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# SIGNIFIKAN

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THE EFFECT OF ENVIRONMENTAL TAX-SPENDING MIX ON PROVINCE AIR QUALITY INDEX  
*Riatu Mariatul Qibthiyyah, Fauziah Zen*

DO NATURAL RESOURCES AFFECT UNEMPLOYMENT? EVIDENCE FROM INDONESIAN PROVINCE PANEL DATA  
*Beni Teguh Gunawan*

FACTORS AFFECTING ECONOMIC GROWTH IN INDONESIA  
*Anna Yulianita, Dimas Resy Ramadhan, Mukhlis*

UNLOCKING INCLUSIVE GROWTH: THE IMPACT OF SHARIAH INVESTMENT IN INDONESIA  
*Indra, Muhammad Yusuf Ibrahim*

DETERMINANTS OF INDONESIAN SUGAR IMPORT  
*Winni Putri Inayatullohmah, Istiqomah, Ratna Setyawati Gunawan*

OPTIMIZING HAJJ FUND MANAGEMENT THROUGH ISLAMIC FINANCE INSTRUMENT  
*Aini Masruroh, Ahmad Rodoni, Iwan P. Pontjowinoto*

THE EFFECT OF MONETARY VARIABLE SHOCKS ON INDONESIAN PORTFOLIO INVESTMENT  
*Muhammad Khoirul Fuddin, Firdha Aksari Anindyntha*

DOES FINANCIAL INCLUSION AFFECT HEALTH AMONG OLDER ADULTS? EVIDENCE FROM INDONESIA  
*Adnan Abdurrahman, Tri Haryanto*

BANKING SELECTION CRITERIA AMONG MILLENNIALS: INSIGHTS FROM ISLAMIC AND CONVENTIONAL BANKS  
*Ali Rama, Suhenda Wiranata*

THE HAPPINESS OF THE SANDWICH GENERATION IN BALI: THE ROLES OF FAMILY, SOCIAL, AND BALINESE CULTURE  
*Ni Komang Ayu Yuniari, Ida Ayu Nyoman Saskara*

IMPACTS OF COVID-19 PANDEMICS AND WEALTH ON HOUSEHOLD CONSUMPTION IN JAVA ISLAND  
*Prima Puspita Indra Murti, Hermanto Siregar, Iman Sugema*

UNTAPPED POTENTIAL OF MANUFACTURING MSEs IN BALI AMIDST THE COVID-19 PANDEMIC  
*Ida Ayu Candrawati, Putu Ayu Pramitha Purwanti*

INFORMAL TRAFFIC CONTROLLER: STUDY ON SHADOW ECONOMY IN INDONESIA  
*Pheni Chalid, Isnati Kuswini*

SOCIOECONOMIC AND DEMOGRAPHIC CAUSES OF CRIME REPORTING IN INDONESIA  
*Wilson Rajagukguk*

DOES INDONESIA'S HIGH LEVEL OF CORRUPTION AFFECT ITS TRADE VOLUME?  
*Zuhairan Yunmi Yunan*

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## Contents

|                                                                                                          |     |
|----------------------------------------------------------------------------------------------------------|-----|
| The Effect of Environmental Tax-Spending Mix on Province Air Quality Index .....                         | 221 |
| <i>Riatu Mariatul Qibthiyah, Fauziah Zen</i>                                                             |     |
| Do Natural Resources Affect Unemployment? Evidence from Indonesian Province Panel Data.....              | 231 |
| <i>Beni Teguh Gunawan</i>                                                                                |     |
| Factors Affecting Economic Growth in Indonesia.....                                                      | 245 |
| <i>Anna Yulianita, Dimas Resy Ramadhan, Mukhlis</i>                                                      |     |
| Unlocking Inclusive Growth: The Impact of Shariah Investment in Indonesia.....                           | 263 |
| <i>Indra, Muhammad Yusuf Ibrahim</i>                                                                     |     |
| Determinants of Indonesian Sugar Import .....                                                            | 275 |
| <i>Winni Putri Inayaturohmah, Istiqomah, Ratna Setyawati Gunawan</i>                                     |     |
| Optimizing Hajj Fund Management through Islamic Finance Instrument .....                                 | 287 |
| <i>Aini Masruroh, Ahmad Rodoni, Iwan P. Pontjowinoto</i>                                                 |     |
| The Effect of Monetary Variable Shocks on Indonesian Portfolio Investment .....                          | 307 |
| <i>Muhammad Khoirul Fuddin, Firdha Aksari Anindyntha</i>                                                 |     |
| Does Financial Inclusion Affect Health among Older Adults? Evidence from Indonesia.....                  | 327 |
| <i>Adnan Abdurrahman, Tri Haryanto</i>                                                                   |     |
| Banking Selection Criteria among Millennials: Insights from Islamic and Conventional Banks .....         | 341 |
| <i>Ali Rama, Subenda Wiranata</i>                                                                        |     |
| The Happiness of the Sandwich Generation in Bali: the Roles of Family, Social, and Balinese Culture..... | 355 |
| <i>Ni Komang Ayu Yuniari, Ida Ayu Nyoman Saskara</i>                                                     |     |
| Impacts of Covid-19 Pandemics and Wealth on Household Consumption in Java Island.....                    | 371 |
| <i>Prima Puspita Indra Murti, Hermanto Siregar, Iman Sugema</i>                                          |     |
| Untapped Potential of Manufacturing MSEs in Bali Amidst the Covid-19 Pandemic.....                       | 383 |
| <i>Ida Ayu Candrawati, Putu Ayu Pramitha Purwanti</i>                                                    |     |
| Informal Traffic Controller: Study on Shadow Economy in Indonesia .....                                  | 399 |
| <i>Pheni Chalid, Isniati Kuswini</i>                                                                     |     |
| Socioeconomic and Demographic Causes of Crime Reporting in Indonesia.....                                | 413 |
| <i>Wilson Rajagukguk</i>                                                                                 |     |
| Does Indonesia's High Level of Corruption Affect Its Trade Volume?.....                                  | 425 |
| <i>Zuhairan Yunmi Yunan</i>                                                                              |     |

# The Effect of Environmental Tax-Spending Mix on Province Air Quality Index

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## Abstract

*The provincial government in Indonesia has been mandated to collect environmental-related taxes in recurrent vehicle taxes, vehicle transfer taxes, and gasoline taxes. These vehicle-related taxes have been the dominant type for the provincial government. Yet, the environment-related spending has been relatively low, within 1-3% of total expenditures. This study examines to what extent such environmental tax-spending mix affects the environmental outcomes measured by the air quality index. The novelty of this study comes in using detailed environmental-related tax revenues at the sub-national level and providing a context of the large developing country in a decentralized economy – Indonesia – as a case study. Our study finds the link between environmental tax in the case of the vehicle recurrent tax and gasoline tax in improving air quality and environmental quality index, respectively. But on the spending side, there is no evidence that provincial environmental spending may improve the air or environmental quality index. Nonetheless, we found a correlation between the vehicle transfer tax revenues and the share of province environmental spending, implying that environmental tax revenues, to some extent, correspond to the related provincial expenditures on environmental protection. This study signals the need also to expand environmental spending to complement existing environmental tax policy at the provincial level.*

## Keywords:

environmental taxes; vehicle-related taxes; sub-national level; air quality; environmental spending

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## INTRODUCTION

Environmental-related taxes can be loosely defined as taxes levied on goods and or services related to environmental depletion, such as pollution, resource exploitation, and waste, and or direct taxes on those environmental "bads" (Bosquet, 2020). For example, carbon-related and or emission taxes can be viewed as an environmental type of tax as the objective is to reduce emissions linked to pollution. The tax levied on goods and services perceived to emit high emissions is referred to as the output type of tax. In contrast, the taxes that are directly imposed on emissions perceived to be harmful to the environment are the scope of carbon emission type of tax. Taxing this so-called negative externality has been long adopted in Indonesia, though the channel is through output taxes.

The recent initiative to adopt carbon tax at the central level, as stipulated in Law 7 2021, complemented an already existing type of tax that can also link to mitigating emissions at the lower government level. For example, some of the taxes levied at the provincial level may indirectly mitigate carbon emissions. At the provincial level, there are taxes on recurrent annual vehicles tax. The vehicle registration tax refers to the tax levied when there is a change in vehicle ownership and, to some extent, gasoline taxes. Although there is a subsidy at the national level for gasoline consumption, the provinces still receive tax revenues that are based on gasoline consumption at the gas (pump) station in the respective province. In addition to tax instruments, the government also implemented programs related to environmental protection. By the function of spending, spending is allocated for environmental protection at the central and lower-level governments.

This study aims to investigate the relationship between the presence of environmental tax and spending on air quality at the subnational level. We use Indonesia, a developing country that has introduced environmental tax and spending at the provincial level since the introduction of the decentralization era. Environmental protection in Indonesia is conducted not only by the national or central government but also by the lower-level governments. As a country with three tiers of government, the central – provincial – and local governments (municipalities or cities level of government), the policies on environmental protection naturally translated in the form of taxes and expenditure policies at central and lower-level governments. However, the discussion in the existing literature, for the case of Indonesia, referring to the context of its multi-level government, rarely discusses tax policies and their link to government spending despite the nature and type of taxes and functional spending assigned to lower-level government.

Vehicle-related provincial taxes are a significant type of tax for most provinces in the context of provincial tax revenue composition. The aggregate share of these vehicle-related taxes is 70-80% of provincial government tax revenues. However, for the spending side, referring to environmental spending, the provinces' average share of environmental spending is just less than 1% of the total budget. This relatively small spending share limits the coverage and program of environmental protection by the lower-level government, the provincial, and or local governments.

In terms of environmental outcomes, the government has regularly issued provincial-level environmental quality indexes since 2009. This environmental quality index consists of a water quality index, an air quality index, and a land quality index. The environmental spending at both provincial and local governments is mainly in the form of spending on waste and sanitation. Thus, its linkages with water and land quality could be more apparent. Meanwhile, the air-quality index can be attributed to the vehicle-related taxes' main objective.

This study extends the ongoing literature in several areas. First, existing literature on the impact of environmental taxes and or environmental spending is primarily discussed in terms of type or specific program assessment referring to taxes or expenditure-related policies (Fullerton & Muelegger, 2019; Kaufmann, 2019; Kulin & Seva, 2019; Fairbrother, 2017). Regarding the tax-spending mix, only a few studies conducted taxes and spending as part of policy option assessment (Sommer et al., 2022). This paper uses Indonesia as a case study to bring a significant developing country context in a decentralized economy.

The working of policies may be inter-related, as policies on taxation may also function as a disincentive to emit emissions and or reduction in the consumption and or ownership of the respective goods and services perceived to contribute to carbon emission affecting as well not only private but also government response in terms of its public spending (Aydin & Esen, 2018; Safi et al., 2021). Given this context, the second research gap of this study is to understand which instruments, environmental-related taxes, and or the spending program on the environment may contribute to improving environmental protection indicators.

Prior studies in Indonesia, most of them separately, address the impact of sub-national level environmental spending or particular sub-national government revenues on the outcome of environmental protection (Mutiarra et al., 2021; Cadman et al., 2019). The environmental protection outcome that is used in those studies is mainly on the forestry-related outcome, which is generally only applied to some regions, especially provinces with large urban areas. The novelty of our study is examining a more general context of the sub-national government's intervention by linking the use of environmental-related taxes/revenues with the spending allocation in the respective sector.

