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Building Forward Better: Co-Creating Practical Knowledge for Development in the Post-COVID-19 World

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Abstract

The COVID-19 pandemic has had tremendous effects not only on health but also on the economy and society as a whole. The pandemic has created an unprecedented situation in which the world is simultaneously experiencing a crisis and sharing policy experiments. This pandemic is a strong reminder of the importance of international cooperation, and raises several critical issues related to the conventional approach to international development cooperation. First, there is no "one-size-fits-all" solution, and each country, society, and region must explore the optimal solution through trial and error. Second, a model based on the experiences of developed countries is not always superior. There is no need to assume that knowledge and technology should flow "from the North to the South." Rather, it is important for diverse partners to "co-create" and learn from each other. Third, as we advance these efforts, it is necessary to maximize the benefits of digitalization while giving due consideration to our pledge to "Leave No One Behind." This keynote speech aims to (i) review recent global development trends; (ii) reflect on what COVID-19 means for international development cooperation, particularly from a knowledge-centered development perspective; and (iii) draw implications for our approaches to development cooperation to "build forward better" in a post-COVID-19 world.

Keywords: Localized solution, Knowledge co-creation, Translative adaptation, COVID-19, International development

1. Introduction

It is my great honor and pleasure to speak at the Asian Pacific Conference 2021, which has a 19 years of history promoting intellectual exchange among researchers and students. I sincerely appreciate the kindness and efforts of the organizer, Ritsumeikan Asia Pacific University (APU), for inviting me to Beppu City, Oita Prefecture, for such an important conference that has been held in a hybrid format.

The purpose of my speech today is to reflect on what COVID-19 means for the

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future of international development cooperation and how we can "build forward better" in post-pandemic recovery. As this is a broad topic, I would like to focus on how we can co-create practical knowledge for sustainable, inclusive, and resilient development that the world aspires to achieve in the post-pandemic era. This topic has occupied my mind in recent years, and my thoughts continue to evolve. Therefore, I am grateful for your constructive comments and suggestions.

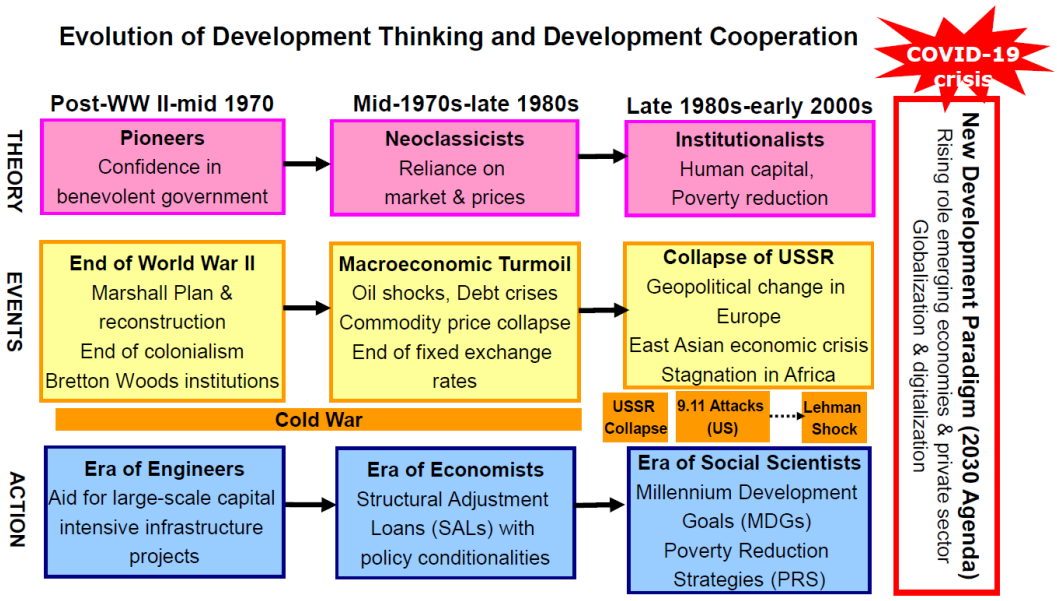

Figure 1. Evolution of Development Thinking and Development Cooperation

Source: Elaborated by the author, based on Akiyama (2003), Figure 2, p. 21.

Development thinking and the practices of development aid (interchangeably, development cooperation) have evolved over the past 75 years. As Figure 1 shows, development studies and the concept and systems for development aid were established after World War II (WW2) to replace the pre-existing system based on colonial administration. During 1944-45, a new international architecture based on the United Nations (UN) and the Bretton Woods Institutions (such as the International Monetary Fund (IMF) and the World Bank) was built to restore world peace and reconstruct war-damaged countries in Europe and Japan, and subsequently to support the nation building of newly independent countries in Asia and Africa (so called "developing countries").

The mainstream agenda on international development has shifted over the past 75 years, partly influenced by development theories and various events and shocks the world has faced. Initially, economic development was given top priority through large-scale capital investments and infrastructure development, assuming that the fruits of

development would trickle down and reduce poverty. There was confidence in the government's role as a key actor in the economic development. Faced with macroeconomic turmoil brought about by oil shocks and other crises, neoclassical economics, which emphasizes the efficient functioning of market mechanisms, rose to prominence in the mid-1970s and the late 1980s, and the World Bank and IMF actively implemented structural adjustment programs in many developing countries. By the end of the Cold War, the 1990s had become the age of global integration, including the transition of former socialist economies to market-oriented economies. Establishing institutions that support the market economy and good governance has become a high-priority agenda. Furthermore, as globalization progresses, the global call for poverty reduction has increased in response to widening inequalities within and between countries. The Millennium Development Goals (MDGs), which were adopted by heads of state at the UN in 2000, became a key milestone. Currently, we are in a new phase of international development. As we live in an age of globalization and digitalization, development challenges are becoming even more diverse and complex, as exemplified by infectious diseases, migration, and climate change, while nation building at the national level remains a fundamental task. It is also important to consider how to take advantage of the opportunities provided by the digital revolution and technological innovation, while addressing the problem of the digital divide within and between countries.

Having said that, I would like to note that, most of the time, regardless of such evolution of development thinking, the North (advanced countries) largely provided development aid to the South (developing countries) in the form of official development assistance (ODA). It was understood that knowledge and technology were transferred mainly from advanced to developing countries. Such conventional approaches are currently being challenged, because actors in international development have become diverse in two ways. First, globalization has expanded the role of the private sector in development[2].

The private sector is expected to make significant contributions to job and income generation, financial resource mobilization, and the development of innovative technologies. Corporate behavior also affects the sustainability, inclusiveness, and resilience of global and local economies through value chains. Second, some latecomer countries, especially in Asia, have made progress in their development efforts and become emerging donors. They are in a position to share their respective development experiences

[2] In 2017, private finance accounted for roughly 60% of the total financial flows to developing countries from the Organisation for Economic Co-operation and Development (OECD)-Development Assistance (DAC) countries, while ODA constituted only one third (Ohno and Uesu, 2022).

with other low-income countries. This is why the Sustainable Development Goals (SDGs), adopted by heads of state at the UN in 2015, embrace a broader set of universal goals than the MDGs, and aim to engage a wide range of stakeholders, including both developed and developing countries, as well as the private sector, by sharing a "One World" vision and committing to "Leaving No One Behind." Going beyond North-South relations based on ODA is a big departure from MDGs and preceding periods.

The COVID-19 outbreak occurred at a critical point in international development. With this in mind, I would first like to discuss the impact of COVID-19 on the SDGs and country-specific responses, and highlight the importance of knowledge and localized solutions in coping with the COVID-19 crisis. Then, I will share my perspectives on the challenges and directions that need to be taken to "build forward better" post-pandemic recovery and conclude. In doing so, I elaborate on why local learning and co-creating practical knowledge for development are important.

2. COVID-19 Impacts and the SDGs

COVID-19 has had a far-reaching impact on society. This is not just a health crisis but also one of the deepest economic crises since the Great Depression of the 1930s. The global poverty rate steadily declined until 2019 (as we recall, goal 1 of the MDGs—halving poverty—was achieved globally). We expected that such a trend would continue more inclusively. However, as the World Bank (2020) shows, COVID-19 pushed an additional 100 million people into extreme poverty in 2020, reversing this global poverty reduction trend for the first time over the past 20 years. The International Labour Organization (ILO) estimated that 8.8% of global working hours were lost in 2020 (compared to the fourth quarter of 2019), which is equivalent to 255 million full-time jobs (ILO, 2021). The IMF (2020) estimated that the Gini index for emerging markets and developing economies would increase by 2.6 percentage points to 42.7, which is comparable to the 2008 level, warning of worsening inequality. Various indicators show that the COVID-19 crisis has severely affected low-income, developing countries. Furthermore, recovery prospects are uneven between and within countries, depending on the coverage and speed of vaccination (UN DESA 2021).

All of this suggest that enormous challenges lie ahead in achieving the SDGs. However, this does not mean that we should abandon progress toward SDG implementation. The SDGs should serve as our compass for "building forward better." I would like to become more optimistic and proactive with my approach. In this regard, the role of the private sector is vital. The private sector is the engine of growth, driving industries and the economy. Moreover, the behavior of the private sector critically affects

the speed and scope of SDG achievement. As corporate activities span various countries and industries in today's globalized and interconnected world, it is vital for businesses to be mindful of building inclusive, sustainable, and resilient supply chains. The private sector is also a driving force of technological innovation, and it is better positioned to implement and disseminate innovations that address societal needs.

One interesting observation relates to CO2 emissions. As a result of the contraction of economic activities and restrictions on human movement, there was a significant decrease in global CO2 emissions during the pandemic compared to the pre-COVID situation, which had experienced its worst point (UNIDO, 2021). However, with economic recovery, the level of CO2 emissions began to rise. Electricity generation, transport services, and industries are major sources of CO2 emissions. This poses the important question of what kind of recovery we would like to realize and how we should "build forward better."

3. Localized Solutions: The Importance of Knowledge, Technology, and Industrial Capability

Consider what the COVID crisis means for international development. Although there are numerous lessons we can learn, I would like to point out the importance of localized solutions as the most critical one. The pandemic has spread instantly and everybody in the world has experienced this shock simultaneously, regardless of where they live. I was impressed by the considerable differences in national responses, especially during the first stage of the COVID crisis (pre-vaccination stage). Because there are no standardized protocols available to cope with such a magnitude of global health shock, each country devised its own localized solution through trial and error. Even low-income countries with limited technological and financial resources managed the situation quite successfully in the initial stages before the vaccination roll-out.

According to the analysis by Crosby S. et al. (2020) and the subsequent report published by an Independent Panel for Pandemic Preparedness and Response (2021) co-chaired by Helen Clark, former Prime Minister of New Zealand and Ellen Johnson Sirleaf, former President of Liberia, a country's higher capacity to cope with a health crisis did not necessarily equate to lower death rates.

Figure 2 plots the relationship between the death rate (Y axis) and the country's capacity to cope with a health crisis (X axis) as indicated by the Joint External Evaluation

Score (JEE)[3] created by the World Health Organization (WHO). Contrary to expectations, a number of advanced countries, such as the United States (US), Belgium, Canada, and Finland, had high death rates in the initial phase of the COVID-19 crisis compared to developing countries in Asia and Africa. Developing countries that generally have limited resources and capacity to cope with health crises have managed to avoid the worst situation in the initial phase.

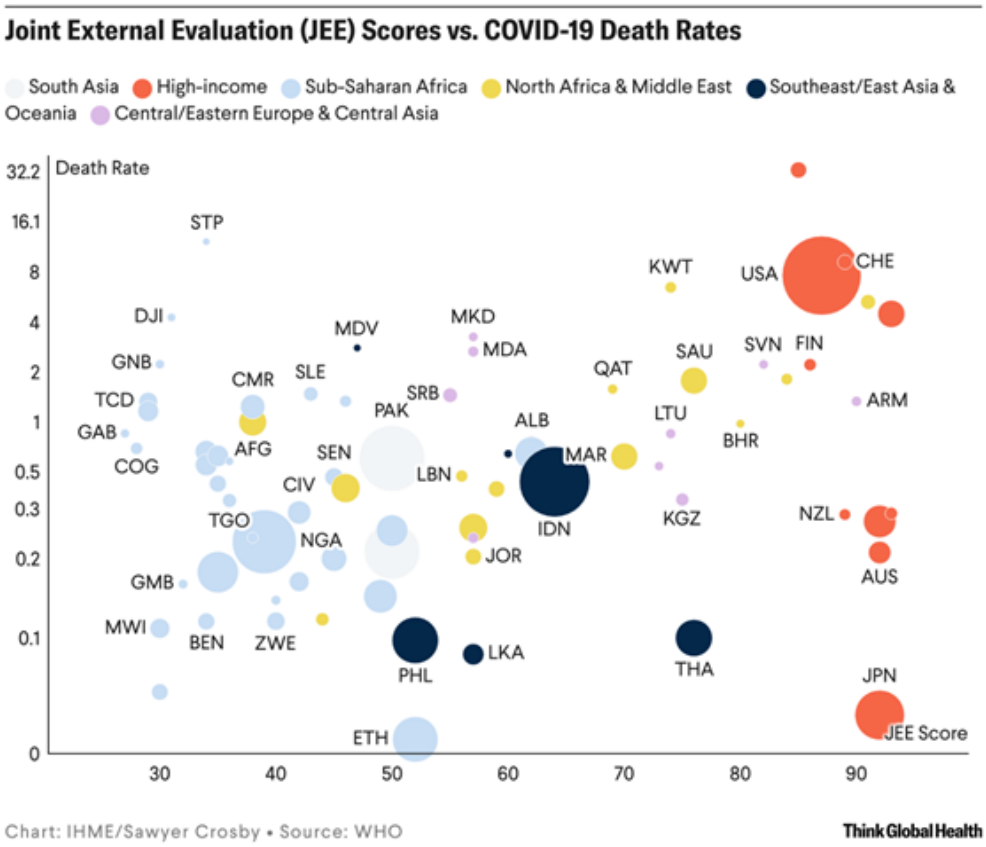

Figure 2: Country Capacity for Health Crisis Response vs. COVID-19 Death Rates

Source: Think Global Health. Original data come from WHO.

Several implications can be drawn from this result, particularly from the international development perspective. Notably, a model based on the experience of developed countries is not always superior. There is no need to assume that knowledge

[3] JEE is a voluntary, externally validated, collaborative assessment of 19 technical areas required to validate a country's capacities to prevent, detect, and rapidly respond to public health crises. JEE is a formal component of the WHO International Health Regulations (IHR) Monitoring and Evaluation Framework, which all UN member states are committed to implementing.

and technology should flow "from the North to the South." Rather, it is important for diverse partners to learn from each other and "co-create." This implies that we must go beyond the traditional approach of development cooperation and respect locally-initiated responses tailored to country-and society-specific situations. As explained below, there is no ready-made solution available. Each country, society, and region must discover localized optimal solutions through trial and error.

Importance of localized knowledge

I would like to provide three examples of countries' responses to the COVID crisis. The first comes from Vietnam. A Vietnamese student at the National Graduate Institute for Policy Studies (GRIPS) shared with my class how the Vietnamese government and society coped with the initial stages of the pandemic. She explained that the government mobilized various resources, including armed forces, police, and musicians, and actively organized public campaigns to control COVID. For example, a group of young, popular singers promotes handwashing songs. The Vietnamese government and people have a certain level of awareness of the importance of a quick response to the pandemic, having learned from the previous experience of the Severe Acute Respiratory Syndrome (SARS) outbreak in 2003, such that "we've got to work together to tackle this with communities." They have fostered localized knowledge and learning from past experiences.

The second example is Bhutan. The country is known for its peaceful society and respect for the king. Bhutan has been successful in the rapid roll-out of vaccination (Tsheten et. al, 2022)[4]. By the end of July 2021, the country had fully vaccinated 90% of its adult population (the second dose). The prime minister is a medical doctor, and the health minister acted quickly. The prime minister set up many vaccination centers and transported vaccines to mountainous areas via helicopters. The king said, "I will be the last person to receive vaccination. I want to protect our people first."[5] Then, many Bhutanese people went to the vaccination centers, saying "let's get vaccinated to protect the king." This shows the existence of a trusting relationship among the king, the government, and citizens, which has greatly contributed to the societal response to the pandemic crisis. This could be viewed as a social contract. This is a good example of a homegrown response to the COVID crisis.

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[4] See also an article of Washington Post (July 28, 2021).
https://www.washingtonpost.com/world/2021/07/28/bhutan-covid-vaccination/

[5] See Nikkei News Paper (April 30, 2021).
https://www.nikkei.com/article/DGXZQOGM3098F0Q1A430C2000000/

The third example is from Africa. This is based on "knowledge co-creation" through development cooperation. The Japan International Cooperation Agency (JICA) has been working in various African countries for many years, and Ghana has been one of its long-standing partners. JICA supported the establishment of the Noguchi Memorial Institute for Medical Research (NMIMR) in 1979 as a core research institute for controlling infectious diseases. NMIMR carries the name Noguchi Hideyo (1876-1928), a famous Japanese bacteriologist who dedicated his life to medical research on yellow fever. Noguchi Hideyo died in Accra, Ghana, and had been infected with yellow fever. Over the past few decades, JICA has provided support to NMIMR through a series of grants and technical cooperation projects. These include physical upgrading and equipment supply, training doctors and other medical experts, and joint research cooperation programs. Currently, they function not only as Ghana's core medical research institute but also as a training base to counter infectious diseases in Sub-Saharan Africa. The NMIMR has played a critical role in coping with the COVID crisis, conducting 80% of PCR tests (at its peak), and promoting public education campaigns for preventive measures[6]. It has also provided guidance on infectious disease testing in 11 West African countries. Such achievements are the result of long-standing development partnerships that have enabled the country to acquire and co-create knowledge with Japanese experts.

Importance of knowledge, technology, and industrial capability

The fight against COVID shifted to a new stage from 2021, focusing on vaccine roll-out. Hereafter, hygiene practices as well as knowledge, technology, and industrial capacity have become critically important, as vaccine production, availability, and access have a significant impact on the effectiveness of controlling the pandemic. Differences in crisis-response capacities have become evident between advanced and developing countries. For example, African countries have limited access to vaccination compared to advanced and oil-rich countries, with only 7% of the population being fully vaccinated (two doses) as of early December 2021.

The development of messenger RNA (mRNA) vaccines is a technological breakthrough that has proven the value of scientific research and innovation. It also shows the importance of industrial capabilities to produce and distribute vaccines and essential goods, such as drugs and medical supplies, within countries so that they can be widely shared with various segments of the population in need. Despite the fact that vaccines, drugs, and medical devices present different levels of technological complexity and

[6] Based on JICA website.
https://www.jica.go.jp/english/our_work/thematic_issues/health/initiative/example_01.html

involve a wide range of scientific fields, industries, and technologies (UNIDO, 2021), step-by-step upgrading of capabilities in the pharmaceutical and medical supply industries is crucial for dealing with the effects of future health crises.

Related to industrial capabilities, UNIDO's recent survey also shows that the level of digitalization of firms, particularly the adoption of advanced digital production technologies, is an important element in reinforcing resilience in coping with the COVID-19 crisis (UNIDO, 2021). This suggests that in the post-pandemic era, fostering digitalization as a means of enhancing industrial capability should be a top priority.

4. Toward Building Forward Better: Tackling Old and New Problems

Let us think more concretely about how we can "build forward better." Here, I emphasize the need to distinguish between two types of challenges—COVID-19 induced (new) and structural (old) problems. We are currently struggling to cope with the COVID-19 crisis and its socioeconomic consequences, with a strong determination to realize sustainable, inclusive, and resilient recovery. This is a pressing issue. However, tackling the current challenges is insufficient. Furthermore, there is a need to address the structural problems that existed prior to the COVID outbreak. These include inequalities that have been exacerbated due to the pandemic, as well as challenges of economic transformation, such as middle-income traps and premature deindustrialization. Overcoming the COVID-19 crisis does not guarantee a sustained economic recovery if other problems are serious and unattended. In many countries, COVID-19 acts as an accelerator of inequalities (UN DESA, 2021). Our efforts to build forward better should also consider the pre-COVID situation.

Regarding pre-COVID problems, I would like to note that the nature of the development challenges has not fundamentally changed. As Figure 3 shows, our analysis of the World Bank's income classification data for 193 countries (UN member states) during the period 1987-2019 where historical data are available,[7] found that many countries have moved up the World Bank's income ladder over the past three decades. The number of "low-income countries" decreased, and now more countries belong to the

[7] For operational lending purposes, the World Bank classifies economies into four income groups: low, lower middle, upper middle, and high income countries. Income is measured using gross national income (GNI) per capita, in US$, based on the Atlas methodology. These graphs show historical data available from the World Bank from 1987 to 2019 (see https://datahelpdesk.worldbank.org/knowledgebase/articles/378834-how-does-the-world-bank-classify-countries). For example, thresholds for 2019 are as follows: (i) US$1,035 and less for low-income countries; (ii) US$1,036 to 4,045 for lower-middle income countries; (iii) US$4,046 to 12,535 for upper-middle income countries; and (iv) US$12, 535 and above for high-income countries.

"lower middle-income," "upper middle-income," and even "high-income" categories. However, a more careful analysis revealed the following three issues[8].

First, Africa continues to face the challenges of low-income traps. The number of low-income countries has declined from 49 to 29 over the past 32 years (after the peak in 2001), of which 23 are in sub-Saharan Africa. Thus, African development has remained a long-standing challenge. Second, the number of countries in the middle-income category, particularly the upper-middle income category, has increased from 24 to 54 over the past 32 years. China and Indonesia are notable countries that jump from the low to upper-middle income categories. At the same time, there are quite a few countries that move up and down between income categories (Figures 3-1, 3-2). For example, Russia and Argentina fluctuated between the lower-and upper-middle-income categories. The oil-rich countries of Angola and Venezuela moved between low-and upper-middle-income categories.

Third, the number of countries in the high-income category doubled from 30 to 61 during 1987-2019. However, more than half of these were Central and Eastern European countries that experienced a transition to the market economy in the 1990s. These countries benefited from new opportunities for economic integration into the euro area after the fall of the Berlin Wall in 1989. They became the major destination of foreign direct investment (FDI) in Western Europe, including Germany, and received technology transfers. The other countries belonging to this income category are either traditional advanced countries that joined the Organisation for Economic Co-operation and Development (OECD) before 1987 or oil-rich countries (e.g., Kuwait, Qatar, and the United Arab Emirates), except for a small number of countries (i.e., Singapore, South Korea, and Israel).

Certainly, the rise of Central and Eastern European countries is encouraging. However, if we use the very high-income threshold of USD 25,000 (twice as high as the World Bank's high-income threshold)[9], only Singapore, South Korea, and Israel have caught up with traditional advanced countries during the past three decades. This implies that only a handful of countries have rapidly become leading countries despite an increase in the number of high-income countries. Technological upgrades and value creation remain important challenges in emerging economies.

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[8] For more details, see Ohno et al. (2022).

[9] Since the World Bank's high-income category is broad and includes countries with per capita GNI of 12,500-85,000 US$ or more, the author has hypothetically created the 25,000 US$ threshold for the very high-income category.

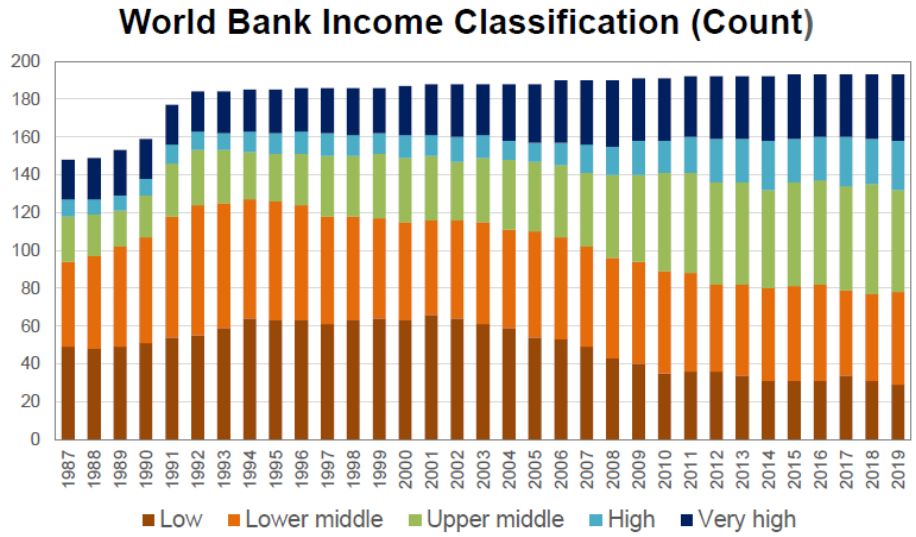

Figure 3-1: Analysis of World Bank Income Classification Data

Source: Calculated by the author based on World Bank income classification data.

Note: UN member states only.

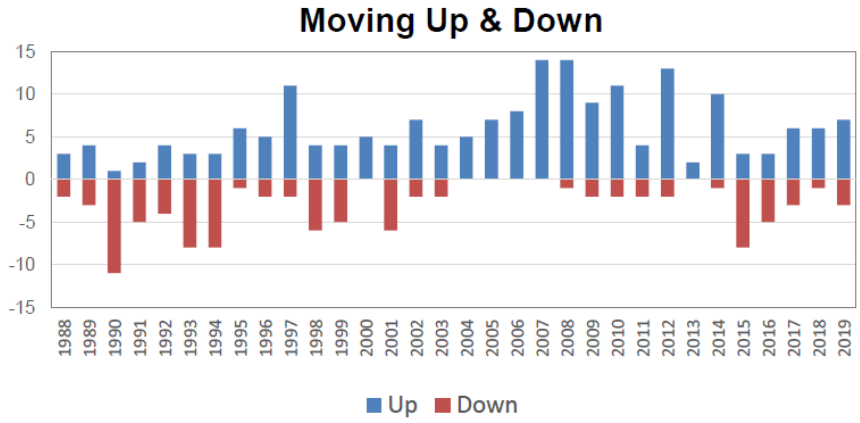

Figure 3-2: Analysis of World Bank Income Classification Data

Source: Calculated by the author based on World Bank income classification data.

Note: UN member states only.

5. Importance of Local Learning and Co-creating Practical Knowledge for Development[10]

I return to the discussion on localized knowledge and knowledge co-creation. There are two lines of thought that I consider essential in light of how to enhance societal

[10] This section incorporates insights gained from Ohno et al. (2022).

capacity to acquire, adopt, adapt, and disseminate knowledge for development. The first is knowledge-centered development thinking—"creating a learning society"—as articulated by Joseph Stiglitz and Bruce Greenwald, who emphasize the significance of local learning and the role of industrial policy in development (see Stiglitz and Greenwald, 2014). The second is the theory of translative adaptation proposed by Keiji Maegawa, a Japanese economic anthropologist who attaches high importance to indigenous perspectives and local learning (see Maegawa 1998, 2000).

Stiglitz highlights the importance of knowledge in development. When he served as the chief economist of the World Bank, he led the publication of *The World Development Report (WDR) 1998/99: Knowledge for Development* by putting knowledge at the core of our development efforts (World Bank, 1998). Later, Stiglitz and Greenwald published a book *Creating a Learning Society: A New Approach to Growth, Development, and Social Progress*, which contained the following key messages (Stiglitz and Greenwald, 2014):

> *"A central focus of development policy should be closing that gap [a gap in knowledge]—and that means enhancing learning. This is, for instance, one of the central objectives of modern industrial policies and particular technologies with greater learning capabilities and greater spillovers to other sectors."* (p. 22)

> *"A critical aspect of "learning" is that it takes place locally and must adapt to local differences in culture and economic practice."* (p.375)

WDR (1998/99) highlighted that a combination of three factors greatly contributes to economic growth: (i) openness to trade, which provides opportunities to learn foreign knowledge; (ii) education, which enhances people's capacity to use acquired knowledge; and (iii) availability of information communication infrastructure, which supports people's ability to access useful information when needed (World Bank, 1998). The government assumes a critical role in securing these factors, and industrial policies are a key building block to enhancing societal capability because they "create economic policies and structures that enhance both learning and learning spillovers" (Stiglitz and Greenwald, 2014, p. 15).

The second is the concept of translative adaptation as presented by Maegawa. Translative adaptation refers to the process of systemic mergers and the resultant dynamic

interaction between a dominant foreign system and the local society. This concerns the adaptive acceptance of advanced systems and new cultures by latecomer countries—often introduced from abroad through foreign aid and globalization—in the process of modernization. In this process, dynamic interactions occur between foreign and local systems, where foreign elements are reinterpreted and adjusted to the existing value structure and local institutions (Maegawa 1998, 2000).

In the context of development, translative adaptation can be understood as the process of global integration by a latecomer country while maintaining a strong country ownership of policy content, institutions, technology choices, social systems, and values. It is also the process of industrial catch-up: acquiring foreign knowledge and technology, adapting to country-specific circumstances, scaling up, and eventually institutionalizing them (Ohno, 2022). Because each country has "indigenous" elements, such as values and social institutions unique to that country, it is important to selectively learn foreign knowledge and systems and adapt them to the actual situation in the country. In this case, government plays a key role.

