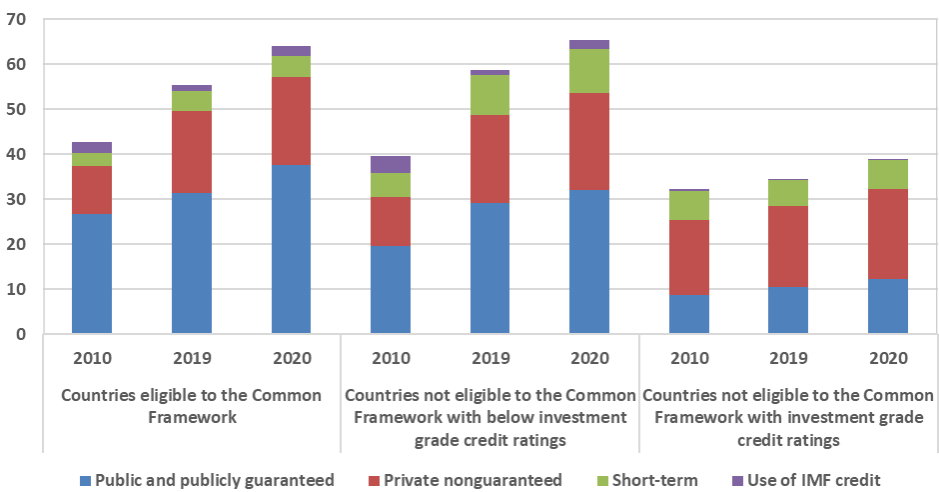
Country group	Countries
(1) Countries eligible for Common Framework treatment	Afghanistan, Bangladesh, Bhutan, Cambodia, Fiji, Kyrgyzstan, the Lao Peoples Democratic Republic, Maldives, Myanmar, Mongolia, Nepal, Pakistan, Papua New Guinea, Samoa, Solomon Islands, Tajikistan, Timor-Leste, Tonga, Uzbekistan and Vanuatu
(2) Countries not eligible for Common Framework treatment with below investment grade credit ratings	Armenia, Azerbaijan, Georgia, Sri Lanka, Turkey, Turkmenistan and Viet Nam
(3) Countries not eligible for Common Framework treatment with investment grade credit ratings	China, India, Indonesia, Kazakhstan, the Philippines, the Russian Federation and Thailand

Source: Author, based on data from World Bank, COVID-19: Debt Service Suspension Initiative. Available at www.worldbank.org/en/topic/debt/brief/covid-19-debt-service-suspension-initiative (accessed on 14 December 2021); and Trading Economics, Credit rating. Available at <https://tradingeconomics.com/country-list/rating> (accessed on 14 December 2021).

As a result of the COVID-19 pandemic, the level of indebtedness of the Asia-Pacific developing countries increased substantially in 2020. The increase was largest for the group of countries eligible for Common Framework treatment, 8.7 percentage points of GDP, followed by the countries not eligible for Common Framework treatment with below investment grade credit rating, 6.6 percentage points of GDP, and the countries not eligible for Common Framework treatment with investment grade credit rating, 4.5 percentage points of GDP (figure 1).

Figure 1 also shows that the category of countries not eligible for Common Framework treatment and with credit ratings below investment grade had the highest average debt-to-GDP ratio in 2020, 65.3 per cent, and experienced the fastest increase in the ratio since 2010, 25 percentage points. In contrast, the countries not eligible for Common Framework treatment and with investment grade credit ratings had the lowest debt-to-GDP ratio in 2020, 39 per cent, and it has increased the least since 2010, 6.7 percentage points. With regard to the composition of the external debt, the share of the public and publicly guaranteed debt decreased across the three groups. In 2020, this share ranged from slightly above 30 per cent for the countries not eligible for Common Framework treatment with investment grade credit ratings to close to 60 per cent of the total for the countries eligible for Common Framework treatment. In the first group of countries, more than 50 per cent of the debt is private non-guaranteed.

Figure 1. Total external debt stocks, percentage of the GDP, by country group



Source: Author, based on data from World Bank, “International debt statistics”, Data Bank. Available at <https://databank.worldbank.org/source/international-debt-statistics> (accessed on 14 December 2021).

Regarding terms of borrowing, they improved significantly between 2019 and 2020. As shown in table 2, the average interest rate on new loans for all countries decreased by one full percentage point, from 2.8 percent in 2019 to 1.8 per cent in 2020, while the maturity was extended slightly. These favourable conditions applied to the three groups of countries considered in the analysis. The group of countries eligible for Common Framework treatment had the lowest interest rates and longer maturities because of their access to concessional credit lines.

As shown in figure 2, the countries eligible for Common Framework treatment recorded the most rapid increase in their public and publicly guaranteed external debt between 2019 and 2020, 6.2 percentage points of the GDP, followed by the countries not eligible for Common Framework treatment with credit ratings below investment grade, 2.8 percentage points, and the countries not eligible for Common Framework treatment with investment grade credit ratings, 1.7 percentage points.

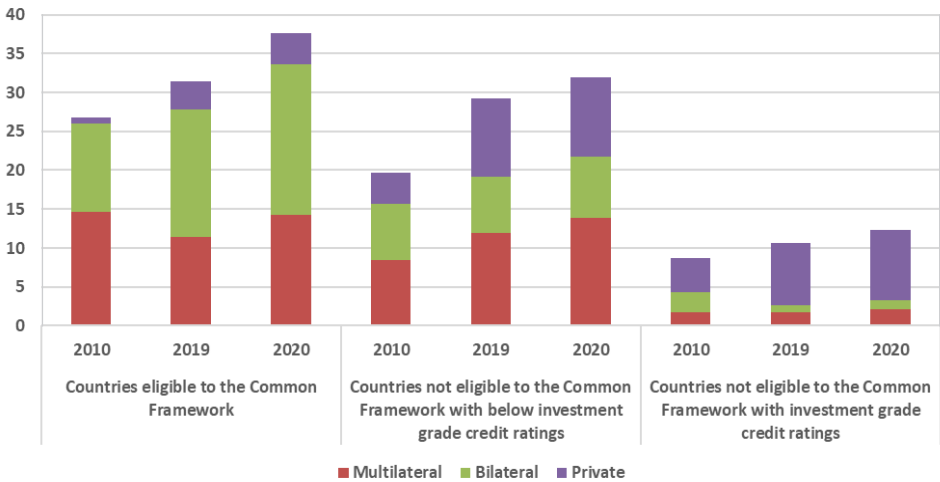
Table 2. Average interest rate and maturity of new public and publicly guaranteed external debt in 2019 and 2020, by country group

	Average interest on new external debt commitments (per cent)		Average maturity on new external debt commitments (years)	
	2019	2020	2019	2020
Countries eligible for Common Framework treatment	2.3	1.4	25.8	26.5
Countries not eligible for Common Framework treatment with below investment grade credit ratings	3.2	1.9	14.5	17.5
Countries not eligible for Common Framework treatment with investment grade credit ratings	3.5	2.7	18.1	16.9
All countries	2.8	1.8	21.6	22.3

Source: Author, based on data from World Bank, "International debt statistics", Data Bank. Available at <https://databank.worldbank.org/source/international-debt-statistics> (accessed on 14 December 2021).