This study is limited to the provincial level given the environmental type of taxes are relatively dominant taxes for the provinces rather than local governments. As we do not include the environmental taxes of the municipalities, the spending correspondence in this study is only assessed at the level of the provincial government as well. This study is structured as follows. Section 2 explains the data and method. Section 3 discusses and analyzes the empirical result. The last section concludes the paper.

## METHODS

The estimation model uses the panel fixed effect model with provincial environmental quality index and provincial air quality index as the dependent variables. The following is the estimation model:

$$Y_{it} = \alpha_i + \theta S_{it} + \sum \beta_j T_{it}^j + \sum \gamma_k X_{it}^k + e_{it} \quad (1)$$

Our  $Y_{it}$  represents environmental outcome, i.e environmental quality index or air quality index in the province  $i$  at year  $t$ ,  $S_{it}$  is the environmental protection spending size of the province  $i$  at year  $t$  (% to total spending, current year or one-year lag).  $T_{it}^j$  is per capita environmental taxes of type  $j$  referring to either vehicle recurrent tax, vehicle transfer tax, or gasoline tax of province  $i$  at year  $t$ .  $X_{it}$  represents other explanatory variables.  $e_{it}$  is the error term.

As shown in the estimation model, in addition to the variable of interest from the type of environmental taxes, another variable of interest is the related provincial spending variable. Therefore, the variable of interest is the share of environmental spending from the total provincial spending and per capita vehicle-related taxes. The share of environmental spending is assumed to have a positive relationship with environmental outcome indicators. Previous studies show that it is the share of the spending and not per se the level of spending that affected improved environmental outcomes (Lopez et al., 2011). Meanwhile, per capita type of taxes is frequently used in analyzing lower-level government type of taxes, generally based on consumption and or considered as community type of taxes. For these vehicle-related tax variables, we used per capita type of taxes in the estimation models as explanatory variable(s). The impact of the sub-national vehicle-related taxes may reduce emissions through lower utilization and or ownership of vehicles. As in the case of provincial environmental spending, the spending program may also target reducing pollution or, in general, improving the environmental quality.

As the type of province taxes are not earmarked directly to the spending related to provinces' spending on environmental protection, we may assume that the spending on environmental protection is independent of the province tax revenues, especially on vehicle-related taxes. However, there is also plausibility that the related province tax revenues may also influence the size of the environmental protection spending of the respective government. To incorporate a plausible link between the tax and spending policy on environmental protection, we also use a panel tobit estimation on identifying which factors affect the share of environmental spending as the sub-national level of government applies a balanced budget approach. An increase in tax revenues referring to vehicle-related tax revenues may drive spending, including a share of provincial spending on the environment. Below is the estimation model for environmental protection spending:

$$S_{it} = \delta + \sum \gamma_j T_{it}^j + \sum \beta_l Z_{it}^l + u_{it} \quad (2)$$

where  $Z_{it}$  is other explanatory variables and  $u_{it}$  is the error term.

For the above estimation model (1) and (2), the data started from 2015 as before that year there is the issue of a new province – referring to the establishment of the province of North Kalimantan. For the estimation model (1), the dependent variables are the environmental-related outcome data which consist of the environmental quality index and air quality index issued by the Central Bureau of Statistics. To note, the use

of the general index of environmental quality and a specific index of air quality, as discussed, is due to the characteristic of the provincial taxes which are dominated by the vehicle-related taxes, and in the context of environmental spending – at the provincial level, may also be used for other than programs intended directly to improve air quality. Examples of sectors that are also managed at the provincial level related to environmental protection programs are water basin management and CO<sub>2</sub> emission planning (ADB, 2016; Qibthiyyah, 2019). In the case of subnational level tax revenues data by type of taxes, relatively complete data is only available for the last ten years.

## RESULT AND DISCUSSION

For the three types of vehicle taxes, adopting vehicle recurrent tax and vehicle transfer tax may affect environmental and air quality, possibly due to changes in the number of registered vehicles irrespective of usage. In the case of the gasoline tax, as gasoline is subsidized, it generally links to vehicle usage, and gasoline, to some extent, reflects vehicle usage. The estimation results in Table 1 show a correlation between higher per capita recurrent vehicle taxes and improvement in the province's environmental quality index, specifically in the provincial air quality index. The recurrent vehicle tax is the most dominant type of tax for the provinces and is a relatively stable type of revenue. From the air quality index estimation, an increase of 100 thousand IDR per capita of vehicle recurrent tax may improve the air quality index by 5.2 points of the index.

Given that the average of per capita recurrent vehicle taxes is 131.74 thousand IDR (see Annex), there is a need for a significant increase in vehicle tax revenues to increase the province's air quality index significantly. A positive correlation between per capita vehicle recurrent tax revenues and air quality index indicates that a higher number of registered vehicles may not deteriorate air quality if it is dominated by relatively low-emission vehicles. For example, in the case of European countries, the number of vehicles on gasoline consumption has a negative effect, implying there may be a more efficient gasoline consumption from existing registered vehicles (Zimmer & Koch, 2017).

However, from the estimation of a broader outcome, the province environmental quality index, the result in Table 1 shows no effect of per capita vehicle recurrent tax. The per capita gasoline tax tends to link with the province's environmental quality index, although the effect is still relatively small. An increase of 100 thousand IDR per capita in gasoline tax only increases around 2.3 points of the province's environmental quality index. The positive correlation of per capita gasoline tax to both outcome, air quality index, and environmental quality index, as shown in Table 1 estimation results of model 1a and 1b respectively, implies that provinces with higher per capita gasoline revenues may also have higher environmental and air quality index. The results are as expected if the gasoline tax revenue increase comes from a type of gasoline that may be relatively cleaner or the type the central government does not subsidize. As a note, the gasoline taxes received by the provinces are based on retail (pump station) sales, consisting of subsidized and non-subsidized gasoline. Thus, increasing per capita gasoline taxes may indicate lower

consumption, assuming higher prices, possibly from non-subsidized gasoline, or an increase in cleaner gasoline consumption, emitting lower carbon emissions.

From the estimation results in Table 1, the vehicle transfer taxes show contradictory implications, as the higher per capita vehicle transfer tax would instead be associated with lower environmental performance for the respective provinces. The negative coefficient of vehicle transfer taxes, as shown in the estimation results of the province environmental quality index and the province air quality index, is puzzling. The vehicle transfer tax rates are progressive, and there could be a condition in which secondary vehicle ownership then shifted to a lower price of vehicles that may instead have higher emissions, or there could also be the ineffectiveness of demand management policies in the transportation sector affecting instead an increase in vehicle ownerships, such as on the policy of odd-even to mitigate road congestion (Yudhistira et al., 2019).

**Table 1. The Effect of Environmental Tax on Environmental Quality**

|                                     | Air Quality Index<br>(1a) | Environmental Quality<br>(1b) | Share of Environmental Spending<br>(2) |
|-------------------------------------|---------------------------|-------------------------------|----------------------------------------|
| Per Capita Vehicle Recurrent Tax    | 0.053*<br>(0.016)         | 0.012<br>(0.021)              |                                        |
| Per Capita Vehicle Transfer Tax     | -0.0067***<br>(0.012)     | -0.076***<br>(0.017)          |                                        |
| Per Capita Gasoline Tax             | 0.007***<br>(0.006)       | 0.023***<br>(0.008)           |                                        |
| Lag of Share Environmental Spending | 0.006<br>(0.452)          | -0.070<br>(0.599)             |                                        |
| Population                          | 6.602**<br>(1.996)        | -4.35*<br>(2.644)             | -0.0001<br>(0.0001)                    |
| Population Square                   | -0.089<br>(0.029)         | 0.089**<br>(0.039)            |                                        |
| Per Capita GRDP                     | 0.081<br>(0.093)          | 0.087<br>(0.122)              | 0.0424<br>(0.037)                      |
| Per Capita GRDP Square              | -0.00004<br>(0.0002)      | 0.00002<br>(0.0003)           |                                        |
| Vehicle Recurrent Tax               |                           |                               | 0.00027**<br>(0.0001)                  |
| Vehicle Transfer Tax                |                           |                               | 0.00045***<br>(0.0001)                 |
| Gasoline Tax                        |                           |                               | -0.0005***<br>(0.00017)                |
| Observations                        | 164                       | 164                           | 193                                    |
| R-squared                           | 0.55                      | 0.33                          |                                        |
| Log Likelihood                      |                           |                               | -282.744                               |

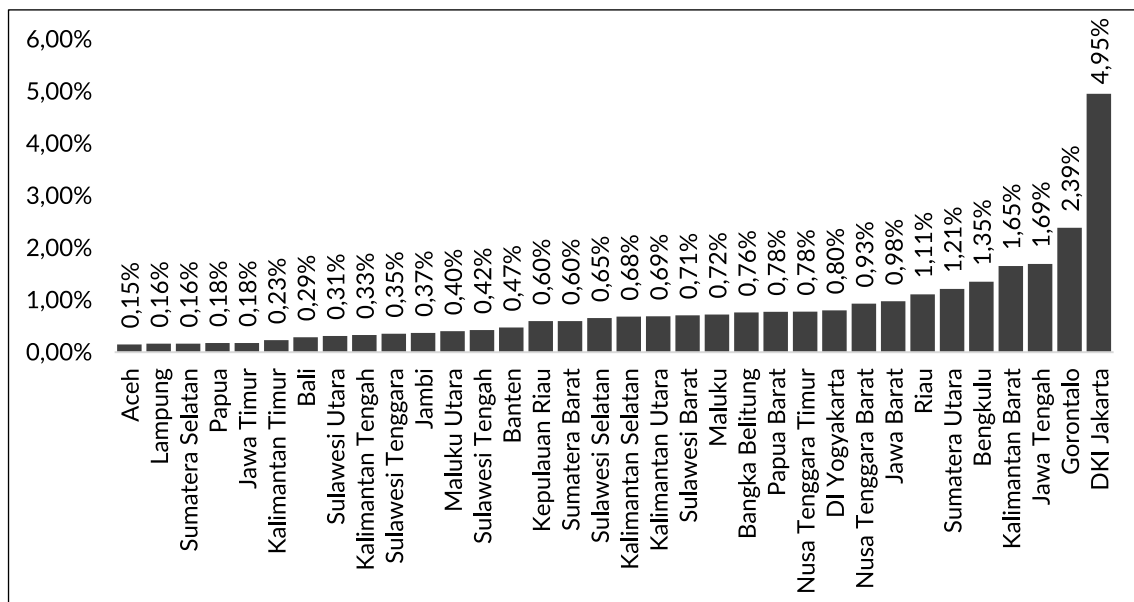
The figures in parentheses indicate the standard error. \*, \*\*, \*\*\* represent significance at the level of 10%, 5% and 1%, respectively.

Source: Author's Calculation Results (2023).

Overall, our results on the effectiveness of the three vehicle-related taxes complemented existing studies from other countries that investigate the link of vehicle-related taxes to environmental outcomes such as air quality or carbon emission (Lo et al., 2022; Moz-Christofolletti & Pareda, 2021; Streinsland et al., 2018). Our study, in terms of the effectiveness of vehicle recurrent tax and gasoline tax, is in contrast with the study by Lo et al. (2022) that shows no effect of vehicle recurrent tax and gasoline tax in reducing air pollution in the case of China. Meanwhile, Moz-Christofolletti and Pereda (2021), based on a case study of Brazil, and Steinsland et al. (2018), based on a case study of Norway, shows the effectiveness of fuel tax in reducing carbon emission and that the taxes tend to welfare improving for the case of Norway. However, it is a regressive tax in the case of Brazil.