In particular, in the early stages of development, government assumes dual roles in establishing the systemic aspect of learning—as a learner (policy learning) and a facilitator of learning by the private sector (promoting technology transfer) and the whole society—with a thorough understanding of each country's situation and the surrounding external environment. First, the governments of latecomer countries must learn how to establish the overall industrial vision and strategic direction of their industrialization, and design policy instruments accordingly. This involves collecting external knowledge, selectively adopting and adapting to country-specific situations, and scaling up for institutionalization. Second, the government is responsible for creating policies and institutions for effective local learning, so that translative adaptation can take place within society. In this process, the government must learn from various actors—industry, firms, people, and educational/research institutes—to properly understand their needs, the current situation of the industry, and the knowledge level of society. Such a mutual learning process is important for promoting structural transformation towards an industrial economy. In summary, translative adaptation, local learning, and industrial policymaking interact in two ways:

Figure 4 synthesizes Stiglitz's knowledge-centered development thinking towards an industrialized economy and Maegawa's theory of translative adaptation.

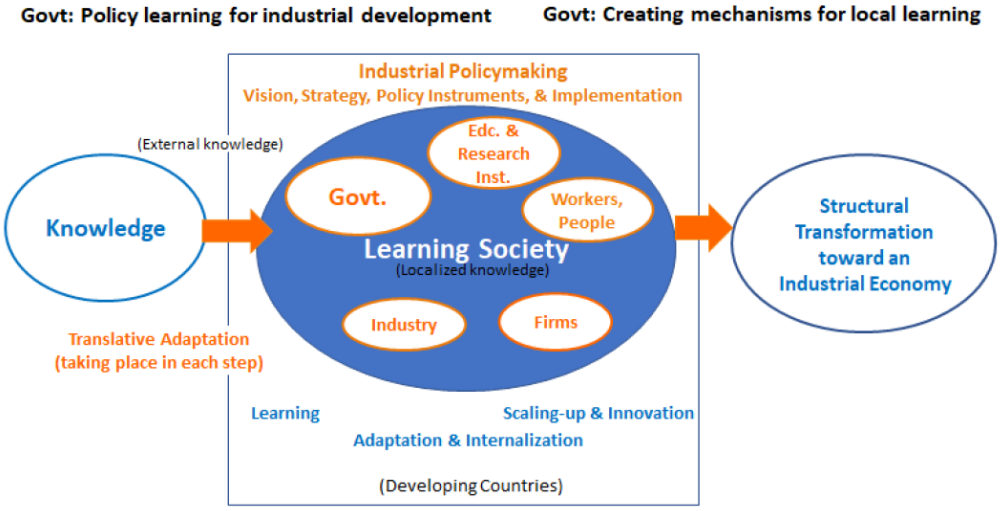

Figure 4: Role of Industrial Policy through a Lens of Translative Adaptation

Source: Adapted by the author based on Ohno et al. (2022).

6. East Asian Experiences: A Chain of Local Learning and Translative Adaptation

In East Asia, a chain of local learning and translative adaptation took place—in both the public and private sectors—for industrial catch-up. Japan's catch-up experiences since the Meiji modernization and during its post-war economic development were characterized by the learning and internalization of Western technologies and knowledge, which entailed efforts to adapt them to Japan's own culture and system (Ohno, 2022). Such historical experiences in Japan stimulated and generated a chain of learning in the neighboring countries of East Asia and Southeast Asia, including China, Taiwan, South Korea, Singapore, and Malaysia.

For example, Malaysian Prime Minister Mahathir launched the "Look East" policy in 1981 to improve Malaysia's human resource development by learning not only academic and technical know-how but also the labor ethics and discipline of the Japanese people. Since 1982, a series of large-scale programs has been implemented to send Malaysian students and trainees to Japanese universities, industries, and training institutes through various funding schemes. This initiative continues today under the framework of Look East Policy 2.0.[11] The Singaporean Prime Minister Lee Kuan Yew initiated the nationwide productivity movement in 1981 to overcome the mindset problem and poor ethics of Singaporean workers and requested the Japanese government to transfer its know-how in quality and productivity improvement. JICA ran its first comprehensive

[11] See the website of "The Malaysian Look East Policy" created by the Embassy of Japan in Malaysia. https://www.my.emb-japan.go.jp/English/JIS/education/LEP.htm

technical cooperation project in Singapore, between 1983 and 1990. The East Asian region has witnessed the spread of local and translative adaptation. This is an important mechanism for homegrown development and industrial catch-up. To succeed, strong willingness and enthusiasm for learning must exist on the recipient side, including both the public and private sectors. Regarding the role of development cooperation, donors should respect the uniqueness of each country and society, ownership, and the features of the process orientation of the learning process in light of how to facilitate translative adaptation and effective learning in partner countries (Ohno, 2022).

Japanese experiences of translative adaptation

I would like to give two concrete examples of how learning and translative adaptation took place in Japan during the periods of Meiji modernization and post-WW2 economic reconstruction. Regarding the Meiji experience, the Tomioka Silk Mill (located in Gunma prefecture) was the first modern "model" silk factory, established by the Meiji government in 1872, acquiring the advanced method and technology for processing silkworm cocoons into high-quality raw silk textiles in order to compete in the US and European markets. The Meiji government, which faced a shortage of foreign exchange, prioritized export promotion as a major agenda. The invitation of French experts led by Paul Bruner was part of a major national effort to learn about modern machine silk reeling. Local technologies and materials were used to construct buildings and factories. For example, Japanese tile artisans make bricks under the guidance of French technicians. Initially, there were approximately 400 female factory workers in Tomioka Silk Mill. Later, some highly skilled workers were dispatched to other parts of Japan to transfer their silk milling skills to other factories. In this way, knowledge was disseminated and learning took place on a larger scale. After foreign experts were left at the end of 1875, the mill was managed only by the Japanese (it was headed by Junchu Odaka as the first factory manager). In 1893, Tomioka Silk Mill was privately sold. By the early twentieth century, Japan had become the world's leading exporter of raw silk threads. This is a good example of how learning and translative adaptation occurred in Meiji Japan.

Another notable example is the history of the diffusion of quality and productivity improvements in the post-WW2 period. Japan imported productivity movements and quality control (QC) methods from the US and Europe after WW2. This has been quickly assimilated and adopted by Japan as a management method. Compared with the original US model, which was based on a statistical approach, the adapted method emphasized process orientation, worker participation, and hands-on pragmatism. This method, known as *Kaizen*, spread rapidly among both large and small Japanese

companies to form the core of the Japanese *monozukuri* (making things) spirit (Ohno and Mekonnen, 2022). *Kaizen* is a Japanese management approach for continuous improvement to achieve enhanced quality and productivity. It is a participatory approach involving the entire workforce, from the top management to middle managers and workers (Ohno et al., 2009). In this way, the Japanese made a "translative adaptation" of this original US model into a more participatory method. This adapted method, *Kaizen*, has spread among Japanese companies, including small-and medium-enterprises (SMEs). The two oil crises of the 1970s drove Japanese companies to integrate energy savings into their efforts to improve quality and productivity. Japanese private sector organizations such as the Union of Japanese Scientists and Engineers (JUSE), Japan Productivity Center (JPC), and Japan Management Association (JMA) played a key role in promoting *Kaizen* methods through training and education, consultancy, dissemination, and award systems.

Regional diffusion

Regarding *Kaizen*, it is important to note that a chain of learning and translative adaptation has taken place beyond Japan, spreading to Asia and other regions. The regional spread of *Kaizen* began in the mid-1980s, coinciding with the globalization of Japanese business activities. The sharp appreciation of the Japanese yen after the 1985 Plaza Agreement prompted Japanese manufacturing companies to shift their production bases to East Asia, where the production costs were lower. Japanese firms have attempted to duplicate their quality management systems in their factories abroad. Moreover, as they endeavored to increase local procurement of intermediate inputs, local suppliers were requested to conform to Japan's quality standards. Japanese companies often assist their local partners in learning *Kaizen*'s philosophy and practice. In addition, various public organizations, such as the Association for Overseas Technical Scholarship (AOTS), the Asian Productivity Organization (APO), and regional intergovernmental organizations (JICA, JUSE, and JPC) have begun their active engagement in *Kaizen* assistance in developing countries. This was when JICA started its first productivity management project in Singapore in 1983, as explained above.

Singapore learned from the Japanese model and established its own institutional mechanism for the productivity movement. Unlike the Japanese approach, which was led by the private sector, the Singaporean productivity movement was led by the government, and campaigns were promoted not only in the business sector but also in the public sector, linked with a civil service reform program. Based on this experience, Singapore offered technical cooperation for productivity improvement in developing countries, including the neighboring Association of Southeast Asian Nations (ASEAN) countries and some

African countries (Ohno and Mekonnen, 2022).

Currently, Japan is promoting *Kaizen* in regions other than East Asia, including African countries. JICA began providing *Kaizen* assistance in 2006 and implemented *Kaizen* projects in nine African countries. Tunisia and Ethiopia were early adopters, and developed their own institutional arrangements to promote quality and productivity improvement. More recently, JICA supported the Africa Kaizen Initiative (AKI) in collaboration with the African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) and the Pan-African Productivity Association (PAPA) (Jin and Ohno, 2022). AKI aims to serve as a knowledge-sharing network of *Kaizen* practices among African countries (both the public and private sectors), provide opportunities for mutual learning, and facilitate the process of translative adaptation of the *Kaizen* approach suitable to each country. Such ongoing efforts can be viewed as one way to create a chain of learning and knowledge co-creation at the regional level, with Japan functioning as a facilitator.

Thailand offers a brilliant case of the learning and localization of foreign knowledge for industrial development related to the regional spread of *Kaizen* in East Asia via the Japanese FDI channel. The Technology Promotion Association (Thailand-Japan) (TPA) was established in 1973 with the objective of promoting industrial development in Thailand at the initiative of Thai students who graduated from Japanese universities and ex-trainees of AOTS. After returning from Japan, they established the TPA as a non-profit organization (NPO) to promote Japanese-style industrial technology for Thai companies and people in Thailand. In doing so, the TPA took a four-stage approach: (i) "technology transfer" by learning from Japanese experts; (ii) "technology promotion" by nurturing Thai experts while reducing dependence on Japanese experts; (iii) "technology diffusion" by building the capacity of local companies through training and consulting activities; and (iv) "technology education" through the establishment of the Thai-Nichi Institute of Technology (TNI) as a university specialized in Japanese-style manufacturing by the Thai people for the Thai people. More recently, TNI started an international program for neighboring countries such as Cambodia, Laos, Myanmar, Vietnam, and Japan. This is an impressive initiative of local learning, translative adaptation, and further development of a chain of knowledge creation[12] (Ohno, 2020).

7. Final Thoughts

[12] See the website of the Japan-Thailand Economic Cooperation Society (JTECS). http://www.jtecs.or.jp/

COVID-19 experiences highlight the importance of localized initiatives tailored to diverse country-specific circumstances. There is no "one-size-fits-all" solution, and each country and society must discover optimal solutions through trial-and-error. In this regard, a model based on the experiences of developed countries is not always superior. There is no need to assume that knowledge and technology should flow "from the North to the South." Rather, it is important for diverse partners to learn from each other and "co-create." It is important to support proactive learning and to increase knowledge flow and mutual learning within and beyond Asia.

In the post-COVID-19 world, it is important to increase knowledge flow and promote mutual learning within and beyond Asia. This is particularly true because few Asian countries are interested in sharing their development experiences as emerging donors[13]. They have their own experiences of learning foreign knowledge and technologies, and adapting and institutionalizing them to suit their country-specific situation. Therefore, they are in a position to show diverse paths to development and to promote local learning and translative adaptation during their catch-up processes.

We should also focus on the population dynamics. It is estimated that by 2100, 80% of the world's population will live in Asia and Africa. This highlights the importance of Asia and Africa ("AfrAsia") in shaping the global future (Mine, 2019). Therefore, knowledge co-creation should be promoted proactively both in and beyond Asia. It is my hope and expectation that Japan will play an active role in this global engagement based on its experience of industrial catch-up and development cooperation. As history shows, Japanese experiences stimulated neighboring countries and generated a chain reaction of learning and translative adaptation in East Asia. It is important for Japan to systematically build intellectual networks with other emerging donors in Asia so that their experiences can be shared with developing countries. Japan should also play a facilitating role so that it can consider translative adaptation perspectives when sharing its catch-up experiences. In this regard, Japan's current engagement in promoting *Kaizen* in Africa in partnership with regional institutions offers useful insights.

Finally, we should recognize the opportunities and challenges of learning in the age of digitalization. On the positive side, new knowledge and technologies are available more easily and quickly in a standardized format. Simultaneously, this may discourage the process of creating localized learning unless conscious efforts are made by individuals, organizations, governments, and the private sector to make the best use of digital technologies conducive to translative adaptation. It is also important to ensure fair

[13] In addition to South Korea and China, which have sizable aid programs, Singapore, Malaysia, Thailand, Indonesia, and India have institutional mechanisms for international cooperation.

and equitable access to digital infrastructure. There is a need to maximize the benefits of digitalization while giving due consideration to our pledge to "Leave No One Behind. " The co-creation of practical knowledge for development in the era of new dynamism is a central task that should be carried out to shape the post-COVID-19 world.

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Impact of Inflation Targeting on Inflation Volatility

Salimov Muhammad[1]

Abstract

In this study, we investigate the impact of the inflation targeting (IT) regime on inflation volatility by applying treatment effects to a panel of 186 countries for the 1980–2018 period. We apply the differences-in-differences estimation to evaluate the pre-and post-adoption impact of the IT policy on reducing inflation volatility. Our estimation results demonstrate that IT countries have significantly reduced inflation volatility compared with non-IT countries. However, several countries suffer from historic hyperinflation, which significantly impacts IT after its adoption. Central banks adopt a similar price stability-centric approach in monetary policy execution. The crucial elements needed for effective IT policy implementation include financial market maturity, effective monetary policy transmission, and the overall macroeconomic stability of countries.

Keywords: Monetary Policy, Macroeconomic Impact, Inflation Targeting

1. Introduction

New Zealand was among the first countries to adopt the inflation targeting (IT) regime in 1989, which has since gained popularity among developing nations. Many central banks in the developing world have shifted to the IT monetary policy framework, which has now emerged as their core objective, with a clear mandate to pursue price stability, straightforward communication, transparency, and accountability (Coats et al., 2000). Generally, inflation rates have declined since the 1990s and most countries (both IT and non-IT) have managed to stabilize inflation and anchor inflation expectations. However, several developing countries continue to suffer from volatile inflation because of their monetary policy ineffectiveness. Therefore, theoretically, an IT regime provides a better anchor for controlling inflation volatility and reducing uncertainty in developing countries.

The applicability of IT regimes, the effects of IT on macro-financial stability, and comparative analysis with non-IT countries have been extensively studied. At the same time, IT regimes have sparked a debate over policy choices among practitioners and academicians on whether central banks should apply a mainstream macroeconomic policy and abandon monetary targeting, exchange rate peg, and other traditional monetary policy regimes. The IT regime countries have reduced their inflation volatility. However, empirical

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studies illustrate that country-based fundamentals play a crucial role in financial market maturity, economic structure, and resilience to external shocks (Fouejieu, 2017; Lin & Ye, 2007, 2013).

We expect this study to contribute significantly to the literature on the effects of IT on inflation volatility and macroeconomic performance. First, we cover the dataset of 186 countries between 1980 and 2018. We consider the impact of the IT regime on inflation volatility from a broader perspective. The core focus is to compare the impact of the IT regime on two sub-samples: the IT and non-IT countries dataset. IT has gained popularity among developing countries since the early 2000s. Nevertheless, the advantages that accrue to these countries may differ based on their experiences and financial system maturity.

The remainder of this study is organized as follows. Section 2 illustrates the motivation and aim of the study on the IT regime. Section 3 discusses the theoretical and empirical literature on the effectiveness of IT policies. Section 4 describes the methodological framework, model, and data, while Section 5 provides empirical outcomes and discusses them. Finally, Section 6 summarizes the results and discussion and proposes additional enhancements.

2. Literature Review

Many central banks have explored various methods to improve monetary policy effectiveness. The IT regime is one such policy mechanism that originated in developed nations during the 1990s. New Zealand was the first country to introduce an IT regime after the collapse of the Bretton Woods system (White, 2013). The IT regime gained popularity in developing countries during the 2000s. Thus, monetary aggregate targeting has been primarily used to implement an effective monetary policy. However, developing financial innovations and weakening the link between nominal income and money supply is not sufficient for monetary policy transmission to create a stable policy environment (White, 2013).

IT implies a monetary policy regime in which the central bank uses its tools to maintain price stability (inflation rates) within the announced inflation target in the medium term. According to the International Monetary Fund (IMF), this implies a public declaration of numerical inflation targets, and the commitment of the monetary authority to utilize tools toward achieving these targets, generally in the medium term. Other key features tend to include better public communication about the strategies and purposes of decision-makers and greater central bank responsibility for achieving inflation targets. Monetary policy decisions are usually directed by the deviation of future inflation projections from the declared inflation target, with inflation projections being an intermediate target for monetary policy (Roger, 2010b; Svensson, 2010). According to Bernanke and Mishkin (1997), most economists agree that monetary policy is the most efficient in the short-to-medium term. Therefore, central banks set short-to-medium-term targets to maintain inflation and output stability. However, achieving or missing the target affects central banks' credibility, and communicating with

the public through the Inflation Report, Monetary Policy Report, and press releases after policymaking decisions are crucial (Bernanke & Mishkin, 1997).

Countries set inflation targets primarily in three different forms: (i) target points, (ii) target points and ranges, and (iii) target ranges. Most advanced economies provide a lower inflation target of 2% between the range of +/−1 percentage points. By contrast, target points are usually higher with a broader corridor range in developing economies (Figure 1). We can attribute this to highly volatile inflation dynamics, less developed financial systems, financial dollarization, low monetary policy credibility, and the money market mechanism (Roger, 2010a).

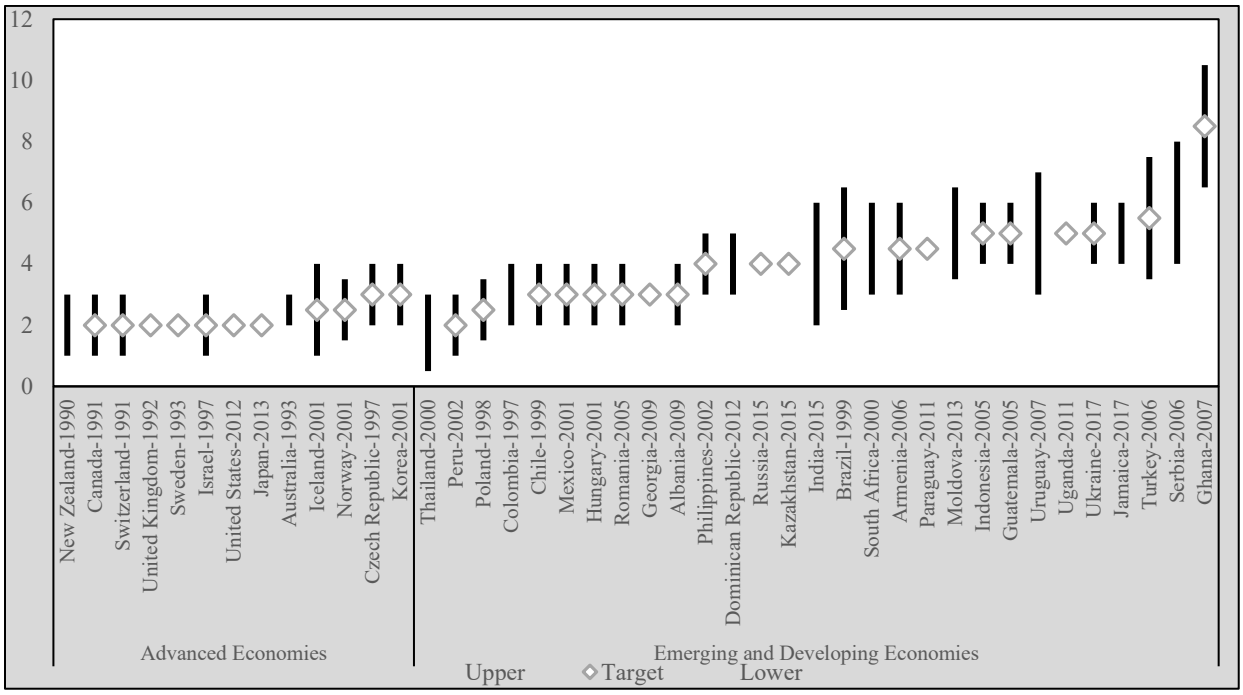


Figure 1. Inflation Targets, Points, Ranges for IT Countries

Source: IMF and author *Note: Countries classified as IT regimes used from The Annual Report on Exchange Arrangements and Exchange Restrictions Report 2018 of the IMF.

Monetary policy conducted under the IT regime was criticized by King (1997) with the famous *cliché* "inflation nutters," arguing that a strict IT framework is not favorable for achieving financial stability goals and real economic growth (King, 1997). According to Lars E. O. Svensson[2], IT, by itself, does not achieve macro-financial stability (Heise, 2019). However, a flexible IT regime allows room for policy trade-offs, such

[2] He is an ex-Deputy Governor of the Central Bank of Sweden.

as adjusting inflation in the medium-to-long term and sustaining output growth in the long term (Svensson, 2010).

Previous studies have mainly investigated samples of advanced economies, as IT originated in the developed world before being adopted by emerging economies (Table 1). Hence, in this study, we focus on emerging market economies, specifically comparing them with advanced economies. An assessment of the current literature shows that several approaches have been applied to measure the impact of IT policy on inflation volatility, including matching methods, difference-in-differences (DID) models, and panel data analysis. Specifically, to estimate the effect of IT policy vis-à-vis non-IT policy on macroeconomic performance, the matching and DID methods have been applied. The primary empirical approach for analyzing the impact of IT policy on reducing inflation, output, money growth, and exchange rate volatility (Lin & Ye, 2013) reveals that the average treatment effect of the overall IT policy effectively reduced the level of dollarization in 106 developing economies. The impact of IT on reducing inflation volatility was quantitatively small and statistically insignificant in the seven advanced economies (Lin & Ye, 2007). Similarly, Fouejieu (2017) applied the propensity score matching method to investigate the power of IT in cooperation with macroprudential instruments in 26 emerging-developing economies (Fouejieu, 2017).

Table 1. Selected Cross-Country Studies on Panel Data Analysis

Author	Period	Number of countries	Technique	Main findings of IT performance
Ball & Sheridan, 2003	1960–1994	20	Panel data, DID	No clear evidence, similar monetary policy
Pétursson, 2004	1981–2002	Three samples 21, 13, 7	Panel data analysis, seemingly unrelated	No clear evidence of IT reducing inflation and output volatility or the central bank's credibility
Batini & Laxton, 2006		31 country's central banks' survey	A detailed survey of central banks, treatment effects, DID model	Developing economies improve macroeconomic stability more than developed countries by implementing IT policy
Lin & Ye, 2007	1985–1999	7	Treatment effects, propensity score matching	The impact of IT policy on inflation variability is statistically insignificant and quantitatively unimportant
Lin, 2010	1985–2005	22 advanced and	Panel data, treatment effects using the	The impact of IT on the exchange rate, reserves, and current account

		52 developing countries	propensity score matching method	significantly raises the exchange rate strength and reserves in developing nations, although it lowers both in the advanced economies
Lee, 2011	1993–2006	13 IT countries and 47 non-IT countries	Panel data, synthetic control method for comparative cases	Many emerging market economies experience no significant reduction in inflation in the post-adoption period, and not all emerging market economies benefit from IT
Lin & Ye, 2013	1985–2004	106 developing countries from International Financial Statistics (IFS)	Panel data, average treatment effects, nearest neighbor matching method, a probit model	The treatment effects of IT policy on the dollarization level are adverse in emerging market economies, statistically significant, and have a quantitatively tremendous impact in 13 IT countries

Source: Author's compilation based on literature review.

Ball and Sheridan (2003) found no substantial evidence on the role of IT policy in diminishing inflation volatility during the sample period between 1960 and 1994. The rationale is that countries that implement a similar monetary policy based on the Taylor rule are most likely to reduce inflation volatility by using the interest rate channel (Ball & Sheridan, 2003; Taylor, 1998). Further, the authors contended that IT policy might improve macroeconomic conditions in the future and countries must test IT regimes for a broader range of analyses (Ball & Sheridan, 2003; Batini & Laxton, 2006).

Recent literature has argued that IT improves macroeconomic performance and reduces inflation volatility, provided a set of prerequisites is met, such as effective monetary transmission mechanism, financial system development, and the effectiveness of the interest rate channel (Fouejieu, 2017b; Lee, 2011; Lin & Ye, 2007, 2012, 2013). Policy practitioners and academics have been debating on the effectiveness of the IT regime. Despite its advantages, the IT framework has raised several controversies among scholars. The first advantage is that the framework offers a nominal anchor for monetary policy to anchor inflation expectations through intermediate targets to accomplish the ultimate goal of price stability. Central banks publish inflation forecasts for the medium-term horizon, which shows a clear monetary policy path, and utilize their tools to achieve long-term goals. Communication on published inflation forecasts increases central banks' credibility and transparency and enables them to accomplish their monetary policy objectives (Green, 2014).

In the early adoption stage, the financial sector is more vulnerable in IT than in non-IT countries. Therefore, the central banks in former countries are keener to shift toward this policy regime and likely to criticize their excessive focus on inflation rather than financial stability. However, central banks should use macroprudential tools to maintain financial stability in line with the IT framework. Indeed, IT has proven to be a more active monetary policy regime than other monetary policies for stabilizing inflation in emerging market economies (Fouejieu, 2017).

The current literature, both from the academic and policy practitioner perspectives, illustrates that IT reduces inflation volatility to some extent. Moreover, IT-implementing emerging market economies have greater control over the domestic money market than those implementing managed-float or fixed exchange rate regimes. However, the IT framework itself does not reduce inflation and output volatility; instead, developing the financial sector and technical infrastructure is crucial.

3. Data

We used secondary data from the World Bank and IMF databases. The dataset comprises 186 countries and covers critical macroeconomic indicators from 1980 to 2018. The sample contains 38 IT countries and 148 non-IT countries. The IT countries group comprises 13 advanced economies and 25 emerging market economies. Targeting dummy variables are introduced to identify the IT and non-IT countries and country classifications for emerging-developing and advanced economies. The time dummy for the starting period of the IT policy adoption of the 38 IT countries is specified; each country in the sample has a different starting year of adoption. The classifications of IT policy implementing countries and advanced and emerging-developing economies were based on the *World Economic Outlook* and The Annual Report on Exchange Arrangements and Exchange Restrictions Report in 2018 (IMF, 2018, 2019), respectively.

In Table 2, we summarize the statistics for the dataset. It covers the key macroeconomic indicators for 186 countries during the 1980–2018 period.

Table 2. Summary of Statistics of Data from 1980–2018 for 186 Countries

Variable	Label	N	Mean	SD
M2 (billion)	*Broad money (current Local Currency Unit)*	*4536*	*29500.0*	*302000.0*
GDPC (USD)	*Gross domestic product (GDP) per capita in Purchasing Power Parity (PPP) terms (constant=2011)*	*4472*	*15685.89*	*18518.35*
M2_G	*Broad money growth (annual %)*	*4490*	*31.30*	*261.45*
π	*Inflation, consumer prices (annual %)*	*5128*	*21.02*	*172.68*
HYPER	*Dummy variables for hyperinflation*	*7254*	*0.30*	*0.46*

DEF	*Deflator of GDP (various base year country; linked series)*	*4623*	*134.65*	*343.57*
$\bar{\pi}$	*Consumer Price Indices (CPI) (2010 = 100)*	*4873*	*70.93*	*88.66*
M2_RES	*M2 to total reserves ratio*	*4170*	*8.61*	*63.67*
REER	*Real Effective Exchange Rate (2010 = 100)*	*2593*	*116.86*	*131.86*
$\bar{\pi}$**(inf_sd)**	*Standard deviation of inflation*	*6318*	*0.99*	*0.42*
M2_RES_SD	*Standard deviation of M2_RES*	*4104*	*5.64*	*60.22*
CPI_SD	*Standard deviation of CPI*	*4744*	*6.62*	*37.39*
REER_SD	*Standard deviation of REER*	*2520*	*16.86*	*96.32*
ER	*Exchange rate (annual change in %)*	*5482*	*2.33*	*3.24*
RIR	*Real interest rate (%)*	*3227*	*7.03*	*31.30*
M2_GDP	*Broad money (% of GDP)*	*4674*	*49.72*	*33.12*
GDP_G	*GDP (growth)*	*5893*	*3.51*	*5.69*
GDPC_G	*GDP per capita(growth)*	*5893*	*1.92*	*5.61*
INF	*CPI truncated at 100% as the maximum*	*5023*	*8.40*	*12.05*
RES	*Total reserves in terms of months of imports*	*4697*	*4.15*	*4.13*
TAX_GDP	*Tax revenue (% of GDP)*	*3040*	*17.63*	*6.92*
TREATED	*Dummy variable for IT countries*	*7254*	*0.19*	*0.39*
TIME	*Time dummy for starting point of IT*	*7254*	*0.06*	*0.24*
DID	*Difference-in-differences dummy*	*7254*	*0.02*	*0.13*

Source: World Bank, *World Development Indicators* and IMF, *International Financial Statistics*.