From a longer-term perspective, the creditor composition of the public and publicly guaranteed debt changed between 2010 and 2020 in the three groups. In the case of the countries eligible for Common Framework treatment, the share of the multilateral development banks declined significantly, from 55 per cent in 2010 to 38 per cent in 2020. This drop was compensated by increases in bilateral debt, from 42.1 per cent in 2010 to 51.3 per cent in 2020, and debt to private creditors, from 2.8 per cent in 2010 to 10.6 per cent in 2020. In the countries not eligible for Common Framework treatment, the main change has been the growing importance of private creditors. Their share increased from 20.1 per cent in 2010 to 32.3 per cent in 2020 in the below-investment grade countries and from 49.9 per cent in 2010 to 73.1 per cent in 2020 in the investment grade countries.

Figure 2. Public and publicly guaranteed external debt stocks, percentage of the GDP, by country group



Source: Author, based on data from World Bank, “International debt statistics”, Data Bank. Available at <https://data.bank.worldbank.org/source/international-debt-statistics> (accessed on 14 December 2021).

To complete this overview of the impact of the COVID-19 pandemic on external debt in Asia and the Pacific, figure 3 shows the debt service-to-exports ratios by country and by country group.¹⁶ Debt services are for the public and publicly guaranteed debt on average for 2021 and 2022, and exports include goods and services. The figure includes two horizontal lines at 10 per cent and 21 per cent. These are the prudential thresholds for the debt services-to-exports threshold recommended by the Debt Sustainability Framework for Low-Income Countries of IMF and the World Bank.¹⁷

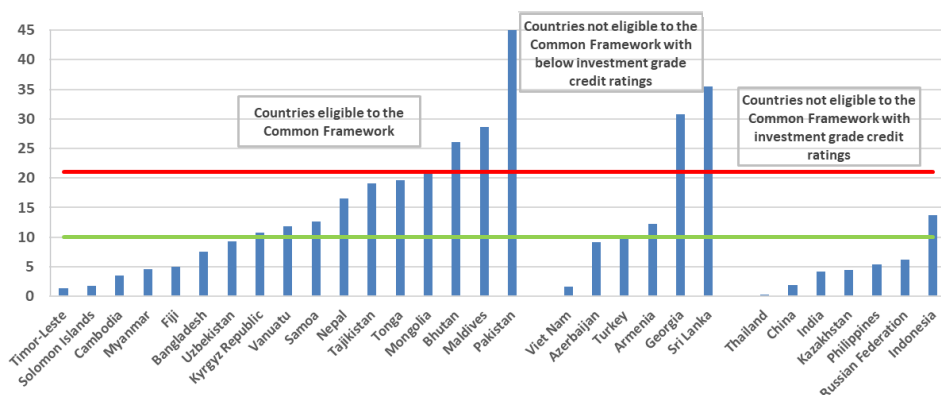
The figure shows that 16 out of 30 developing countries have debt services-to-export ratios below 10 per cent, eight are between 10 and 21 per cent, and six are above 21 per cent. Of the six above 21 per cent, four belong to the category of countries eligible for Common Framework treatment and two are countries not eligible for Common Framework treatment that have credit ratings below investment grade.

¹⁶ Afghanistan, the Lao People’s Democratic Republic, Papua New Guinea, and Turkmenistan were excluded because they lacked data on exports for 2020. The indicator in the figure is Sustainable Development Goal indicator 17.4.1.

¹⁷ According to IMF (2021c), the Framework suggests different indicative thresholds for debt burdens depending on the country’s historical performance and outlook for real growth, international reserves coverage, and the state of the global environment. Strong performers have higher thresholds.

If the debt situation deteriorates in 2022 and beyond due to increases in interest rates by the main central banks in an effort to contain inflationary pressures, the latter countries will be the most exposed because of their ineligibility for Common Framework treatment and difficulties to access global capital markets due to their below investment grade credit ratings.

Figure 3. Debt service on public and publicly guaranteed external debt, average 2021–2022, over exports of goods and services in 2020 (percentage)



Source: Author, based on data from World Bank, “International debt statistics”, Data Bank. Available at <https://databank.worldbank.org/source/international-debt-statistics> (accessed on 14 December 2021); and World Bank, Open Data. Available at <https://data.worldbank.org/indicator/NE.EXP.GNFS.CD> (accessed on 14 December 2021).

Coping with debt challenges during the pandemic

Despite the increasing debt pressures resulting from the COVID-19 pandemic, as of December 2021, no developing country in Asia and the Pacific needed to restructure its external debt. Countries with access to global capital markets were able to borrow at favourable terms helped by the abundant global liquidity driven by massive asset purchase programmes instituted by the developed countries’ central banks. Even some countries facing challenging circumstances, such as Maldives, which was badly affected by the collapse of the travel and tourism industry during the pandemic, were able to obtain financing in the global capital market. Maldives raised \$500 million through a series of issuances of sukuk (Islamic bonds), but the cost of this financing was high, at close to 10 per cent per year (Maldives Financial Review, 2021).

In addition, the international financial institutions contributed significant amounts of financing to assist developing countries amid the pandemic. By one estimate, they provided \$237.2 billion in COVID-19-related support in 2020, including \$102.9 billion by IMF, \$39.1 billion by the European Investment Bank, \$36.9 billion by the World Bank, and \$15.5 billion by the Asian Development Bank (Segal and Henderson, 2021).

Countries in the region also benefited from various global initiatives, including DSSI, mentioned in the introduction, and a new general allocation of special drawing rights (SDRs) for \$650 billion approved by the IMF Board of Governors on 2 August 2021. Out of 24 Asia-Pacific developing countries eligible to partake in DSSI, 11 countries chose to participate. ESCAP (2021a, pp. 17–18) estimated that their average potential savings from participating at the initiative were 1.9 per cent of their combined GDP. This amount, however, represented only 20 per cent of their average external debt services due in 2020 and 2021. Regarding the SDR allocation, the Asia-Pacific developing countries are estimated to have received 1.5 per cent of their 2020 GDP, on average, ranging from a minimum of 0.3 per cent for China to a maximum of 3.9 per cent for Tonga.

III. THE VIEWS OF THE UNITED NATIONS ON DEBT ISSUES, INCLUDING DEBT RESTRUCTURING

As an institution that seeks to address global challenges through deliberation, consensus-building and international cooperation, the United Nations has approached debt issues mostly through the establishment of normative principles. The Monterrey Consensus of 2002 emphasized “the importance of putting in place a set of clear principles for the management and resolution of financial crises that provide for fair burden-sharing between the public and private sectors and between debtors, creditors and investors” (United Nations, 2003, para. 51). The Doha Declaration on Financing for Development of 2008 elaborated further on the need for principles for debt crisis prevention and resolution through “solutions that are agreeable and transparent to all” and “in cooperation with the private sector” (United Nations, 2009, para. 61). The proposed principles include the following:

- (a) Ensuring that debt resolution is a joint responsibility of all debtors and creditors, both State and commercial;
- (b) Recognizing that furthering development and restoring debt sustainability are the main objectives of debt resolution;
- (c) Strengthening transparency and accountability among all parties;
- (d) Promoting responsible borrowing and lending practices;

- (e) Improving debt management and national ownership of debt management strategies;
- (f) Facilitating equivalent treatment of all creditors.