In the context of provincial environmental spending, the coefficient of provincial environmental spending is insignificant from the estimation model of the province air quality index and the province environmental quality index. A low share of environmental spending at the provincial level, which is on average 0.8% for 2015-2020, as shown in Figure 1, may contribute to its ineffectiveness for improving the environmental quality index and in the context of province air quality. Based on the estimation result in Table 1, an additional 1% of the previous year's environmental spending would not translate to an increase in the province air quality index or province environmental quality index, as in both estimation results, the coefficient of environmental spending share is not statistically significant. These results may reflect a condition in which fiscal instrument in terms of spending is not directly allocated for the impacted agents, resulting in unclear performance indicators of the respective spending function.

Figure 1. Share of Environmental Spending (Average 2015-2020)



Source: Authors' calculation from Provincial Finance Statement (Ministry of Finance)

The per capita GRDP does not significantly affect environmental quality outcomes on other explanatory variables. It is the province's population size that may have an impact

on the province's environmental quality index. Provinces with a relatively low population may experience an increase in population size correlated with higher environmental quality. However, the correlation is reversed for the provinces with a relatively high population. These estimation results signal the inverse Kuznet effect between population size and environmental protection. Urbanization for the provinces that have not reached a threshold level is somehow beneficial for environmental protection improvement, referring to the improvement in the environmental quality index.

Furthermore, the estimation results, shown in Model 2 in Table 1, found a significant correlation between vehicle-related tax revenues and provincial environmental spending. The provinces with high vehicle-related tax revenues referring to vehicle transfer tax and recurrent vehicle tax revenues will tend to have a higher share of environmental spending. However, a negative correlation exists between gasoline tax revenues and the share of environmental spending. As the magnitude of the coefficient is relatively small, only provinces with very high revenues from these taxes may also have a corresponding high share of environmental spending. The share of environmental spending is the percentage of environmental spending from total spending, showing the government's commitment to this area in terms of spending allocation.

Our estimated results show that tax revenues are still an important aspect that needs to be mobilized. In the case of vehicle-related taxes, the taxes revenue of vehicle recurrent tax is also an objective of the government. Thus, the relief of taxes for low-emission vehicles when it is levied through the scheme of vehicle recurrent taxes needs to be ensured that it will not have a long-term impact on the reduction in tax revenues. To a degree, this vehicle recurrent tax, from our study, also shows a positive correlation with provincial government spending for environmental protection. The spending on environmental protection has been relatively low at the provincial level, within 1-3% of total spending. In the case of Indonesia, there is no fiscal rule on environmental spending despite extensive environmental-related tax instruments assigned to lower-level governments. The environmental tax-spending mix has the potential to scale up environmental protection efforts.

Even though the role of provincial spending referred to the share of the environment has not significantly affected related environmental indicator outcomes, our study finds the link between province environmental spending and its environmental-related taxes. Based on 2015-2020 provincial-level data, the correlation between environmental taxes of vehicle recurrent taxes and vehicle transfers tax with the provincial environmental spending size is positive, netting out the negative correlation of the gasoline tax. Our studies show that these environmental taxes potentially promote a higher share of provincial expenditure on the environment. The results imply how vehicle transfer tax correlates to the size of province spending for environmental protection. Therefore, this study signals the need to expand environmental spending to complement existing environmental tax policy at the provincial level. In addition to an increase in tax revenues, the taxes may somehow still improve environmental outcome, as have been shown in studies on other countries: Denmark, Norway, and China (Yan & Eskeland, 2018; Ciccone, 2018; Mabit & Fosgerau, 2011; Liu, 2023).

## CONCLUSION

Our study explores the effect of taxes and spending on environmental protection outcome indicator(s). The provincial government in Indonesia collected taxes that can be referred to as environmental-related taxes, such as vehicle, vehicle transfer, and gasoline taxes. These vehicle-related taxes have been the dominant type of taxes to the provincial government, amounting to, on average, 80% of provincial tax revenues. Among those three types of vehicle-related taxes, each may affect environmental protection directly or indirectly. In this case, a set of environmental taxes in the form of vehicle-related taxes, referring to vehicle recurrent tax and gasoline tax, have correlated with an improvement in the air quality index, a major indicator of the environmental quality index. Meanwhile, vehicle transfer tax revenues tend to negatively correlate with an improvement of the air quality index, indicating that among the three types of taxes, vehicle recurrent taxes and gasoline tax signal effectiveness for improving the air quality index. The vehicle recurrent tax also positively correlates with the share of provincial-level environmental spending.

The finding of our study indicates that going forward, in terms of policy formulation, the government needs to first assess the effectiveness of each scheme of taxes not only in terms of the tax structure but also in the likely response of each instrument as well as possible interconnected between taxes policies and government spending. For example, for the improvement of air quality, the instrument of the gasoline taxes and, to a degree, vehicle recurrent tax signal the existence of environmental dividend.

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# Do Natural Resources Affect Unemployment? Evidence from Indonesian Province Panel Data

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## Abstract

*Since the stipulation of regional autonomy in the early 2000s, local governments have managed their revenues and expenditures independently, in direct or revenue-sharing funds from the Central Government, including income from natural resource exploitation. This study aims to identify the region with high natural resources, especially from the mining and quarrying sectors, expected to improve its human resources quality, focusing on the employment sector. In addition, this study identifies the impact of natural resources on reducing unemployment in 34 provinces in 2015-2021. A previous study implemented natural resources rent to proxy natural resources in a region. However, identification of this proxy has been challenging due to the considerable informality in Indonesia. This study employs mining and quarrying sectors to proxy natural resources as a comprehensive output of a region. The data used in this study was secondary data sourced from the National Statistics Board (BPS). The analysis method of this study was fixed effect with the Human Development Index (HDI) and the unemployment rate as the dependent variable. The results of this study revealed that regional natural resources did not impact HDI or reduce the unemployment rate in a province, indicating that the mining and quarrying sectors did not contribute to improving the quality of human resources and reducing unemployment significantly.*

## Keywords:

natural resources; unemployment rate; human development index; panel data

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## INTRODUCTION

Indonesia is acknowledged as a country rich in natural resources. Some critical and particular natural resources are found in Indonesia, such as nickel and bauxite. Indonesia's government policy regarding downstream nickel ore provides the opportunity for a better economic contribution with rigorous management (Pandyaswargo et al., 2021). Overall, Indonesia's natural resources provide significant economic development opportunities despite posing challenges in terms of sustainability, environmental protection, and social equity. In the renewable energy sector, Indonesia has wind, solar, and bioenergy resources that are still in their early utilization stages. Moreover, Indonesia has one of the largest geothermal reserves in the world, with significant potential for producing clean energy.

Discussion regarding the relationship between natural resource exploitation and economic growth was initiated when Simon Kuznets introduced the inverted U curve. EKC exhibits a two-axis relationship between the environmental Kuznets Curve (EKC), a hypothesized relationship among various indicators of environmental degradation (Majid et al., 2020; Shahbaz et al., 2019). Indirectly, the EKC also indicates a relationship between the exploitation of natural resources, per capita income (Stern, 2018), and inequality (Wu et al., 2021). Although the EKC does not explicitly describe a relationship between the exploitation of natural resources and unemployment, numerous prior studies revealed that unemployment has a direct impact on economic growth (Dankumo et al., 2019; Fung & Nga, 2022; Soyulu et al., 2018). In addition, economic growth affects the condition of a country's human resources (Mahmood et al., 2019; Zallé, 2019).

Previous studies generally agree that higher exploitation of natural resources contributes to reducing unemployment (Ali & Kalsoom, 2018; Advisor & Ankenman, 2015). However, debates remain, indicating whether the relationship will be different when investigated by considering the time frame. Specific results reported that the exploitation of natural resources did not significantly impact in the short term, and the impact only occurred in the long term (Fattah, 2017). Current research issue has previously been conducted in Indonesia, reporting that natural resource revenue-sharing has an indirect impact on reducing the unemployment and poverty rate (Majid et al., 2020). An indication of the different impact of natural resources on unemployment was due to the structure of the labor market in a country. As a developing country, Indonesia has a majority informal workforce group (Gunawan, 2018; Günther & Launov, 2012; Hohberg & Lay, 2015). Thus, it was assumed that informality presents a distortion because it did not follow the general labor market (Husmanns, 2004). Informality is described as a dual economy in the labor market, lacking the standard employment relationship as a core legal and economic institution of a market economy (Adams & Deakin, 2014; Alatas & Cameron, 2008). However, the treatment of the informal labor sector is relatively different in the economy context. Previous research did not describe informal labor activities related to natural resources exploitation, solely applying natural resources rent to proxy natural resources variable. Unfortunately, the natural resources rent usually does not cover the informal activity. Previous research results indicated that many natural resource management, especially C excavation, were illegally committed in

Indonesia (Cerya & Khaidir, 2021). The relationship in the EKC for the environmental degradation variable in an area is proxied by the percentage of natural resource exploitation (Sunday, 2015). The variable percentage of natural resource exploitation in this study is proxied from the percentage of GRDP from the mining and quarrying sectors. However, the added value of a production process as a whole economic activity should be identified and reflected in the components of GDP (Murshed et al., 2020), although managing natural resources becomes an integral part of a country's political economy (Gylfason, 2018). In Indonesia, natural resource management policies can only be carried out after a while and sectorally.

This research aims to identify the impact of natural resource exploitation in reducing unemployment with the presence of the informal sector in the labor market. The novelty of this study lies in the application of the Gross Regional Domestic Product (GRDP) of the mining and quarrying sectors as a proxy for natural resources by considering that it is relatively challenging to comprehensively identify the impact of profit-sharing funds at the provincial and district/city levels due to high informality in Indonesian mining, quarrying, and labor markets. GRDP considers all mining and quarrying activities comprehensively in both formal and informal sectors. The panel regression model includes other policies that are assumed to affect improving human resource quality and alleviating unemployment. Variables that are considered to have an impact on the main variables include GRDP and GRDP per capita (Sinaga, 2020), foreign direct investment (FDI) value (Alam et al., 2020), domestic investment, minimum wage (Lemos, 2009; Meer & West, 2016; Siregar, 2020; Soares, 2005), labor force, and net enrollment rate at the vocational high school level as a proxy of human capital quality in the region.

## METHODS

The data used in this study was regarded as secondary data sourced from the Indonesian National Statistics (BPS), which was the exploitation of natural resources proxied from the GRDP of the mining and quarrying sectors. Data regarding unemployment was obtained from the National Labor Force Survey (Sakernas) publication in August each year. Meanwhile, other variables included the Human Development Index (HDI), labor force, GRDP, per capita GRDP, provincial minimum wage, foreign direct investment (FDI), domestic investment, and vocational high school net enrollment rate (APM) as a proxy for human capital in a region. The HDI, minimum wage, and APM are published annually; GRDP, per capita GRDP, FDI, and domestic investment are published quarterly.