We use the standard deviations of the five-year moving averages of annual inflation rates as the proxy for inflation volatility. This technique was previously applied to measure stock market volatility (Officer, 1973).

The mathematical definition of inflation volatility is given below: First, we assume that the mathematical representation of the inflation rate is:

$$\Delta \ln p_t = \ln p_t - \ln p_{t-1} \quad (1)$$

(Suppose pt is the level of price at time t)

Then, price volatility is defined as the double-difference in the logarithm of price:

$$\Delta^2 \ln p_t = (\ln p_t - \ln p_{t-1}) - (\ln p_{t-1} - \ln p_{t-2}) = \ln p_t - 2\ln p_{t-1} + \ln p_{t-2}$$

Price volatility is defined as the standard deviation of sample inflation rates:

$$SD\ (\Delta lnp) = \sqrt{\frac{1}{T-1}\sum_{t=2}^{T}\left(\Delta lnp_t - \overline{\Delta lnp}\right)^2} \quad (2)$$

$$(\overline{\Delta lnp} \equiv \frac{1}{T-1}\sum_{\tau=2}^{T}\Delta lnp_t) \quad (3)$$

Before estimating the model, we conducted a pre-estimation procedure to check for unit root issues in the dataset. Table 3 shows that all the variables displayed are nonstationary according to the augmented Dickey–Fuller (ADF) test. Assuming that the variables are nonstationary, we estimate the error correction model (ECM). However, as the number of explanatory variables is too large in this model, the ECM is unsuitable for this estimation. We found no unit root issues based on the ADF unit root test, and the variables were stationary (Dickey & Fuller, 1979). The test statistics for the variables used in the model were stationary and significant (Table 3).

Table 3. ADF Unit Root Test

Variable	Coefficient	Test statistic
INF	−.2970759	−30.468***
INF_SD	−.2141915	−25.634**
GDP	−.6932378	−26.965***
RIR	−.4934206	−31.853***
REER	−.1090542	−9.682***
GDPC	−.0578432	−5.960***
M2	−.0766022	−6.659 **
RES	−.1026541	−7.598***
M2/GDP	−.0817078	−6.906***
ER	−.0751549	−6.494**

Source: Author's estimation.

Note: * p < 0.05, ** p < 0.01, *** p < 0.001. "INF_SD" denotes the standard deviation of the inflation rate.

4. Methodology

The DID estimation is applied by introducing the time dummy for the pre-and post-adoption periods of IT policy for 38 countries. The sample countries adopted the IT policy regime at different periods. We interact a time dummy with a treated dummy to obtain DID interactions with countries implementing IT policy at the starting point of adoption.

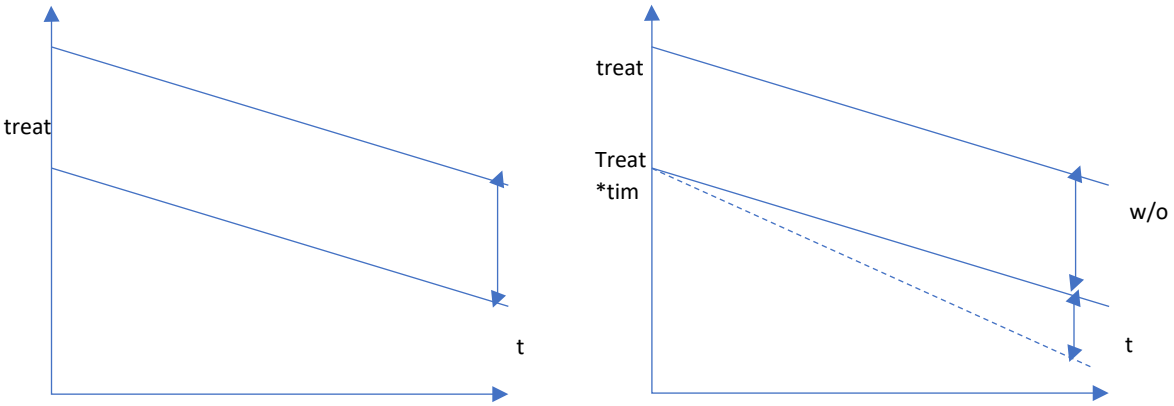


Figure 2. DID Estimation Graph

Source: Author derived based on Hill et al. (2011, p. 282).

According to Wooldridge (2009), this method has many applications, particularly when data arise from a quasi-experiment. A natural experiment seeks to capture exogenous consequences—such as changes in government policy that change the way people, families, businesses, or cities operate—and comprises a control group unaffected by the policy transformation and treatment set affected by the change in policy. Therefore, we split the sample into four groups: the control group before the policy transition, the control group after the policy transition, the treatment group before the adoption period, and the treatment group after the adoption period (Wooldridge, 2016, p. 435).

Table 4. DID Estimators

	Pre	Post	Pre-Post
C	α	$\alpha + \gamma$	γ
T	$\alpha + \beta$	$\alpha + \beta + \gamma + \delta$	$\gamma + \delta$
T-C	β	$\beta + \delta$	δ

Note: C—Control groups and T—treated groups during the pre-and post-adoption periods.

Source: Wooldridge (2009).

The DID model is used in observational studies to measure the effect of policy intervention or treatment impact by mimicking the differential effects between the "treatment" group, which received the treatment, and the "control" group, which did not receive the treatment. For the analysis, we use the log of the price indicator ($\ln P_t$), treatment dummy (treated), time dummy (time), and interaction dummy (DID).

We employ the treatment dummy for IT and non-IT countries.

$$IT_i = \begin{pmatrix} 1 & \text{for an IT country} \\ 0 & \text{for a non} - \text{IT country} \end{pmatrix}$$

The time dummy is the pre-and post-adoption period for identifying the adoption period and capturing the impact before and after the policy adoption.

$$TIME_{it} = \begin{pmatrix} 0 & \text{Before IT policy adopted} \\ 1 & \text{After IT policy adopted} \end{pmatrix}$$

We use the following equation (4):

$$\pi_{it} = \alpha + \beta IT_i + \gamma TIME_{it} + \delta(IT_i * TIME_{it}) + e_{it} \quad (4)$$

where α is a constant term, the treatment group-specific effect is captured in β, γ is the time trend common to IT and non-IT countries, and δ is the effect of treatment, indicating the impact of the IT regime.

First, for a non-IT country

$$E(\pi_{it}|IT_i) = \alpha + \beta IT_i \quad (5)$$

Second, for an IT country before the adoption period

$$E(\pi_{it}|IT_i) = \alpha + \beta IT_i + \gamma \quad (6)$$

Third, for an IT country after the adoption period

$$E(\pi_{it}|IT_i) = \alpha + \beta IT_i + \gamma + \delta \quad (7)$$

Here, γ is a difference in inflation (π) before the adoption period among IT and non-IT countries, γ + δ is the difference in inflation after the adoption period between IT and non-IT, δ is the difference in inflation (π) before and after the adoption period for IT and non-IT countries. In Section 5, we apply this estimation procedure to estimate our model.

5. Empirical Findings

In this section, we estimate the treatment effects: fixed-effects with an interaction dummy variable, DID, and matching estimations to determine the impact of IT on both IT and non-IT countries. The dependent variables are annual inflation rates (π_{it}) and standard deviation of inflation rate moving averages ($\bar{\pi}_{it}$). Figure 3 shows a trend in inflation rates (π_{it}) for both IT and non-IT countries during 1980–2018. From Figure 3, we can observe that some uncontrolled factors affect both country groups.

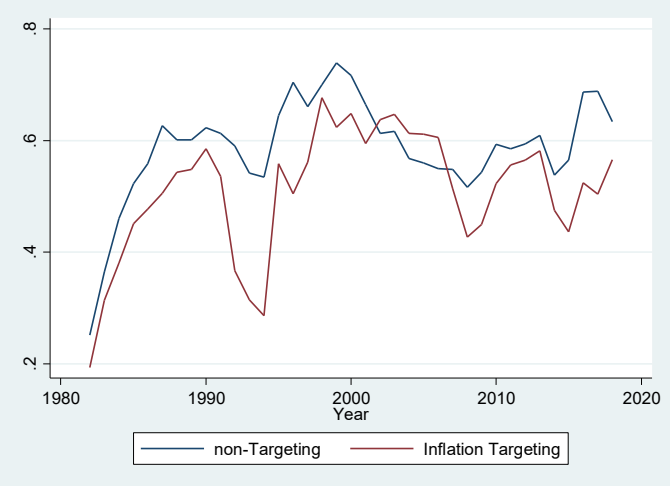
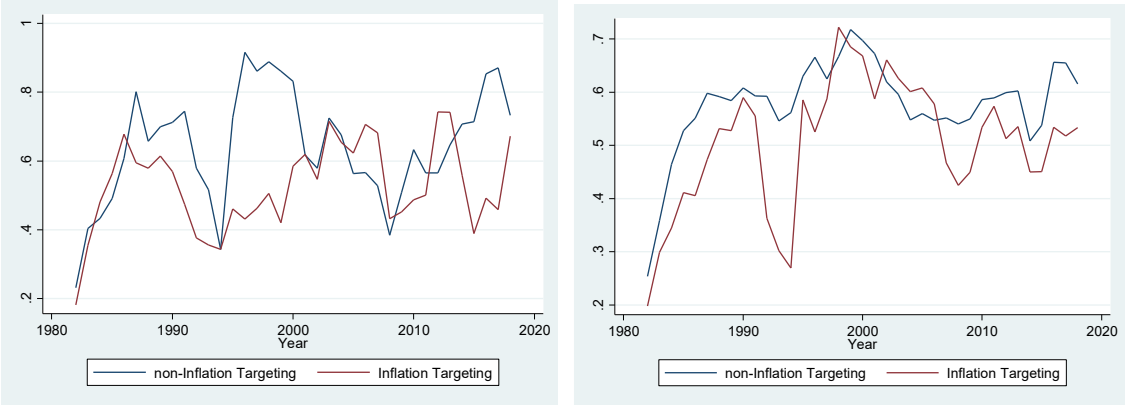


Figure 3. Trends in Inflation Volatility and Difference between IT and Non-IT Countries

As evident from Figure 3, overall inflation volatility is low in both IT and non-IT countries, although a fair inflation margin exists between the two groups. However, IT countries have been more successful in reducing inflation volatility than non-IT countries.



Advanced Economies Emerging-Developing Economies

Figure 4. Inflation *V*olatility in Advanced Economies and Emerging-Developing Economies

If the sample is divided into two sub-samples, we observe from Figure 4 that IT benefits the developing IT countries more than the advanced IT countries. Advanced economies have more stable inflation volatility, sound financial systems, and a more robust transmission mechanism than emerging markets and developing economies. Therefore, how the IT regime benefits developing countries in reducing inflation

volatility, unlike advanced economies, is unclear. Developing countries have less control over their monetary policy given the underdeveloped financial sector and are vulnerable to external shocks. Hence, by adopting an IT regime, developing countries seek to enhance monetary policy tools, develop the financial sector, and further reduce inflation volatility.

Next, we will present various estimations on the inflation rate and its volatility.

5.1. Estimation

We apply the fixed-effects and random-effects models with the DID interaction dummy variable of treatment and time dummies. The reason for applying the interaction DID dummy is to capture the group-specific for each group. We estimate our model using two inflation measures: the annual inflation rates and inflation rates excluding hyperinflation episodes. Equation (4) can be expressed as follows:

$$\pi_{it} = \beta_1 + \beta_2\pi_{it-1} + \beta_3 GDP_{it} + \beta_4 REER_{it} + \beta_5 RIR_{it} + \beta_6 GDPC_{it} + \beta_7 ER_{it} + \beta_8 M2_{it} + \beta_9 M2/GDP_{it} + \beta_{10} RES_{it} + \delta IT_{it} * TIME_{it} + u_i + \varepsilon_t + e_{it} \quad (8)$$

where π_{it}, the dependent variable, denotes inflation rates with i representing countries and t time; on the right-hand side are the independent variables GDP_{it}—output growth rates; $REER_{it}$—real effective exchange rates; RIR_{it}—real interest rates; $GDPC_{it}$—GDP per capita in PPP terms; ER_{it}—exchange rates; $M2_{it}$—broad money (M2); $M2/GDP_{it}$—M2–GDP ratio; RES_{it}—reserves in terms of three months of imports; $ITD_{it} * TIME_{it}$—interaction term between the time and treatment dummy variable (referred to as "DID dummy"); u_i—fixed-effect or individual (country) effect; ε_t—time effects; and e_{it}—error or disturbance term.

5.1.1. Determinants of Inflation Rates

In this section, we explore the impact of countries with and without inflation targets on the inflation rate. We estimate our model using equation 8. As shown in Table 5, we include the pooled sample and two different sub-samples: IT and non-IT countries, and estimate the following model:

$$\pi_{it} = \beta_0 + \beta_1 RIR_{it} + \beta_2 REER_{it} + \beta_3 ER_{it} + \beta_4 GDP_{it} + \beta_5 GDPC_{it} + \beta_6 M2_{it} + \beta_7 RES_{it} + \beta_8 M2/GDP_{it} + \delta IT_{it} * TIME_{it} + u_i + \varepsilon_t + e_{it} \quad (9)$$

Table 5. Estimation of Output Fixed-Effects with DID Dummy

Inflation rate (π_{it})	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Pooled Sample	FE IT	FE non-IT	FE IT	FE non-IT	FE IT	FE non-IT
		Overall		Advanced economies		Developing economies	
RIR	−0.0770	−0.0793	−0.0912	−0.484	−0.0298	−0.0541	−0.147
	(−1.51)	(−0.90)	(−1.49)	(−1.78)	(−0.33)	(−0.88)	(−1.17)
REER	−0.751*	−0.311	−0.714	−1.414	−2.406	−0.673	−1.332*
	(−2.42)	(−0.87)	(−1.95)	(−2.48)	(−2.34)	(−1.72)	(−2.93)
ER	0.425*	1.655*	0.352	0.0774	−2.327	0.352	1.588
	(2.05)	(2.42)	(1.68)	(0.04)	(−0.73)	(1.63)	(2.14)
GDP	−0.0331	−0.0619	−0.0312	0.138	−0.123	−0.0428	−0.0730
	(−0.86)	(−0.65)	(−0.77)	(0.68)	(−9.64)	(−1.09)	(−0.38)
GDPC	0.0774	−0.449	0.0830	−0.763	10.36	0.110	0.548
	(0.20)	(−0.76)	(0.17)	(−0.51)	(1.58)	(0.21)	(0.84)
M2	−0.249**	−0.113	−0.265*	−0.0734	−3.827	−0.269*	−0.265*
	(−2.92)	(−1.06)	(−2.51)	(−0.22)	(−2.21)	(−2.39)	(−3.37)
RES	−0.0422	−0.0392	−0.0452	−0.154	0.0772	−0.0439	−0.00931
	(−1.98)	(−0.96)	(−1.97)	(−1.56)	(0.20)	(−1.88)	(−0.20)
M2-to-GDP	0.00219	0.00963	0.00132	0.003	0.0717	0.0005	−0.00184
	(0.58)	(1.60)	(0.32)	(0.41)	(4.32)	(0.11)	(−0.27)
DID dummy	−0.115*	−0.313*			0.262*		
	(−2.23)	(−3.44)			(23.77)		
Constant	10.88***	9.145	11.21**	17.82	5.027	10.85**	10.35
	(3.67)	(2.24)	(3.26)	(1.78)	(0.20)	(2.96)	(1.97)
Adj. R^2	0.169	0.095	0.181	0.127	0.161	0.193	0.143

Note: t-statistics are in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001. FE represents the fixed-effects estimation. IT implies that the samples are limited only to IT countries, while non-IT implies that only non-IT countries are included in the estimation.

According to the estimation of the fixed-effects model with the interaction DID dummy variable, we find that the DID dummy is highly significant in reducing inflation rates in the pooled and overall samples of IT countries.

5.1.2. Determinants of Inflation Volatility ($\bar{\pi}_{it}$)

In this section, we examine the impact of adopting an IT regime on inflation volatility in the overall sample, including advanced and developing countries, and compare the two subgroups of countries: IT and non-IT countries. Further, we estimate the following equation:

$$\bar{\pi}_{it} = \beta_1 + \beta_2\pi_{it-1} + \beta_3 GDP_{it} + \beta_4 REER_{it} + \beta_5 GDPC_{it} + \beta_6 ER_{it} + \beta_7 M2_{it} + \beta_8 M2/GDP_{it} + \beta_9 RES_{it} + \delta IT_{it} * TIME_{it} + u_i + \varepsilon_t + e_{it} \quad (10)$$

Table 6. Output Table of Fixed-Effects model with DID Interaction Dummy Variable

	(1)	(2)	(3)	(4)
Standard Deviations of inflation rates $\bar{\pi}_{it}$	OLS	FE Pooled sample	FE IT	FE non-IT
Inflation rates(lagged)	−0.215***	−0.171***	−0.146***	−0.177***
	(−17.10)	(−12.96)	(−5.95)	(−11.95)
REER	−0.286***	−0.185**	−0.243*	−0.173*
	(−4.95)	(−2.90)	(−2.18)	(−2.16)
ER	0.573***	0.469***	0.964***	0.470***
	(14.13)	(11.14)	(5.05)	(10.39)
GDP	−0.0297*	−0.0424**	0.00668	−0.0550***
	(−2.07)	(−3.08)	(0.32)	(−3.45)
GDPC	−0.0621***	−0.169*	0.0156	−0.266**
	(−4.89)	(−2.21)	(0.13)	(−2.81)
M2	−0.0182***	−0.0267	−0.0644*	−0.0104
	(−5.01)	(−1.77)	(−2.11)	(−0.58)
RES	0.00633*	0.00136	−0.00331	0.000130

	(2.04)	(0.34)	(−0.38)	(0.03)
M2-to-GDP	−0.00153***	−0.00328***	−0.000892	−0.00414***
	(−3.59)	(−3.60)	(−0.61)	(−3.90)
DID dummy	−0.0619	−0.201	−0.216*	
	(−0.48)	(−1.20)	(−2.06)	
Constant	3.261***	4.093***	3.329**	4.624***
	(10.26)	(7.02)	(2.99)	(6.71)
N	1183	1183	190	993
Adj. R^2	0.248	0.164	0.235	0.168

Note: t-statistics are in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. FE represents the fixed-effects estimation. IT implies that the samples are limited only to IT countries, while non-IT implies that only non-IT countries are included in the estimation.

The estimation result indicates that the DID dummy, at an average of −0.216%, is highly significant in reducing inflation volatility in IT countries. The pooled sample has a relatively low effect (0.201%) and an insignificant impact (see Table 6).

The lagged value of inflation has a significant negative impact for all cases, implying that monetary authorities have less control over domestic inflation rates in most countries with historically high inflation and a relatively low impact on IT countries.

The REER reduces inflation volatility in IT and non-IT countries by −2.43% and −0.173%, respectively, and in the overall sample by −0.185% on average. An increase in the REER, meaning an appreciation in the local currency, leads to a decrease in the price of imported items, which in turn leads to a decline in the overall inflation rate.

Exchange rate volatility reduces inflation volatility in both country groups, implying that most developing economies suffer from dollarization. The IT regime pays more attention to inflation stability than to exchange rate stability. Hence, the average reduction in exchange rate volatility at 0.47% is less in non-IT countries than the average 0.964% in IT countries because of pegged or managed-float regimes focusing on exchange rate stability. We use the standard deviations of the five-year moving averages of the inflation rate and observe a significant reduction in inflation variability in both countries.

5.2. Discussion

First, we investigated the impact of IT on inflation volatility in IT and non-IT countries by applying the DID estimation method and various matching estimations. Our results demonstrated a significant reduction in inflation volatility in IT countries. Second, we excluded hyperinflation episodes (outliers) from the dataset and found no significant decrease in inflation volatility in IT countries compared with non-IT countries.

We mainly focused on the impact of IT on inflation rates and inflation volatility in the two sub-samples of IT and non-IT countries. The previous study by Lin and Ye (2010) covered inflation volatility with fewer country datasets and in the shorter range because of data availability constraints. Therefore, we emphasize inflation volatility by using a larger sample of countries and additional control variables, such as REER and real interest rates. Although previous literature established that IT has a less significant impact, recent investigations reveal that it has a more significant impact on inflation volatility when combined with macroprudential and fiscal policies (Fouejieu, 2017; Ismailov, Kakinaka, & Miyamoto, 2016).

The findings of this study are consistent with those in previous studies, although we found more action on inflation volatility. However, the experience of IT countries illustrates that although many countries did not have a proper monetary transmission mechanism and financial system development before adoption (Lavigne et al., 2012), after the adoption period, IT countries have gradually improved and developed a framework for policy conduct.

6. Concluding Remarks

In this study, we investigated inflation variability after the adoption of IT policy. Our findings using the DID analysis demonstrated that IT policies have a significant and quantitatively substantial impact on reducing inflation variability. Countries with high and volatile inflation are more likely to apply an IT policy to reduce inflation. In summary, the IT regime reduces inflation volatility, but financial market development, economic base, and exchange rate vulnerability to external sector development are important factors in emerging market economies.

Our empirical findings are consistent with those in previous studies. We found that the IT regimes significantly impact inflation by reducing the actual inflation and volatility. Previous studies also confirm that in practice, monetary policy is not the only option for reducing inflation and maintaining a stable macroeconomic environment. The implementation of monetary policy is coordinated with fiscal policy, macroprudential policy, and the financial system, all of which play a vital role in maintaining the overall macroeconomic stability. Central banks should consider the main elements of the policy framework and

economic issues while formulating policy decisions during the transition period. This study can be further elaborated in the future by considering exchange rate regimes and fiscal policy in the case of a specific country's experience.

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Appendix

This appendix provides supplementary analyses. In the following exercises, we excluded the outliers (hyperinflation episodes) from the dataset and found the IT impact on reducing inflation volatility to be less significant in IT than in non-IT countries.

A1. Inflation Rate Regression Analysis Excluding Hyperinflation Episodes (Outliers)

In this section, we estimate the model excluding hyperinflation episodes from the dataset. The dataset suffers from outliers; therefore, we exclude the hyperinflation period comprising inflation rates higher than 100% in annual terms.

Table A1. Regression Analysis of Inflation Rates Excluding the Hyperinflation Episodes

Inflation rate (π_{it})	(1) Pooled Sample	(2) FE IT	(3) FE non-IT	(4) FE IT	(5) FE non-IT	(6) FE IT	(7) FE non-IT
RIR	0.0679	−0.845	0.0673	−2.210	−1.197	0.260	−1.126
	(0.13)	(−1.54)	(0.12)	(−2.62)	(−0.98)	(0.40)	(−1.12)
REER	−10.33*	−4.234*	−9.375*	−2.171	−28.43	−9.991*	−12.81
	(−2.41)	(−3.00)	(−2.18)	(−0.64)	(−6.09)	(−2.17)	(−2.37)
ER_SD	4.050	15.84*	3.248	10.22	−16.09	3.147	15.69**
	(1.40)	(2.76)	(1.16)	(1.79)	(−1.02)	(1.15)	(4.56)
GDP_G	−0.288	−0.690	−0.176	0.160	−0.965	−0.185	−1.133
	(−0.99)	(−0.91)	(−0.54)	(0.28)	(−1.90)	(−0.52)	(−0.76)
GDPC	2.146	−0.410	2.399	−5.381	120.5	2.896	8.728*
	(0.58)	(−0.09)	(0.43)	(−0.72)	(1.37)	(0.48)	(2.57)
M2	−3.692*	−1.444	−4.160*	−0.662	−43.99	−4.345*	−2.695**
	(−2.46)	(−1.62)	(−2.16)	(−0.40)	(−1.72)	(−2.13)	(−4.33)
RES_IMP	−0.196	−0.278	−0.177	−0.678	1.587	−0.137	−0.0928
	(−1.26)	(−0.98)	(−0.97)	(−1.19)	(0.89)	(−0.71)	(−0.25)
M2_GDP	0.103	0.0797	0.113	0.0382	0.947	0.122	−0.0282
	(1.97)	(1.09)	(1.92)	(0.81)	(2.31)	(1.83)	(−0.70)
DID dummy	−0.245	−1.452			2.735		
	(−0.59)	(−1.44)			(1.33)		
Constant	124.8**	62.27	130.2**	84.42	26.68	132.0**	67.52
	(3.21)	(2.07)	(3.06)	(1.40)	(0.14)	(2.95)	(2.44)

N	923	159	764	79	43	685	116
Adj. R^2	0.319	0.125	0.353	0.090	0.431	0.369	0.209

Note: t-statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. FE represents the fixed-effects estimation. IT implies that the samples are limited only to IT countries, while non-IT implies that only non-IT countries are included in the estimation.

Figure A1 shows that removing the outliers from the dataset does not result in a significant drop in inflation in IT countries compared with non-IT countries after the 2000s. Most countries' central banks follow the same monetary policy rules. Ball and Sheridan (2005) revealed that countries are most likely to follow the same Taylor rule when controlling inflation rates. We observe that IT countries experienced higher inflation rates than non-IT countries; hence, they are most likely to adopt the IT regime to reduce inflation.

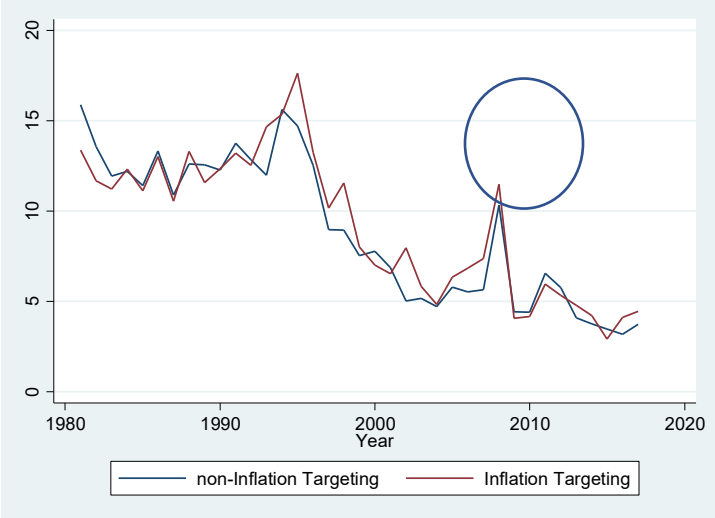

Figure A1. Annual Rates of Inflation (Natural logs)

We examine inflation reduction by breaking down the dataset into two sub-samples of advanced and emerging market economies. Advanced economies have similar inflation rate dynamics in both groups. Emerging market economies have benefited from the adoption of IT policies to reduce inflation rates to a lower level.

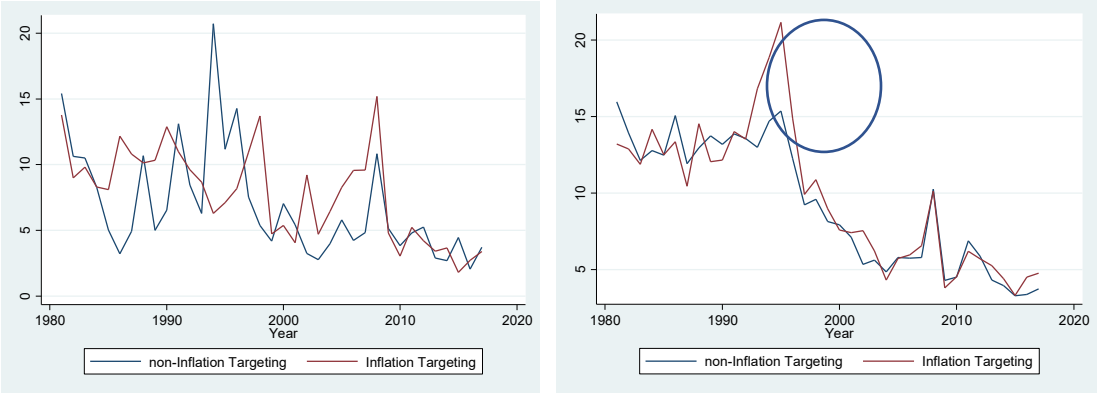

Figure A2. Trends in Inflation Rates in Advanced Economies (left) and Emerging Market Economies (right)

Why IT countries have adopted a route similar to non-IT countries in recent years merits a discussion. The first reason is that most central banks have price stability as a primary objective and follow a similar Taylor rule to control inflation rates (Ball & Sheridan, 2003). We discussed this issue in more detail in the Discussion section (subsection 5.2).