The promotion of responsible borrowing and lending practices was further elaborated in the United Nations Conference on Trade and Development Principles on Responsible Sovereign Lending and Borrowing of 2012 (UNCTAD, 2012). The principles include the following: *Agency* – the recognition that sovereign borrowers have the obligation to act in the public interest; *Informed decisions* – the need for lenders to ensure that sovereign borrowers understand the implications of the loans they take; *Responsible credit decisions* – the need for lenders to ensure that sovereign borrowers have the capacity to repay the loan; *Transparency* – the need for borrowers to put in place and implement a comprehensive legal framework that clearly defines procedures, responsibilities and accountabilities in sovereign borrowing; *Disclosure and publication* – the need for borrowers to disclose terms and conditions of loans; and *Restructuring* – the prompt, efficient and fair restructuring of sovereign debt obligations if needed.

On debt restructuring, the General Assembly, in a 2014 resolution, decided to “*elaborate and adopt through a process of intergovernmental negotiations... a multilateral legal framework for sovereign debt restructuring processes* with a view, inter alia, to increasing the efficiency, stability and predictability of the international financial system and achieving sustained, inclusive and equitable economic growth and sustainable development...” (United Nations General Assembly, 2014, emphasis added). While the language in this resolution is about the adoption of a multilateral legal framework for debt restructurings, a similar idea to the failed sovereign debt restructuring mechanism proposed by IMF a decade before, an ad hoc committee established to provide further elaboration on such multilateral legal framework actually proposed a set of normative principles (United Nations General Assembly, 2015a). These principles were subsequently adopted by the General Assembly in a resolution entitled “Basic principles on sovereign debt restructuring processes” (United Nations General Assembly, 2015b). Notably, while the resolution was approved with 136 countries voting in favour and 41 abstaining, major creditor countries, such as Canada, Germany, Japan, the United Kingdom of Great Britain and Northern Ireland, and the United States voted against it.

The annex provides a comprehensive perspective of the views of the United Nations on debt issues by comparing the outcomes of the Monterrey, Doha, and Addis Ababa conferences on financing for development and the Basic Principles resolution. One of the principles on debt restructuring, the principle of sustainability, is consistently highlighted in the four documents. As spelled out in the Basic Principles resolution,

sustainability implies that sovereign debt restructuring workouts are completed in a timely and efficient manner and lead to a stable debt situation in the debtor State, preserving at the outset creditors' rights while promoting sustained and inclusive economic growth and sustainable development, minimizing economic and social costs, warranting the stability of the international financial system and respecting human rights. (United Nations General Assembly, 2015b, Principle 8)

This principle means that debt restructuring workouts need to provide enough financial space for debtors to invest in sustainable development. The principle of equivalent treatment of creditors (United Nations General Assembly, 2015b, Principle 5) has also been articulated in the Doha Declaration on Financing for Development, as noted above. This principle includes the duty of debtors to (a) not discriminate arbitrarily among creditors in the treatment they receive and (b) not exclude creditors or creditors groups from the restructuring process. The principle of sovereign immunity from litigation by foreign domestic courts (United Nations General Assembly, 2015a, Principle 6) builds on concerns about vulture fund litigation expressed in the Doha Declaration (United Nations, 2009, para. 60) and the Addis Ababa Action Agenda (United Nations, 2015, paras. 98 and 100). The principle of majority restructuring (United Nations General Assembly, 2015b, Principle 9) broadens language in the Addis Ababa Action Agenda (United Nations, 2015, paras. 98 and 100), which focuses only on restructuring of sovereign debt with bondholders, to include also sovereign debt with official bilateral creditors.

The principle of transparency (United Nations General Assembly, 2015b, Principle 3) has also been articulated in the Doha Declaration, as noted above, and in the Addis Ababa Action Agenda. The latter also invited "relevant institutions to consider the creation of a central data registry including information on debt restructurings." The principle that debt restructuring negotiations should be conducted in good faith by the sovereign debtor and its creditors (United Nations General Assembly, 2015b, Principle 2) was also hinted in the Addis Ababa Action Agenda. Finally, the principle of sovereignty (United Nations General Assembly, 2015b, Principle 1), which states that a sovereign state has the right to design its macroeconomic policy, including restructuring its sovereign debt, contrast with language in the Doha Declaration, which recommends borrowers to "strive to implement sound macroeconomic policies and public resource management" (United Nations, 2009, para. 64).¹⁸

¹⁸ Two remaining principles of the Basic Principles resolution have no precedent in the outcomes of the international conferences on financing for development. These are the principles of impartiality (Principle 4, that all institutions and actors involved in sovereign restructurings refrain from exercising any undue influence over the process or engage in actions that would give rise to conflicts of interest or corruption) and legitimacy (Principle 7, that the establishment of institutions and the operations related to sovereign debt restructurings respect the rule of law).

The outcomes of the three international conferences on financing for development cover various other issues related to debt in addition to debt restructuring. These include technical assistance to debtor countries “to enhance debt management, negotiations and renegotiation capacities, including tackling external debt litigation, in order to achieve and maintain debt sustainability” (United Nations, 2009, para. 64). Other issues considered, related to debt sustainability, include the following: (a) the usefulness of the IMF-World Bank debt sustainability analysis as a tool to promote prudent public debt management, (b) the disruption caused by natural disasters and social or economic shocks on debt sustainability and the need for debt relief for countries affected by them, and (c) the joint responsibility of borrowers and lenders in ensuring debt sustainability, as elaborated in the UNCTAD principles on responsible sovereign lending and borrowing. Regarding the latter, under the Addis Ababa Action Agenda, participants committed to work towards a global consensus on “guidelines for debtor and creditor responsibilities in borrowing by and lending to sovereigns, building on existing initiatives” (United Nations, 2015, para. 97).

In addition to soft law principles, the United Nations set up a precedent of direct intervention in a debt restructuring case through United Nations Security Council Resolution 1483, adopted on 22 May 2003, shortly after the collapse of the regime of Saddam Hussein in Iraq. Under this resolution, a stay on the enforcement of creditor rights to use litigation to collect unpaid sovereign debt of Iraq was implemented (Weiss, 2011). Specifically, under the resolution, all of the oil and gas wealth of Iraq was immunized from legal process until the end of 2007, and the Member States of the United Nations were instructed to freeze the remaining Iraqi assets in their jurisdictions and transfer them to the Development Fund for Iraq, which was internationally supervised and also immune (Gelpern, 2005). The significance of this resolution is that it showed that the official sector already has the tools to shield a sovereign borrower from its creditors, even without a statutory sovereign bankruptcy regime. This, however, is viewed as a special case in which there was a diplomatic consensus that the financial distress of Iraq would threaten international security.