As it publishes twice a year, this paper utilized the August Sakernas data, considered to have a more significant number of samples than the February data. In this research, the authors employed the vocational high school net enrollment rate due to the high unemployment related to this education level. The unemployment rate of vocational high school graduates in 2020 was 8.49 percent (Miko et al., 2021).

The analytical method used in this paper was panel analysis with regional analysis units. Meanwhile, during 2015-2021, complete data was available for 34 provinces starting

in 2015. The last period utilized the 2021 data due to the unavailability of FDI data for 2022. Panel data analysis generally implements the method of fixed effect, random effect, or pooled least square. The procedure for selecting the best model as the primary model implements the Hausman, Chow, and Lagrange Multiplier test (Kabdrakhmanova et al., 2021). The Hausman, Chow, and Lagrange Multiplier test results indicate that the model fixed effect depicts the best model that can be used on data in research (Widiastuti et al., 2022). The influence of a phenomenon associated with employment is often implemented with independent variables representing regional macro conditions (Herreño & Ocampo, 2023). The complete model of the panel data is illustrated in the following equation:

$$HDI_{it} = \beta_0 + \beta_1 Mining_{it} + \beta_2 GRDP_{it} + \beta_3 \ln LabourForce_{it} + \beta_4 Per\ Capita_{it} + c'X + e \quad (1)$$

$$Unemployment_{it} = \beta_0 + \beta_1 Mining_{it} + \beta_2 Per\ Capita_{it} + \beta_3 GRDP_{it} + \beta_4 \ln LabourForce_{it} + \beta_5 HDI_{it} + c'X + e \quad (2)$$

In equation (2), referred to as equation (1), HDI is influenced by several independent variables, including Mining which is the GRDP value variable from the mining and quarrying sectors in units of millions of rupiah; GRDP refers to the gross regional domestic product in units of billions of rupiah; Ln Labour Force refers to the logarithm of the number of the labor force; and per capita refers to the income per capita of the population in a million rupiahs. Meanwhile, other control variables are included in the model, such as LnMW, indicating the logarithm of the provincial minimum wage; APM refers to the pure enrollment rate at the vocational high school level; FDI refers to the value of incoming foreign direct investment to the province in a million rupiahs; and domestic refers to the value of the domestic investment in million rupiahs. Meanwhile, in equation (2), unemployment refers to the unemployment rate in province *i* in year *t* in percent units. All control variables in the second model are similar to the first model except for the HDI variable, included in this model. Regression model interpretation on fixed effect can be made according to the interpretation in the OLS. Partial effects are marked from the value of the regression coefficient of each variable.

## RESULT AND DISCUSSION

Prior to conducting inferential analysis on panel data, the initial procedure is conducted to perform a descriptive analysis of each variable. The total number of variables included in the first and second equations consists of ten variables. The formed panel data is strongly balanced with 238 observations on each variable or 34 units of cross-sectional provinces over seven years. The transformation is performed on the Labor Force and MW variables to facilitate the interpretation of the model.

The results of the descriptive analysis indicate that the range of data on the HDI variable is quite wide, with a standard deviation of 4.08 and an average of 70.19, depicting that human development in Indonesia is unequal. The highest score was achieved by the Province of DKI Jakarta in 2021. In comparison, the Province

of Papua obtained the lowest score in 2015. Referring to the HDI trend from year to year, the trend tends to rise steadily, along with the unemployment rate, which also tends to move constantly in contrast to the fluctuating contribution of mining and quarrying sectors to the provincial GRDP. The trend for this variable increased between 2015 and 2018 but tended to decrease during the COVID-19 pandemic. In the descriptive analysis section, it is identified that the changes in GRDP fluctuations in the mining and quarrying sectors had no impact on HDI and unemployment. On the other hand, unemployment and HDI had almost the same pattern, potentially indicating a relationship.

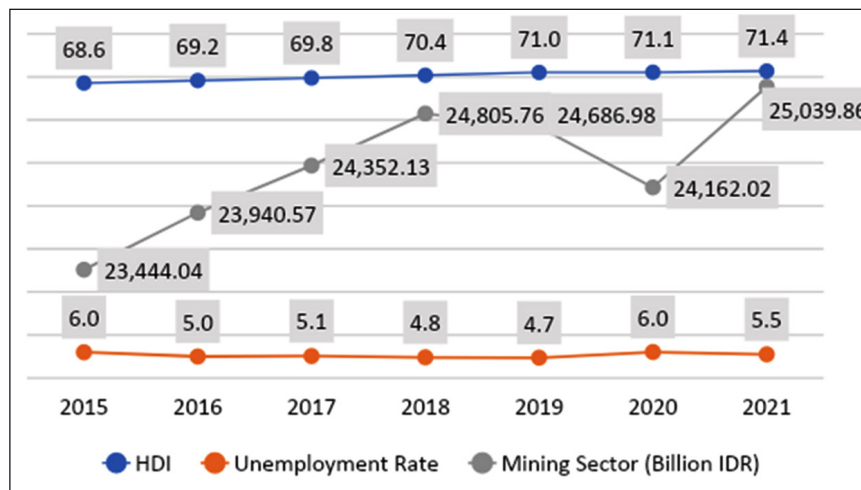
**Table 1. Descriptive Analysis**

| Variable                           | Obs. | Max. Value   | Min. Value | Average    | Std. deviation |
|------------------------------------|------|--------------|------------|------------|----------------|
| HDI                                | 238  | 81,11        | 57,25      | 70,19      | 4,08           |
| GRDP per capita (millions rupiahs) | 238  | 174.941,72   | 11.087,91  | 41.368,75  | 31.040,56      |
| Unemployment                       | 238  | 10,95        | 1,40       | 5,30       | 1,88           |
| Log Labour Force                   | 238  | 17,02        | 12,55      | 14,57      | 1,02           |
| APM                                | 238  | 143,63       | 81,68      | 105,14     | 8,59           |
| Log Minimum Wage                   | 238  | 15,30        | 13,72      | 14,59      | 0,27           |
| PMDN (billion rupiahs)             | 238  | 62.094,80    | -          | 9.385,50   | 12.981,89      |
| FDI (billion rupiahs)              | 238  | 5.881,00     | 2,00       | 872,92     | 1.200,45       |
| GRDP (billion rupiahs)             | 238  | 1.856.075,82 | 20.380,30  | 303.377,60 | 428.600,14     |
| Mining (billion rupiahs)           | 238  | 233.680,62   | 294,31     | 24.347,34  | 41.106,45      |

The procedure of inferential analysis for panel data was conducted to determine the best model. This research employed Lagrange Multiplier test, Chow and Hausman to identify the model (Kabdrakhmanova et al., 2021). Based on the results of the Lagrange Multiplier test, Chow and Hausman, it was found out that the best model used in the first model was the fixed effect, as well as for model 2. The pretest procedure as shown in Table 2 concludes that the testing pooled least squares and random effects using the Lagrange Multiplier test, model 1 and model 2 have a p-value of less than 5 percent alpha, similarly for model 2. Hence, it is concluded that the random effect model is better than the pooled least squares. Based on the Chow test, conducted to determine the best model between the pooled least squares and the fixed effect, the results are similar between models 1 and 2, which reject H0; thus the fixed effect is better than the pooled least squares. The final test was conducted by the Hausman test to determine the best model between the random and fixed effects, indicating that the p-value for both models is less than 5 percent alpha; thus the decision is to reject H0, which means that the fixed effect model is better than the random effect.

Albeit the pretest conclude that fixed effect is the best model, the inferential model result in Table 3 displays the result of random effect and pooled least square as a comparison. Panel data analysis employing the fixed effect in Model 1 with HDI as the dependent variable displays that only the labor force and minimum wage variables significantly impact to HDI, which is positive, with a coefficient value of 5, 00 and 3, 95 respectively. The interpretation of fixed effect coefficients for Labor Force variable is every one percent increase in the labor force in a province will increase the HDI by approximately 5 points. As for the minimum wage variable, every one percent increase in a province's minimum wage will have an impact on increasing HDI by 3.95 points. These results are in accordance with the previous studies concluding that minimum wage had the positive and significant impact to HDI (Cahyanti & Fevrieria, 2020; Herman, 2021).

Figure 1. Average HDI, Unemployment, and GRDP of the Mining and Quarrying Sector 2015-2021



Source: BPS (Data processed)

Similar results are found for labor force variable in Model 1 utilizing random effect and pooled LS. Random effect and pooled LS indicate the different result for main variables (mining), minimum wage, GRDP per capita, PMDN, FDI, and GRDP in Model 1. Random effect model was significant for minimum wage, while pooled LS was significant in the rest of the variables. Although the result did not impact the whole model, but it indicates that the different treatment for the same data could generate the different conclusion.

Table 2. Best Model Conclusion

| Test                | Model 1 |           |               | Model 2 |           |               |
|---------------------|---------|-----------|---------------|---------|-----------|---------------|
|                     | Results | Decision  | Conclusion    | Results | Decision  | Conclusion    |
| Lagrange Multiplier | 0,000   | Reject H0 | Random Effect | 0,000   | Reject H0 | Random Effect |
| Chow                | 0,000   | Reject H0 | Fixed Effect  | 0,000   | Reject H0 | Fixed Effect  |
| Hausman             | 0,022   | Reject H0 | Fixed Effect  | 0,0061  | Reject H0 | Fixed Effect  |

In Model 2, unemployment is presented as the dependent variable with all other variables include in the model. The fixed effect founds that the HDI variable, the vocational high school net enrollment rate, and the minimum wage significantly impact the unemployment rate. The HDI variable has a negative impact with a coefficient value of -0.64, indicating that every one-point increase in HDI would reduce the unemployment rate by 0.64 percent. The net enrollment rate variable for vocational high school has a significant impact with a coefficient value of -0.02, indicating that every one-point increase in the pure enrollment rate for vocational high school education would lessen the unemployment rate by 0.02 percent. In Model 2, only the minimum wage variable positively and significantly impacts the unemployment rate. The minimum wage variable has a coefficient of 3.04, indicating that every one percent increase in the minimum wage would increase unemployment by approximately 3 percent.