A2. Inflation Volatility Regression Analysis Excluding the Hyperinflationary Episodes (Outliers)

In this section, we estimate the inflation volatility model by excluding outliers from the dataset. Our data suffer from outliers that have historical problems with high inflation. Several countries have suffered from hyperinflation episodes. Estimation using the actual dataset will result in a more significant impact on IT countries. Therefore, we exclude the data on annual inflation rates if it is higher than 100%.

$$\bar{\pi}_{it} = \beta_1 + \beta_2\pi_{it-1} + \beta_3 GDP_{it} + \beta_4 REER_{it} + \beta_5 RIR_{it} + \beta_6 GDPC_{it} + \beta_7 ER_{it} + \beta_8 M2_{it} + \beta_9 M2/GDP_{it} + \beta_{10} RES_{it} + \delta IT_{it} * TIME_{it} + u_i + \varepsilon_t + e_{it} \quad (9)$$

Table A2. Regression Analysis of Inflation Volatility Excluding Hyperinflation Episodes

Inflation volatility $\bar{\pi}_{it}$	(1)	(2)	(3)	(4)	(5)	(6)
Estimation Method and Sample	FE Overall	RE Overall	FE IT	RE IT	FE Non-IT	RE Non-IT
Inflation lagged	0.167	0.530***	−0.0587	0.23	0.114	0.436**
	−1.09	−3.51	(−0.13)	−0.5	−0.72	−2.8
REER	−1.480*	−0.294	−1.535	1.956	−1.475*	−1.970*
	(−2.09)	(−0.43)	(−0.79)	−1.45	(−1.67)	(−2.33)

RIR	0.0174	0.0282*	−0.0242	−0.047	0.0538**	0.0714***
	−1.09	−1.83	(−0.79)	(−1.53)	−2.81	−4.02
ER	9.018***	10.76***	27.49***	27.11***	7.744***	8.978***
	−12.2	−14.5	−8.39	−8.89	−10.5	−12.05
GDP_G	−0.346*	−0.329*	−0.151	0.0486	−0.302*	−0.370*
	(−2.24)	(−2.09)	(−0.40)	−0.12	(−1.82)	(−2.19)
GDPC	1.442*	−0.659*	3.653*	−1.512**	1.534	−0.571*
	−1.63	(−2.33)	−1.68	(−2.65)	−1.46	(−1.70)
M2	−1.865***	−0.379***	−1.861***	−0.286*	−1.876***	−0.352***
	(−9.83)	(−4.97)	(−3.48)	(−1.76)	(−8.12)	(−4.14)
RES	0.0904	0.0995*	0.0577	0.0955	0.0959	0.0885
	−1.41	−1.69	−0.33	−0.7	−1.35	−1.33
M2_GDP	0.0151	−0.0103	−0.0201	0.0214	0.0215*	−0.0118
	−1.47	(−1.35)	(−0.68)	−0.99	−1.95	(−1.38)
DID dummy	0.74	−0.448	1.192	2.038		
	−0.44	(−0.29)	−0.67	−1.38		
Constant	43.84***	19.23***	25.24	9.435	42.95***	25.72***
	−6.39	−4.4	−1.31	−0.91	−5.69	−5.24
N	932	932	165	165	767	767
Adj. R^2	0.335	0.399	0.444	0.596	0.348	0.395
Note: t-statistics in parentheses. * p < 0.10, ** p < 0.05, *** p< 0.01. FE represents the fixed-effects estimation, while RE represents the random-effects estimation. IT implies that the samples are limited only to IT countries.						

Table A2 displays the inflation volatility estimation outcomes, excluding hyperinflation episodes as a dependent variable. We estimate the impact of the IT policy on the reduction in inflation volatility by excluding outliers from our dataset.

As an immediate result of the exclusion of outliers, the remaining variables become insignificant. The random-effects model shows that the lagged value of inflation raises inflation volatility by increasing inflation volatility by 0.53% point in the overall sample and 0.436% point in the non-IT sample.

According to the random-effects model, broad money (M2) and GDP per capita negatively impact inflation volatility in IT countries by −1.5% point and −0.28% point, respectively. In the non-IT sample, we find that M2 and GDP per capita have significant power to reduce the volatility of inflation by −0.57% point and −0.35% point, respectively.

The DID dummy variable becomes insignificant and quantitatively small compared with the previous estimation, that is, without hyperinflation episodes. The other variables were not significant.

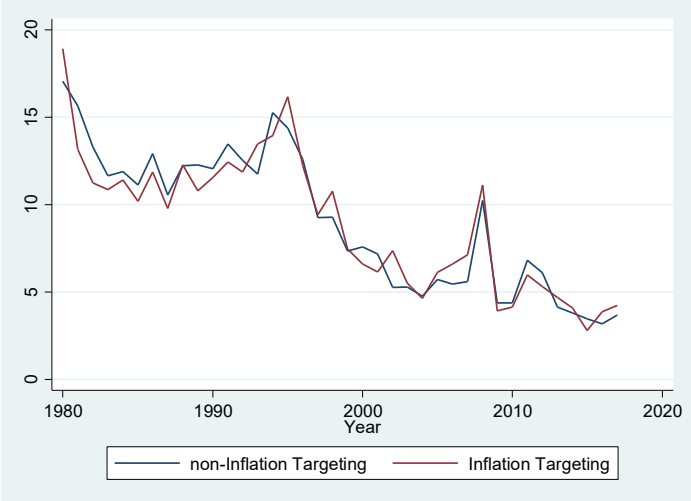

Figure A3. Trend in Inflation Volatility Excluding Hyperinflation Episodes

After excluding the hyperinflation episodes from our sample, inflation volatility does not decrease considerably, unlike the case with the IT and non-IT countries (see Figure A3). We found that inflation volatility did not reduce significantly in IT countries compared with non-IT countries after excluding outliers from the dataset.

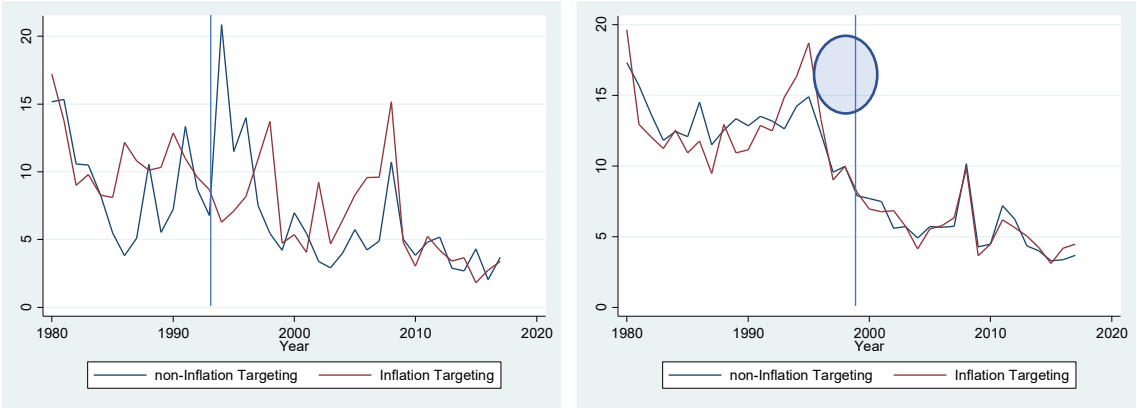

Figure A4. Trends in Inflation Volatility in Advanced Economies (left) and Emerging-Developing Economies (right) (FE-DID)

Source: Author's Estimation.

Finally, we examine the impact on advanced and emerging economies separately. No clear significant impact of reducing inflation volatility is evident compared with non-IT in advanced economies. Moreover, we can observe that IT in emerging market economies had a slight spike before the adoption period (Figure A4) and that IT countries previously had relatively higher volatility and achieved lower inflation volatility. The IT and non-IT samples had a similar path to reducing volatility in the past 20 years.

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Tapping the Growing "Niche Social Market" in the Philippines: The Case of Good Food Community

Jovito Jose P. Katigbak[1]

Abstract

Eradicating poverty in the Philippines entails more than just policies and initiatives concentrated on urban areas as two thirds of the country's poor reside in the rural areas. Specifically, the agriculture sector is regarded as a 'poor man's sector' due to low wages and high levels and incidence of poverty. As a response, both the Philippine government and the private sector have undertaken several initiatives to address the aforementioned issues. However, poverty continues to exist and the need for novel approaches to reduce and eventually end poverty is highlighted. Thus, the emergence of social enterprises is viewed as a possible mechanism to reach certain sub-sector niches which the state, private sector, and non-government organizations (NGOs) are not able to penetrate. This paper attempts to examine the role played by the social enterprises such as Good Food Community in filling the gap left by the government and civil society organizations in poverty reduction initiatives and in extending support to the marginalized and disadvantaged groups in the society. It also outlines key development administration principles mainstreamed and practiced by the Good Food Community through its promotion of community-shared agriculture.

Keywords: social entrepreneurship, development, agriculture, poverty, public value

1. Introduction

For a country like the Philippines, eradicating poverty entails more than just policies and initiatives concentrated on urban areas as two thirds of the country's poor reside in the rural areas. The 2018 poverty incidence data show that of the 17.7 million Filipinos living in poverty, famers comprise 31.6 percent of the total figure, followed by fisherfolks at 26.2 percent, and individuals residing in rural areas at 24.5 percent (Philippine Statistics Authority, 2020). What is quite ironic is the fact that the nation's food producers are those that are mostly hungry. Notably, the agriculture sector is regarded as a 'poor man's sector' due to low wages and high levels and incidence of poverty. Challenges faced by farmers include high cost of production inputs, low productivity, limited access to finance, and lack of connectivity and logistics. These result in an estimated 20-50 percent loss of fresh produce in transit from the farm to the

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markets, which translates to higher retail prices for consumers (JFC of the Philippines, 2016). Other factors constraining the maximization of the sector's potential are the natural disasters that cause disruption, flawed policies, and weak institutions (JFC of the Philippines, 2016).

The Benigno "Noynoy" Aquino III administration (2010-2016) launched several efforts to support and catalyze growth in the agriculture sector, which were continued and supplemented under the presidency of Rodrigo Duterte. Private sector has likewise invested, especially in Mindanao, into the said sector to stimulate economic activity. However, poverty continues to exist and the need for novel approaches to reduce and eventually end poverty is highlighted. Perhaps an answer to such call is the emergence of social enterprises which are hybrid business models that operate in sub-sector niches which the state, private sector, and non-government organizations (NGOs) are not able to penetrate (Smith & Darko, 2014; Griffin-EL & Darko, 2014; Vu et al., 2014). In the Philippines, the main goal is the promotion of a social enterprise with the poor as primary stakeholders (SEPPS). While still it its nascent stages, the potential of SEPPS as viable alternative mechanisms for achieving pro-poor growth within the country is highly touted. The case of Good Food Community illustrates the vital role played by social enterprises in advancing inclusive growth and sustainable development at the same time.

Good Food Community mainstreams the community-shared agriculture which directly links smallholder organic farming with consumers by allowing the latter to subscribe to prepaid, local, and seasonal vegetables produced by the former and are delivered weekly to their communities. The organization's over-all thrust is worth examining as it applies three important concepts and principles in the study and practice of development administration, namely: i) sustainable development and institutions; ii) the role of social enterprises in creating public value; and iii) the significance of social capital in poverty reduction initiatives.

Research Question

This study seeks to answer the inquiry, *"What are the essential development administration principles that have been mainstreamed and practiced by the Good Food Community as a social enterprise?"*

This paper claims that social enterprises play a vital role in filling the gap left by the government and civil society organizations in poverty reduction initiatives and in extending support to the marginalized and disadvantaged groups in the society.

Objectives of the study

In conducting this study, the author aims to attain the following:

1. To describe the current state, challenges, and initiatives by various stakeholders on rural poverty and farming in the Philippines and the community-shared agriculture model adopted by the Good Food Community, a social enterprise;

2. To evaluate Good Food Community's strategy and efforts vis-à-vis development administration principles and concepts such as sustainable development and institutions, the role of social enterprise in creating public value, and the significance of social capital in poverty reduction; and
3. To recommend policy options and considerations for various stakeholders including local and national authorities, civil society organizations, private sector, and social entrepreneurs in mainstreaming and advancing social entrepreneurship in the country thereby contributing to the overarching goals of realizing inclusive growth and sustainable development.

2. Theoretical Background

2.1. Sustainable Development and Institutions

Development policies during the 20th century were primarily anchored on boosting economic growth which inevitably resulted in negative effects on most ecosystems. Ehrlich and Holden (1971) perceived that the pace of population growth, technological advancement, and economic growth are the three anthropogenic forces determining environmental deterioration. Meadows (1999) expounded on the notion of (population) 'growth' by labeling it as the root cause of majority of the problems such as poverty, resource depletion, environmental destruction, and urban degradation and that subdued growth in several scenarios (and even negative growth) were/are necessary. Perhaps Ehrlich, Holden, and Meadows drew their inspiration from Thomas Malthus when the latter argued that the arithmetic increase in food supply would not keep up with the exponential growth of population, hence putting a check on the latter via food scarcity (Malthus, 1798). The fast pace of population growth along with rapid urbanization which promoted linear consumption, mostly based on resource-intensive processes, therefore placed greater strain on urban ecosystems and led to the deterioration of the living standards of urban residents, especially in least-developed and developing countries

Three significant publications had substantial contribution in shaping public perception on the growing issue of environmental degradation. R. Carson's *Silent Spring* (1962) paid attention to the reduction of biodiversity while D. H. Meadows et al. (1972) tackled the irreversible decline in both industrial growth and human population before 2100 if resource use and emissions were maintained. E. F. Schumacher's *Small is Beautiful* (1974) then dwelled on the negative side of contemporary economics as it failed to account for the people and perpetuated environmental destruction. Notably, the first internationally acknowledged initiative which mainstreamed the *environment versus development* debate was the UN Conference on Human and Environment (UNCHE) held in Stockholm, Sweden in 1972 (Bayulken and Huisingh, 2015). The event called for concrete strategies, plans and actions for a development model which altogether incorporated economic, social, and environmental aspects. The cited debate gained more ground after the publication of the Brundtland Report as it advocated for the integration of economic, social, and environmental considerations in the world's collective push towards sustainable development and its common future (Bayulken and Huisingh, 2015). While the report was successful in orienting the world's view toward the attainment of sustainable development, it was criticized

for its vagueness and lack of policy options specifically for planning and land use policies (Kasioumi, 2011).

Another concept that became more prominent since the 1980s was ecological modernization (EM). Langhelle (2000) distinguished EM from sustainable development by referring to the former as catering to some aspects of global issues (by reconciling economics and ecology) while the latter covers a wide spectrum of economic, environmental, and development issues, population, peace and security, and social justice. Christoff (1996) built on Hajer's (1995) definition of EM and particularly categorized it into two forms: the weak or techno-corporatist form which seeks to address environmental concerns through technological solutions; and the strong or reflexive form which manifests general changes in institutional and economic structure of society to include ecological issues. Consequently, the United Nations in September 2015 unveiled a set of goals with an overall vision of eradicating extreme poverty in the context of sustainable development by 2030. Known as the Sustainable Development Goals (SDGs), the 17 goals and 169 associated targets define the post-2015 development agenda to lead the world toward a path of economic development, social inclusion, and environmental sustainability. These universal targets are intended to build on the gains under the Millennium Development Goals (MDGs) (Katigbak & Salazar, 2016).

Savola et al. (2010) underscored the importance of institutions in determining the development of a country when they wrote: *"political economy factors are likely to be important in influencing the quality of institutions a country is able to develop – unequal societies develop exploitative and insufficient institutions."* The role of institutions therefore in realizing sustainable development is demonstrated as they monitor compliance of players with the established rules and policies and exercise coercion or compensation among such actors.

Perhaps Meadowcraft (2007) discussed best the concept of governance for sustainable development when he wrote:

> *"The idea of governance for sustainable development embodies a specific 'steering logic'. Sustainable development is not a spontaneous social product: it requires goal-directed intervention by governments and other actors. This form of 'steering' does not seek to control every dimension of social life. It can accept that the future is largely unknown and unknowable, and recognise that our collective capacities to determine what is to come are limited (Meadowcroft, 1999). But even in the face of this radical uncertainty and indeterminacy human beings can try: 1) to orient society towards the attainment of desirable objectives and the avoidance of dangerous pitfalls; 2) to take action to protect groups that are especially vulnerable to the unfolding pattern of change; and 3) to re-order social institutions so that they are better placed to cope with whatever the future does bring.*

> *In a fundamental sense, governance for sustainable development implies a process of 'societal self-steering': society as a whole is to be involved in the critical interrogation of existing practices, and to take up the conscious effort to bring about change. Thus it involves not only actions and policies to orient development along certain lines, but also the collective discussion and decision required to define those lines. Value choices – about the kind of society in which we want to live, about the kind of world we want to leave to posterity – lie at the heart of governance for sustainable development. At base, it is not a technical project, although technical expertise is essential, but a political project. For, while the concept indicates issues that should be of concern, its practical bearing cannot be established independent of the concrete life circumstances of a particular society and the needs, interests, values and aspirations of its members. Thus governance for sustainable development is 'interactive', not just in the instrumental sense that societal inputs can facilitate progress towards known objectives, but also in the deeper sense that the objectives themselves must be collectively defined, refined and re-defined"* (p. 302-303).

Hence, this paper underscores the significant role of social enterprises as complementary and alternative mechanisms, alongside the state, private sector, and civil society, in catalyzing and preserving democratic, pro-poor governance for inclusive growth and sustainable development.

2.2. Bridging the Gap: The Role of Social Enterprises

In the early 1960s, the study of development administration has been focused on the efficacy and capacity of the big government to provide for the development needs of the citizens. However, a retreat of the state was witnessed by the end of 1980s with the emergence of the Washington Consensus and enhanced involvement of the market. As such, conditionalities (required by the World Bank and International Monetary Fund) such as reduced government expenditure, privatization, fiscal deregulation, and trade liberalization altogether shifted the core of public services provisioning from the Keynesian-like developmental state to the neo-liberal economic system, in which the private sector competes based on efficiency and better quality of commodities and services. This general idea of a market-like mechanism and citizens as customers were adopted by public (development) administrators and termed it as 'New Public Management' (NPM).

Moore and Khagram (2004) highlighted the novel expectation for privately-run businesses to contribute to the creation of 'public value' and the provision of social goods which are greatly produced and distributed by the government. The authors cited a 'strategic triangle' originally formulated for government managers to respond effectively to the demands and needs of growing customer base and stakeholders. Specifically, the three components of the triangle are: i) the public value to be created; ii) the sources of legitimacy and support for the securing of authorization and resources; and iii) the operational capabilities of an organization to achieve the desired outcome. Moore and Khagram (2004) believe that the core strategy of firms should be geared toward the attainment of legitimacy and support from "stakeholders."

Traditionally, customers and investors are perceived as authorizers of the 'license to operate' of a corporation and sources of financial and material resources. However, "stakeholders" are equally significant and influential to a business' strategy, goals, and operations. They lobby for their respective interests in various spheres – economic, social, political, and environmental. The dilemma of a shareholder and stakeholder view mainly experienced by corporate strategists thereby comes into play. Accordingly, those who ascribe to a shareholder strategy seeks to secure the legitimacy and support of only one actor which is the shareholder, while those who advocate for the stakeholder strategy argues for the formulation of "sustainable deal" among all the stakeholders in the firm. Several considerations are to be accounted for such as economic, legal, and moral or ethical for the utilization of a certain strategy. However, Moore and Khagram (2004) note that there is a blurring of lines in practice when distinguishing whether a firm is utilizing either a shareholder strategy or a "stakeholder" view. An important point therefore: the development of a company's strategy, objectives, and activities greatly depends on its recognition of the level of influence and power of the legitimacy and support given by the "stakeholders".

Perhaps an answer to the above mentioned call is the emergence of social enterprises. The government of United Kingdom (UK) defines a social enterprise as *"a business with primarily social objectives whose surpluses are principally reinvested for that purpose in the business or in the community, rather than being driven by the need to maximize profit for shareholders and owners"* (Government of UK, as cited in Darko & Quijano, 2016). Other definitions are provided by the British Council Philippines and the Overseas Development Institute (ODI) which both highlight the business nature of such enterprises but also carry social and/or environmental objectives. Further, they are viewed as hybrid business models that operate in sub-sector niches which the state, private sector, and non-government organizations (NGOs) are not able to penetrate (Smith & Darko, 2014; Griffin-EL & Darko, 2014; Vu et al., 2014). Several studies done by ODI found that social enterprises work in three niches: a) in markets which cater to the very poor; b) in markets where innovative products, services and business approaches are introduced; and c) in basic social services which the government is unable and was never able to comprehensively provide (Smith & Darko, 2014).

2.3. Utilizing Social Capital in Poverty Reduction Efforts

Putnam (1993) refers to social capital as *"features of social organization, such as networks, norms, and trust that facilitate coordination and cooperation for mutual benefit."* Social capital likewise serves as a complementary element in augmenting the gains brought by investments in physical and human capital and social capital. He cited regions of Italy such as Emilia-Romagna and Tuscany which have become rich due to the dynamic civic involvement of their citizens, as opposed to "uncivic regions" like Calabria and Sicily. Putnam (1993), in concordance with Coleman (1988), claims that social capital is a public good which makes it a resource available to all and one that tends to be under-produced by private agents. Hence, social capital is generated by other social activities and is transferable from one social setting to another thereby making it self-reinforcing and cumulative.

Fukuyama (2001) argues that Putnam's definition and characterization of social capital is not quite accurate as trust, networks, civil society, and the like are all by-products of social capital itself but do not make up the latter. He also challenged the notion of social capital being underprovided by private agents as rational individuals would seek to create some semblance of such capital thus generating it as a private good. For Fukuyama (2001), social capital is appropriately defined as *"an instantiated informal norm that promotes co-operation between two or more individuals."*

In terms of the positive relation between social capital and economic development, Putnam (1993) outlines three main reasons: a) networks of civic engagement foster sturdy norms of generalized reciprocity; b) these networks also facilitate coordination and communication and amplify information about the trustworthiness of other individuals; and c) these networks embody past success at collaboration, which can serve as a cultural template for future collaboration. Studies around the world also show that social capital is a crucial factor in promulgating rural development through robust network of indigenous grassroots associations. Examples in East Asia and in advanced Western countries illustrate the significance of social capital, aside from physical and human capital, in fostering economic progress and stimulating long-term development (Putnam, 1993). Evidently, social capital can serve as a complementary, alternative, and viable mechanism to reducing poverty in impoverished communities and to spurring inclusive growth and sustainable development.

3. Review of Related Literature

This section is divided into two segments: a) Rural Poverty and Farming in the Philippines: Current State, Challenges, and Initiatives; and b) Social Entrepreneurship in the Philippines.

3.1. Rural Poverty and Farming in the Philippines: A Snapshot from 2010-2016

The agriculture sector is regarded as a "poor man's sector" due to high poverty indices and large economic inequality in agricultural areas. The sector has recorded disappointing performances reflected by a 1.1 percent growth in 2013. Total factor productivity (TFP) growth has also remained at 0.2 percent annually over the past 20 years (ADRI, 2015). Philippine agricultural exports, in spite of modest improvements, are still one of the lowest shares (at 10 percent) of the global export market for agriculture, compared with its ASEAN peers (ADRI, 2015).

The agriculture sector only accounts for 10 percent of GDP and has measly grown by an average of 1.3 percent from 2010 to 2015. While it contributed a smaller portion compared with the services sector (60 percent of GDP in 2014), almost one third of the country's labor force (12 out of 38 million in 2013) are employed in the agriculture sector. These farmers earn low wages with just enough for their subsistence, making them part of the 73 percent of the poor residing in the rural areas (JFC of the Philippines, 2016). As agricultural production remained flat in 2015 registering 0.11 percent (from PhP799 billion in 2014 to PhP789 billion last year), farmers and fisherfolks are subjected to the highest incidence of poverty (around 38 percent) from 2005 to 2015 (JFC of the Philippines, 2016).

Challenges faced by farmers mostly pertain to the supply chain such as high cost of production inputs, low productivity due to unavailability of machines, limited access to finance, and lack of connectivity and logistics. These result in an estimated 20-50 percent loss of fresh produce in transit from the farm to the markets, which translates to higher retail prices for consumers. This does not bode well for Filipinos as the country has the highest share of total consumption of food among regional peers. Also constraining the maximization of the sector's potential are the natural disasters that cause disruption, flawed policies which discourage investors, and weak institutions which hinder the effective provision of local extension services and agricultural support offices (JFC of the Philippines, 2016).

Another key issue that must be resolved to successfully realize a modern, productive and pro-poor agriculture sector is the inadequate infrastructure. Investments can be poured into farm-to-market roads, post-harvest processing facilities, sanitary and phyto sanitary (SPS) inspection facilities, food terminals, cold storage, and food processing factories. The irrigation infrastructure gap must also be addressed as only 57 percent (1.7 million hectares of the 3.0 million hectares) of the total irrigable area receives irrigation (JFC of the Philippines, 2016). Lastly, the extension services provided to farmers can be rationalized due to its fragmented nature as evidence by 1,891 publicly funded agencies and municipalities having extension function and resources.

Under the Aquino Administration, the Department of Agriculture (DA) implemented several programs and activities to address the previously cited challenges. First, DA moved to invest more in public goods, especially rural infrastructure. In 2011-2015, DA strived to improve physical access to markets, building around 6,600 kilometers of farm-to-market access roads and nearly 220,000 hectares of service area for irrigation. It also launched a geo-tagging project that monitors land conditions before, during, and after government projects have been implemented. Meanwhile, DA discontinued subsidizing seeds and fertilizers across the country (except in calamity areas) because Secretary Alcala claims that it has long been used by farmers but its effect has not been felt by them (Guerrero, 2016).

The Department also implemented a value-chain approach in crop diversification and the Philippine Rural Development Project (PRDP), which will expand farmers' market access and improve competitiveness of their outputs. PRDP is a six-year program that seeks to make the agri-fishery sector modern, climate-smart, and market-oriented by the end of 2018. One of its activities is to identify champion crop/s for every province, which will serve as input for the formulation of a location and commodity-specific investment plan (Guerrero, 2016). Furthermore, DA launched credit facilitation activities to expand formal farm credit coverage. It reintegrated the three pillars of rural finance: credit, insurance, and guarantee. The Philippines is currently disease-free in the livestock and poultry sectors. Major pests and diseases such as Avian flu, Peste des Petits Ruminants, and Food-and-Mouth Disease have been controlled, if not eliminated (Guerrero, 2016).

On the other hand, Habito (2012) writes about a case study of six private firms that have successfully ventured and operated in the conflict areas of the Autonomous Region in Muslim Mindanao

(ARMM). Three of which are: a) the Unifrutti Philippines, Inc. (UPI) which invested in a banana plantation and packing house in Maguindanao; b) Agumil which expanded its palm oil investments in Sultan Kudarat and Maguindanao; and c) BJ Coconut Oil Mill which is the one of its kind in ARMM. Despite initiatives by both the government and the private sector, poverty levels and incidence remained high and unequal development continues to persist.

In this regard, what are the possible alternative mechanisms, approaches, vehicles or practices which can be effectively utilized to spur inclusive growth and sustainable development thereby reducing poverty especially in the rural areas? The critical role of social entrepreneurship is thus clearly illustrated.

3.2. Social Entrepreneurship in the Philippines

The Institute of Social Entrepreneurship in Asia (ISEA), headed by Lisa Dacanay, has underscored the importance of social enterprises in pursuing inclusive growth and sustainable development in the Philippines by calling for the promotion of a social enterprise with the poor as primary stakeholders (SEPPS). Specifically, the Senate Bill No. 1496, or the Poverty Reduction through Social Entrepreneurship (PRESENT) Bill, describes SEPSS as *"a social enterprise which explicitly declares and pursues poverty reduction/alleviation or improving the quality of life of specific segments of the poor as principal objective. A SEPPS engages and invests in the poor to become effective workers, suppliers, clients and/or owners, and/or ensures that a substantive part of the wealth created by the enterprise is distributed to, or benefits them. In addition to reinvesting its surplus or profits back to the enterprise to sustain the fulfilment of its social mission, a SEPPS also uses its surplus or profits and mobilizes other resources to assist the poor to become partners in SE or value chain management/governance and to become partners in community, sectoral and societal transformation"* (Senate of the Philippines, 2020, p. 3).

Aside from ISEA, other organizations committed to advancing the plight of SEs in the country include the Philippine Social Enterprise Network (PhilSEN), the Poverty Reduction Through Social Entrepreneurship (PRESENT) Coalition, Gawad Kalinga Community Development Foundation, Cebu Chamber of Commerce, Social Enterprise Development Partnerships, Inc. (SEDPI), Peace and Equity Foundation (PEF). The Department of Trade and Industry and the Asian Development Bank have likewise launched initiatives and projects to support the development of SEs. Due to the work of these actors and other stakeholders, it was estimated in 2007 that there were 30,000 social enterprises in the Philippines, majority of which resemble themselves as cooperatives and associations (Dacanay, 2013). More recently, private-initiated cooperatives have generated wealth among the marginalized groups. Microfinance institutions has likewise been instrumental in cultivating the social enterprise movement. Successful SEs in the Philippines include the likes of Human Nature, Hapinoy, and Rags2Riches.