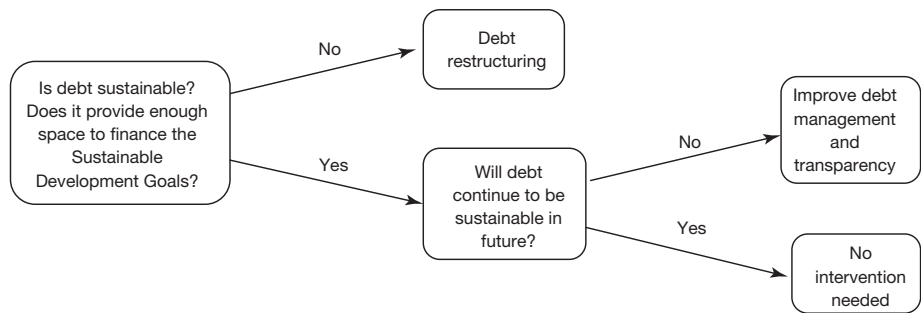
IV. THE ROLE OF THE UNITED NATIONS IN ADDRESSING UPCOMING DEBT CHALLENGES

The various views of the United Nations on debt issues discussed in the previous section can be summarized into a single message: the attainment of sustainable development requires that public debts are sustainable. Unsustainable debts can lead either to financial and macroeconomic disruption and harm to investments in sustainable development or to a situation of debt overhang in which a large share of the country’s savings need to be allocated to the payment of debt services, leaving little left for the country’s sustainable development. To be sure, debt sustainability

is also an important goal of other international organizations, such as IMF, but their focus is on financial and macroeconomic stability. What distinguishes the United Nations is the explicit link between debt sustainability and sustainable development.

There are two ways to achieve debt sustainability. The first one is when debt is already unsustainable, in which case the only option is debt restructuring. Notice that from the viewpoint of the United Nations, the definition of unsustainable debt includes a situation in which debt service payments restrict the capacity of the country to invest in sustainable development. However, if the debt is currently sustainable in that sense, there is a risk that it will become unsustainable in future. To prevent this possibility, the country may need to strengthen its debt management capabilities. Ensuring transparency through the timely disclosure of debt data is also important to facilitate the monitoring of the debt situation in the country and take preventive measures proactively, if needed, to preserve debt sustainability. These options are depicted in figure 4.

Figure 4. Debt sustainability flowchart



Source: Author.

As discussed in section I, some progress has been made regarding debt restructuring over the last few years. The enhanced collective actions clauses of the International Capital Markets Association proposed in 2014 have proven successful in facilitating the 2020 restructuring of debts with bondholders of Argentina and Ecuador, and the Common Framework may offer in future an effective option for the restructuring of debts with official and private creditors. However, a fundamental problem remains: the reluctance of debtors to initiate a debt restructuring process. There are many reasons behind this: fear that the country’s credit rating will be downgraded by the credit rating agencies; fear that the process will be disruptive to the country’s economy; and an elevated degree of uncertainty about the duration and outcome of

the process. As a result, it is not uncommon for policymakers of debtor countries to consider debt restructuring as the last resource option.

These fears are not unfounded. As pointed out by Asonuma and Trebesch (2016), most debt restructurings have occurred post-default, when there was no other option, but these have been more costly than pre-emptive restructurings occurring before default. Post-default restructurings have been characterized by higher haircuts for the creditors, higher output losses for the debtor, and longer negotiating times, making them a suboptimal solution. To address the reasonable concerns of debtors about restructuring their debts, it is crucial to improve the expediency, predictability, and effectiveness of debt restructuring processes.

If debtors have clarity about what to expect during a debt restructuring process and if the process can take a few months rather than a few years, they will be more willing to restructure pre-emptively, minimizing the costs mentioned above. The main purpose of the failed IMF proposal to set up a legal framework for sovereign debt restructuring, the sovereign debt restructuring mechanism, discussed in section I, was precisely to enhance the predictability and effectiveness of sovereign debt restructuring processes. Although the Common Framework still needs work, the recommendations of Georgieva and Pazarbasioglu (2021) discussed in section I are a good starting point to improve its design and implementation.

The United Nations has a very important element to contribute to the design of the Common Framework: its link to sustainable development. Sovereign debt workouts under the Common Framework should not focus narrowly on bringing countries back to financial sustainability: they need to ensure that the debtor will be able to invest in sustainable development and climate action as well.

How to operationalize this? One option to be considered is debt swaps.¹⁹ This idea was endorsed in the outcome document of the 2021 Financing for Development Forum of the United Nations Economic and Social Council: “We invite creditors and debtors to further explore, where appropriate and on a mutually agreed, transparent and case-by-case basis, the use of debt instruments, such as debt swap initiatives, for sustainable development and climate action” (ECOSOC, 2021, para. 64).

¹⁹ The Secretary-General in a policy brief issued in March 2021 suggested considering a range of options in debt restructuring negotiations, including debt swaps, debt buy-backs, credit enhancements, reprofiling or exchanging debt, and/or cancellation, depending on a country’s specific circumstances and debt challenges (United Nations, 2021).

Debt for climate swaps, in particular, are a promising mechanism to reduce debt burdens and provide financing to critical investments in climate mitigation and adaptation. As such, they can connect two important pillars of the Paris Agreement: a) the commitment of developed countries to provide \$100 billion per year on climate finance to developing countries and (b) the Nationally Determined Contributions (NDCs). The swaps can be particularly useful to fund conditional contributions in developing countries' NDCs, the implementation of which is contingent on the availability of international financial support (ESCAP, 2021b).

A direct connection between debt restructuring and investment in sustainable development through climate swaps could motivate debtors to engage in restructuring negotiations because it would guarantee that important development goals of the countries would be part of the outcome of the negotiations. Bilateral official creditors could also find the link between debt restructuring and sustainable development outcomes appealing because any haircut they take to their debt could count as a partial fulfillment of their climate finance obligations under the Paris Agreement or as overseas development assistance. Finally, private creditors may also find a debt restructuring deal that includes an element of investment in sustainable development appealing because it can open opportunities for additional investments in sustainable development in the debtor country in future.

To be sure, connecting debt restructuring with sustainable development requires additional elements compared to a purely financial deal. These include the implementation of suitable sustainable development projects or programmes and a mechanism for monitoring, reporting and verification of their implementation. However, the additional efforts are worthwhile as they are likely to make debt restructuring more appealing to both debtors and creditors and result in enhanced sustainability in the debtor, both financial and developmental.

Debt restructurings, however, are a costly solution for both debtors and creditors. A better option is to prevent debt from becoming unsustainable in the first place. In the outcome document of the 2021 Financing for Development Forum of ECOSOC, a balanced approach is proposed under which both debt restructuring and measures to prevent the buildup of unsustainable debts are considered: "Debt restructuring should be coupled with addressing... systemic debt vulnerabilities, improving fiscal policies and ultimately managing debt in a more transparent and sustainable manner" (ECOSOC, 2021, para. 67).