Table 3. Panel Data Analysis Results

| Variables                          | Model 1                |                                   |                           | Model 2                |                        |                          |
|------------------------------------|------------------------|-----------------------------------|---------------------------|------------------------|------------------------|--------------------------|
|                                    | Fixed Effect           | Random Effect                     | Pooled LS                 | Fixed Effect           | Random Effect          | Pooled LS                |
| HDI                                |                        |                                   |                           | -0,64 <sup>**)</sup>   | -0,07                  | 0,04                     |
| Mining (billion rupiahs)           | 5,86x10 <sup>-6</sup>  | 1,98x10 <sup>-6</sup>             | -3,2x10 <sup>-5**)</sup>  | 1,32x10 <sup>-5</sup>  | -4,04x10 <sup>-7</sup> | -2,00x10 <sup>-6</sup>   |
| GRDP per capita (millions rupiahs) | 9,41x10 <sup>-6</sup>  | 2,32x10 <sup>-5**)</sup>          | 1,1x10 <sup>-4**)</sup>   | -1,86x10 <sup>-5</sup> | 9,5x10 <sup>-6</sup>   | 1,05x10 <sup>-5</sup>    |
| Log Labour Force                   | 5,00 <sup>**) )</sup>  | 3,03 <sup>**) )</sup>             | 2,243 <sup>**) )</sup>    | -0,22                  | -0,19                  | 0,07                     |
| APM                                | -0,0026                | -0,027                            | -0,014                    | -0,02 <sup>)</sup>     | -0,02                  | -0,004                   |
| Log Minimum Wage                   | 3,95 <sup>**) )</sup>  | 4,466 <sup>**) )</sup>            | -1,265                    | 3,04 <sup>**) )</sup>  | -0,006                 | 0,65                     |
| PMDN (billion rupiahs)             | 7,59x10 <sup>-6</sup>  | 8,41x10 <sup>-6</sup>             | 10 <sup>-4**)</sup>       | 2,15x10 <sup>-5</sup>  | 1,13x10 <sup>-5</sup>  | 3,57x10 <sup>-5</sup>    |
| FDI (billion rupiahs)              | -8,05x10 <sup>-5</sup> | -1,1x10 <sup>-4<sup>)</sup></sup> | -6x10 <sup>-4**)</sup>    | -1,54x10 <sup>-4</sup> | -4,43x10 <sup>-5</sup> | 5,59x10 <sup>-4**)</sup> |
| GRDP (billion rupiahs)             | 5,6x10 <sup>-7</sup>   | -1,5x10 <sup>-6</sup>             | -5,35x10 <sup>-6**)</sup> | 1,96x10 <sup>-6</sup>  | 1,59x10 <sup>-6</sup>  | -1,20x10 <sup>-6</sup>   |

Note: \*\*) significant at 5% alpha; \*) significant at 10% alpha; a total of 238 observations with a total of 34 cross-sectional units

Table 3 depicts that the main variable (mining) is not significant even for all three methods. Fixed effect model coefficient result has the different direction compared to random effect and pooled LS. The fixed effect has positive and insignificant result, while random effect and pooled LS have negative result, which are different from previous studies, indicating the significant impact of natural resources to unemployment (Ali & Kalsoom, 2018). However, this result indicates that the time frame of panel data matters for short and/or long term impact (Fattah, 2017), rather than for informal sector.

Based on the results of the fixed effect regression analysis, facts were obtained related to the various variables included in Models 1 and 2. In Model 1, it can be

proven that the variables, expected to support human development in a region, do not have a significant impact. Foreign and domestic investments are expected to boost the regional economy and to improve the quality of human resources, but they still need to meet expectations, indicating that the priority of FDI and domestic investment is currently focused on something other than increasing human resource capacity. However, instead of technology transfer (Su & Liu, 2016) the characteristics of the industry are more capital-intensive (Henok & Kaulihowa, 2022). In addition, FDI is more likely to implement skilled labor (Fagbemi & Osinubi, 2020) than workers with low skills. Thus, FDI cannot be utilized to improve the quality of human resources. Instead, the quality of human resources must be initially improved to align with incoming FDI (Dankyi et al., 2022). In Model 2, FDI and domestic investment are also evident to have no impact on reducing unemployment. Alike the case in Model 1, FDI tends to be capital intensive, prioritizing skilled workers, hindering workers with low skills.

The minimum wage variable has a significant impact on both models. In the first model (Model 1), the minimum wage variable has a positive impact, indicating that an increase in the minimum wage also increases the HDI of a region. The minimum wage becomes one of the components of the Gini ratio income, as an indicator of the HDI (Stewart, 2019). In Indonesia, the relationship between the minimum wage and HDI has been widely studied by including a combination of inflation (Herman, 2021) and regional income (Ali & Azhari, 2021). Meanwhile in Model 2, the relationship between the minimum wage and unemployment has been widely studied before, and the results tend to vary. In developed countries, the minimum wage tends to have a negative impact on unemployment (Azar et al., 2019; Campolieti et al., 2005; Dickens et al., 1999; Lee & Saez, 2012; Meer & West, 2016; Yuen, 2003). In Indonesia, the impact of the minimum wage tends to be anomalous. The minimum wage has a negative impact, especially on the formal sector, because this sector is covered by the minimum wage (Siregar, 2020). However, the minimum wage does not impact the informal sector (Wahyuningsih et al., 2020). On the mining variable, which is a proxy for regional natural resource resources, based on regression, it depicts insignificant results for both Models 1 and 2, indicating that the development priorities of areas rich in natural resources have yet to lead to an increase in HDI and a reduction in unemployment.

Natural resources are essential to a country's economy, especially in economic growth and job creation, because good natural resource management could benefit the society, including job creation. In addition, natural resource exploitation activities, such as mining or plantations, could provide numerous employment opportunities for local people, thereby reducing the unemployment rate in the area. Natural resources also boost state/province revenue, from which governments can earn significant revenue through exports of natural resources. This income can, thus, finance development and social welfare programs, such as building infrastructure and providing health and education services.

However, exploiting natural resources might lead to negative impacts if inappropriately. Excessive and poorly use of natural resources could lead to environmental degradation, such as forest destruction, water and air pollution, and ecosystem damage. Exploiting

natural resources could cause conflict among parties, companies, and local communities, thereby exacerbating the social and economic situation in the area. Exploitation of natural resources often only benefits a few people or companies, while local communities need more of these benefits. This situation could lead to social injustice and discontent public. To reduce these negative impacts, the government and companies are demanded to properly conduct the socially responsible management of natural resources. Furthermore, governments could also strengthen environmental regulation and protection by the provision of training and supports to local communities in order to develop other sectors which could potentially create new jobs.

Although several provincial governments in Indonesia have announced human resources as one of the priorities, results have been far from evident. Natural resources do not necessarily hamper human progress. However, poor governance could negatively impact HDI by not diverting the rents on the growth path. The results of this study suggests that an appropriate policy for the better utilization of resource rents with good governance will lead to inclusive growth and human development which are in accordance with prior study (Chen et al., 2023). Top-down policies and practices for citizen engagement and local involvement in natural resource governance do not sufficiently reduce power imbalances in extractive sector decision-making or enhance socially just and democratic processes as also reported by prior study (Kurniawan et al., 2022). The results of this study are expected to boost and influence governance capacities and resources, as well as capabilities, including local decision-makers and agents in proportion to their responsibilities. Inclusive governance of natural resources, thus, requires that legal governance mandates be matched to resources and powers for lower-level decision-making agents to complement and support their mandates and capabilities (Mustalahti & Agrawal, 2020). Hence, a more systematic and transparent management of natural resources and the involvement of local governments is deemed required to handle natural resources in their area directly.

Related to reducing unemployment, the handling is more complex because it covers cross-sectoral. Most important consideration is emphasized on the commitment to improve a region's human resources quality. The quality of human resources serves as a fixed price for developing a region. The common issues related to unemployment include the availability of a better education system and an excellent intermediary system between school and job transition. The rising level of education has provided the warranty of rising human capital (Becker, 1962). Therefore, if we have an educated labor force, half of our unemployment will automatically vanish (Ibupoto et al., 2018). Referring to the results of this study, the three issues were navigated in reducing unemployment in Indonesia: firstly, the high number of the low-skill labor force; secondly, a new culture of a young workforce expecting life work balance and work with high flexibility; and lastly, supply-demand mismatch. As we live in high technology and digitalization, our education system is currently prepared to anticipate the change. The labor market does not directly absorb output from our education system due to skill differences. On the other hand, industries run faster with a small group of workers with their world, high flexibility, and efficiency.

Indonesia's employment system also unfortunately creates an uncomfortable environment at work. Another labor problem that draws more serious attention includes the high percentage of workers who do not engage in a full-time job or are underemployed. This fact signifies that many workers undertake unproductive work, whatever available to survive, working for long hours with fewer wages and retaining their poor living condition (the working poor). On the other hand, real jobless people are only sometimes considered poor, in the case of Indonesia, who does not impose jobless security, in which people must work to make a living (Nagib & Ngadi, 2008). This problem causes a high turnover among formality, informality, and unemployed (Gunawan, 2017).

## CONCLUSION

The results of the analysis revealed that natural resources do not have a significant impact on the employment sector, especially in reducing unemployment. There are two possibilities on why natural resources have no impact. First, the portion of income from natural resources is minimally allocated to the regions. Second, local attention to reducing unemployment is also minimal considering that physical infrastructure projects are considered more attractive to increase public attention. Hence, it is deemed important to conduct an in-depth study regarding the portion of natural resources revenue-sharing funds to improve regional welfare. Likewise, strict supervision is required regarding the utilization of these funds, including for the non-physical sector such as employment.

During the reform period, regional financial management adhered to the principles of fairness and transparency, in which regions with high sources of natural resources would receive comparable profit-sharing funds. Regional development priorities play a key role in regional financial management. Based on the quantitative analysis of this study, it is apparent that the natural resources of the area have no impact either on the HDI or on reducing unemployment in a province. Although the relationship between natural resources and unemployment reduction could not be stated to be direct, the best way to reduce unemployment is by improving human resources' quality for better preparation to enter the labor market. Several regions have announced human resources as one of the priorities, despite unproven results. Consequently, it takes a more complicated effort and extended time to comprehend investment in human resources.

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## Factors Affecting Economic Growth in Indonesia

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### Abstract

*Inclusive economic growth is an important issue in Indonesia, given the country's uneven economic history and many social and economic inequalities. Despite significant economic progress in recent decades, many Indonesians still live in poverty and are marginalized from economic progress. The data used in this study are panel data from cross-sectional data, namely data from 34 provinces in Indonesia, and time series data, namely data from 2012–2021. The analysis technique used is panel data regression with the fixed effect model method. Based on the results of the study, it is clear that the relationship between poverty, unemployment, and economic inequality is negative and significant for inclusive economic growth in Indonesia. The analysis also emphasizes that efforts to achieve inclusive economic growth should focus on community empowerment, investment in education and training, inclusive infrastructure development, and policies focused on sustainable economic development.*

### Keywords:

poverty; unemployment; economic inequality; inclusive economic growth

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## INTRODUCTION

As a developing country, Indonesia strives to realize people's welfare through economic growth (Wibowo, 2019). Economic growth is said to be one of the indicators used to measure the success of a country's development (Valickova et al., 2014). However, the problem is that high economic growth is not enough to ensure the development of people's welfare (Dauda, 2016). On the contrary, various issues must pay attention to income equality and poverty and unemployment alleviation. There are still differences in regional development due to inequality in income distribution, causing situations that can increase poverty (Fosu, 2015). Based on these conditions, one of the economic development strategies is more directed at paying attention to the quality of economic growth through inclusive economic growth (Yurui et al., 2021). According to Corrado (2017), inclusive growth is a concept that develops fair opportunities for economic actors during economic growth. By ensuring that all communities benefit from economic growth, inclusive growth can help create a more stable and harmonious environment (Naustdalslid, 2014).