In terms of niches, the thrust of social enterprise community in the country is on markets which support the very poor. Accordingly, many social enterprises in the Philippines are producer-based organizations, operating with low-income and disadvantaged groups of producers and suppliers. The main objective of SEs working across these sectors is better prices for producers and greater market access.

However, there has been a confusion and overlap between the programs of social enterprises and NGOs, especially in the agriculture sector, with the re-modelling of some NGOs as SEs despite the lack of clear shift in their business strategies (Darko & Quijano, 2015).

An example of a social enterprise that has gained considerable success in contributing to the poverty reduction and inclusive growth initiatives of various national, local, and international actors and stakeholders is the Good Food Community.

4. Analysis

Founded in 2011, Good Food Community advocates for the nurturing of "a sustainable society that nourishes everyone – you, the farmers, the land and generations to come. The multiple crises of our age serve as an invitation to evolve a new system and culture – one that puts the planet and people first" (Good Food Community, n.d.). The organization believes that a sustainable society is attainable through a community shared agriculture (CSA) approach. Otherwise known as community-supported agriculture, CSA is a sustainable alternative, locally-based agriculture and food distribution model that advances smallholder organic farming by allowing consumers to subscribe to prepaid, local, and seasonal vegetables delivered weekly to their communities. In this type of arrangement, farmers can purchase seeds, transplants, and other inputs necessary for the growing season, and compensate their farm labor without waiting for the post-harvest period to collect revenues.

By paying for a share which materially comes in the form of the farm produce, consumers basically shoulder the risk of crop failure, pest and disease concerns, and poor quality of crops. In essence, consumers acknowledge the fact that a refund is unavailable if no crops are harvested and that the financial support will serve as a vital mechanism for farmers to continue organic farming despite setbacks and headwinds. More importantly, Good Food Community believes that "if we can connect socially aware city-dwellers with small holder farmers in a re-localized food economy, we will make farming more sustainable, conserve and protect our soil resources and build the health of our communities" (Good Food Community, n.d.).

Presently, the organization coordinates a network of more than 60 smallholder farmers from Capas Organic Farmer Producers Cooperative (Tarlac City, Tarlac Province), La Organica and Chico River Organic Producers Cooperative (La Trinidad, Benguet Province), Barangay Labney (Mayantoc, Tarlac Province), Sitio San Ysiro (Antipolo), and Coromina Forest Cottage (Benguet Province, Luzon) to directly provide fresh produce weekly to its over 90 subscribers in Metro Manila (Good Food Community, n.d.). The packages range from a span of four to twelve weeks and would cost from PhP1,050.00 to PhP5,810.00, which are above market prices. Aside from directly linking smallholder organic farmers to conscious consumers, Good Food Community is also involved in raising funds for the Learning & Accreditation program for partner farmers which will lead them to acquire the necessary skills, tools, and practical knowledge to sustain their farms, efficiently manage their agribusiness, and exercise a sustainable lifestyle hence positively impacting their own communities (Good Food Community, n.d.).

The case of Good Food Community is examined in this section through the application of three essential development administration principles: 1) Sustainable Development and Institutions; 2) The Role of Social Enterprises in Creating Public Value; and 3) Utilization of Social Capital in Poverty Reduction Initiatives.

On Sustainable Development and Institutions

Good Food Community's main action of raising the level of recognition and acceptance of organic farming among the Filipino consumers underlines the organization's cognizance of the need to mainstream sustainable development and the triple bottom-line (people, planet, profit) approach across all sectors/industries within the country. The organization contributes to attaining social justice by targeting farmers, who are widely considered poor and marginalized in the Philippine society. Next, Good Food Community practices ecological soundness by partnering with farmers in using organic techniques which mean less carbon emission and more efficient use of natural resources. Lastly, the organization's position as willing and committed middlemen between producers and consumers ensure farmers of their stable income and relives them of logistical and market access concerns. Hence, Good Food Community's initiative of promoting smallholder organic farming within a small yet growing number of subscribers certainly contributes to the overall purpose of heightening the intensity of consciousness among Filipinos about sustainable development.

On The Role of Social Enterprises in Creating Public Value

Even though labeled as hybrid models, social enterprises like Good Food Community can still be considered as leaning toward the private sector sphere since their primary purpose is to generate profit through selling products to individual customers while simultaneously pursuing social and/or environmental objectives. Good Food Community may also be considered a private sector enterprise because of its ability to "exit" anytime and is held liable only to its subscribers. When viewed via the strategic triangle, it can be said that the organization has successfully identified and articulated its public value, sources of legitimacy and support, and operational capabilities.

First, Good Food Community explicitly states in the vision that "*a sustainable society that nourishes everyone – you, the farmers, the land and generations to come"* is its overarching objective. Therefore, all actions are geared toward the realization of creating public value that focuses on nurturing a sustainable society. Second, subscribers and social impact investors are viewed by the institution as sources of legitimacy and support but given its unique position as middlemen, the farmers are also taken as important stakeholders in Good Food Community's undertakings. While customers and investors provide material and financial support, the partner farmers authorize social and political legitimacy for the organization thus giving the latter the "license to operate" within the environment they are in. Moreover, the organization is keenly aware that other stakeholders such as the local communities, local government units (LGUs), government agencies, and the environment itself are to be accounted for in formulating its strategy for producing the identified public value. Lastly, the small number of subscribers within Metro

Manila is intentionally controlled by Good Food Community because of their limited operational capabilities such as few manpower and logistical costs. This makes the operations efficient and seamless.

Further, customers are procedurally seen as shareholders but substantially stand as stakeholders. How is this so? The effort to build and promulgate social capital is hence necessary to be discussed.

On Utilization of Social Capital in Poverty Reduction Initiatives

The promotion of community-shared agriculture (CSA) that involves direct interaction between smallholder organic farmers and customers paves way for the establishment of robust networks among actors, including Good Food Community. More importantly, subscribers assuming the risks and threats of crop failure on one hand, and farmers expecting a steady flow of income for continued labor and production despite setbacks on the other hand, would certainly facilitate the raising of level of trust between these two parties and crystallize such norm. CSA advances coordination and cooperation among the farmers, customers, and Good Food Community thereby lifting boats of all three actors. Farmers benefit from the enhance market access, customers consume organic and healthy products, and Good Food Community continues to legitimately exist in its present environment while mainstreaming sustainable development. While studies have yet to be done evaluating the direct impact of the organization's efforts on reducing poverty in the farmers' communities, it is worth stating that its noble initiative has truly provided the support needed by the farmers and subscribers as the government, private sector, and civil society organizations failed to deliver assistance those belonging in the marginalized and disadvantaged strata of society.

5. Conclusion

The 2030 Sustainable Development Goals by the international community emphasizes the responsibility of each member state to translate global commitments into national measures and integrate sustainable development principles into the local agenda. In the Philippines, the enactment of Republic Act No. 9729 or Climate Change Act of 2009 the Republic Act No. 10174 creating the People's Survival Fund Law are manifestations of the state's cognizance of the need to explicitly address the issue of climate change and global warming. However, resolving the said issue of such magnitude requires the involvement and active participation of all stakeholders within the society. The significance of other institutions such as social enterprises (SE) is hence amplified.

Evidently, SE may bridge the gap and serve the niche markets that have failed to be attended to, are insufficiently being catered to, and are yet to be tapped. They play a crucial role in increasing the stock of social capital among the parties involved in a specific undertaking by promoting a hybrid model which realizes economic as well as social and/or environmental goals. Furthermore, most SEs have dedicated themselves to helping the marginalized and disadvantaged groups in the society thus contributing to a country's universal objective of ending poverty and achieving sustainable development.

In the Philippine context, the rural areas, especially agriculture sector, are perceived as less developed compared to the urban areas, with the former having 73 percent of the poor as farmers and fisherfolks. Challenges faced by farmers mostly pertain to the supply chain such as high cost of production inputs, low productivity limited access to finance, and lack of connectivity and logistics. These result in an estimated 20-50 percent loss of fresh produce in transit from the farm to the markets, which translates to higher retail prices for consumers. The recurring El Nino phenomena and heavy typhoons also constrain the maximization of the sector's potential. Both the government, through the Noynoy Aquino administration (2010-2016), and the private sector have undertaken significant initiatives in addressing the abovementioned concerns. However, high poverty incidence in rural areas still underscore the need for novel, innovative approaches, and mechanisms. The Good Food Community's efforts may be a focus of analysis on role of social enterprises in tapping the underserved yet growing "niche social market."

Specifically, advancing the community-shared agriculture (CSA) model greatly contributes to the country's national effort of mainstreaming sustainable development into the decision making and implementation processes of all stakeholders and actors. Moreover, Good Food Community's main thrust of introducing the CSA approach into the Philippine society represents the novel expectations for privately-run businesses (though Good Food Community is mainly considered as a SE) to create public value and secure legitimacy and support from stakeholders aside from their regular customers and investors. Finally, building social capital between smallholder organic farmers and consumers is an essential condition for the successful realization of inclusive growth and a sustainable society.

6. Recommendations

In the short run, the enactment of the Poverty Reduction through Social Enterprises (PRESENT) Bill would institutionalize social enterprises such as Good Food Community as vital actors in poverty reduction and development efforts of the government. Moreover, the passing of the said bill would establish the Social Enterprise Council, as an attach agency of the Department of Trade and Industry, which will be responsible in providing training and research and in overseeing a program for enhanced market access for social enterprises. Other key features of the PRESENT Bill are finance-related which would grant SEs with tax exemptions, guarantee fund pool with non-collateral loans, special credit windows at concessional rates, and a 10 percent share of total government procurement value. The immediate enactment of the bill into law is therefore a necessary condition to mainstream social entrepreneurship in the country.

In the medium run, getting SEs off the ground entails incubating such entities through social entrepreneurship courses in learning institutions and capacity building activities for current and interested SEs. The government, along with other stakeholders, may provide support for SEs in terms of marketing and commercial development. The creation of an information network which integrates all actors and stakeholders within a dynamic, sharing, and open environment is critical in strengthening cross-sector partnerships and collaboration.

In the long run, the cultivation of locally efficient and globally competitive SEs would require more than just specific policies for social entrepreneurship. In particular, the inclusion and integration of SEs into the national and local long-term development agenda of decision-makers can bring forth increased citizen awareness and greater civic involvement of Filipino citizens in pursuing a wide spectrum of development objectives – economic, social, cultural, and/or environmental. Transforming the current economic system of the country into one that has competitive and fair markets can support SEs in carrying out their specific goals without threats of financial instability and unequal competition.

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Evaluating Suicide Representation in Asia-Pacific Horror Film Series Using WHO Guidelines: Counterproductive Narratives and Graphics

ANI Aileen Concepcion[1]

Abstract

Films can play an important role in providing information about suicide. At the same time, films produced for entertainment purposes may provide incomplete or misleading information about how and why people die by suicide. This paper explores these issues by comparing the representation of suicide in selected Japanese and Filipino horror film series. Using the World Health Organization [WHO] Guidelines for Filmmakers as the basis for content analysis, the paper finds that the sensationalized way of presenting suicide in these series is misleading due to inaccuracy and an unrealistic representation of suicide. The data further suggest that, despite stylistic differences, both series have significantly low compliance rates with the WHO guidelines. Instead of presenting details that feature a character's inner struggles, scenes representing suicide were over-dramatized. Narrowly framing suicide based on a single factor, such as dramatic appeal, overlooks interrelated causes of suicidal behavior. The paper concludes that both series could be improved by representing suicide as preventable rather than portraying it as a rational way to solve personal problems, or considering it as a rewarding act.

Keywords: suicide, the Philippines, Japan, suicide representation, horror film

1. Introduction

Beyond its presumed value as entertainment, the film presents a platform to discuss controversial issues that may otherwise be considered as taboo. In particular, fictional films can challenge, as well as reinforce, commonly held values and principles by appealing to emotions. Further, the solitary nature of film highlights a way to offer an alternative reality. This points to the crucial role of film in creating and naturalizing certain ideas and behaviors at the expense of others. Thus, film can create opportunities to discuss controversial issues such as suicide as a relatively common but surprisingly "understudied form of film fatality" (Saddington, 2010, p. 9).

This research examines the representation of suicide in films by using two Asia-Pacific horror film series: *"Tales of Terror from Tokyo and All Over Japan"* and *"Shake, Rattle & Roll"*, from Japan and the Philippines, respectively. It employs the WHO Guidelines for filmmakers to evaluate the representation of suicide in these series. Comparative analysis can extend this process by highlighting unexplored elements related to suicide. To achieve the general objective of the study, this paper is guided by two questions: *In what ways do the selected Asia-Pacific horror film series represent suicide? To what extent do the series conform to the WHO Guidelines in their portrayal of suicide?*

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2. Past Studies

Previous research about the representation of suicide in media focused on two main themes: 1) the possible impact of news media coverage or portrayal of facts such as the rate of suicide, demographics, etc.; and 2) the ways in which suicide is generally represented in media. Related literature exhibits the correlation between suicide rate and media representation. Aside from this, a few studies have been conducted to evaluate media coverage based on existing suicide guidelines for news reporting. In this regard, this research wants to fill in the gaps from previous studies that were usually concerned with non-fictional forms, like news reporting that contributed to the very limited studies conducted in Asian films. The novelty of this research aims to show the comprehensive use of the WHO guidelines and to illustrate the point missing in Asian scholarship.

The following review of related studies identifies three main areas that explain the *media's impact on suicide rate*, *suicide representation*, and *recommendations for future creation.* These key points emphasize the role of media in suicide prevention and explain the extent of harmful reporting. By highlighting the areas for improvement, it would help raise more awareness for different stakeholders and potentially reduce the negative impact of suicide portrayal.

2.1. Media's Impact on Suicide Rate

Several studies have focused on how various forms of media may reduce the rate and develop an understanding of people who have suicide ideation. As noted by The National Centre of Mental Health Research, Information and Workforce Development (2011, p. iii), "television, movies, the internet, songs, and music videos were the most common source of any media exposure to portrayals of suicidal behaviors". Similarly, Stack (2003) discovered that widespread coverage of suicide in the media tended to increase the suicide rate. This can be seen as a "tremendous opportunity to educate the public about mental health problems and their treatment" (Barbour & Clark, 2009, p. 233). Depending on its type, Till et al (2015) argued that "the effects of suicide-related media material seem to vary with individual vulnerability and with type of media portrayal" (p. 72). Though it "could be perceived as a threat to media freedom", and possibly stifling artistic license for filmmakers, Colhoun (2016) agreed that "the quality of suicide presentations can still be improved" (p. 1). It is particularly notable to films "given that people spend more time watching movies than any other leisure time pursuit" (Sisask & Varnik, 2012, p. 134). On the other hand, despite the affirmative results of past research stating the connection between media portrayal and suicide rate, Perakis (2020) believes that the question of the relationship between social representation and suicidal acts remains open.

A series of documented reports stated that there's an implication of fictional representation to suicide. The Irish Association of Suicidology (1999) cited *"Death of a Student",* a German TV series that featured the suicide of a young man who did a railway suicide as proof of the influence in the number of suicide and the choice of method. The report shows that during its release, there's a demonstrable increase of railway suicide of teenage males by 175%. Another fictional story mentioned by the Irish' guideline is Britain's TV series entitled *"Casualty"*. It depicted a character who had an overdose of paracetamol in

which a noticeable increase of 17% and 9% who did self-poison has been documented for the first two weeks after broadcast. Consequently, "20% of self-poisoning patients who had seen the program said that it had influenced their decision to attempt suicide" (*Ibid*., p. 9). A similar study conducted by Gould et al (1988) assessed the teenage suicide rate in New York metropolitan area between 1984-1985 and discovered the impact on teenage suicide of four fictional television films that featured suicidal behavior. The copycat suicide, Werther effects, social learning theories, and other concepts that are striving to explain why readers or viewers can feel the connection towards the fictional characters may be explained by Beachum (2010) in line with psychology:

> The film audience can relate to characters because they can identify how the character is feeling, and some seek the movie-going experience simply for the emotional reaction that movies can inspire in us. Psychiatrists, too, understand the motivational power of emotion, and how emotion can affect behavior. Specifically, psychiatry and film both specialize in unusual cases. Films rely on strange or extraordinary characters or behaviors to attract interest and build the plot (p. 16).

Several research papers identify binary effects of suicide portrayal in films and other media platforms. Martin (1998) found that "the evidence for influence on suicide for a range of media is increasingly clear and cogent" (p. 62). The contradicting effect of portrayals of suicide, particularly in cinema can contribute to "public understanding of the nature of suicide or hurt the development of effective suicide prevention programs" (Sisask & Varnik, 2012, p. 134). Furthermore, the same view was also emphasized in journalism by Niederkrotenthaler et al (2010) where he asserted that "the impact of suicide reporting may not be restricted to harmful effects", a protective effect can also be observed by covering "positive coping in adverse circumstances about suicide ideation" (p. 234). In this manner, media can be considered as an "ally in promoting dialogue and raising awareness of important public health issues such as suicide" (Carmichael & Whitley, 2018, p. 1).

2.2. Assessment of Suicide Representation

A few assessments on suicide portrayal have been done to examine the quality of media reporting and representation based on existing guidelines. For instance, research shows evidence for an association between sensationalized and detailed media reporting, and suicidal behavior (McTernan et al, 2018). One example given was the adherence to media guidelines in Ireland in terms of media reporting of suicide. Using 243 media articles that have been examined between 2009 and 2012 of two high profile cases of suicide, it was revealed that:

> … minority of articles breached the media guidelines in relation to sensationalized language [11.8%], placement of reports on the front page of the newspaper [9.5%], publishing of inappropriate photographs [4.2%] and mention of location of suicide

> [2.4%], while no articles disclosed the contents of a suicide note. However, in the majority of articles analyzed, journalists did not refer to appropriate support services for people vulnerable to, and at risk of suicide [75.8%] or mention wider issues that are related to suicidal behaviour [53.8%]. Overemphasis of community grief [48.3%] was also common. Nearly all articles [99.2%] breached at least one guideline and 58.9% of articles breached three or more guidelines (*Ibid*., p. 1).

In line with this, scholars identified the improvement and challenges in adhering to media guidelines on reporting suicide in Ireland between the stated period. Aside from these important findings, the need for media monitoring had been emphasized. Another study that directly relates to the same assessment is in Bangladesh, which also evaluates the quality of reporting suicide in the newspaper based on international guidelines. Utilizing the content analysis in the six daily newspapers between November 2016 and April 2017, Arafat et al (2019) found 327 articles with suicide deaths. Data confirmed that it is a very common practice to have harmful reporting [75% of articles stated detailed suicide methods] and almost no helpful reporting practices have been made [ex. no articles provide support service]. In general, the scholar concluded that explicit and simplistic reports of suicide deaths were frequently observed in Bangladeshi newspapers.

2.3. Recommendation for Future Creation

A series of recommendations on how media can improve suicide portrayal have been well elaborated. Understanding that raising awareness about suicide through film portrayal (Scalco et al, 2016) may help prevent the act and lessen the condemnation. McTernan et al (2018) pointed out the importance of monitoring agencies, regulators, and the role of government departments in media coverage and representation. Gould (2006) specified this claim and highlights the power of media "to educate the public in an appropriate fashion and change attitude towards suicide" (p. 216). Another recommendation given by Gregory et al (2020) suggests focusing on the need for media personalities' training, heightening "awareness of the potential distressing effect and nuances of bereaved people's preferences in consideration to the level of exposure to suicide" (p. 1). The National Institute for Mental Health in England (2007), Sisask & Varnik (2012) and Beautrais et al (2008) also endorsed the review of the most appropriate way to develop and disseminate guidelines and consider the efficacy of existing regulation for journalism and films.

Since cinematic realists believed that "film has an especially strong tie to reality because of its visual and aural presentation of information" (Fiorelli, 2016, p. v), the main objective of this research is to analyze Asia-Pacific horror film series on how suicide was cinematically represented. The alarming result about the contagious effect to youth's suicidal behavior of exposure to suicide movies, where the stars became models (Stack et al, 2014) is a serious reminder about the need for the improvement of suicide representation.

3. Methodologies

Assessing the two horror film series as qualitative research, this research focuses on how horror film series represented suicide using the WHO guidelines for filmmakers.

3.1. The Process

To gain substantial insights while conducting content analysis, the researcher will follow specific methods to administer different phases of inquiry. First, the researcher collected and watched selected Japanese and Filipino horror series. By accessing *YouTube* site as the main source and purchasing DVD copies of both series, the researcher watched *"Tales of Terror from Tokyo and All Over Japan"* and *"Shake, Rattle & Roll"*. The two series have been selected to maximize the greatest number and most popular horror series of Japan and the Philippines. Its rich collection of contents can serve multiple opportunities to assess different suicide-related issues. Both sets of horror film series also demonstrate various suicide portrayals, which is suitable for identifying patterns in terms of depiction and representation.

For the succeeding steps, preliminary analysis has been conducted by analyzing the plot, characters, settings, themes, conflict, problems, and other elements of each film episode. After exhausting all relevant information, exploratory analysis has been done by filtering all episodes that feature suicide. Then, a comparative analysis between the two series has been executed where the recurring themes have been listed to come up with the conclusion.

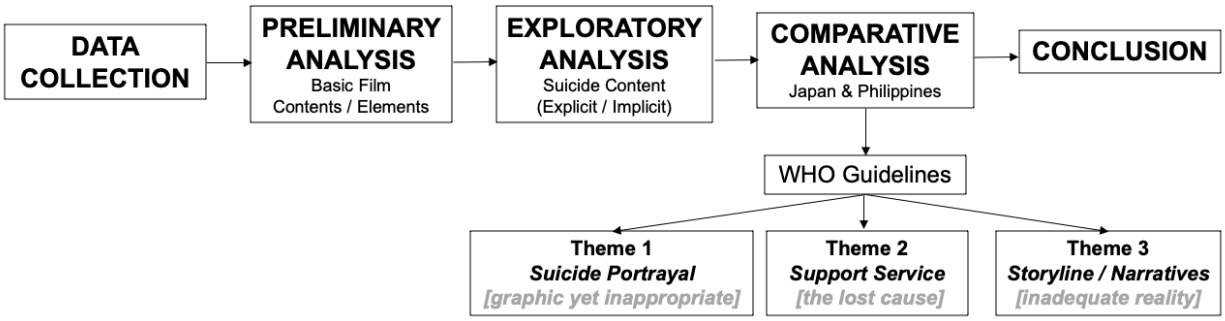

Figure 1. Methodologies of the Study

This research acknowledges possible limitations. First, subjectivity is well considered since the text to be analyzed is in a form of art. Second, this research is limited to content analysis; therefore, audience-response data are excluded. The issue of assessment reliability is also acknowledged due to the possible effect of a single rating method. Third, another potential challenge is the conceivable incomparability of the chosen film series because Japan and the Philippines have different social and cultural experiences. Fourth, the analysis of the length of suicide scenes is not included. There is no distinction whether the suicide content is explicitly or implicitly integrated into the production [i.e., visual, script, narratives]. Lastly, this research uses the point-of-view of characters who died by suicide, including those who attempted and manifested self-injury. In addition, there is a difference between the way a single

act of suicide is perceived by the viewer and/or other persona in the narrative and the actual characters who died by suicide. For example, viewers or people that surround the suicidal character may interpret the act as selfish or sinful, but for the character who experienced major depressive disorder, the act of killing oneself is the most beneficial for everyone, believing that it would end all the suffering. As such, this study emphasizes the importance of providing the opportunity to listen to the commonly disregarded perspectives.

3.2. Data Source: Asia Pacific Horror Film Series Background

"Tales of Terror from Tokyo and All Over Japan" has four volumes in total, where the first two volumes were released as a TV series [2003-2004], while the remaining two were released in cinemas in Japan [2004-2005]. It was later premiered as a DVD in the US and other European countries [2006]. The first volume has 15 short episodes, and the second volume has 18 short episodes, both ranging from 4-6 minutes long for each short film. The third volume was divided into two parts with 33 episodes, approximately 5 minutes long for each. The movie version of volume 4 has 8 episodes with an average length of 10 minutes. The full series did not have a strong connection or continuity with each other, except for part 2 of volume 3 where there is a recurring appearance of a single actress and her character within the series. This anthology was a product of collaboration from different Japanese directors. With the available information about the series, sources stated that the majority was filmed with a significantly low budget. Finally, stories from this anthology were collected and claimed as based on true events.

On the other hand, the *"Shake, Rattle & Roll"* anthology has 15 installments that were originally released in cinemas from the year 1984-2014, then shown in the Philippine local TV channels in 2017. Each series title has three episodes that range from 25-35 minutes. The full series did not establish a strong connection with each other except for *"Shake, Rattle & Roll 9"* where a "bus" and the character "teacher" hinted subtle connection in between episodes, and *"Shake, Rattle & Roll XV",* where one character appeared in all episodes with a minor role. The anthology was also a product of the collaboration of experienced and contemporary Filipino directors. There is no direct claim that all stories told in this anthology were true, but many of these were based on popular Filipino urban legends and folklores that introduce supernatural creatures and demonic possessions.

Table 1. Complete List of *"Tales of Terror from Tokyo and All Over Japan"* Series

Tales of Terror from Tokyo and All Over Japan (Season 1)	
Season 1 - Episode 1	"ELEVATOR"
Season 1 - Episode 2	"THE SCHOOL EXCURSION"
Season 1 - Episode 3	"KENGLO NISHIOKA"
Season 1 - Episode 4	"THE VISITOR"
Season 1 - Episode 5	"COVERING THE 100 TALES"
Season 1 - Episode 6	"CASETTE TAPE"
Season 1 - Episode 7	"SPILT WATER"
Season 1 - Episode 8	"THE BACKWARD SUIT"
Season 1 - Episode 9	"EXAMINATION ROOM #3 1"
Season 1 - Episode 10	"EXAMINATION ROOM #3 2"
Season 1 - Episode 11	"A FORGOTTEN ITEM"
Season 1 - Episode 12	"VIDEO"
Season 1 - Episode 13	"A DROP OF BLOOD"
Season 1 - Episode 14	"ENLIGHTENMENT"
Season 1 - Episode 15	"WAITING TIME"
Tales of Terror from Tokyo and All Over Japan (Season 2)	
Season 2 - Episode 1	"OFF THE SHELF"
Season 2 - Episode 2	"STONES"
Season 2 - Episode 3	"MY SISTER'S ROOM"
Season 2 - Episode 4	"THE TRAIN"
Season 2 - Episode 5	"THE LOVER"
Season 2 - Episode 6	"TAKE A GOOD CARE OF HIM"
Season 2 - Episode 7	"LET'S PLAY"
Season 2 - Episode 8	"A MOTEL"
Season 2 - Episode 9	"THE GARDEN"
Season 2 - Episode 10	"DON'T EVER OPEN"
Season 2 - Episode 11	"GETTING CLOSER"
Season 2 - Episode 12	"PLEASE DON'T"
Season 2 - Episode 13	"NO MORE, PLEASE"
Season 2 - Episode 14	"COME, IF YOU DARE"
Season 2 - Episode 15	"FOX AND A BATH"
Season 2 - Episode 16	"AN INTERROGATION"
Season 2 - Episode 17	"FAMILY CREST"
Season 2 - Episode 18	"HANDPRINTS"
Tales of Terror from Tokyo and All Over Japan (Season 3)	

Season 3 - Episode 1	"THE RED EYES"
Season 3 - Episode 2	"TELL ME"
Season 3 - Episode 3	"ANOTHER ONE"
Season 3 - Episode 4	"THE MEN IN BLACK"
Season 3 - Episode 5	"MY WIFE'S COMING"
Season 3 - Episode 6	"THE BLOODIED ARMOR"
Season 3 - Episode 7	"OVERTIME"
Season 3 - Episode 8	"OVERTIME 2"
Season 3 - Episode 9	"RED TRICYCLE"
Season 3 - Episode 10	"SHADOWS SITTING BY THEIR FEAR"
Season 3 - Episode 11	"GHOST HOUSE"
Season 3 - Episode 12	"THE BREATH OF MONONOKE"
Season 3 - Episode 13	"THE BRIDE"
Season 3 - Episode 14	"ONLY TWO OF US"
Season 3 - Episode 15	"A WOMAN NEXT DOOR"
Season 3 - Episode 16	"THREE PEOPLE ARE COMING"
Season 3 - Episode 17	"A SNAPSHOT"
Season 3 - Episode 18	"BLUE RAINCOAT"
Season 3 - Episode 19	"UNBROADCAST FOOTAGE"
Season 3 - Episode 20	"HE'S HOME"
Season 3 - Episode 21	"VISITOR"
Season 3 - Episode 22	"SLEEPY HEAD"
Season 3 - Episode 23	"SECOND ROUND"
Season 3 - Episode 24	"COPY MACHINE"
Season 3 - Episode 25	"GREETINGS"
Season 3 - Episode 26	"ANIMAL ODOR"
Season 3 - Episode 27	"THE LOST TRAIN"
Season 3 - Episode 28	"NOOSE SNAP"
Season 3 - Episode 29	"MAI'S VOICE"
Season 3 - Episode 30	"THE GHOST OF OHATSUTENJIN"
Season 3 - Episode 31	"THE PROMISE"
Season 3 - Episode 32	"HAIR PINS"
Season 3 - Episode 33	"THE MUSIC BOX"
Tales of Terror from Tokyo and All Over Japan (Season 4)	
Season 4 - Episode 1	"REPORT FROM THE NIGHT WATCHMAN"
Season 4 - Episode 2	"LINGERING SMOKE"

Season 4 - Episode 3	"GLOVES"
Season 4 - Episode 4	"SO HEAVY"
Season 4 - Episode 5	"FULL-LENGTH MIRROR"
Season 4 - Episode 6	"EYES"
Season 4 - Episode 7	"PROMISE"
Season 4 - Episode 8	"HISAO"

Note: Highlighting Episode with Explicit/Implicit Representation of Suicide.