The prevention of episodes of unsustainable build-ups of sovereign debt is not different conceptually to the prevention of unsustainable commercial debts in a national context. Both can be addressed through the design and implementation of suitable financial regulations. The difference is that while domestic financial markets

are regulated by national institutions, such as central banks or securities and exchange commissions, there is no supranational regulatory authority for sovereign debts at the global level.²⁰

This does not mean that sovereign debt markets do not need to be regulated. Quite the opposite, sovereign lending and borrowing are plagued with agency problems, time inconsistency, information asymmetries and moral hazard issues. As Gelpern (2012, p. 3) wryly puts it: “Public officials borrow in the name of the people, but not in their interest; ...disclosure is faulty; ...[and] lenders who expect to be rescued by third-country taxpayers keep credit flowing to insolvent debtors.” In addition, in cases of default, a resolution is complicated by “sovereign immunity and the difficulty of reaching sovereign assets, [which] make debt contract enforcement unpredictable, ...[while] there is no bankruptcy procedure for sovereigns” (Gelpern, 2012, p. 9).

One option to regulate sovereign debt markets could be through an institutional arrangement similar to what is in place for the international coordination of national supervisors of banks and financial markets. This is characterized by a hub-and-spoke architecture in which a global institution (the hub) – such as Basel Committee for Bank Supervision (BCBS) and the Financial Stability Board (FSB) – coordinates the work of national regulatory bodies (the spokes) by issuing recommendations, providing capacity-building and collecting data for dissemination. These are examples of soft law because even though the rulings of BCBS and FSB are not formally binding, national regulatory bodies of banks and financial markets are willing to comply with them voluntarily.

A similar approach could be implemented as a basis for an international debt architecture, with a global sovereign debt coordinating body playing the role of the hub and the national debt management offices playing the roles of spokes. The functions of the hub would be similar to those of BCBS and FSB: it could issue norms and recommendations for the prudential issuance of sovereign debt, provide capacity-building, and collect information on sovereign debts from the debt management offices. Such institutional arrangements would provide recommendations and technical support for national debt management offices to help them improve their capacities and skills in preventing episodes of unsustainable debt build-ups. In addition, debt management offices participating in it would voluntarily disclose details of their sovereign debts, contributing in that way to enhancing international debt transparency. In the proposed arrangement, the spoke institutions, the debt management offices, already exist. What is missing is a hub institution to coordinate them.

²⁰ There are, however, supranational regulatory authorities at the regional level, such as the European Central Bank and the European Securities and Markets Authority.

In sum, the United Nations view of debt sustainability as intrinsically related to sustainable development is an important principle to inform future debt restructuring workouts. In that regard, debt for climate swaps, which provide an explicit link between debt reduction and sustainable development, could be a useful tool to consider. In addition, instituting a hub-and-spoke architecture to disseminate prudential debt management practices, provide capacity-building to debtor countries and enhance debt transparency can be an effective way to operationalize core ideas on prudential and responsible debt management discussed at the United Nations international conferences on financing for development. It is to be expected that ideas such as these will contribute to future global discussions on debt.

REFERENCES

- Asonuma, T., and C. Trebesch (2016). Sovereign debt restructurings: preemptive or post-default. *Journal of the European Economic Association*, vol. 14, No. 1, pp. 175–214.
- Buchheit, L., and M. Gulati (2020). The Argentine collective action clause controversy. *Capital Markets Law Journal*. Duke Law School Public Law and Legal Theory Series No. 2020-72. Available at <https://ssrn.com/abstract=3656833>.
- Buchheit, L., and others (2019). How to restructure sovereign debt: lessons from four decades. Peterson Institute for International Economics Working Paper, No. 19-8. Available at www.piie.com/system/files/documents/wp19-8.pdf.
- Bulow, J., and others (2020). The debt pandemic: new steps are needed to improve debt workouts. *Finance and Development*, September. Available at www.imf.org/external/pubs/ft/fandd/2020/09/pdf/debt-pandemic-reinhart-rogooff-bulow-trebesch.pdf.
- Das, Udaibir S., M. Papaioannou, and C. Trebesch (2012). Sovereign debt restructurings 1950–2010: literature survey, data, and stylized facts. IMF Working Paper, No. 12/203. Washington D.C.: IMF.
- Gelpern, A. (2005). What Iraq and Argentina might learn from each other? *Chicago Journal of International Law*, vol. 6, No. 1, article 23.
- (2012). Hard, soft, and embedded: implementing principles on promoting responsible sovereign lending and borrowing. American University, Washington College of Law Research Paper, No. 2012-44. Oxford University Press.
- Georgieva, K., and C. Pazarbasioglu (2021). The G20 Common Framework for Debt Treatments must be stepped up. IMF Blog, 2 December. Available at <https://blogs.imf.org/2021/12/02/the-g20-common-framework-for-debt-treatments-must-be-stepped-up/>.
- Hagan, S. (2005). Designing a legal framework to restructure sovereign debt. *Georgetown Journal of International Law*, vol. 6, No. 2, pp. 299–402.
- International Monetary Fund (IMF) (2014). Strengthening the contractual framework to address collective action problems in sovereign debt restructuring, 2 September. Available at www.imf.org/external/np/pp/eng/2014/090214.pdf.
- (2020a). *Fiscal Monitor: Policies for the Recovery*. Washington, D.C.
- (2020b). *Global Financial Stability Report: Bridge to Recovery*. Washington, D.C.
- (2020c). The international architecture for resolving sovereign debt involving private-sector creditors – recent developments, challenges, and reform options. Policy Paper, No. 2020/043. Washington, D.C.
- (2021a). *Fiscal Monitor: Strengthening the Credibility of Public Finance*. October. Washington D.C.
- (2021b). Debt relief under the Heavily Indebted Poor Countries (HIPC) Initiative. Factsheet, 23 March. Available at [www.imf.org/en/About/Factsheets/ Sheets/2016/08/01/16/11/Debt-Relief-Under-the-Heavily-Indebted-Poor-Countries-Initiative](http://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/11/Debt-Relief-Under-the-Heavily-Indebted-Poor-Countries-Initiative).
- (2021c). Joint World Bank-IMF Debt Sustainability Framework for Low-Income Countries. Factsheet, 17 March. Available at [www.imf.org/en/About/Factsheets/ Sheets/2016/08/01/16/39/Debt-Sustainability-Framework-for-Low-Income-Countries](http://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/39/Debt-Sustainability-Framework-for-Low-Income-Countries).