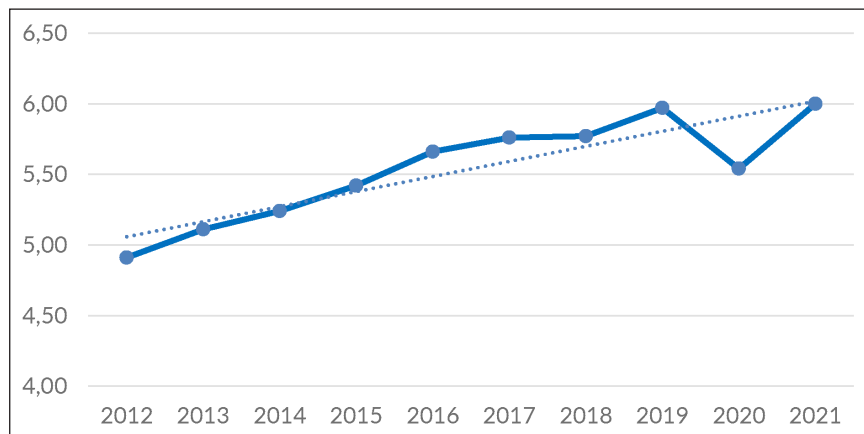
The objective of inclusive economic growth, according to the Asian Development Bank (2011), explains that, considering harmony and fairness, a good and inclusive distribution of growth in all regions is necessary. Second, economic growth with a high level of inequality will lead to dangerous social conditions, for example, crime because of the large number of unemployed. The three continuing inequalities will impact political stability, disrupting sustainable growth.

Inclusive economic growth is an essential issue in Indonesia, given the country's uneven economic history and many social and economic inequalities (Libassi, 2020; Nugraha et al., 2020). Although there has been significant economic progress in recent decades, many Indonesians still live in poverty and are marginalized from economic progress (Gupta et al., 2016; Leichenko & Silva, 2014; Gatzweiler & Baumüller, 2014). Based on Figure 1, inclusive economic growth in Indonesia has not shown maximum improvement. Inclusive economic growth increased from 2012 to 2019 but decreased in 2020. In that year, it was difficult for people to experience mobility because, at that time, the government imposed lockdown rules for every area infected with the COVID-19 virus (Hensher, 2020; Kanda & Kivimaa, 2020).

The problems of poverty, unemployment, and inequality in Indonesia have not been completely resolved. Although there has been a decrease in the poverty rate in recent years, around 9.2 percent, or around 24 million people, will still live below the poverty line in 2020 (Central Statistics Agency, 2020). Poverty rates are also higher in rural and remote areas (Wirawan & Gultom, 2021; Priasto & Ginting, 2015). Poverty is a significant obstacle to achieving inclusive economic growth, as impoverished people do not have equal access to opportunities and resources (Kim et al., 2013; Scheyvens & Biddulph, 2018; Etuk et al., 2014). The economic development literature has widely discussed the relationship between poverty and economic growth over the past few decades. Dauda (2016) examines issues surrounding the paradox of increasing poverty amid high economic growth in Nigeria. He argues that this absurdity includes

unemployment growth, non-pro-poor growth, and the failure of poverty alleviation initiatives to address the structural transformations necessary for sustainable growth, job creation, and bridging income gaps in the economy. With the same goal, Garza-Rodriguez (2018) examines the problem of economic growth in Mexico, showing the negative influence of poverty on economic growth. Research with similar results has also been examined by Iniguez-Montiel (2014).

Figure 1. Indonesia's Inclusive Economic Growth 2012-2021



Source: Development Planning Agency (2012-2021)

In addition to poverty, unemployment is a significant problem in Indonesia (Siregar, 2020; Sasongko & Huruta, 2019). The unemployment rate is still relatively high, especially among youth and less developed areas. High unemployment can hinder inclusive economic growth because it causes a decrease in people's purchasing power and impacts decreasing demand for goods and services (Amorós et al., 2019; Omoniyi, 2018). In addition, unemployment can also exacerbate poverty and social and economic inequality, as unemployed people tend to have low incomes and have difficulty making ends meet (Prawitz et al., 2013; Gudmundsdottir, 2013). As a result, poverty rates and social and economic inequality may worsen further, thus amplifying the negative impact of unemployment on inclusive economic growth. The complex relationship between unemployment and economic growth has been examined by Mohseni and Jouzaryan (2016), who examined the influence of these two variables in Iran. Another study by Olusadum (2018) examined the situation in South Africa.

Inequality between developed and underdeveloped regions is also a problem in Indonesia (Yusuf & Resosudarmo, 2015; Gibson et al., 2021). There is significant inequality in terms of household expenditure between developed and lagging provinces (Turner, 2014). This inequality can have a negative impact on inclusive economic growth as it can exacerbate poverty and social and economic inequality (Ncube et al., 2014; Ratnawati, 2020). Inequality can strengthen the dominance of already wealthy groups and hinder the progress of underprivileged groups (Jetten, 2019). This condition can result in social and economic injustices and exacerbate disparities between groups of people.

Research related to inequality in economic growth has been studied in several countries (Halter et al., 2014; Goschin, 2015; Kim, 2016).

Based on this theory, it can be observed from previous research that the relationship between variables and inclusive economic growth has several different results from several previous studies. In line with research (Hapsari et al., 2013; Rini & Hamonangan, 2021), which explains the phenomenon of inclusive growth in reducing poverty, reducing inequality, and increasing employment, it occurs more in the western part of Indonesia. Likewise, Andrian (2020), Sholihah et al. (2014), and Purwanti & Rahmawati (2021) prove that poverty, unemployment, and inequality have a negative and significant effect on inclusive economic growth but not fully inclusive growth, namely the poverty equivalent growth (PEG) method. In further contrast with the study conducted by Anyanwu et al. (2013) and Lee & Sissins (2016), which found that education and income distribution variables have a positive effect on inclusive economic growth, Sitorus and Arsani's (2018) research on inclusive economic growth has shown satisfactory results for infrastructure and education. Folarin's (2019) research shows that financial inclusion and inclusive growth have a positive relationship because they are achieved by reducing income inequality.

Then, several previous studies at the provincial level, namely research conducted by Nurlina *et al.* (2021), stated that while poverty and the Gini Ratio did not affect economic growth, the workforce positively impacted inclusive economic growth in the province of Aceh. Furthermore, research conducted by Rahmawati *et al.* (2021) with statistical test analysis shows a significant influence of COVID-19 on inclusive economic growth in East Java. In her research, Azwar (2019) states that the variables unemployment, education, and poverty negatively influence inclusive economic growth. Furthermore, research conducted by Aimon *et al.* (2020) concluded that inclusive growth has a positive and significant effect on health, education, investment, and government spending. Meanwhile, inclusive growth in income inequality has a negative and significant effect on health, education, investment, and government spending in West Sumatra.

Based on the arguments above, this research is exciting and deserves to be studied more deeply. Despite Indonesia's economic growth, there are still significant problems in poverty, unemployment, and inequality. By highlighting this, the analysis shows that more than economic growth that relies solely on national statistics is needed to achieve inclusive and sustainable development goals. The analysis also emphasizes that efforts to achieve inclusive economic growth should focus on community empowerment, an investment in education and training, inclusive infrastructure development, and policies focusing on sustainable and environmentally sound economic development. In addition, research using panel data from all provinces in Indonesia still needs to be conducted concerning inclusive economic growth.

## METHODS

The type of research used in this study is quantitative descriptive research. The type of data used in this study is secondary data, where the data obtained comes from the

publication website of the Central Bureau of Statistics and Development Planning using dependent (related) variables, namely Inclusive Economic Growth in Indonesian provinces in 2012-2021. In comparison, the free variable uses data on poverty, unemployment, and economic inequality in Indonesian provinces. The data used in this study were at the national level.

The panel data regression analysis combines date time series and cross-section with estimation model methods: Common Effect Model, Random Effect Model, and Fixed Effect Model. It uses two model estimation techniques. Both techniques are used in panel data regression to obtain precise models in panel data regression estimation, Chow Test, and Hausman test. Test the hypothesis using the F-test and the t-test. Panel data analysis helps evaluate the effect of Independent Poverty (P), Unemployment (U), and Economic Inequality (EI) variables for Dependent Variables, namely Inclusive Economic Growth (IEG). The mathematical equation of this research as follows:

$$IEG_{it} = \alpha_{it} + \beta_1 P_{it} + \beta_2 U_{it} + \beta_3 EI_{it} + \varepsilon_{it}$$

Where: IEG = Coefficient or Index of Inclusive Economic Growth in Indonesian Provinces; P = Poverty in Indonesian Provinces; U = Unemployment in Indonesian Provinces; EI = Economic Inequality in Indonesian Provinces;  $\alpha$  = Regression Coefficient;  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  = Coefficient of independent variable  $\varepsilon$  = error term; i = 34 provinces in Indonesia; t= Year.

## RESULT AND DISCUSSION

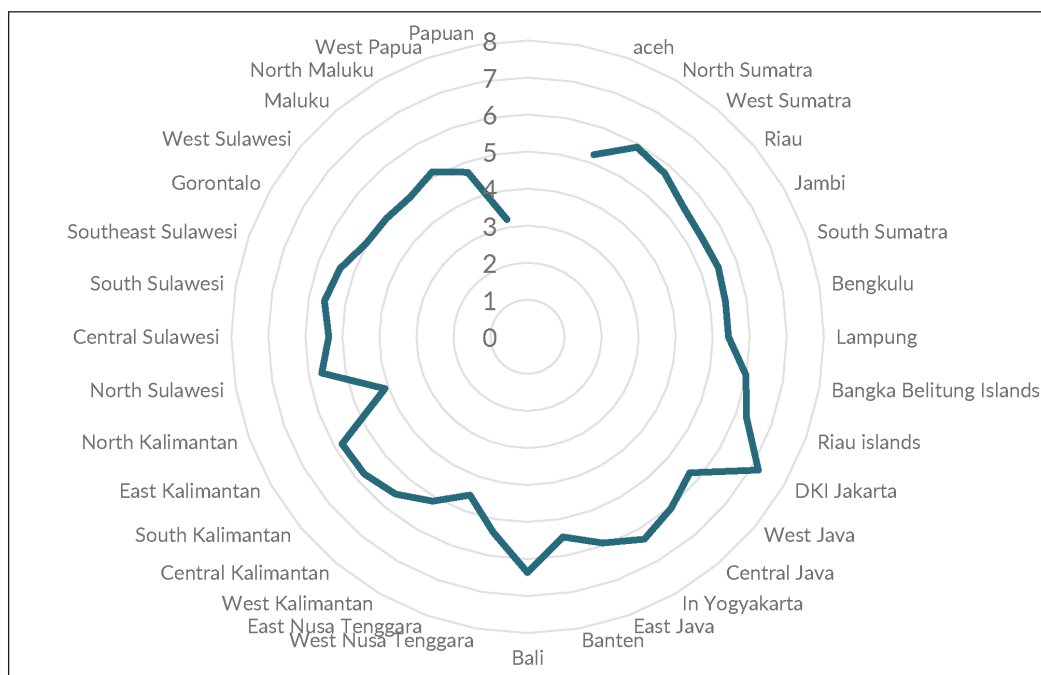
From the perspective of measuring the quality of economic growth, in addition to looking at the achievements of economic and social indicators, the measurement of the quality of economic growth can be seen in the value of the Inclusive Growth Index (IGI). This composite index is based on grading methods and weighting schemes. For the measure of economic growth, including in provinces in Indonesia, it is seen utilizing measurement, namely the achievement of a scale of 1-3 percent is unsatisfactory, a scale of 4-7 percent is satisfactory, and a scale of 7-9 percent is very satisfactory. Economic growth, including in Indonesian provinces, is shown in Gambar 2.

According to data published by the Planning and Development Agency (BAPPENAS), the province with the highest inclusive economic growth in Indonesia during 2012-2021 is DKI Jakarta Province, with an average satisfaction score of 7,197 percent. Jakarta has a conducive employment system to reduce poverty levels and absorb labor. Meanwhile, Papua Province has the lowest inclusive economic growth with an average value of 3,717 percent.