Table 2. Complete List of *"Shake, Rattle & Roll"* Series Highlighting Episode with Explicit/Implicit Representation of Suicide

SERIES TITLE	EPISODE 1	EPISODE 2	EPISODE 3
"Shake, Rattle & Roll" 1984	"GLASS"	"REFRIGERATOR"	"MANANANGGAL"
"Shake, Rattle & Roll II" 1990	"GHOST"	"WITCHCRAFT"	"ASWANG"
"Shake, Rattle & Roll III" 1991	"NANNY"	"BIG SISTER"	"MOTHER"
"Shake, Rattle & Roll IV" 1992	"TEACHER"	"NEIGHBOR"	"NUN"
"Shake, Rattle & Roll V" 1994	"MALIGNO"	"SHADOW"	"IMPAKTO"
"Shake, Rattle & Roll VI" 1997	"TELEVISION"	"BRIDGE"	"MOON"
"Shake, Rattle & Roll 2K5" 2005	"WATER PUMP"	"AQUARIUM"	"SECRET OF SAN JOAQUIN"
"Shake, Rattle & Roll 8" 2006	"13TH FLOOR"	"NANNY"	"LRT"
"Shake, Rattle & Roll 9" 2007	"CHRISTMAS TREE"	"NIGHTMARE"	"ENGKANTO"
"Shake, Rattle & Roll X" 2008	"EMERGENCY"	"CLASS PICTURE"	"NIEVES"
"Shake, Rattle & Roll 11" 2009	"DEVIL"	"UKAY-UKAY"	"LAMANLUPA"
"Shake, Rattle & Roll 12" 2010	"MAMANYIKA"	"ISLAND"	"FUNERAL HOME"
"Shake, Rattle & Roll 13" 2011	"TAMAWO"	"LIGHTHOUSE"	"RAIN, RAIN, GO AWAY"

"Shake, Rattle & Roll Fourteen: The Invasion" 2012	"INHERITANCE"	"THE LOST COMMAND"	"UNWANTED"
"Shake, Rattle & Roll XV" 2014	"SNAKE"	"VIAND"	"FLIGHT 666"

Note: Highlighting Episode with Explicit/Implicit Representation of Suicide.

Out of 74 total short films included in the Japanese anthology, there are 12 episodes [16.22%] that explicitly or implicitly show suicide, while out of 45 total number of short films included in the Filipino anthology, there are 14 episodes [31.11%] with suicide contents.

4. Results and Analysis

By taking advantage of the WHO guidelines referenced in this research, this section focuses on the analysis and discussion of how the Japanese and Filipino horror film series represent suicide.

4.1. Do the Series Conform with WHO Guidelines in Portraying Suicide?

As the "directing and coordinating authority on international health within the United Nations system", WHO envisions a "world in which all people attain the highest possible level of health" with the mission to "promote health, keep the world safe and serve the vulnerable"; its aim is not only to ensure people to have universal health coverage and protection from health emergencies but also to provide better health and well-being where suicide is treated as a "serious global public health problem" (WHO, 2019 & 2020, n. pag). As a response to this particular issue, the organization made a series of suicide preventive guidelines [2014], in media [2008 & 2017], news reporting [2015], a resource for filmmakers and others working on stage and screen [2019], and suicide prevention in countries [2021]. It is based on the increasing evidence that media (WHO, 2019) and social media (Luxton et al, 2012) contribute to suicide and suicide attempts. In parallel with the guidelines from the *"Resource for Filmmakers and Others Working on Stage and Screen"* this research intends to assess the horror film series whether the representation is appropriate to maximize positive and minimize negative impacts (WHO, 2019).

Considering the guidelines published by the WHO, this research covers all specified items and is converted into a checklist that can be treated as the primary indicators for the assessment. This excludes two points: [1] *consult suicide prevention and communication experts, mental health professionals and persons with lived experience,* and [2] *consider the impact of portraying suicide on persons involved in stage and screen productions* as these two are not measurable, cannot be validated, and no available reference can be obtained.

Table 3. Summative Assessment of Japanese and Filipino Horror Series' Compliance Rate Using WHO Guidelines

	Japan	Philippines	Average
WHO Guideline #1 **Include characters and narratives displaying resilience and effective ways of dealing with problems.**			
1.1 Include characters who display resilience and positive coping strategies that enable them to deal with life stressors, feelings of sadness and/or suicidal thought.	0.08	0.86	**0.47**
1.2 Depict efforts to access relevant services of overcoming stressors or crises and of coping with stress and recovery.	0.00	0.21	**0.11**
1.3 Convey a message that change is possible, even in seemingly desperate circumstances.	0.08	0.50	**0.29**
WHO Guideline #2 **Outline how to obtain help from support services.**			
2.1 Provide contact details for support services which can provide support services to anyone affected by the story's content.	0.00	0.00	**0.00**
WHO Guideline #3 **Show the potential positive value of support from friends, family and others.**			
3.1 Provide examples of how friends, family members and the wider community can help and support vulnerable persons.	0.17	0.64	**0.41**
WHO Guideline #4 **Avoid depicting the act or method of suicide.**			
4.1 Avoid showing the act of suicide.	0.92	0.14	**0.53**
4.2 Avoid showing images of the body following the suicidal act.	0.33	0.71	**0.52**
4.3 Avoid the inclusion of details like the method used in the narrative.	0.08	0.14	**0.11**
4.4 As an alternative, show narrative surrounding the person's death by a family member or friend to let the audience know that the character has died by suicide or made a suicide attempt.	0.17	0.14	**0.16**
WHO Guideline #5 **Base storylines on real life.**			
5.1 Depiction of fictional and non-fictitious events should not deviate from real life.	1.00	0.50	**0.75**
5.2 Avoid simplifying, glamourizing or otherwise presenting events unrealistically.	0.75	0.64	**0.70**

5.3 Special caution must be used when telling the story of a suicide which occurred at a location that is frequently associated with people taking their own life to avoid further suicides at that location.	0.50	0.86	**0.68**
5.4 Paint a picture, informed by research, that accurately represents the real lives of people experiencing suicidal behavior and those caring for, treating or working with them.	0.08	0.14	**0.11**
WHO Guideline #6 **Include potential warning signs of suicide and how to cope with them.**			
6.1 Include behaviors that are potentially indicative of a person's plan to take their own life (changes in mood, heightened engagement in risky behaviors, self-harm, talking about taking one's life and feelings of hopelessness).	0.42	0.86	**0.64**
6.2 Do not portray suicide as the only option for coping with complex adversities.	0.00	0.21	**0.11**
WHO Guideline #7 **Display the complexity and wider issues associated with suicide.**			
7.1 Depict the presence of multiple stressors.	0.17	0.07	**0.12**
WHO Guideline #8 **Use appropriate language.**			
8.1 Language should be appropriate for the audience (non-judgmental, non-sensational). Avoid stigmatizing or adding shame to issues of mental health conditions or suicide.	0.67	0.57	**0.62**
WHO Guideline #9 **Consider including a content advisory message prior to the beginning of cinematic, televised, streamed of theatrical content.**			
9.1 Inclusion of advisory message stating that the theme of suicide is covered and should be considered.	0.00	0.00	**0.00**
WHO Guideline #10 **Provide parental guidance for content aimed at viewers under 18 years of age.**			
10.1 Place information for parents / guardians at the start as well as the end of a screen or theatre production featuring the theme of suicide.	0.00	0.00	**0.00**
Subtotal Theme 1 [Suicide Portrayal] Guideline #4	0.38	0.28	**0.33**
Subtotal Theme 2 [Support Service] Guidelines #2, #9, and #10	0.00	0.00	**0.00**
Subtotal Theme 3 [Storyline/Narratives] Guidelines #1, #3, #5, #6, #7, and #8	0.33	0.46	**0.42**
TOTAL	**0.285**	**0.378**	**0.33**

Note on Indicators: 90-100 extremely high; 75-89 very high; 56-74 high; 45-55 average; 26-44 low; 11-25 very low; 0-10 extremely low.

4.2. Thematic Analysis: Japanese and Filipino Horror Series Using WHO Guidelines

Between the Japanese and Filipino horror film series, there are noticeable similarities and differences on how they present suicide and its level of compliance with the WHO guidelines. The Filipino series has a higher compliance rate of 38% as compared to the Japanese horror series with 29%. The average compliance rate of Filipino and Japanese horror series is only 33%, which shows a significantly low compliance rate with the WHO guidelines. Specifically, the top complied criteria in the guidelines for both series are [5.1] depiction of fictional and non-fictitious events should not deviate from real life; [5.2] avoid simplifying, glamourizing or otherwise presenting events unrealistically; and [5.3] special caution must be used when telling the story of a suicide which occurred at a location that is frequently associated with people taking their own life to avoid further suicides at that location. Both series shared the most common violation that includes [2.1] provide contact details for support services which can provide support to anyone affected by the story's context; [9.1] inclusion of advisory message stating that the theme of suicide is covered and should be considered; and [10.1] place information for parents / guardians at the start as well as at the end of a screen or theatre production. Additionally, for Japan, it is remarkable to evaluate how it seriously violates the guideline, which is [6.2] do not portray suicide as the only option for coping with complex adversities. Interestingly, there are items that can be observed between the two series that have a wide gap. For example, criteria [1.1] include characters who display resilience and positive coping strategies that enable them to deal with life stressors, feelings of sadness and/or suicidal thought and [4.1] avoid showing the act of suicide that will be discussed in the succeeding section of this paper.

By thematically analyzing the Asia-Pacific horror film series, the WHO guidelines and the assessment were categorized by three main themes: *suicide portrayal, storyline / narratives,* and *support service.*

4.2.1. Suicide Portrayal *[graphic yet inappropriate]*

The category of *suicide portrayal* covers the WHO guidelines [4] avoid depicting the act or method of suicide. With a total of 33%, the two series have a low compliance rate in terms of avoiding the depiction or method of suicide. Furthermore, there is a noticeable gap between [4.1] avoid showing the act of suicide and [4.2] avoid showing images of the body following the suicidal act against the two remaining criteria: [4.3] avoid the inclusion of details like the method used in the narrative and [4.4] show narrative surrounding the person's death by a family member or friend to let the audience know that the character has died by suicide. The first set has an *average* compliance rate while there is a considerable *very low* compliance in the second set. It means that both series commonly depicted the method and failed to focus on bereaved family members and friends as an alternative. In addition, there is a recognizable discrepancy between the Japanese and the Philippine horror series especially in showing the act of suicide. The

Japanese avoid presenting the actual suicide, yet it features the images of the body following the suicidal act, which is contrary to that of the Filipino horror series. The Japanese one also provides too specific details, especially in methods used like in the following scripts:

"I'd been bullied by classmates. So I hanged myself in the school bathroom!"
[Tales of Terror from Tokyo and All Over Japan, "Covering 100 Tales" Episode]

"Deborah's sister called, she's dead… suicide… she hanged herself."
[Tales of Terror from Tokyo and All Over Japan, "Cassette Tape" Episode]

"That's when I found out that he hanged himself!"
[Tales of Terror from Tokyo and All Over Japan, "The Lover" Episode]

"The basketball coach from some junior high hanged himself in that room."
[Tales of Terror from Tokyo and All Over Japan, "Another One" Episode]

"She burned herself to death since she was frustrated with some guy!"
[Tales of Terror from Tokyo and All Over Japan, "Overtime" Episode]

"Reiko hanged herself two weeks ago in her own house!"
[Tales of Terror from Tokyo and All Over Japan, "Ghost House" Episode]

"It is said that it was the fault of fire. But she really… burnt herself."
[Tales of Terror from Tokyo and All Over Japan, "Only Two of Us" Episode]

"Did you know, Sir? Someone hanged himself in this building."
[Tales of Terror from Tokyo and All Over Japan, "Noose Snap" Episode]

4.2.2. Support Service *[the lost cause]*

The category of *support service* covers the WHO guidelines [2] outline how to obtain help from support service; [9] consider including a content advisory message prior to the beginning of cinematic, televised, streamed of theatrical content; and [10] provide parental guidance for content aimed at viewers under 18 years of age. With an average of 0%, the two series failed to provide information about support services, advisory messages, and guidance that can assist the viewers.

Being the least complied aspect, both series neither include advisory messages nor information at the start and end of the screen about the suicide theme of the movie production. An example of this initiative is what an American Netflix series added in the ending part of the official trailer of the series *"13 Reasons Why Season 2"*, which explicitly features suicide content. In the trailer uploaded to *Netflix*

YouTube account that has 2 minutes and 14 seconds long, there's a 3-second screen time for advisory warning that states: "If you or someone you know needs help finding crisis resources, visit 13reasonswhy.info" (Netflix, 2018).

Another example is from a Filipino movie entitled *"Last Night"* that includes a trigger warning:

> The following video contains scenes that some viewers might find disturbing and/or inappropriate, including depictions and conversations related to self-harm, suicidal thoughts, and actions. If you or anyone you know are suffering from depression and suicidal thoughts, there are resources available to you such as the National Mental Health Crisis Hotline (0917-899-8727 / 989-8727) and Hopeline Philippines (0917-558-4673 / 0918-87304673 / 02-88044673 / 2919). Your suffering is not permanent, and you can get help.

The said warning lasts 10 seconds at the start of the supercut version of the movie uploaded by the official *ABS-CBN Star Cinema's Youtube* account. However, the official trailer uploaded under the same media company did not include any warning or advisory (ABS-CBN, 2017 & 2020).

4.2.3. Storyline / Narratives *[inadequate reality]*

The category of *storyline / narrative* covers the WHO guidelines [1] include characters and narratives displaying resilience and effective ways of dealing with problems; [3] show the potential positive value of support from friends, family and others; [5] base storylines on real life; [6] include potential warning signs of suicide and how to cope with them; [7] display the complexity and wider issues associated with suicide; and [8] use appropriate language. With an average of 42%, the two series have a *low* compliance rate in creating and presenting film elements that include a character who displays positive coping strategies, support system like family and community, realistic depiction of events from real life, presenting location frequently associated with suicide, representing real-life experience with people who care, treat, and work with them. Aside from this, contents that feature behavioral warning signs, complexities of suicide, multiple stressors, and even the appropriate language for audiences are lacking.

Specifically, *characterization* [1.1, 1.2, 1.3] has been problematic with an average of 29% compliance rate for both series. It is especially common with the Japanese horror series that failed to depict characters who may serve as encouraging personas and display optimistic views in dealing with suicidal thoughts and other mental health issues. The Japanese horror series presented a limited discussion on the nature of suicide. There is a notable discrepancy too between the Japanese and Philippine horror series in some criteria like [1.1] characters who display resilience and positive coping strategies, and [1.3] convey a message that change is possible, even in a seemingly desperate situation. On the other hand, it is alarming to see that both series commonly avoid to [1.2] depict effort to access relevant services of overcoming stressors or crises and of coping with stress and recovery. Additionally, with an average of 41%, support coming from the *character's significant others* [3.1] was also remarkably *low* with a great deviation

between the two series. The Filipino series has a higher rate with 47% difference compared to its Japanese counterpart.

Interestingly, with an average of 56%, the two horror film series successfully featured realistic *storylines* [5.1, 5.2, 5.3, 5.4] despite the nature of horror films as a genre that tackles supernatural events and introduces paranormal creatures. For example, the Japanese horror series tends to present real issues that revolve around family, work, and even identity crisis. Moreover, both horror series featured events that could be experienced by locals. It may not come as a surprise since it was already established that these collections of horror series were based on the actual folklore, urban legends, and haunting experiences of the Japanese and Filipinos alike.

Though there is a considerable level of compliance in presenting suicide locations, the series still mentioned and showed the specific areas where characters tried to end their lives. This includes home [toilet, room, window], office, or hotel/apartment for the Japanese; while for the Filipino series, it is home, forest, and other work-related places and leveraged some typical places, like the cemetery and bridges. Conversely, one of the lowest compliance rates under this category is the [5.4] accurate representation of real lives of people experiencing suicidal behavior and those caring for, treating, or working with them. There is a very limited focus on this category, especially with the potential support system that the character can rely on in times of hardship. It is uncommon to emphasize the significant role of characters that would directly help the struggling characters.

In terms of *behavioral indicators* [6.1, 6.2] with an average of 38% compliance rate, the two series, especially the Japanese, presented a *low* compliance on depicting potential warnings and alternative options aside from killing oneself. In fact, the Japanese horror series completely failed to show the latter where it always seemed that suicide is the sole solution for every antagonist's problem. It is also a common issue for both series to present the *complexity* [7.1] and severity of suicide and did not show the multiple reasons why people decided to kill themselves with only 12% average compliance rate.

Language [8.1] also played a huge part in presenting suicide. Though the two series have an average of 62% compliance rate, judgmental and sensational lines were still included:

"He's crazy! The boy next door. He must be mad!"
[Tales of Terror from Tokyo and All Over Japan, "Off the Shelf" Episode]

"Why? What happened to you? You never spoke like that! What's wrong?
Come on, you can do it. For me, I beg you, be patient!"
"... I did not imagine he was so depressed, I later learned that by trying to give him courage, I made him worse. "Patience" is the last thing you can tell someone in that state. But that day, I don't know how many times I told him."
[Tales of Terror from Tokyo and All Over Japan, "The Lover" Episode]

"She burned herself to death since she was infatuated with some guy.

You should be careful too."
"This is non-sense. They quit because they hated this job!"
[Tales of Terror from Tokyo and All Over Japan, "Overtime" Episode]

"Douglas, you are the eldest. Your siblings will rely on you.
You started this. You approached Anita."
[Shake, Rattle & Roll, "Manananggal" Episode]

"What are you looking at? Retard! Get some water!"
"My name is not Retard! It's Richard!"
That's what I said, Retard!"
[Shake, Rattle & Roll, "Engkanto" Episode]

"You'll take a leave?!"
"You didn't know? He's going to end his life!"
"Oh?"
"Hey!"
"He will strangle himself!"
"No! I'm just getting married."
[Shake, Rattle & Roll, "Nightmare" Episode]

The last set of examples integrates wordplay technique using the Filipino word "sakal" [strangle] and "kasal" [wedding]. It implies the possible misfortune that someone may experience should a man gets married. Framing it as a joke, this suggests that getting married is akin to suicide.

4.2.4. Other Aspects

In the Japanese horror film series, the majority of suicide is completed with a single attempt. Analyzing conflict within the narrative, majority is unknown and the second-ranked is the character's conflict towards his society, particularly with family and/or work. It also did not feature specific characters that have been affected after the incident. Overall, the Japanese horror film series' way of portraying suicide is by means of figurative or indirect style. Suicide is generally considered a solution to escape reality or challenging issues. Furthermore, this becomes a source of fear and anxiety for many, since they are afraid that people who died by suicide would haunt them forever.

On the contrary, the Filipino horror series mainly highlights the heroic type of suicide, where most of the characters portrayed a sacrificial act to save others by offering their own lives. Aside from being consumed or captured by supernatural creatures, the most used method of suicide is by gunshot. It is also common for the male character to be the suicide victim, who typically belongs to the working class, and who has a conflict with his family or in the workplace. Although it is worth mentioning that there are

several upper-class male characters who also died by suicide. In the series, family members were the most common characters affected by the incidents. The common style for depicting suicide act is literal, and many of the episodes portrayed suicide as a form of sacrifice. Though it is not encouraged, the series emphasized its value among characters and how it affected the narrative flow of the story.

Like the WHO guidelines, another guide named "*Factsheet Drama Portrayal: Media Guidelines for Reporting Suicide"* also promotes sensitive, responsible, and realistic portrayal of suicide (Samaritans, 2013). Based on the data gathered in this study, both series commonly presented suicide due to a single factor, but the guidelines emphasized that it is more likely to have interrelated causes. Following the WHO and Samaritan's guidelines, the Japanese and Filipino horror film series could be improved further by featuring suicide acts as preventable rather than rewarding. The Filipino horror series has a tendency to sensationalize suicide scenes due to excessive display of actions and the methods being used. For example, some episodes included graphic methods that may be imitated by the audience [e.g., burying alive].

The most problematic representation of the two series is that the suicide act was portrayed unrealistically, for example, the act itself displayed a quick and almost painless way to die. The simplistic representation of the after-death scenes was common in the Filipino series featuring the body that is improbable after a devastating act of suicide.

5. Conclusion

Featuring suicide acts in films neither assure nor create meaningful opportunities to destigmatize suicide. Having a significantly low compliance rate against the WHO guidelines, both series appeared to have failed to provide accurate and responsible suicide portrayals. Despite similarities, there are also notable contradictions between Japan and the Philippines' representation of suicide. Based on the results of this study, it can be observed that the Filipino characters were more engaged and proactive in improving life's conditions. However, the Japanese were more isolated in dealing with personal problems and less expressive of their emotions publicly.

Since the primary goal of this research is to promote responsible media portrayal, specifically in movies by using the WHO guidelines, it hopes to address how the Japanese and Filipino horror film series represent suicide acts. More studies could be done to further the discussion of the sensitive nature of suicide, such as assessing data from audience response or performing a multiple-rater system to increase the reliability of the assessment. It is also beneficial to do advanced studies that evaluate different platforms or genres to elaborate further the comparative analysis. Moreover, it is valuable to conduct additional empirical studies in the future to strengthen the observations using actual human experience, particularly in countries that have the tendency to underreport suicide cases, such as the Philippines. By taking advantage of the established guidelines, filmmakers would be guided by the most appropriate and reasonable methods of presenting suicide content that would not result in misleading the viewers. On the other hand, government agencies and other stakeholders need to create more programs that would address mental health issues.

This research concludes that suicide acts in the Japanese and Filipino horror series may differ in the way it is presented through films, but the recurring theme of the two Asia-Pacific horror series is the need to *revitalize suicide representation*, *strengthen support service*, and *improve the storyline or narratives*. The result of this research could be treated as a wake-up call to further improve and normalize the discussion of suicide through films and other media. Not only is suicide a global issue, but also a personal challenge. But having a holistic approach in educating the public and facilitating the essential dialogues and courses of action would be a much-needed change for a better world.

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Distribution of COVID-19 Vaccines to 49 Sub-Saharan African Countries: Which Vaccines Go Where and How? †

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Abstract

Sub-Saharan Africa faces difficulties in securing COVID-19 vaccines. Which sub-Saharan African countries procure more vaccines than others? Do relatively rich and populous countries gain more vaccines irrespective of their need? Alternatively, is the seriousness of the infection reflected in the number of distributed vaccines on the continent? This study concludes that the need for vaccines, proxied by the number of infection cases and deaths due to COVID-19, is a determinant of vaccine distribution, even after the income and size of recipient countries are controlled. The data used for this study were from UNICEF's COVID-19 Vaccine Market Dashboard. Analyses by mode indicate that commercial transactions and COVAX distribution reflect the need while higher-income countries in the region tend to receive vaccines without disclosing their sources.

Keywords: COVID-19, vaccine, Africa, COVAX

1. Introduction

Sub-Saharan Africa desperately needs COVID-19 vaccines. By the end of 2021, most of the population in developed countries would have received two doses of vaccines, while only 195 million doses have been distributed to 1.1 billion people living in sub-Saharan Africa (as of November 14, 2021, as detailed in the main text). The international community is urged to secure vaccines for sub-Saharan Africa.

It is noticeable that the main modes of procurement of COVID-19 vaccines are distinct between sub-Saharan Africa and the rest of the world. As detailed subsequently, sub-Saharan Africa depends on COVAX, a UN-backed collaboration scheme to develop and distribute COVID-19 vaccines worldwide, while the rest of the world largely purchases vaccines by either bilateral or multilateral agreements if those of which sources are unknown are put aside. Some sub-Saharan African countries have managed to purchase vaccines, while others have not. In addition, some

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countries have received donation of vaccines besides COVAX vaccines. Another scheme to procure vaccines is led by the African Union, named African Vaccine Acquisition Trust (AVAT), initiated in August 2021. Thus, sub-Saharan African countries have different mechanisms to secure COVID-19 vaccines from the rest of the world.

How have countries in sub-Saharan Africa procured COVID-19 vaccines? Which vaccines have been distributed to the continent more? Are there any differences in the mode of distribution among various vaccine products? Does a country that needs more vaccines receive more? Instead, is it only a country's population or economy that determine the distribution of vaccines? What is the mechanism of vaccine distribution in sub-Saharan Africa? These are the questions posed in this study.

To address the above questions, the authors of this study used an interesting and useful data source maintained by the United Nations Children's Fund (UNICEF), called "COVID-19 Vaccine Market Dashboard." This data release mechanism covers approximately 210 countries and territories worldwide. All COVID-19 vaccine transactions are counted in units of doses for commercial trade and donation, even though a considerable number of doses are transacted without disclosing a mode and whose source is labeled as "unknown". While procurement of COVID-19 vaccines depends on political, social and cultural factors, this study limited the scope of research to an empirical analysis using the unique dataset.

This study concludes that vaccine distribution to each sub-Saharan African country reflects the need for COVID-19 vaccines even after the scale and capacity of each country are controlled. More precisely, the need for COVID-19 vaccines is proxied by the number of confirmed COVID-19 cases and deaths. The scale and capacity of an economy are represented by population and per capita income, respectively. All 49 sub-Saharan African countries were analyzed as a cross-country study. It is well known that the absolute scale of the number of vaccine deliveries to sub-Saharan Africa is too small. However, it is good to know that COVID-19 vaccines are more likely to be delivered to a country with more infected people and consequential deaths.

An additional finding is the sharp division of labor among various vaccine products according to the country where a vaccine is developed. Vaccines developed in China by Sinopharm or Sinovac are likely to be delivered to sub-Saharan African countries through commercial transactions and donations outside COVAX. Meanwhile, vaccines developed in Europe or the USA are more likely to be distributed to the continent through COVAX and AVAT. The underlying mechanism of this clear differentiation is yet to be fully elucidated. However, this feature is interesting for understanding the determinants of COVID-19 distribution in this region.

The remainder of this paper is structured as follows. Section 2 provides a literature review, which focuses on policy-oriented works. Section 3 describes the data used in this study and the way it is structured and processed. Section 4 is devoted to empirical analyses to draw conclusions. Cross-

country analyses were developed by treating 49 sub-Saharan African countries as samples. Section 5 concludes the paper.

2. Social Science Oriented Analyses on COVID-19: Literature Review

While social science-oriented research on COVID-19 vaccines is emerging, three categories of journal studies have been identified so far. The first one discusses the importance of expanding the vaccine supply capacity. Ahuja et al. (2021) explore the best magnitude and structure of public intervention that align social and private benefits while expanding vaccine production capacity. The study concludes that expanding the manufacturing capacity for a wide range of vaccine portfolios has significant benefits during the pandemic. The authors point out that the COVAX facility played the role of a central procurement vehicle to coordinate donations to low-income countries. At the same time, their analysis shows that higher-income countries prefer to purchase bilaterally if COVAX allocates vaccines in proportion to the population. Castillo et al. (2021) analyze and estimate the financial benefits of investment in expanding vaccine production capacity. The authors conclude that expanding the production capacity would generate substantial global benefits and that production capacity could mitigate conflicts over distribution. The authors also argue that COVAX can facilitate efficient allocation across countries. While both studies mention the role of COVAX in vaccine distribution, their primary focus is production capacity analysis.

The second category of the literature asserts vaccine equity. Singh and Chattu (2021) examine how global health diplomacy (GHD) can play a role in equitable access to vaccines. The authors describe healthcare divide, particularly the wide gap between the higher-income and lower-income countries regarding the accessibility of COVID-19 vaccines. They argue that GHD plays a critical role in creating successful global partnerships and funding mechanisms. Aborode et al. (2021) also discuss the equal access and distribution of COVID-19 vaccines focusing on the situation in Africa. They highlight that most African nations depend on the COVAX facility. They describe challenges such as limited healthcare facilities, limited infrastructure to handle vaccines at constant and cold temperatures, vaccine hesitancy in Africa, and limited availability of vaccines due to higher-income countries prioritizing their citizens. The authors emphasize “a need for African based framework for accelerated and equal distribution of COVID-19 vaccines and technologies to Africa” (Aborode et al., 2021, p. 5214).