- Jubilee Debt Campaign (2021). Decision time for Chad's private creditors and the Common Framework. Blog, 1 July. Available at <https://jubileedebt.org.uk/blog/decision-time-for-chads-private-creditors-and-the-common-framework>.
- Kharas, H. (2020). What to do about the coming debt crisis in developing countries? Brookings Institution Blog, 13 April. Available at www.brookings.edu/blog/future-development/2020/04/13/what-to-do-about-the-coming-debt-crisis-in-developing-countries/.
- Kose, M., and others (2021). *Global Waves of Debt: Causes and Consequences*. Washington, D.C.: World Bank.
- Krueger, A. (2001). A new approach to sovereign debt restructuring. Address by Anne Krueger, First Deputy Managing Director, IMF, given at National Economists' Club Annual Dinner, American Enterprise Institute. Washington, D.C., 26 November. Available at www.imf.org/en/News/Articles/2015/09/28/04/53/sp112601.
- Lissakers, K. (1991). *Banks, Borrowers, and the Establishment: A Revisionist Account of the International Debt Crisis*. New York: Basic Books.
- Mahler, D., and others (2021). Updated estimates of the impact of COVID-19 on global poverty: turning the corner on the pandemic in 2021? World Bank Blogs, 24 June. Available at <https://blogs.worldbank.org/opendata/updated-estimates-impact-covid-19-global-poverty-turning-corner-pandemic-2021>.
- Maldives Financial Review (2021). Maldives' Sukuk reaches USD500 million, 4 September. Available at <https://mfr.mv/debt/maldives-sukuk-reaches-usd500-million>.
- Paris Club (2020). Extension of the Debt Suspension Initiative and Common Framework for Debt Treatments. Press release, 14 October. Available at <https://clubdeparis.org/en/communications/press-release/extension-of-dssi-and-common-framework-for-debt-treatments-14-10-2020>.
- _____ (2021). 1st meeting of the creditor committee for Ethiopia under the Common Framework for Debt Treatments beyond the DSSI. Statement, 28 September. Available at <https://clubdeparis.org/en/communications/press-release/1st-meeting-of-the-creditor-committee-for-ethiopia-28-09-2021>.
- _____ (n.d.). Standard terms of treatment. Available at <https://clubdeparis.org/en/communications/page/standard-terms-of-treatment>.
- Schuhmacher, J., C. Trebesch, and H. Enderlein (2018). Sovereign defaults in court. Kiel Working Paper, No. 2103. Available at www.econstor.eu/bitstream/10419/176573/1/101653664X.pdf.
- Segal, Stephanie, and Joshua Henderson (2021). International financial institutions' Covid-19 approvals approach \$240 Billion for 2020. Commentary, 25 January. Center for Strategic and International Studies. Available at www.csis.org/analysis/international-financial-institutions-covid-19-approvals-approach-240-billion-2020.
- Spiegel, Shari, Oliver Schwank, and Mohamed Obaidy (2020). COVID-19 and sovereign debt. UN/DESA Policy Brief, No. 72. Available at www.un.org/development/desa/dpad/publication/un-desa-policy-brief-72-covid-19-and-sovereign-debt/.
- Trade Association for the Emerging Markets (2021). The Brady Plan. EM Background. Available at www.emta.org/em-background/the-brady-plan/.

- United Nations (2003). Monterrey Consensus on Financing for Development. Final text of agreements and commitments adopted at the International Conference on Financing for Development in Monterrey, Mexico, 18–22 March 2002. New York.
- _____ (2009). Doha Declaration on Financing for Development. Final text of agreements and commitments adopted at the Follow-up International Conference on Financing for Development to Review the Implementation of the Monterrey Consensus in Doha, Qatar, 29 November - 2 December 2008. New York.
- _____ (2015). Report of the third International Conference on Financing for Development. Addis Ababa, 13–16 July. A/CONF./227/20.
- _____ (2020). Debt and COVID-19: a global response in solidarity. United Nations Executive Office of the Secretary-General (EOSG) Policy Briefs and Papers, 17 April. Available at https://in.one.un.org/wp-content/uploads/2020/06/un_policy_brief_on_debt_relief_and_covid_april_2020.pdf.
- _____ (2021). Liquidity and debt solutions to invest in the SDGs: the time to act is now. United Nations Executive Office of the Secretary-General (EOSG) Policy Briefs and Papers, March. Available at www.un.org/sites/un2.un.org/files/sg_policy_brief_on_liquidity_and_debt_solutions_march_2021.pdf.
- United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2021a). *Financing the SDGs to Build Back Better from the COVID-19 Pandemic in Asia and the Pacific*. Sales No. E.21.II.F.13.
- _____ (2021b). Debt-for-climate swaps as a tool to support the implementation of the Paris Agreement. Policy Brief, 4 October.
- United Nations Conference on Trade and Development (UNCTAD) (2012). Principles on promoting responsible sovereign lending and borrowing, 10 January. Available at https://unctad.org/system/files/official-document/gdsddf2012misc1_en.pdf.
- United Nations Economic and Social Council (ECOSOC) (2021). Report of the Economic and Social Council forum on financing for development follow-up. 28 April. E/FFDF/2021/3.
- United Nations General Assembly (2014). Towards the establishment of a multilateral legal framework for sovereign debt restructuring processes. 17 September. A/RES/68/304.
- _____ (2015a). Basic Principles on Sovereign Debt Restructuring Processes. 29 September. A/RES/69/319.
- _____ (2015b). Report of the ad hoc committee on sovereign debt restructuring processes. 4 August. A/AC.284/2015/2.
- Weiss, Martin A. (2006). Debt relief for heavily indebted poor countries: issues for Congress. Congressional Research Service, 18 April. Available at www.hsdl.org/?abstract&did=716063.
- _____ (2011). Iraq's debt relief: procedure and potential implications for international debt relief. Congressional Research Service, 29 March. Available at <https://sgp.fas.org/crs/mideast/RL33376.pdf>.
- _____ (2013). The Paris Club and international debt relief. Congressional Research Service, 11 December. Available at <https://sgp.fas.org/crs/misc/RS21482.pdf>.

ANNEX

A guide to the United Nations perspectives on debt issues

Selected contents on debt issues in the three international conferences on financing for development and the United Nations Basic Principles on Sovereign Debt Restructuring Processes are synthesized in the table below. The numbers in parentheses in the first three columns indicate paragraphs, respectively, of the Monterrey Consensus, the Doha Declaration and the Addis Ababa Action Agenda. The fourth column includes the corresponding basic Principles. The texts included in this table are selective, and some details are omitted for brevity.

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Sustainability	Sustainable debt financing is an important element for mobilizing resources for public and private investment (47). External debt relief can play a key role in liberating resources that can then be directed towards activities consistent with attaining sustainable growth and development (48).	...Furthering development and restoring debt sustainability are the main objectives of debt resolution (61). In debt renegotiations, we stress the need for full involvement of debtors as well as creditors and the importance of taking into account debtors' national policies and strategies linked to attaining the internationally agreed development goals... (63).	We recognize the need to assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief, debt restructuring and sound debt management, as appropriate (94). We believe that a workout from a sovereign debt crisis should aim to restore public debt sustainability, while preserving access to financing resources under favourable conditions.	Sustainability implies that sovereign debt restructuring workouts are completed in a timely and efficient manner and lead to a stable debt situation in the debtor State, preserving at the outset creditors' rights while promoting sustained and inclusive economic growth and sustainable development, minimizing economic and social costs, warranting the stability of the international financial system and

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
			<p>We further acknowledge that successful debt restructurings enhance the ability of countries to achieve sustainable development and the Sustainable Development Goals (98).</p>	<p>respecting human rights (Principle 8).</p>
Shared responsibility of debtors and creditors	<p>Debtors and creditors must share the responsibility for preventing and resolving unsustainable debt situations (47).</p>	<p>...Debt resolution is a joint responsibility of all debtors and creditors, both State and commercial (61). We underline that heavily indebted poor countries eligible for debt relief will not be able to enjoy its full benefits unless all creditors, including public and private, contribute their fair share and become involved in the international debt resolution mechanisms... (58).</p>	<p>We reiterate that debtors and creditors must work together to prevent and resolve unsustainable debt situations (97). We recognize that there is scope to improve the arrangements for coordination between public and private sectors and between debtors and creditors, to minimize both creditor and debtor moral hazards and to facilitate fair burden-sharing and an orderly, timely and efficient restructuring that respects the principles of shared responsibility (99).</p>	