High inclusive economic growth in DKI Jakarta Province occurs due to several factors, such as geographical conditions, the existence of business and financial centers, and local government policies that support economic inclusivity. In addition, Jakarta is the center of economic and business activities in Indonesia, so many national and international companies have their headquarters and branches in Jakarta (Firman & Fahmi, 2017). It offers many job opportunities in various sectors, such as finance, trade, services, and

industry. In addition, local governments have also implemented various policies to expand employment, such as job training and education programs that focus on industry needs (Sulistiyadi et al., 2017). This program allows people to develop skills and employability to compete in an increasingly competitive labor market. With available employment and easy accessibility, people can reduce poverty rates and improve economic well-being. Therefore, a conducive employment system in Jakarta plays a vital role in encouraging inclusive economic growth that has a positive impact on society and the country as a whole (Lestari & Rahmawati, 2021).

**Figure 2. Provincial Inclusive Economic Growth in Indonesia 2012-2021**



Source: Development Planning Agency (2012-2021)

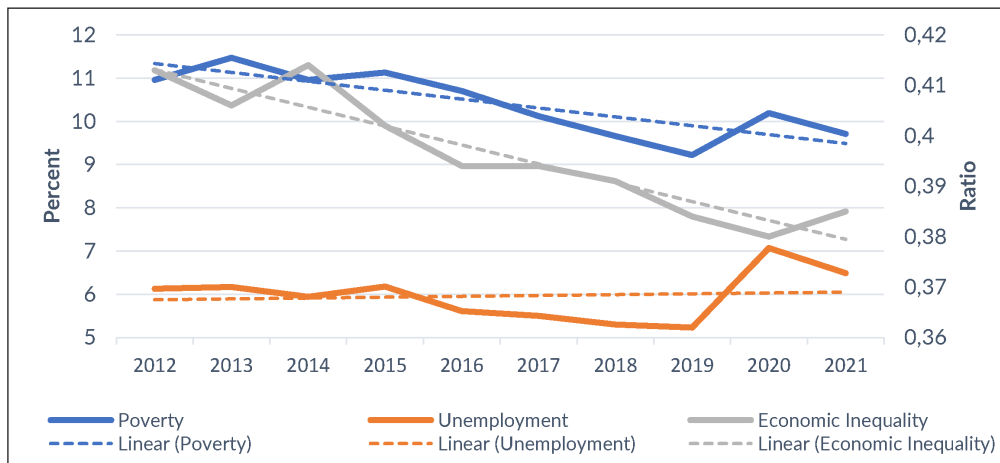
Inclusive economic growth in Papua Province is low compared to other provinces in Indonesia. Wilayah Papua still faces infrastructure, energy availability, and accessibility to markets and resources (Fauzi et al., 2019). This condition makes developing adequate economic sectors and investments difficult, thus hampering inclusive economic growth. The lack of accessibility to education and skills makes it difficult for Papuans to compete in an increasingly competitive labor market (Dong & Manning, 2017). In addition, the high poverty rate in the Papua region makes it difficult for many Papuans to find decent work and develop businesses. Significant cultural and linguistic differences in the Papua region can hinder inclusive economic development.

Based on Figure 3, the trend of poverty in Indonesia is relatively down every year but has not dropped significantly. The Government of Indonesia has implemented various development programs and improved community welfare, such as family hope programs, cash social transfers, and non-cash direct transfers (Aziz et al., 2021). These programs aim to help impoverished families meet basic needs such as food, clothing, and shelter.

However, this has yet to be implemented evenly throughout Indonesia. High economic growth only occurs in certain regions, such as Java and Bali, while others still need more growth. This condition causes economic disparities and poverty between regions to occur.

The unemployment rate showed a downward trend during 2012–2021 but has not shown satisfactory results. During this period, the Indonesian government has implemented programs to improve the quality of education and job training (Tamsah et al., 2020). However, there is still a gap between the workforce's skills and the job market's needs. Indonesia has a large population, thus affecting the number of unemployed (Atmojo & Fridayani, 2021). Although there is a decrease in the number of unemployed, the decrease is still not significant compared to Indonesia's population. Despite the increase in economic growth, the growth has not been optimized. This condition is because many economic sectors have not developed properly, and there are still development inequalities between regions in Indonesia.

Figure 3. Poverty, Unemployment and Economic Inequality in Indonesia



Source: Central Bureau of Statistics (2012-2021)

Poverty and unemployment show a downward trend, but inequality shows an upward trend. Economic growth in Indonesia during 2012–2021 has not been evenly distributed between regions, causing economic inequality between regions. Some regions in Indonesia experience high economic growth, while others experience slow or stagnant growth. Educational inequality also contributes to increased inequality in Indonesia (Chongvilaivan & Kim, 2016). Low levels of education make it difficult for a person to get a good job, thus causing economic inequality between groups of people (Patel et al., 2018). The distribution of resources such as land, water, and energy also influences the increase in inequality in Indonesia (Nugroho et al., 2022). These resources are not evenly distributed, so some community groups or regions can access them more efficiently, while others find it difficult to access them.

The final model selection effort determines the regression model that EViews 9 will use. Determination of the best model between Common Effect, Fixed Effect, and

Random Effect using two model estimation techniques. Both techniques are used in panel data regression to obtain the right model for estimating panel data regression. The first two tests used the Chow test, and the second was the Hausman test.

**Table 1. Chow Test**

| Effects Test             | Statistics | d.f.    | Prob.  |
|--------------------------|------------|---------|--------|
| Cross-section F          | 33.797766  | -33,300 | 0.0000 |
| Cross-section Chi-square | 522.799185 | 33      | 0.0000 |

The results of the Chow test show that the probability value of the cross-section chi-square is  $0.0000 > 0.05$ . This shows that  $H_0$  is accepted because the probability value obtained is smaller than 0.05. Based on the Chow Test, the best model to use is the Fixed Effect Model.

**Table 3. Hausman Test**

| Test Summary         | Chi-Sq. Statistic | Chi-sq. d.f. | Prob.  |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 76.67098          | 3            | 0.0000 |

Based on Table 2 of the Hausman test, a random cross-section value of  $0.000 < 0.05$  was obtained. This determines that  $H_0$  is rejected and  $H_1$  is accepted because the probability value is smaller than 0.05. Based on the results obtained by the Hausman test, it can be stated that the best model to use is the Fixed Effect Model.

**Table 3. Results of Panel Data Regression Estimation Using Common Effect Model, Fixed Effect Model, and Random Effect Model Methods**

| Variable | Common      |        | Fixed       |        | Random      |        |
|----------|-------------|--------|-------------|--------|-------------|--------|
|          | Coefficient | Prob.  | Coefficient | Prob.  | Coefficient | Prob.  |
| C        | 6.026447    | 0.0000 | 11.14235    | 0.0000 | 9.896616    | 0.0000 |
| P        | -0.088745   | 0.0000 | -0.227926   | 0.0000 | -0.129978   | 0.0000 |
| U        | 0.014366    | 0.3709 | -0.082817   | 0.0000 | -0.079933   | 0.0000 |
| EI       | 0.987065    | 0.2214 | -7.618106   | 0.0000 | -7.129139   | 0.0000 |

After testing the suitability of the model on panel data regression using the Common Effect Model, Fixed Effect Model, and Random Effect Model methods, the best method, according to the test results of the three models, is the Fixed Effect Model. Therefore, the Fixed Effect Model is the best model used in this study. In testing using the Chow Test and Hausman Test, both obtained the result that the best model is the Fixed Effect Model. Based on the test results using the Fixed Effect Model method in Table 3.

The result of the regression equation shows a constant value of 11.14235 and a positive sign. If the variables of poverty, unemployment, and economic inequality are considered fixed, then inclusive economic growth will increase by 11.14235 percent. The poverty variable (P) negatively affects inclusive economic growth. This result can be seen in the value of the poverty variable coefficient of -0.227926. It can be seen that if there is an increase in poverty by 1 percent, inclusive economic growth will decrease by 0.227926 percent. This result shows that poverty will result in more significant costs for economic development, indirectly hampering the economic growth rate so that inclusive economic growth will decrease. So, the variable of poverty significantly affects inclusive economic growth.

Furthermore, the unemployment variable negatively affects inclusive economic growth. This condition can be seen in the value of the coefficient on the unemployment variable (U), which is -0.082817, from which it can be concluded that if unemployment increases by 1 percent, inclusive economic growth will decrease by 0.82817 percent. This condition shows that increasing unemployment will impact reducing inclusive economic growth. So, the unemployment variable significantly affects inclusive economic growth.

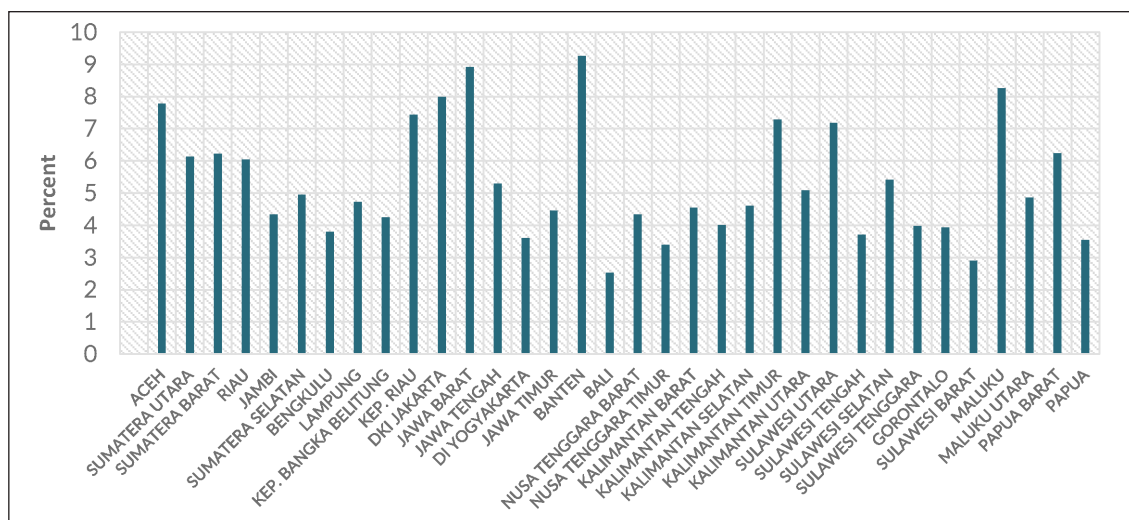
Economic inequality (EI) is the last variable that negatively affects inclusive economic growth. This result can be seen in the value of the coefficient on the unemployment variable of -7.618106, from which it can be concluded that if there is an increase in economic inequality by 1 percent, inclusive economic growth will decrease by 7.618106 percent. According to the data, the high level of economic inequality in every province in Indonesia can decrease the inclusive economic growth rate. The variable of economic inequality significantly affects inclusive economic growth. The variable of economic inequality significantly affects inclusive economic growth.