The third category explores the determinants of access to COVID-19 vaccines. Roghani (2021) examines the relationship between COVID-19 vaccine distribution and two macro-socioeconomic measures, GDP per capita and the Human Development Index (HDI), in 25 countries in February and August 2021. The author uses GDP as an indicator of country’s ability to produce and distribute vaccines and HDI as an indicator of public health infrastructure availability. The author concludes that higher GDP per capita is associated with greater vaccinations and no

significant relationship between HDI and vaccination rate. It should be noted that the 25 countries the author selected are mainly from Europe and North America, while only Indonesia from Asia is included, and none from the African continent. It is also notable that COVID-19 vaccine-producing countries, such as China, Russia, and India are not included in the analysis. The study by de Oliveira et al. (2021) analyzes determinants of access to COVID-19 vaccines as of February 2021 in 189 countries, using GDP and HDI (socio-economic aspects) and COVID-19 cases and deaths (country's impact) as explanatory variables. The authors use structural equation modeling (SEM) to identify relations among variables. Its main result is the "Country Impact," which includes cases, deaths, and tests of COVID-19, significantly and positively correlated with total vaccine doses distributed to each country. The approach of de Oliveira et al. (2021) is close to what these authors are going to present in this study. The conclusion of de Oliveira et al. (2021) concerning causality from COVID-19 cases and deaths to total vaccine doses is similar to that attained in this study's authors' research. However, de Oliveira et al. (2021) attempted to identify only the structure of relations among the variables mentioned above using SEM. They did not explore multivariate interactions using regression analysis. In addition, they did not highlight vaccine distribution by products and modes.

In conclusion, during the course of the research, the authors did not find any study discussing the cross-sectional analysis of vaccine distribution based on vaccine products and distribution mode, studies focusing on empirical analysis of vaccine distribution in sub-Saharan Africa, or studies using data from UNICEF Vaccine Dashboard.

3. Data of COVID-19 Infection and Vaccine Distribution

According to the World Health Organization (WHO) Coronavirus Dashboard, there have been 251,266,207 confirmed cases of COVID-19 worldwide, including 5,070,244 deaths[3]. Among them, 5,973,267 confirmed cases, including 149,517 deaths, were from 49 countries[4] in sub-Saharan Africa. These absolute figures may give the impression that the scale of COVID-19 is relatively small. However, if one reviews total confirmed cases, deaths, and vaccine doses delivered per 100,000 population in four sub-regions of sub-Saharan Africa, it becomes clear that the situation in Southern Africa is alarming (Table 1).

[3] See WHO (2021). While this dashboard is updated daily, the number of cases and deaths used in this study are based on the global table data downloaded on November 12, 2021.
[4] In this study, 49 countries of sub-Saharan Africa are those listed in Appendix Table 2.

Table 1. COVID-19 Cases, Deaths, and Vaccines per Sub-Region in Sub-Saharan Africa

	Cases - cumulative total per 100000 population	Deaths - cumulative total per 100000 population	Total doses delivered per 100000 population
Global	3,223.62	65.05	107,853.61
Sub Saharan Africa	525.33	13.15	17,168.76
Eastern Africa	335.55	7.37	17,593.45
Western Africa	175.06	2.63	15,397.37
Middle Africa	176.37	3.15	9,579.63
Southern Africa	4,911.21	144.16	44,834.28

Sources: COVID-19 cases and deaths, WHO Coronavirus (COVID-19) Dashboard as of November 12, 2021; COVID-19 vaccine delivery, UNICEF COVID-19 Vaccine Market Dashboard as of November 14, 2021; Population data, United Nations Department of Economic and Social Affairs, *World Population Prospects 2019*. https://population.un.org/wpp/Download/Standard/Population/

Vaccine distribution data released by UNICEF illustrate the inequality and distinctive nature of vaccine distributions in sub-Saharan Africa compared to the rest of the world. While the total population in sub-Saharan Africa accounts for 14.6% of the total global population, they received only 1.2% of the total vaccines distributed worldwide (Table 2).

Table 2. Global COVID-19 Vaccine Distribution as of August 13, 2021 (Unit: 1,000 doses, %)

Region	Bilateral/multilateral agreement	Donation	COVAX	Unknown	Total	%
World	1,831,442 (40.2)	83,484 (1.8)	192,939 (4.2)	2,443,589 (53.7)	4,551,453 (100.0)	100.0
East Asia and Pacific	209,344 (9.4)	25,476 (1.1)	54,948 (2.5)	1,948,532 (87.1)	2,238,300 (100.0)	49.2
South Asia	174,990 (40.5)	12,083 (2.8)	27,708 (6.4)	216,771 (50.2)	431,551 (100.0)	9.5
Middle East and North Africa	71,126 (40.8)	6,697 (3.8)	22,364 (12.8)	74,347 (42.6)	174,534 (100.0)	3.8
Europe and Central Asia	566,076 (73.5)	2,424 (0.3)	12,712 (1.7)	188,702 (24.5)	769,914 (100.0)	16.9
Latin America and Caribbean	344,888 (81.4)	28,123 (6.6)	35,748 (8.4)	14,878 (3.5)	423,637 (100.0)	9.3
USA and Canada	455,752 (99.6)	1,000 (0.2)	972 (0.2)	0 (0.0)	457,725 (100.0)	10.1
Sub-Saharan Africa	9,265 (16.6)	7,682 (13.8)	38,486 (69.0)	359 (0.6)	55,792 (100.0)	1.2

Source: UNICEF, COVID-19 Vaccine Market Dashboard (http://bit.ly/2NgN9w0) as of August 13, 2021.
Note: The African Vaccine Acquisition Trust (AVAT) began procuring and distributing vaccines to its member countries in early August 2021. Therefore, no doses were distributed through AVAT when the above figures were collected.

Globally, procurement through bilateral and multilateral agreements is the main mode of vaccine distribution. Note that this mode is commercial trade after bilateral or multilateral negotiations. In sub-Saharan Africa, in contrast, the majority (69%) of vaccines are distributed through the COVID-19 Vaccines Global Access (COVAX), and donation is also an important route, accounting for 13.8%. COVAX is the vaccines pillar of the Access to COVID-19 Tools Accelerator, a global collaboration to accelerate the development, production, and equitable access to COVID-19 tests, treatments, and vaccines[5] (COVAX, 2021). Another distinctive feature of vaccine distribution in sub-Saharan Africa is the presence of the African Vaccine Acquisition Trust (AVAT), a centralized purchasing agent of the African Union, that aims to vaccinate at least 60% of the African population (AU, 2021). There is also a stark difference between global trends and sub-Saharan Africa in sources labelled as "unknown[6]". Globally, over half of vaccines (53.7%) are distributed through "unknown" mode, whereas only 0.6% is "unknown" in sub-Saharan Africa. As shown in Table 2, East Asia and the Pacific incorporate a majority of source-unknown doses (around 1.9 billion doses out of 2.4 billion of world total source-unknown doses). China does not disclose the modes and products of any vaccines jabbed inside the country, which amounts to approximately 1.8 billion. Japan follows China in the region that classifies 92 million doses in the "unknown" category. In contrast, the vaccine distribution to sub-Saharan Africa is more transparent. Therefore, it is worth reviewing the vaccine distribution data in sub-Saharan Africa in more detail.

The main data source of this research is UNICEF's COVID-19 Vaccine Market Dashboard. This information source has unique characteristics. In December 2020, UNICEF launched a dashboard, which provides the latest information on the world's COVID-19 vaccine market and the COVAX Facilities' vaccine deliveries (UNICEF, 2020). The dashboard is currently divided into seven categories: an overview, products (status of global vaccine approvals), vaccine production capacity, publicly announced supply agreements, reported vaccine price per dose, vaccine deliveries by supply source, and immunization device deliveries (UNICEF, 2021). The dashboard is updated daily[7], using data UNICEF possesses as the designated COVAX procurement coordinator

[5] Signatory countries of COVAX are categorized into "self-financing participants" and "AMC eligible economies." AMC stands for the Advance Market Commitment, a facility to promote the development and distribution of vaccines for developing countries. COVID-19 vaccines are distributed to AMC eligible countries free of charge. sub-Saharan Africa, Botswana, Gabon, Mauritius, Namibia, and South Africa are included in the group of "self-financing participants"(WHO, 2021c).

[6] An explanatory note in UNICEF's Dashboard states that "where the number of doses administered by OWID (plus 10% wastage) is greater than the total number of reported deliveries for a country/territory, the difference between the doses administered (plus 10% wastage) and the doses delivered (through COVAX, AVAT, donations, and/or bilateral/multilateral) is categorized as 'Unknown'" (UNICEF, 2021).

[7] A disclaimer on UNICEF's Dashboard states that "UNICEF does not commit to it being up to date" (UNICEF, 2021); meanwhile, one of the authors of this study has monitored this dashboard since August 2021 and witnessed daily updates in the delivery section.

and agent and those reported by public sources[8]. Similar websites or data providers for the global situation on COVID-19 vaccines include the IMF-WHO COVID-19 Vaccine Tracker, Our World in Data's Coronavirus (COVID-19) Vaccinations, and Airfinity. However, IMF-WHO's dashboard relies on data from UNICEF and does not provide details of all countries (IMF, 2021). Our World in Data is focused on vaccination instead of vaccine delivery (OWID, 2021), and Airfinity is a private company that provides health intelligence and analytics to its clients (Airfinity, 2021). The United Nations Development Programme (UNDP), WHO, and the University of Oxford also launched the "Global Dashboard on Vaccine Equity" in July 2021. However, this dashboard focuses on vaccination combined with socio-economic information collaborating with other UN agencies (UNDP et al., 2021). Therefore, the authors of this study consider UNICEF's dashboard as the most comprehensive, detailed, and publicly available dataset in terms of global vaccine distribution. The authors recorded vaccine delivery data (doses per vaccine product and delivery mode) for all 49 countries in sub-Saharan Africa on November 14, 2021. There were nine vaccine products distributed in sub-Saharan Africa, and basic information on these nine vaccines are given in Table 3. A wide variety of vaccines distributed on the continent is another distinctive feature. It is worth investigating whether there are any differences in the distribution mode among various vaccine products.

Table 3. Varieties of COVID-19 Vaccines Distributed in Sub-Saharan Africa as of November 14, 2021

Developer/Product	Type	WHO's approval for emergency use/approval date
AstraZeneca/University of Oxford: Vaxzevria	Virus vector	Yes, February 15, 2021
Bharat Biotech: Covaxin	Inactivated	Yes, November 3, 2021
Gamaleya Research Institute: Sputnik V	Virus vector	
Johnson & Johnson/Janssen: Ad26.COV 2-S	Virus vector	Yes, March 12, 2021
Moderna: Spikevax	Messenger RNA	Yes, April 30, 2021
Pfizer/BioNTech: Comirnaty	Messenger RNA	Yes, December 31, 2020
Serum Institute of India: Covishield	Virus vector	Yes, February 15, 2021
Sinopharm: BBIBP-CorV	Inactivated	Yes, May 7, 2021
Sinovac: Coronavac	Inactivated	Yes, June 1, 2021

Source: UNICEF, COVID-19 Vaccine Market Dashboard (http://bit.ly/2NgN9w0), WHO (2021b).

4. Analyses: Which Vaccines Go Where and How

As detailed in the previous section, UNICEF's COVID-19 Vaccine Market Dashboard

[8] An explanatory note in UNICEF's Dashboard states that "the number of administered doses from Our World in Data plus a standard 10% multi-dose wastage rate is used as a proxy", where "the number of reported doses delivered is unavailable or inconsistent" (UNICEF, 2021).

offers informative and widely accessible data to scrutinize the vaccines' distribution to sub-Saharan African countries. In this section, factors that determine destinations and the amount of various COVID-19 vaccine products are examined by exploring the data. The main question is whether vaccines are distributed more to countries needing them. The need for vaccines is proxied by infection cases and deaths. A null hypothesis to be tested is that the destinations and amounts of COVID-19 vaccine distribution are solely determined by the economic capacity to purchase them and do not depend on the need for vaccines. Economic capacity is represented by per capita income and the size of each country, namely the population. Another important aspect governing the vaccine supply mechanism to sub-Saharan African countries is the distribution mode. As previously mentioned, there are four modes: bilateral/multilateral agreements, donation, COVAX, and AVAT. Recipient countries have to pay for vaccines by the mode of "bilateral/multilateral agreements," while they can obtain vaccines free of charge by the modes of "donation," "COVAX," and "AVAT" in most cases. Thus, the procurement of vaccines by bilateral/multilateral agreements is expected to be influenced by the economic capacity of recipient countries. Donation may be affected by the political and economic closeness between a recipient country and a vaccine-donating country. In the meantime, COVAX and AVAT are operated by international coordinating functions so that their vaccine distribution may depend more on the need for vaccines reflected by the number of COVID-19 cases and deaths. The determinants of vaccine distribution by mode were explored by statistical analyses of the data collected from the COVID-19 Vaccine Market Dashboard on November 14, 2021.

4.1. Distribution of COVID-19 Vaccines by Mode and Product

Before proceeding to the statistical analyses, a grand picture of COVID-19 vaccine distribution to sub-Saharan African countries by mode is presented in Table 4. Its complete dataset is displayed as Appendix Tables 2-4.

As of November 14, 2021, nine COVID-19 vaccine products were distributed. AstraZeneca's vaccine was developed in cooperation with the University of Oxford. A significant portion of its vaccines are manufactured by the Serum Institute of India. The figures displayed in the table are based on vaccine developers, not manufacturers. The Serum Institute of India has a vaccine named "Covishield," which is a variation of Vaxzevria developed by AstraZeneca and the University of Oxford. In India, there is another vaccine developer, Bharat Biotech. Johnson & Johnson wholly own Janssen, hence, Janssen's vaccine is sometimes referred to as Johnson & Johnson. Those developed by Moderna and Pfizer/BioNTech are messenger RNA vaccines. Sinopharm and Sinovac are Chinese pharmaceuticals, while Sputnik is the brand name of the virus vector vaccine developed by the Gamaleya Research Institute of Russia.

Table 4 reveals interesting specialization patterns of COVID-19 vaccine distribution by

mode and vaccine products. These specialization patterns are insightful because those in sub-Saharan Africa are distinct from those in the rest of the world, as shown in Table 2.

First, distribution through COVAX, which accounts for 67.% of the total doses arriving in the region (Table 4), is mainly supplied in products developed in either Europe or the United States. Pfizer/BioNTech and AstraZeneca's vaccines supply more than a quarter of the total doses that reached the region through COVAX (Table 4). Combining Janssen (11.7%) and Moderna (7.8%), these four European and US developers' vaccines jointly amounted to almost three-quarters (73.1%) of total COVAX distributions. The Serum Institute of India (12.5%) and Sinopharm (12.0%) followed European and US pharmaceuticals. As the WHO has not approved Sputnik, no dose of Sputnik is offered through COVAX.

A stark contrast is the dominance of Chinese vaccine distribution through the mode of "bilateral/multilateral agreements." As mentioned above, this is a mode of vaccine supply through commercial trade. Sinovac (43.1%) and Sinopharm (42.3%) are the two prevailing suppliers by this mode, followed by the Serum Institute of India (8.3%).

The presence of Chinese vaccines is outstanding through the mode of donation, too. The greatest contributor to this mode was Sinopharm (45.9%). Combining those of Sinovac, the two Chinese developers offer as much as 58.5% of the total vaccines by the mode of donation. Interestingly, Chinese developers lead vaccine distribution by the two modes, commercial trade and donation, even though the relative number of doses offered by the two modes is not substantial (17.2% as the sum of 6.8% and 10.4%. See Table 4). AstraZeneca's vaccines (27.4%) followed Sinopharm, probably because developed countries released AstraZeneca's vaccines to African countries after they noticed that they had procured more than the required quantity of COVID-19 vaccines.

AVAT is a scheme based on an agreement between the African Union (AU) and Johnson & Johnson (AU, 2021, Inaba, 2021 and World Bank, 2021). Therefore, by construction, Janssen supplied vaccines under the AVAT scheme.

Finally, "unknown" sources of vaccines have drawn attention. Out of the total number of vaccines from "unknown" sources, which is 18.7 million doses, only 234 thousand were revealed to be donations. The rest were not associated with any mode or vaccine products. Appendix Table 4 shows that South Africa is the highest contributor of source-unknown doses with 15.5 million doses, while the source-unknown doses in the region amount to 18.7 million. Factors associated with the number of source-unknown vaccines are analyzed in Subsection 4.3.

Table 4. Vaccine Distribution by Products and Modes (Units: Dose and Percent)

Product/ Mode	AstraZeneca	Bharat Biotech	Janssen	Moderna	Pfizer BioNTech	Serum Institute of India	Sinopharm	Sinovac	Sputnik	Unknown	Total
Bilateral/ multilateral agreements	0 (0.0) [0.0]	200,000 (1.5) [0.1]	80,000 (0.6) [0.0]	0 (0.0) [0.0]	325,260 (2.5) [0.2]	1,102,000 (8.3) [0.6]	5,594,000 (42.3) [2.9]	5,703,000 (43.1) [2.9]	221,000 (1.7) [0.1]	0 (0.0) [0.0]	13,225,260 (100.0) [6.8]
Donation	5,546,600 (27.4) [2.8]	30,000 (0.1) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	756,140 (3.7) [0.4]	1,645,000 (8.1) [0.8]	9,298,340 (45.9) [4.8]	2,550,000 (12.6) [1.3]	210,000 (1.0) [0.1]	234,000 (1.2) [0.1]	20,270,080 (100.0) [10.4]
COVAX	34,636,240 (26.4) [17.7]	0 (0.0) [0.0]	15,382,000 (11.7) [7.9]	10,268,920 (7.8) [5.3]	35,489,610 (27.1) [18.2]	16,327,200 (12.5) [8.4]	15,719,877 (12.0) [8.1]	3,184,800 (2.4) [1.6]	0 (0.0) [0.0]	0 (0.0) [0.0]	131,008,647 (100.0) [67.1]
AVAT	0 (0.0) [0.0]	0 (0.0) [0.0]	12,259,200 (100.0) [6.3]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	12,259,200 (100.0) [6.3]
Unknown	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	0 (0.0) [0.0]	18,452,555 (100.0) [9.5]	18,452,555 (100.0) [9.5]
Total	40,182,840 (20.6) [20.6]	230,000 (0.1) [0.1]	27,721,200 (14.2) [14.2]	10,268,920 (5.3) [5.3]	36,571,010 (18.7) [18.7]	19,074,200 (9.8) [9.8]	30,612,217 (15.7) [15.7]	11,437,800 (5.9) [5.9]	431,000 (0.2) [0.2]	18,686,555 (9.6) [9.6]	195,215,742 (100.0) [100.0]

Note: Vaccine products are displayed in alphabetical order. The values in parentheses are ratios of the total vaccines by mode, while those in square brackets are ratios of the total vaccines delivered to all sub-Saharan Africa.

4.2. Are COVID-19 Vaccines Distributed by Need or Economic Capacity?

The delivery of COVID-19 vaccines to sub-Saharan Africa is a global challenge. This challenge involves two steps. One is how to secure vaccines for the entire sub-Saharan Africa. The other is how to effectively distribute the vaccines inside the region. The former issue is a tremendous task to be undertaken by all stakeholders worldwide. The latter is also an important question posed to the global community. The latter issue is elaborated in this subsection.

The effectiveness in terms of the need for vaccines is measured in the incidence and impact of COVID-19 infection. In this section, it is assumed that the number of COVID-19 cases signifies the incidence, while the number of deaths due to COVID-19 reflects the impact of the infection. Let us call this claim of effective allocation of vaccines with respect to the need for vaccines as the need hypothesis. Meanwhile, recipient countries exert economic and political power to secure vaccines. Therefore, the economic capacity of recipient countries may be a strong determinant of vaccine distribution, which can be called the capacity hypothesis. If the capacity of recipient countries solely determines the distribution of the vaccines, and if low-capacity and great-need countries cannot attain sufficient vaccines at all, we would have to say that the vaccine distribution mechanism in sub-Saharan Africa was inefficient. Which factors, capacity or need, influence the distribution of vaccines more? Is the need for vaccines significantly correlated with the number of vaccines distributed to each recipient country?

Among past studies, de Oliveira et al. (2021) found that need-reflecting variables such as cases, deaths, and tests were determinants of the number of distributed vaccines. However, de Oliveira et al. (2021) did not compare capacity and need factors as determinants of vaccine distribution.

4.2.1. Model

The following regression model was formed to address the questions raised above.

$$V_i = I_i^{\beta_1} P_i^{\beta_2} N_i^{\beta_3} e^{\beta_0 + \beta_4 D_i + u_i}. \qquad (i = 1, \cdots, 49) \qquad (1)$$

V_i: Total number of COVID-19 vaccines distributed in the *i*-th country.
I_i: Gross National Income (GNI) per capita of the *i*-th recipient country.
P_i: Population of the *i*-th recipient country.
N_i: A proxy for the need for vaccines in the *i*-th recipient country. The number of COVID-19 cases or the number of deaths due to COVID-19 was included in this variable.
D_i: A dummy variable that distinguishes self-financing countries in the scheme of COVAX (Botswana, Gabon, Mauritius, Namibia, and South Africa) from the rest of the countries. The dummy variable for self-financing countries takes one, whereas the rest takes zero.

C_i: Other control variables introduced in Subsection
u_i: Error term.

$\beta_0, \beta_1, \beta_3$ and β_4 are assumed to be constant parameters. Once the logarithm is applied to both sides of equation (1), a linear regression equation is formulated as follows:

$$\ln V_i = \beta_0 + \beta_1 \ln I_i + \beta_2 \ln P_i + \beta_3 \ln N_i + \beta_4 D_i + \beta_5 \ln C_i + u_i. \quad (2)$$

Note that β_1, β_2, β_3 and β_5 can be interpreted as vaccine distribution elasticity with respect to I_i, P_i, N_i and C_i.

As part of the vaccine distribution is made as commercial trade, equation (1) can be interpreted in the context of international trade theory. The gravity equation is similar to equation (1) (Feenstra, 2004, pp. 144-146). The gravity equation explains the amount of international trade with the size of the economies of the two trading countries and the distance between them. This relationship among trade, size of economies, and distance is like Isaac Newton's law of universal gravity. Equation (1) incorporates two proxies for the size of economies, namely population and GNI per capita. Note that the product of I_i and P_i is the GNI of the *i*-th country. Thus, a reduced version of equation (2) uses GNI $(= I_i P_i)$ as a proxy for the size of an economy, assuming that $\beta_1 = \beta_2$.

4.2.2. Estimation Results

Table 5 summarizes the results of the various estimation patterns along with equation (2)[9]. The key parameters of the dependent and independent variables are listed in Appendix Table 1. The sample size is as small as 49, which is the number of sub-Saharan African countries[10]. Therefore, the number of explanatory variables was minimized to increase the degree of freedom.

The first row displays the result of the estimation of equation (2), dropping proxies for the need for vaccines and the self-financing dummy variable (Specification #1). Hence, explanatory variables representing the capacity to secure vaccines are used in this specification. The point estimates of the elasticity with respect to GNI per capita and population were 0.735 and 0.897, respectively. Both coefficients were statistically significant at the 95% level[11]. R^2 is 0.306, which

[9] Only Eritrea has not received any COVID-19 vaccines till November 14, 2021. Hence, Eritrea's value of V_i is assumed to be 1 instead of 0 to apply the logarithm.
[10] Sudan is included in this sample of sub-Saharan African countries.
[11] The heteroscedasticity consistent standard error is shown in Table 4 instead of the ordinary standard error, which incorporates a possibility of heteroscedasticity in the variance of u_i. However, the qualitative natures of estimation results with the heteroscedasticity consistent standard error are maintained even when the ordinary standard error is used instead.

implies that 30.6% of the total variation in the number of vaccines distributed to 49 sub-Saharan African countries were explained by GNI per capita and population while the rest may be explained by social and political factors. *F* statistics and their *p*-value are omitted because the significance of the *t*-value of each coefficient is indicative of the significance of *F* statistics throughout all estimation patterns exhibited in Table 5. This result suggests that the capacity of recipient countries matters how many vaccine doses are secured. It appears that a high income and large population help a sub-Saharan African country fetch some vaccines. Thus, the capacity hypothesis appears to hold.

Table 5. Regression Analysis of Total Vaccines Distributed to 49 Sub-Saharan African Countries

Spec.	Intercept	Capacity			Need		Self-Finance Dummy	R^2
		GNI Per Capita	Population	GNI	# of Infections	# of Deaths		
1	-5.397 (5.751)	0.735** (0.352)	0.897*** (0.192)	-	-	-	-	0.306
2	4.495 (2.996)	-	-	-	0.925*** (0.262)	-	-	0.272
3	8.535*** (2.052)	-	-	-	-	0.880*** (0.282)	-	0.331
4	-2.683 (4.943)	0.341 (0.252)	0.578*** (0.118)	-	0.496** (0.192)	-	-	0.340
5	0.793 (2.880)	0.295* (0.155)	0.474*** (0096)	-	-	0.577* (0.294)	-	0.377
6	-3.815 (4.317)	-	-	0.573*** (0.130)	0.453** (0.216)	-	-	0.331
7	0.050 (2.484)	-	-	0.452*** (0.097)	-	0.573* (0.300)	-	0.372
8	-3.258 (5.374)	0.407 (0.298)	0.563*** (0.116)	-	0.533** (0.221)	-	-0.538 (0.555)	0.343
9	0.205 (3.242)	0.384* (0.208)	0.463*** (0.103)	-	-	0.607* (0.321)	-0.626 (0.679)	0.381

Note: The logarithm is applied to all variables after replacing 0 with 1. The values in parentheses are heteroscedasticity-consistent standard errors. The symbols *, **, and *** signify a significance level of 90%, 95%, and 99%, respectively.

In contrast, the need hypothesis claims that a country in need of vaccines attains more doses. Specifications #2 and #3 of the estimation results displayed in the second and third rows in Table 5, examine this hypothesis. Specification #2 shows that the point estimate of elasticity to the number of infection cases is as high as 0.925. Thus, a 1% increase in the number of COVID-19 cases is associated with a 0.925% increase in the number of distributed vaccines. The estimate is positively significant at the 99% level. The R^2 is 0.272. Specification #3 indicates that the number of COVID-19 deaths plays a similar role in signifying the need for vaccines with the number of cases. The estimate of elasticity to the number of deaths was 0.888. The estimate is also positive and statistically significant at the 99% level. With this explanatory variable, 33.1% of the total variation

in the number of distributed vaccines among the 49 countries. The estimations with specifications #2 and #3 suggest that the number of distributed vaccines may reflect the need for vaccines.

What if both hypotheses were tested together? The two hypotheses are not mutually exclusive. Both may hold at the same time. Specifications #4 and #5 give the regression results incorporating the proxies for capacity and need. For both specifications, the population remains highly significant even though the point estimates of its coefficient dropped to 0.578 (Specification #4) and 0.474 (Specification #5). The GNI per capita lowers the point estimates and significance. The point estimates dropped to 0.341 (specification #4) and 0.295 (specification #5). Meanwhile, the number of infection cases remains positive and statistically significant at the 95% level. The point estimate of the coefficient also declined to 0.496. It appears that the proxies for capacity and need mutually offset their impacts on the number of distributed vaccines to a certain extent. However, as long as the need is proxied by the number of infection cases, the need hypothesis still holds even when capacity-related variables are controlled.

Specification #5, with the number of deaths in place of the number of cases, exhibits a qualitatively similar result to that of Specification #4. The population is maintained significantly positive, while the point estimates of coefficients on population and GNI per capita decline. The coefficient on the number of deaths is kept significantly positive at the 90% level. Specifications #6 and #7 are a pair of estimations for a robustness test that uses GNI instead of GNI per capita and population. Again, the results are qualitatively similar to those of Specifications #4 and #5.

The self-finance dummy is introduced into the benchmark specifications (#4 and #5) as Specifications #8 and #9. Self-financing countries are required to contribute financially to COVAX. Therefore, the behaviors of these countries might be structurally different from those of the rest of the countries. Meanwhile, self-financing countries are likely to be high-income nations. The correlation coefficient between the GNI per capita and the self-finance dummy among 49 sub-Saharan African countries is as high as 0.5624. As a result, the self-finance dummy does not provide additional explanatory power to the benchmark model. Specifications #8 and #9 in Table 5 show that the coefficient estimates on the self-finance dummy are both insignificant. Thus, no differences in behavior to secure vaccines between self-financing countries and AMC-eligible countries were observed.