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Technical assistance/ debt management	<p>National comprehensive strategies to monitor and manage external liabilities...are a key element in reducing national vulnerabilities.</p> <p>Technical assistance for external debt management and debt tracking can play an important role and should be strengthened (47).</p>	<p>Technical assistance to manage debt and address debt problems can be crucial for many countries, in particular the most vulnerable. We reaffirm the importance of adequate capacities of debtor countries during debt negotiations, debt renegotiations and for debt management. In this regard, we will continue to provide developing countries with the necessary assistance, including technical assistance, upon request, to enhance debt management, negotiations and renegotiation capacities, including tackling external debt litigation, in order to achieve and maintain debt sustainability (64).</p>	<p>We encourage international institutions to continue to provide assistance to debtor countries to enhance debt management capacity, manage risks, and analyse trade-offs between different sources of financing, as well as to help to cushion against external shocks and ensure steady and stable access to public financing (95). We also welcome provision of financial support for legal assistance to least developed countries and commit to boosting international support for advisory legal services (100).</p>	

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Highly Indebted Poor Countries (HIPC) Initiative	Continued efforts are needed to reduce the debt burden of heavily indebted poor countries to sustainable levels (49).	We stress the importance of continued flexibility with regard to the eligibility criteria for debt relief under HIPC and MDRI (57).	We will continue to support the remaining HIPC-eligible countries that are working to complete the HIPC process (94).	
Debt sustainability framework/analysis	The computational procedures and assumptions underlying debt sustainability analysis need to be kept under review (49).	We encourage the use of the joint IMF/World Bank Debt Sustainability Framework by creditors and debtors, as appropriate (64). Debt sustainability frameworks should also give due weight to the development needs of debtor countries, including benefits from expenditures and investment that have long-term social and economic returns (66).	We welcome the efforts of IMF, the World Bank and the United Nations system to further strengthen the analytical tools for assessing debt sustainability and prudent public debt management. In this regard, the IMF-World Bank debt sustainability analysis is a useful tool to inform the level of appropriate borrowing. We invite IMF and the World Bank to continue strengthening their analytical tools for sovereign debt management in an open and inclusive process with the United Nations and other stakeholders (95).	

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Debt sustainability and exogenous shocks	<p>We stress the need for the International Monetary Fund and the World Bank to consider any fundamental changes in countries' debt sustainability caused by natural catastrophes, severe terms of trade shocks or conflict, when making policy recommendations, including for debt relief... (50).</p>	<p>Particular attention should be paid to keeping the debt sustainability frameworks under review to enhance the effectiveness of monitoring and analysing debt sustainability and consider fundamental changes in debt scenarios, in the face of large exogenous shocks, including those caused by natural catastrophes, severe terms-of-trade shocks or conflict (65).</p>	<p>We recognize that severe natural disasters and social or economic shocks can undermine a country's debt sustainability, and note that public creditors have taken steps to ease debt repayment obligations through debt rescheduling and debt cancellation following an earthquake, a tsunami and in the context of the Ebola crisis in West Africa. We encourage consideration of further debt relief steps, where appropriate, and/or other measures for countries affected in this regard... (102).</p>	

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Principles for debt resolution	...We emphasize the importance of putting in place a set of clear principles for the management and resolution of financial crises that provide for fair burden-sharing between public and private sectors and between debtors, creditors and investors (51).	We will intensify our efforts to prevent debt crises by enhancing international financial mechanisms for crisis prevention and resolution, in cooperation with the private sector, and by finding solutions that are transparent and agreeable to all. These mechanisms need to be underpinned by principles that have served us well in dealing effectively with many debt problems (61).		
Debt relief and ODA	We encourage donor countries to take steps to ensure that resources provided for debt relief do not detract from 17 ODA resources intended to be available for developing countries (51).	We recall our encouragement to donor countries to take steps to ensure that resources provided for debt relief do not detract from ODA resources intended to be available for developing countries (57).		

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Middle-income countries	We also encourage exploring innovative mechanisms to comprehensively address debt problems of developing countries, including middle-income countries and countries with economies in transition (51).	We emphasize that middle-income developing countries are mainly responsible for the achievement and maintenance of a sustainable debt situation and for addressing their external debt situation (59).		
Equitable treatment of creditors		More efforts are needed through international debt resolution mechanisms to guarantee equivalent treatment of all creditors... (60).		Equitable treatment imposes on States the duty to refrain from arbitrarily discriminating among creditors... Creditors have the right to receive the same proportionate treatment in accordance with their credit and its characteristics (Principle 5).

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Litigation	We are deeply concerned about increasing culture fund litigation (60).	We continue to be concerned with non-cooperative creditors who have demonstrated their ability to disrupt timely completion of the debt restructurings (98). We note legislative steps taken by certain countries to prevent these activities and encourage all Governments to take action, as appropriate. ... We will explore enhanced international monitoring of litigation by creditors after debt restructuring (100).	Sovereign immunity from jurisdiction and execution regarding sovereign debt restructurings is a right of States before foreign domestic courts and exceptions should be restrictively interpreted (Principle 6).	
New developments in sovereign debt	We recognize that a shift has occurred from official to commercial borrowing and from external to domestic public debt, although for most low-income countries external finance is still largely official (62).	We note the increased issuance of sovereign bonds in domestic currency under national laws, and the possibility of countries voluntarily strengthening domestic legislation to reflect guiding principles for effective, timely, orderly and fair resolution of sovereign debt crises (101).		

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Majority restructuring	<p>We recognize that important improvements have been made since Monterrey in enhancing the processes for cooperative restructuring of sovereign obligations, including in the Paris Club of official creditors and in the market acceptance of new standard clauses of government bond contracts. However, we acknowledge the existence of stocks of sovereign bonds without those collective action clauses (98). We welcome the reforms to <i>pari passu</i> and collective action clauses proposed by the International Capital Market Association, and endorsed by IMF, to reduce the vulnerability of sovereigns to holdout creditors. We encourage countries, particularly those issuing bonds under foreign law, to take further actions to include those clauses in all their bond issuance (100).</p> <p>Majority restructuring implies that sovereign debt restructuring agreements that are approved by a qualified majority of the creditors of a State are not to be affected, jeopardized or otherwise impeded by other States or a non-representative minority of creditors, who must respect the decisions adopted by the majority of the creditors. States should be encouraged to include collective action clauses in their sovereign debt to be issued (Principle 9).</p>			

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Transparency	<p>(The principles for the resolution and prevention of debt crises include) strengthening transparency and accountability among all parties (61). We stress the need to address the implications of the significant increase in the number of official and private creditors) through improved data collection and analysis (62).</p>	<p>We welcome the continuing activities in setting methodological standards and promoting public availability of data on public and publicly guaranteed sovereign debt and on the total external debt obligations of economies, and more comprehensive quarterly publication of debt data. We invite relevant institutions to consider the creation of a central data registry including information on debt restructurings. We encourage all Governments to improve transparency in debt management (96). We recall the need to strengthen information-sharing and transparency to make sure that debt sustainability assessments are based on comprehensive, objective and reliable data (97).</p>	<p>Transparency should be promoted in order to enhance the accountability of the actors concerned, which can be achieved through the timely sharing of both data and processes related to sovereign debt workouts (Principle 3).</p>	

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Responsible borrowing and lending		<p>The principles for the resolution and prevention of debt crises include promoting responsible borrowing and lending practices (61).</p>	<p>Maintaining sustainable debt levels is the responsibility of the borrowing countries; however, we acknowledge that lenders also have a responsibility to lend in a way that does not undermine a country's debt sustainability. In this regard we take note of the UNCTAD principles on responsible sovereign lending and borrowing. We will work towards a global consensus on guidelines for debtor and creditor responsibilities in borrowing by and lending to sovereigns, building on existing initiatives (97).</p>	

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Good faith			We affirm the importance of debt restructurings being timely, orderly, effective, fair, and negotiated in good faith (98).	Good faith by both the sovereign debtor and all its creditors would entail their engagement in constructive sovereign debt restructuring workout negotiations and other stages of the process with the aim of a prompt and durable re-establishment of debt sustainability... (Principle 2).
Debtors' macro-economic policy/sovereignty		Borrowers should strive to implement sound macroeconomic policies and public resource management, which are key elements in reducing national vulnerabilities (64).		A sovereign State has the right, in the exercise of its discretion, to design its macroeconomic policy, including restructuring its sovereign debt (Principle 1).

Topic	Monterrey Consensus on Financing for Development 2002	Doha Declaration on Financing for Development 2009	Addis Ababa Action Agenda 2015	Corresponding United Nations Basic Principles on Sovereign Debt Restructuring Processes
Impartiality	Impartiality requires that all institutions and actors involved in sovereign debt restructuring workouts... enjoy independence and refrain from exercising any undue influence over the process and other stakeholders or engaging in actions that would give rise to conflicts of interest or corruption or both (Principle 4).			
Legitimacy	Legitimacy entails that the establishment of institutions and the operations related to sovereign debt restructuring workouts respect requirements of inclusiveness and the rule of law, at all levels. The terms and conditions of the original contracts should remain valid until such time as they are modified by a restructuring agreement (Principle 7).			

ASIA-PACIFIC SUSTAINABLE DEVELOPMENT JOURNAL SUBMISSION GUIDELINES

The *Asia-Pacific Sustainable Development Journal (APSDJ)* is based on recognition of the interconnected and multidisciplinary nature of sustainable development. Published biannually by the United Nations Economic and Social Commission for Asia and the Pacific, it is intended to stimulate debate and assist in the formulation of evidence-based policymaking in the Asia-Pacific region towards the implementation of the 2030 Agenda for Sustainable Development.

APSDJ welcomes the submission of original contributions on themes and issues related to sustainable development that are policy-oriented and relevant to Asia and the Pacific. The articles should be centred on discussing challenges pertinent to one or more dimensions of sustainable development, policy options and implications and/or policy experiences that may be of benefit to the region.

Authors familiar with the Asia-Pacific region are encouraged to submit their work. All manuscripts will undergo a rigorous double-blind peer-review process.

1. Manuscripts

All materials submitted for the consideration of the Editorial Board should be in English. The manuscripts should be typed, double-spaced, on one side of white A4 paper. They should not exceed 8,000 words, including tables, figures, references and other materials and include a short abstract (200 words) of the issues addressed and the most important policy-related findings.

Manuscripts are accepted on the understanding that they may be edited. Contributors are required to sign a consent form verifying that their articles are original and have not been published in any other publications or refereed journal(s).

All manuscripts will be submitted to double-blind peer review by professionals in the field. The name(s) of the author(s) or other identifying information should, therefore, be placed only on the title page in order to preserve anonymity. The title page should also include such information as institutional affiliation(s), complete mailing address, telephone number and the email of the author(s).

Manuscripts should be sent by email to the chief editors of APSDJ at escap-apsdj@un.org.

2. Tables and figures

All tables and figures should be numbered consecutively with Arabic numbers. Each table should be typed double-spaced. Tables and figures should be planned to fit the proportions of the printed page. Full information on the source(s) should appear below the table or figure, followed by notes, if any, in lower-case letters.

Once a manuscript is accepted for publication, the author(s) will be asked to supply figures, tables and charts, preferably in Microsoft Excel or any major spreadsheet programme.

3. Footnotes and quotations

Footnotes, if any, should be numbered consecutively with superscript Arabic numerals. They should be typed single-spaced and placed at the bottom of each page. They should not be used solely for citing references.

Quotations should be double-spaced. A copy of the page(s) of the original source of the quotation, as well as a copy of the cover page of that source should be provided.

4. References

Authors should ensure that there is a complete reference for every citation in the text. References in the text should follow the author-date format, followed, if necessary, by page numbers, for example, Becker (1964, pp. 13-24). List only references that are cited in the text or footnotes. References, listed alphabetically, should be typed double-spaced on a separate page in the following style:

Sen, Amartya (2009). *The Idea of Justice*. Cambridge, Mass: Harvard University Press.

Husseini, Rana (2007). Women leaders attempt to bridge East-West cultural divide. *Jordan Times*, 9 May.

Krueger, Alan B., and Lawrence H. Summers (1987). Reflections on the inter-industry wage structure. In *Unemployment and the Structure of Labour Markets*, Kevin Lang and Jonathan S. Leonard, eds. London: Basis Blackwell.

United Nations publications may be obtained from bookstores and distributors throughout the world.

Please consult your bookstore or write to any of the following:

Customers in: America, Asia and the Pacific

Email: order@un.org
Web: shop.un.org
Tel: +1 703 661 1571
Fax: + 1 703 996 1010

Mail orders to:
United Nations Publications
PO Box 960
Herndon, Virginia 20172
United States of America

Customers in: Europe, Africa and the Middle East

United Nations Publications
c/o Eurospan Group
Email: info@eurospangroup.com
Web: <https://eurospan.co.uk/>
Tel: +44 (0) 1767 604972
Fax: +44(0) 1767 601640

Mail orders to:
United Nations Publications
Unit 2 Lancaster Way
Biggleswade Bedfordshire SG18 8YL
United Kingdom

For further information on this publication, please address your enquiries to:

Chief Editors
Asia-Pacific Sustainable Development Journal

Social Development Division and
Macroeconomic Policy and Financing for Development Division
United Nations Economic and Social Commission for Asia and the Pacific

United Nations Building, Rajadamnern Nok Avenue
Bangkok 10200, Thailand
Email: escap-apsdj@un.org

For more details, please visit www.unescap.org/publication-series/APSJ.



The *Asia-Pacific Sustainable Development Journal (APSDJ)* is a rebranded publication issued by the Economic and Social Commission for Asia and the Pacific (ESCAP). It builds on the success of two former ESCAP journals – the *Asia-Pacific Population Journal*, launched in 1986, and the *Asia-Pacific Development Journal*, launched in 1994.

APSDJ is based on recognition of the interconnected and multidisciplinary nature of sustainable development. Published biannually, it aims to stimulate debate and assist in the formulation of evidence-based policymaking in the Asia-Pacific region towards the implementation of the 2030 Agenda for Sustainable Development.

22-00009

ISBN 9789211208368