A natural question concerning the validity of this set of regression analyses is the endogeneity problem of the explanatory variables. The number of distributed vaccines may generally influence infection cases and deaths due to COVID-19. If this is the case, reverse causality running from the number of COVID-19 vaccines to the number of infections and deaths may work. However, reverse causality is less likely to occur in this specific case of regression analysis. COVID-19 has spread worldwide, including sub-Saharan Africa in 2020, while the systematic distribution of COVID-19 vaccines to sub-Saharan African countries began in February 2021 by COVAX. Until the

authors collected the data on November 14, 2021, the impact of vaccinations to reduce infection and resultant death due to COVID-19 was small. Only 6.5% of the population of African countries were fully vaccinated by November 12, 2021[12]. In a sense, as Diamond and Robinson (2010) depict, a natural experiment is applicable to the causality running from the number of infection cases and deaths to the number of distributed vaccines. Hence, it is possible to interpret that the capacity and need to incorporate variables are determinants of the number of distributed vaccines.

4.2.3. Sensitivity Analyses

The regression analyses shown in Table 5 were limited to exercises that tested interactions with the basic key variables. Only the self-finance dummy variable was used as the control variable. In this subsection, additional control variables and modified functional forms are adopted to check the sensitivity of the results obtained in the previous subsection[13]. The results of the sensitivity analysis are summarized in Table 6.

(1) Total Vaccines Distributed per Capita as a Dependent Variable

One of the simplest modifications of the regression equation (2) is to use the logarithm of the number of vaccines distributed per person as a dependent variable instead of the logged number of vaccines. As the population is controlled by using the denominator of the dependent variable, the logged population on the right-hand side of equation (2) is dropped. Consequently, the regression equation applied to this exercise is a variation of equation (2), with the constraint $\beta_2 = 1$.

$$ln\, V_i - ln\, P_i = \beta_0 + \beta_1\, ln\, I_i + \beta_3\, ln\, N_i + u_i. \quad (3)$$

The estimation results with regression equation (3) are displayed in the first row of Table 6. The number of infections was used as a proxy for the need for vaccines. The estimated elasticity with respect to the number of infections is 0.151. However, this difference was not statistically significant. Therefore, this specification of binding β_2 to 1 does not assure the need hypothesis.

(2) Medical Capacities and Governance of Countries as Control Variables

The estimation results from the second through fifth rows in Table 6 were produced by using some control variables concerning the capacity of each sub-Saharan African country in terms of medical services and administration of the government. The details are provided in Appendix Table 1. The first control variable is health expenditure per person based on purchasing power parity (PPP) to adjust the price levels of each country. The total number of distributed vaccines was

[12] The data source is "Our World in Data." Its categorization of "Africa" include Algeria, Egypt, Libya, Morocco, St. Helena, and Tunisia in addition to 49 sub-Saharan Africa countries used in this study.

[13] The authors of this study appreciate Sangho Kim and referees of this journal for suggestions to do these sensitivity analyses.

restored as the dependent variable. The estimated elasticity with respect to health expenditure per person was 0.525, although it was not statistically significant. Other key variables, the number of infections and population, remain significantly positive, while GNI per capita is not significant.

The second proxy for medical capacity was the number of nurses and midwives per capita. The sign of the estimate of elasticity is negative, with a value of -0.707. As the estimate is not statistically significant, it should be interpreted that this variable is not a determinant of the number of vaccines distributed. The third proxy was the number of medical doctors. The estimate of elasticity with respect to this proxy was also statistically insignificant (0.244). For both exercises, the number of infections and population were significant at the 90% level, whereas GNI per capita was not.

The fourth control variable was the overall CPIA score, which is widely used as a proxy for governance in low-income countries. CPIA is the abbreviation of "Country Policy and Institutional Assessment". The World Bank's International Development Association (IDA), which offers preferential loans to low-income countries, creates and maintains 16 CPIA indicators associated with various aspects of policy formation and institutions. The highest value of each indicator for favorable conditions was 6, while the lowest value was 1. The overall CPIA score was the average of the 16 indicators. The CPIA score is available only for countries in which IDA offers loans. Higher-income countries in sub-Saharan Africa, such as Angola, Botswana, Equatorial Guinea, Eswatini, Gabon, Mauritius, Namibia, Seychelles, and South Africa, are excluded from this regression exercise. Therefore, the sample size was reduced to 40. The estimate of elasticity of the overall CPIA score was also statistically insignificant. Meanwhile, the number of infections and population remained positive and significant.

Table 6. Results of Sensitivity Analyses

Dependent Variable	Explanatory Variables												*n* R^2	*F* *p*-value
	Intercept	# of Infections	# of Deaths	GNI Per Capita	Popula-tion	GNI	Health Expenditure Per Capita	# of Nurses Per Capita	# of Doctors Per Capita	CPIA	Cross Product: Infections & GNI	Cross Product: Deaths & GNI		
Vaccines Per Capita	-8.751**	0.151		0.753***									49	9.38
	(3.600)	(0.239)		(0.185)									0.151	[.000]
Total Vaccines	-4.925	0.343**		0.158	0.731***		0.525						48	5.84
	(6.215)	(0.152)		(0.286)	(0.197)		(0.412)						0.352	[.001]
Total Vaccines	-4.581	0.694*		0.640	.426***			-0.707					42	12.21
	(6.696)	(0.366)		(0.505)	(0.123)			(0.706)					0.368	[.000]
Total Vaccines	2.563	0.322***		-0.0523	0.590***				0.244				35	105.30
	(2.816)	(0.095)		(0.266)	(0.080)				(0.203)				0.838	[.000]
Total Vaccines	-2.257	0.415**		-0.107	0.452***					4.959			40	7.34
	(5.581)	(0.171)		(0.436)	(0.161)					(3.895)			0.419	[.000]
Total Vaccines	-23.456	2.369				1.399					-0.080		49	37.06
	(30.464)	(2.752)				(1.199)					(0.108)		0.338	[.000]
Total Vaccines	-20.051		3.664			1.317						-0.132	49	42.16
	(21.324)		(3.246)			(0.838)						(0.127)	0.395	[.000]

Note: Definitions of the independent variables are given in Appendix Table 1.

(3) Interactions between Need and Economic Capacity

The final sensitivity analysis tested the presence of interactive effects between proxies for needs and economic capacity. This analysis examines whether a low-capacity country exhibits a higher impact of a proxy for the need for vaccines than a high-capacity country. The need-capacity interaction hypothesis can be tested using the following regression equation: (It is assumed that $GNI(= I_i P_i)$ is assumed to be used as a proxy for economic capacity.)

$$ln\, V_i = \beta_0 + \beta_1\, ln\, GNI_i + \beta_2\, ln\, N_i + \beta_3 (ln\, GNI_i \cdot ln\, N_i) + u_i. \quad (4)$$

With this specification, the elasticity of vaccine distribution with respect to a proxy for the need for vaccines is derived as

$$\frac{d\, ln\, V_i}{d\, ln\, N_i} = \beta_2 + \beta_3\, ln\, GNI_i. \quad (5)$$

If the hypothesis of a greater impact of the need for vaccines in low-capacity countries is true, the sign of β_3 is negative.

In Table 6, $ln\, GNI_i \cdot ln\, N_i$ is referred to as a cross product between the logged GNI and logarithm of the proxies for the need for vaccines. Both the number of infections and deaths were used in this exercise. The estimation results are presented in the sixth and seventh rows of Table 6. Irrespective of the proxies for the need for vaccines, the estimates of β_3 is negative and insignificant. It is notable that the estimates of the coefficients of $ln\, GNI_i$ and $ln\, N_i$ turned insignificant.

4.2.4. A Summary of Subsection 4.2

As the analyses in Subsection 4.2.2 indicate, the capacity and need hypotheses hold as the mechanisms of COVID-19 vaccine distribution in sub-Saharan Africa if regression analyses are made with only basic proxies for the need for vaccines and economic capacity. Although large and wealthy countries are likely to secure more vaccines, nations with more COVID-19 cases and deaths tend to receive more vaccines even after the capacity proxies are controlled. Therefore, the need for vaccines is reflected in the number of distributed vaccines.

This conclusion becomes obscure once a different functional form is adopted for the estimation and if cross-products between proxies for the need for vaccines and economic capacity are introduced as explanatory variables, as discussed in Subsection 4.2.3. However, a general tendency displayed in Table 6 is that the number of infections remains significantly positive, even after introducing control variables with the original specification in most cases at the 95% level. These results supported the need hypothesis. The determinants of vaccine distribution among sub-Saharan African countries are explored in the next subsection. .

4.3. Determinants of Vaccine Distribution by Mode

In this subsection, the mechanism of vaccine distribution is examined by mode. There are different modes to procure vaccines such as by payment or free of charge, as mentioned above. Procurement by "bilateral/multilateral agreements" accompanies payments. Vaccines through COVAX are free of charge for low-income countries. Those through "donation" do not require payment by construction. In subsection 4.1, it was found that some vaccine products have mode specializations. In this section, the attributes of vaccine distribution by mode were investigated. The underlying mechanism linking vaccine distribution by mode with some factors is the same as in equation (2). However, the dependent variables in this section are components of V_i by mode, and the explanatory variables are selectively regressed to each dependent variable.

Table 7 displays the ratios of countries that receive COVID-19 vaccines by each distribution mode to the total number of sub-Saharan African countries in this sample of 49. The first column of the table shows that 22.4% of sub-Saharan African countries purchased vaccines under bilateral or multilateral agreements. This implies that more than three-quarter of the countries did not buy any vaccines. Appendix Table 2 details the number of vaccines distributed to each country by mode and product as of November 14, 2021.

Table 7. Ratios of Countries Receiving Vaccines in Each Mode of Distribution

Mode	Bilateral/multilateral agreements	Donation	COVAX	AVAT	Unknown
Ratio	0.224	0.898	0.918	0.592	0.184

Table 7 reveals that approximately 90% of sub-Saharan African countries procured vaccines through donation and COVAX, respectively. Notably, Eritrea is the only country out of 49 that attained no vaccine by the date of data collection. The proportion of countries that received vaccines by AVAT was 59.2%. Since the establishment of AVAT in early August, the prevalence of this mode was still moderate up to November 2021. Intriguingly, 18.4% of countries received a certain number of vaccines by the "unknown" mode. This implies that nine out of 49 countries had some sources of vaccine procurements, which the recipient or source country did not want to disclose information about, such as the name of the vaccine product or the mode of distribution. Which recipient countries are likely to conceal such information? Some factors correlated with the number of distributed vaccines by mode are explored below.

Table 8 summarizes the simple regression analyses based on equation (2), introduced in subsection 4.1. The regression analysis presented in the previous subsection indicated that population is a strong determinant of the total number of distributed vaccines. Therefore, the population was excluded from the analyses in this subsection. Instead, correlations between the number of distributed vaccines by mode and one among GNI per capita, the number of COVID-19 infection cases, and the number of deaths due to COVID-19 were examined using simple ordinary

least squares (OLS) regressions.

As applied to the analyses incorporated in Table 5, the need for vaccines is proxied by the number of COVID-19 infection cases and deaths. Likewise, GNI per capita is used as a proxy for the economic and financial capacity to procure vaccines. Moreover, GNI per capita symbolizes the monetary income richness of each recipient country.

Table 8. Summary of Simple Regression Analyses of Vaccine Distribution by Mode

	Capacity	Need	
Mode	Gross National Income Per Capita	Number of COVID-19 Infection Cases	Number of Deaths Due to COVID-19
Bilateral/multilateral agreements	1.440*	1.391***	1.045**
	(0.757)	(0.515)	(0.474)
	[0.063]	[0.010]	[0.032]
Donation	0.307	0.174	0.039
	(0.517)	(0.681)	(0.572)
	[0.556]	[0.799]	[0.946]
COVAX	-0.287	1.431***	1.585***
	(0.692)	(0.421)	(0.422)
	[0.680]	[0.001]	[0.000]
AVAT	0.153	1.541*	1.330*
	(0.978)	(0.880)	(0.734)
	[0.877]	[0.086]	[0.076]
Unknown	1.957***	0.609	0.319
	(0.729)	(0.735)	(0.629)
	[0.010]	[0.411]	[0.615]

Note: The logarithm is applied to all variables after replacing 0 with 1. The values in parentheses are heteroscedasticity-consistent standard errors. Those in square brackets are *p*-values. The symbols *, **, and *** signify a significance level of 90%, 95%, and 99%, respectively.

The dependent variables of the analyses summarized in Table 8 are the number of vaccines distributed by each mode on which the logarithm is applied. For countries that do not receive any vaccine in a particular mode, unity is substituted in place of zero. These logged numbers of vaccines distributed by mode were regressed to either GNI per capita, the number of COVID-19 infection cases, or the number of deaths.

An interesting observation found in Table 8 is that while vaccine distribution by "bilateral/multilateral agreements," and "COVAX" are offered generally according to the need for vaccines proxied by infection cases and deaths, those by "donation" do not follow the need at all. Certain criteria beyond the need for vaccines seem to be included in the decision-making mechanism.

Higher income countries are likely to procure more vaccines through payment. The

coefficient on GNI per capita in the regression for the mode of "bilateral/multilateral agreements" is significantly positive at the 90% level. The *p*-value of the coefficient with the heteroscedasticity-consistent standard error was 6.3%. Another mode that responds to GNI per capita is vaccine distribution by the "unknown" mode. An interpretation of this observation is that higher income countries in sub-Saharan Africa or their counterparts-sourcing countries tend to hide source and mode of the vaccines. As a result, even the citizens of the recipient country cannot know the number and source of vaccine procurement. This low transparency is more likely to be applied to higher income countries in sub-Saharan Africa.

5. Concluding Remarks

The distribution of COVID-19 vaccines to sub-Saharan Africa is a great challenge in the contemporary world. Since the end of 2019, the world has experienced several waves of COVID-19 infection. These are driven by new strains of the virus. The omicron strain will be spreading in the world by the end of 2021. To mitigate infection with various strains worldwide, the prevalence of vaccination in sub-Saharan Africa is necessary. It is a global risk to keep a geographical area unvaccinated.

This study attempted to address the challenge of enhancing COVID-19 vaccination in sub-Saharan Africa by investigating the mechanism of vaccine distribution within the region. Sub-Saharan African countries try to secure COVID-19 vaccines from various sources in various modes. Which countries have succeeded in obtaining more vaccines? How did they succeed? In contrast, what types of countries are less likely to procure vaccines? These were questions to be addressed in this study.

A feature of this study is the use UNICEF's COVID-19 Vaccine Market Dashboard, which openly provides detailed information on COVID-19 vaccine distribution to around 200 countries and territories. To the best of authors' knowledge, this is the first quantitative study that examines efficiency of vaccine distribution with this data source.

The most appealing finding in this study is that vaccines tend to reach countries where the infection is higher. In that sense, as long as vaccine distribution within sub-Saharan Africa is concerned, a certain degree of efficiency is shown. However, this does not mean that the COVID-19 vaccines supply to sub-Saharan Africa is efficient because the analyses in this study limited its scope to the allocation of vaccines within the continent. Another exercise ahead is a study covering all countries besides sub-Saharan Africa.

Another interesting finding from the analyses of vaccine distribution by mode is that higher income countries in sub-Saharan Africa tend to purchase more vaccines and conceal the sources of vaccines. This is where the strategic actions of the recipient and source countries are involved.

Finally, certain vaccine products follow mode specifications that may incorporate intrinsic vaccine distribution and procurement mechanisms. The dominance of European and US vaccines for vaccine distribution through COVAX may be caused due to the late approval of Chinese vaccines for COVAX. The outstanding presence of Chinese vaccines in commercial sales (bilateral/multilateral agreements) and donations may be the fruit of vaccine diplomacy by China.

A reservation of the conclusions given above is that some are susceptible to functional forms for the regression analyses and control variables introduced to the main explanatory variables, as shown in Table 6. The proxy for the need for vaccines was found to be statistically insignificant when a variation of the original regression equation was used, and when cross products were introduced as explanatory variables. It appears that they are, at least partially, caused by the small sample size of the data used in this study, which should be counted as an intrinsic weakness of this analysis.

The distribution of COVID-19 vaccines in sub-Saharan African countries is not completely random. Large and high-income countries tend to procure more vaccines by exerting economic and political power. However, they are not the sole determinants of vaccine distribution. Though the capacity effect is evident, there exist mechanisms that distribute vaccines based on the number of infections and deaths. There may be more factors manipulating the vaccine distribution by mode and product, which were indicated, but not sufficiently elaborated in this study.

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Appendices

Appendix Table 1. Basic Statistics of Key Variables

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Total Vaccines Distributed (Unit: doses. As of November 14, 2021)	49	3,983,995	5,590,988	0	26,200,000
GNI per Capita (USD, 2020)	49	2,190	2,839	104	14,505
Population (Estimate, 2020)	49	23,200,000	35,600,000	98,462	206,000,000
Number of Infected People (As of November 12, 2021)	49	121,909	415,858	3,730	2,924,622
Deaths Due to COVID-19 (As of November 12, 2021)	49	3,051	12,688	14	89,435
Current Health Expenditure Per Capita (2019. Purchasing Power Parity. Current International $)	48	276	356	41	1476
Number of Nurses and Midwives Per 1,000 People (Latest Value within 2016-2019)	42	1.13	0.95	0.12	4.14
Number of Physicians Per 1,000 People (Latest Value within 2016-2019)	35	0.32	0.57	0.04	2.53
Overall CPIA Score (2020)	40	3.11	0.54	1.48	4.07

Note: CPIA is the abbreviation of Country Policy and Institutional Assessment. The overall CPIA score is known as "IDA resource allocation index". The International Development Association (IDA), a body of the World Bank serving for low income countries. CPIA consists of 16 indices taking 1 as the lowest and 6 as the highest. The overall CPIA score is the average of 16 indices.

Sources:

Total Vaccines Distributed. UNICEF, COVID-19 Vaccine Market Dashboard (http://bit.ly/2NgN9w0).

GNI per Capita. United Nations Department of Economic and Social Affairs (https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/2021-retrospective-review-official.xlsx)

Population. United Nations Department of Economic and Social Affairs, *World Population Prospects 2019*.

Number of Infected People and Deaths Due to COVID-19. WHO Coronavirus (COVID-19) Dashboard (https://covid19.who.int/).

Health Expenditure, Nurses and Midwives, Physicians and CPIA. World Bank, World Development Indicators (https://databank.worldbank.org/source/world-development-indicators)

Appendix Table 2. Vaccines Distributed by Bilateral and Multilateral Agreements (Doses)

	Bharat Biotech	Janssen	Pfizer BioNTech	Serum Institute	Sinopharm	Sinovac	Sputnik
Angola	0	0	0	0	0	0	40,000
Benin	0	0	0	0	0	103,000	0
Botswana	0	0	0	0	0	0	0
Burkina Faso	0	0	0	0	0	0	0
Burundi	0	0	0	0	0	0	0
Cabo Verde	0	0	0	0	0	0	0
Cameroon	0	0	0	0	0	0	0
Central African Republic	0	0	0	0	0	0	0
Chad	0	0	0	0	0	0	0
Comoros	0	0	0	0	0	0	0
Congo, Democratic Republic of	0	0	0	0	0	0	0
Congo, Republic of	0	0	0	0	0	0	0
Cote d'Ivoire	0	0	0	0	0	0	0
Djibouti	0	0	0	0	0	100,000	0
Equatorial Guinea	0	0	0	0	0	0	0
Eritrea	0	0	0	0	0	0	0
Eswatini	0	0	0	0	0	0	0
Ethiopia	0	0	0	0	0	0	0
Gabon	0	0	0	0	0	0	0
Gambia	0	0	0	0	0	0	0
Ghana	0	0	0	2,000	0	0	21,000
Guinea	0	0	0	0	0	300,000	40,000
Guinea-Bissau	0	0	0	0	0	0	0
Kenya	0	0	0	0	0	0	0
Lesotho	0	0	0	0	0	0	0
Liberia	0	0	0	0	0	0	0
Madagascar	0	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	0
Mali	0	0	0	0	0	0	0
Mauritania	0	0	0	0	0	0	0
Mauritius	200,000	0	0	100,000	0	0	120,000
Mozambique	0	0	0	0	1,500,000	0	0
Namibia	0	0	0	0	250,000	0	0
Niger	0	0	0	0	0	0	0
Nigeria	0	0	0	0	0	0	0
Rwanda	0	0	0	0	0	0	0
Sao Tome and Principe	0	0	0	0	0	0	0
Senegal	0	0	0	0	200,000	0	0
Seychelles	0	0	0	0	0	0	0
Sierra Leone	0	0	0	0	0	0	0
Somalia	0	0	0	0	0	0	0
South Africa	0	80,000	325,260	1,000,000	0	0	0
South Sudan	0	0	0	0	0	0	0
Sudan	0	0	0	0	0	0	0
Tanzania	0	0	0	0	0	0	0
Togo	0	0	0	0	0	0	0
Uganda	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	3,644,000	5,200,000	0

Source: UNICEF, COVID-19 Vaccine Market Dashboard (http://bit.ly/2NgN9w0) (As of November 14, 2021).

Appendix Table 3. Vaccines Distributed as Donation (Doses)

	AstraZeneca	Bharat Biotech	Pfizer BioNTech	Serum Institute	Sinopharm	Sinovac	Sputnik	Unknown
Angola	720,000	0	0	0	200,000	0	50,000	50,000
Benin	0	0	0	0	0	100,000	0	0
Botswana	0	30,000	0	0	0	200,000	0	0
Burkina Faso	0	0	0	0	0	0	0	0
Burundi	0	0	0	0	500,000	0	0	0
Cabo Verde	0	0	0	0	50,000	0	0	48,000
Cameroon	0	0	0	0	200,000	0	0	0
Central African Republic	0	0	0	0	0	150,000	0	0
Chad	0	0	0	0	200,000	0	0	0
Comoros	0	0	0	0	100,000	0	0	0
Congo, Democratic Republic of	0	0	0	50,000	0	400,000	0	0
Congo, Republic of	0	0	0	0	400,000	0	0	0
Cote d'Ivoire	0	0	0	50,000	100,000	0	0	0
Djibouti	0	0	0	0	200,000	0	0	0
Equatorial Guinea	0	0	0	0	300,000	0	0	0
Eritrea	0	0	0	0	0	0	0	0
Eswatini	0	0	0	20,000	0	0	0	0
Ethiopia	0	0	0	0	1,500,000	200,000	0	0
Gabon	0	0	0	0	400,000	0	0	0
Gambia	0	0	0	0	10,000	0	0	0
Ghana	1,500,000	0	0	215,000	0	0	0	0
Guinea	0	0	0	0	400,000	0	0	0
Guinea-Bissau	0	0	0	12,000	300,000	0	0	24,000
Kenya	1,622,100	0	0	100,000	200,000	0	0	0
Lesotho	0	0	0	0	203,340	0	0	0
Liberia	0	0	0	27,000	0	0	0	0
Madagascar	0	0	0	0	0	0	0	0
Malawi	0	0	0	152,000	0	0	0	0
Mali	0	0	0	0	0	0	0	0
Mauritania	0	0	5,000	0	330,000	0	0	0
Mauritius	0	0	0	100,000	100,000	0	0	0
Mozambique	0	0	0	100,000	260,000	0	0	100,000
Namibia	275,000	0	0	30,000	20,000	100,000	45,000	0
Niger	0	0	0	25,000	400,000	0	0	0
Nigeria	0	0	0	400,000	0	0	0	0
Rwanda	1,057,000	0	751,140	50,000	200,000	0	0	0
Sao Tome and Principe	37,000	0	0	0	0	0	0	12,000
Senegal	0	0	0	25,000	300,000	0	0	0
Seychelles	0	0	0	50,000	75,000	0	0	0
Sierra Leone	0	0	0	0	400,000	0	0	0
Somalia	0	0	0	0	200,000	0	0	0
South Africa	0	0	0	0	0	0	0	0
South Sudan	0	0	0	59,000	0	0	0	0
Sudan	0	0	0	0	250,000	0	0	0
Tanzania	0	0	0	0	500,000	0	0	0
Togo	0	0	0	45,000	0	400,000	0	0
Uganda	335,500	0	0	100,000	0	1,000,000	0	0
Zambia	0	0	0	0	100,000	0	50,000	0
Zimbabwe	0	0	0	35,000	900,000	0	65,000	0

Source: UNICEF, COVID-19 Vaccine Market Dashboard (http://bit.ly/2NgN9w0) (As of November 14, 2021).

Appendix Table 4. By COVAX, African Vaccine Acquisition Trust, Unknown and Total (Doses)

	COVAX							AVAT	Unknown	Total
	AstraZeneca	Janssen	Moderna	Pfizer BioNTech	Serum Institute	Sinopharm	Sinovac	Janssen		
Angola	1,181,040	0	0	3,518,190	1,119,000	1,226,400	0	468,000	0	8,572,630
Benin	134,400	806,400	0	332,280	144,000	0	50,400	297,600	0	1,968,080
Botswana	502,560	0	0	101,790	0	0	0	432,000	0	1,266,350
Burkina Faso	222,800	302,400	0	0	0	674,400	0	151,200	0	1,350,800
Burundi	0	0	0	0	0	0	0	0	0	500,000
Cabo Verde	31,200	0	100,100	5,850	24,000	0	0	0	320,429	579,579
Cameroon	198,400	639,050	0	0	391,200	0	0	460,800	0	1,889,450
Central African Republic	80,160	638,400	0	0	80,000	0	0	0	0	948,560
Chad	0	0	0	333,450	0	0	0	0	0	533,450
Comoros	0	0	0	0	0	0	0	0	397,874	497,874
Congo, Democratic Republic of	51,840	0	250,320	749,970	271,000	0	0	756,000	0	2,529,130
Cote d'Ivoire	1,981,140	0	0	2,069,730	604,000	1,165,200	0	230,400	0	6,200,470
Djibouti	0	151,200	0	0	24,000	0	0	0	0	475,200
Equatorial Guinea	0	0	0	0	0	0	0	0	182,311	482,311
Eritrea	0	0	0	0	0	0	0	0	0	0
Eswatini	14,400	302,400	0	100,620	24,000	0	0	0	0	461,420
Ethiopia	2,779,440	2,621,750	0	1,552,590	2,184,000	1,993,200	0	271,200	0	13,102,180
Gabon	0	168,000	0	202,410	0	0	0	0	0	770,410
Gambia	38,400	302,400	0	0	36,000	0	0	52,800	0	439,600
Ghana	1,714,320	0	1,229,620	1,330,290	950,000	0	0	1,178,400	0	8,140,630
Guinea	305,760	336,000	188,400	588,510	194,400	0	1,272,000	108,000	0	3,733,070
Guinea-Bissau	28,800	302,400	0	0	28,800	0	0	0	0	696,000
Kenya	2,516,240	0	1,760,780	2,032,290	1,092,000	0	0	897,600	0	10,221,010
Lesotho	36,000	302,400	0	100,620	36,000	0	0	259,200	0	937,560
Liberia	192,000	470,400	0	0	96,000	0	0	381,600	0	1,167,000
Madagascar	242,240	638,750	0	0	250,000	468,000	0	0	0	1,598,990
Malawi	1,273,440	640,350	0	186,030	360,000	0	0	151,200	0	2,763,020
Mali	79,200	319,200	0	0	296,000	0	835,200	0	0	1,529,600
Mauritania	484,800	302,400	0	104,130	69,600	0	0	352,800	214,681	1,863,411
Mauritius	100,800	0	0	76,050	0	0	0	288,000	855,930	1,940,780
Mozambique	1,610,620	638,400	0	0	384,000	2,715,477	0	705,600	191,285	8,205,382
Namibia	108,000	0	0	224,640	0	0	0	331,200	0	1,383,840
Niger	206,400	638,400	0	0	355,200	928,800	0	0	0	2,553,800
Nigeria	9,716,240	0	4,000,080	3,577,860	3,924,000	0	0	1,797,600	0	23,415,780
Rwanda	1,081,100	0	0	2,261,610	370,000	690,000	0	259,200	722,128	7,442,178
Sao Tome and Principe	24,000	0	0	0	24,000	0	0	79,200	0	176,200
Senegal	1,329,260	638,400	0	265,590	324,000	277,200	0	158,400	0	3,517,850
Seychelles	0	0	0	35,100	0	0	0	0	27,482	187,582
Sierra Leone	280,800	151,200	0	401,310	96,000	0	0	240,000	0	1,569,310
Somalia	880,800	638,900	0	0	300,000	231,600	0	0	0	2,251,300
South Africa	0	0	0	9,269,910	0	0	0	0	15,540,435	26,215,605
South Sudan	59,520	152,950	0	0	60,000	0	0	0	0	331,470
Sudan	876,000	606,700	0	499,590	828,000	1,317,600	0	158,400	0	4,536,290
Congo, Republic of	0	470,400	0	0	0	228,000	0	204,000	0	1,302,400
Togo	383,160	0	0	405,990	296,000	0	1,027,200	592,800	0	3,150,150
Uganda	3,133,660	0	2,551,220	5,163,210	864,000	346,800	0	657,600	0	14,151,990
Tanzania	0	1,228,350	0	0	0	2,078,400	0	0	0	3,806,750
Zambia	757,300	974,400	188,400	0	228,000	0	0	338,400	0	2,636,500
Zimbabwe	0	0	0	0	0	1,378,800	0	0	0	11,222,800

Source: UNICEF, COVID-19 Vaccine Market Dashboard (http://bit.ly/2NgN9w0) (As of November 14, 2021).

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