Poverty has a negative and significant effect on inclusive economic growth because it can hinder the potential for sustainable economic growth. Low-income people have limited access to resources, including education, health, and adequate employment opportunities (Silove et al., 2017; Singu et al., 2020). As a result, they cannot take advantage of existing economic opportunities and participate in overall economic growth. In addition, poverty can also hinder access to credit and business capital, making it difficult for underprivileged people to start a business or develop an existing one (Banerjee & Jackson, 2017). Developing small and medium enterprises (SMEs) is one of the most effective ways to encourage inclusive economic growth. Poverty can also exacerbate social and economic inequality, hindering inclusive economic growth (Omar & Inaba, 2020; Kaulihowa & Adjasi, 2018). Social and economic inequality can lead to social and political instability and damage public trust in government and public institutions (Boin et al., 2020). In order to promote inclusive economic growth, addressing poverty and social and economic inequality is essential. Efforts can be made by implementing programs focusing on equitable development and reducing social and economic inequalities. In addition, efforts to improve access to education and skills and encourage the development of small and medium enterprises also need to be carried out to strengthen community participation

in inclusive economic growth. The negative influence of poverty on inclusive economic growth is in line with the results of research conducted by (Erlando et al. 2020; Cabeza-García et al., 2019; Hidayat et al., 2020).

Unemployment in Indonesia has a negative and significant impact on inclusive economic growth. First, unemployment can reduce people's purchasing power, ultimately affecting demand for goods and services, which slows economic growth (Pulkka, 2017). Second, unemployment can decrease overall productivity, which affects slower economic growth (Korkmaz, 2015). Third, unemployment increases the social burden on the government and society (Baldini et al., 2018). The government will have to spend more to provide social assistance and job training, while people will feel pressured because it is difficult to find work. Fourth, unemployment can exacerbate social and economic inequality, as unemployed people tend to be vulnerable and marginalized groups. Therefore, reducing unemployment and increasing fair and inclusive employment opportunities is essential to creating inclusive and sustainable economic growth in Indonesia. These results are in line with research conducted by Awad-Warred & Muhtaseb (2017), Aoyagi & Ganelli (2015), and Ademola & Badiru (2014).

**Figure 4. Average Unemployment of Indonesian Provinces in 2012-2021**



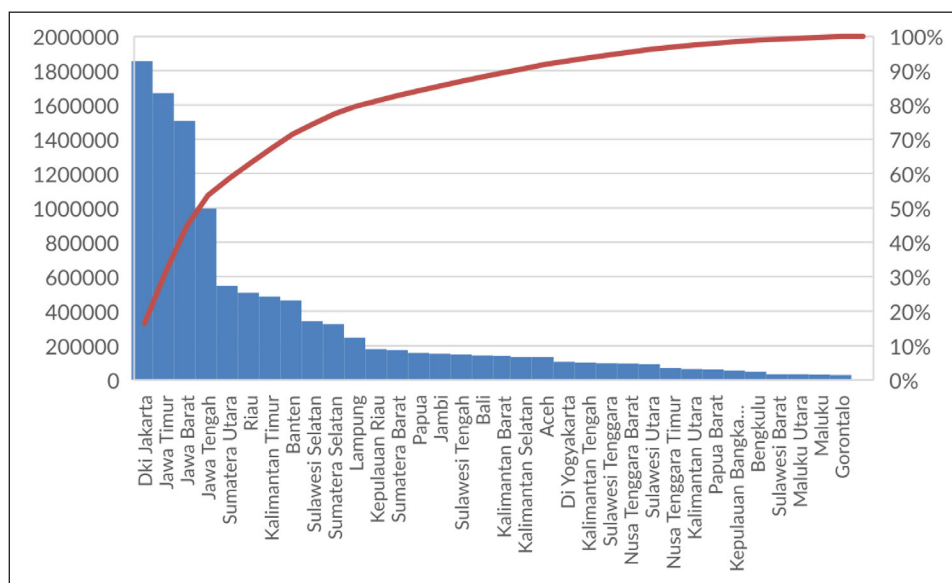
Source: Central Bureau of Statistics (2012-2021)

Based on Figure 4, Indonesia's highest provincial unemployment rate is in Banten, West Java, and Maluku Provinces. Banten, West Java, and Maluku provinces have suboptimal economic growth compared to other provinces in Indonesia. This condition can affect employment and lead to high unemployment rates. Some areas in these provinces have high poverty rates and lack access to education and job training, resulting in limited employment opportunities and increasing unemployment. Banten and West Java provinces have big cities such as Jakarta and Bandung that attract many residents to come and live there (Buchori et al., 2017). However, not all migrants can get the desired job, leading to high unemployment. Maluku is an archipelago that is difficult to

access, which causes difficulties in industrial development and creates jobs (Wiweka et al., 2019). This condition can lead to a high unemployment rate in the area. At the same time, the lowest unemployment rates are in Bali, Yogyakarta, and West Sulawesi. Bali and DI Yogyakarta are popular tourist destinations in Indonesia (Kataoka, 2019). The tourism sector in the two provinces contributes significantly to economic growth, thus creating ample employment for the locals. West Sulawesi is one of Indonesia's provinces with great agricultural potential (Arsyad et al., 2019). The agricultural sector in the province contributes significantly to economic growth, thus creating ample employment for the local population. Bali, Yogyakarta, and West Sulawesi have relatively low poverty rates compared to other provinces in Indonesia. These conditions allow local communities better access to job opportunities and training.

The regression test results of panel data estimates show that the variable economic inequality measured by the Gini Ratio has a negative and significant effect on inclusive economic growth. Economic inequality can affect inclusive economic growth in a variety of ways. First, economic inequality can limit an individual's or group's access to the resources and opportunities needed to increase productivity and prosperity (Kraus et al., 2017; Bapuji et al., 2020). For example, individuals born into underprivileged families tend to have more limited access to education, training, and capital. This condition can hinder their ability to improve skills and productivity and create jobs that can expand the economy. Economic inequality can also hinder individual and community groups' access to fair and balanced markets and limit their ability to actively participate in economic activities (Bapuji & Neville, 2015). Second, economic inequality can lead to social and political instability, affecting overall economic growth (Neaime & Gaysset, 2018; Tchamyou et al., 2019). In an unjust society, people disadvantaged by economic inequality may feel dissatisfied and push for political or social changes that can destabilize the economy. Social and political instability can affect investors and businesses, as well as reduce consumer confidence, which can have a negative impact on economic growth. Lastly, economic inequality can increase income inequality, exacerbating inequalities between social and economic groups (Bor et al., 2017). This condition can hinder inclusive economic growth because sustainable development requires the active participation of all citizens, and economic success must be based on equitable and inclusive progress. Significant income inequality can limit access to equal resources and opportunities and affect society's overall health and well-being (Guest, 2017). Therefore, to achieve sustainable, inclusive economic growth, it is essential to reduce economic inequality and ensure that all citizens have equal access to the resources and opportunities needed to increase productivity and prosperity. This condition can be achieved through various efforts, such as investment in education and training, policies promoting inclusivity and justice, and fiscal policies supporting fair and sustainable redistribution.

Figure 5. Economic Growth of Indonesian Provinces in 2021



Source: Central Bureau of Statistics (2012-2021)

Economic inequality toward inclusive economic growth negatively affects Indonesia due to the large number of big cities with a high per capita income, especially in western Indonesia compared to central and eastern Indonesia (Figure 5). This condition can be caused by various factors, including regional accessibility, level of infrastructure development, unemployment rate, and poverty rate (Marinho et al., 2017; Laurens & Putra, 2020). Comprehensive and coordinated efforts between the government, the private sector, and the public are needed to address economic inequality in Indonesia. Some of the steps that can be taken include improving the accessibility of the region by improving transportation infrastructure, providing support to developing sectors of the economy in a particular region, improving the quality of education and workforce skills, and improving access to essential services such as health and sanitation.

## CONCLUSION

Poverty has a negative and significant effect on inclusive economic growth because it can hinder the potential for sustainable economic growth. People experiencing poverty tend to have limited access to resources, including education, health, and adequate employment opportunities. As a result, they cannot take advantage of existing economic opportunities and participate in overall economic growth. Unemployment in Indonesia has a negative and significant impact on inclusive economic growth. Unemployment can decrease people's purchasing power, ultimately affecting demand for goods and services and lowering overall productivity, affecting slower economic growth. In addition, unemployment increases the social burden on the government and society. Inequality negatively and significantly affects inclusive economic growth because it can limit individual or group access to resources, affect social and political stability, and increase income inequality, exacerbating social and economic inequality.

Governments should improve the effectiveness of poverty reduction programs, including social assistance and training programs, to improve the skills and abilities of community members so they can access better employment. These programs should prioritize the areas most affected by poverty. Encourage investment in sectors that employ a more comprehensive workforce and promote skill development. Government needs to improve access to quality education and training to develop the skills and capabilities of the workforce in Indonesia. Education and training programs should be designed to meet the needs of growing sectors and priority areas most affected by unemployment. Governments should prioritize inclusive economic development in poorer and more remote areas. This condition could include infrastructure, transport, and energy investments that improve the accessibility and connectivity of more isolated areas.

The relatively decreasing poverty trend in Indonesia every year indicates that the Indonesian government has taken adequate measures to deal with the problem of poverty. However, more is needed to eradicate poverty in Indonesia. Some regions in Indonesia still experience very high poverty rates, especially Papua, East Nusa Tenggara, and Maluku. This fact shows that poverty reduction efforts in these areas still need to be more intensive and sustainable. Developing local economic sectors such as agriculture, fisheries, and tourism can increase people's incomes in areas that still experience high levels of poverty. This condition can be done by providing support in terms of technology, capital, and market development. The government also needs to encourage the development of small and medium enterprises to strengthen public participation in inclusive economic growth.

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# Unlocking Inclusive Growth: The Impact of Shariah Investment in Indonesia

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## Abstract

*This study investigates the role of Shariah investment in Indonesia's inclusive growth. Shariah investment is measured in terms of Shariah stocks and sukuk. As determinants of inclusive growth, the study also includes several control variables adopted from separate literature, including the effect of COVID-19. In contrast to previous research, testing is conducted using a variety of inclusive growth metrics. Using principal component analysis (PCA) to compute the composite index of inclusive growth and time series regression models with monthly data at the national level from 2011 to 2022, this study finds three main conclusions. Evidence shows that Shariah investment contributes to inclusive growth in Indonesia, but the effects vary. Shariah stocks significantly affect poverty and unemployment, whereas Sukuk affects poverty and inequality. Both contributed to improving the Human Development Index (HDI) and inclusive growth. This study also revealed that COVID-19 was instrumental in reducing Indonesia's inclusive growth performance. This study complements prior empirical research on inclusive growth issues in Indonesia by examining the role of Islamic economics and finance. This research contributes to future policy initiatives to strengthen Indonesia's inclusive growth.*

## Keywords:

shariah investment; shariah stocks; sukuk; inclusive growth

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## INTRODUCTION

A country's development achievements are linked with the level of economic growth. This assumption is understandable because economic growth is a measure that may be used to assess a country's economic performance. It is easier for a country to raise its people's living standards with positive growth. Unfortunately, economic progress does not guarantee that all people gain equality. In practice, this expansion may overlook the poor or marginalized groups, resulting in greater inequality. Inequality is a critical and strategic issue since it can potentially undermine the impact of poverty reduction efforts and the degree of growth itself. High inequality can also have an impact on political stability and social cohesion. The issue of inclusive growth has been paid attention in many countries.

Several studies have sought to define inclusive growth. Although their narratives may vary, they have generally common substantive elements. Ali & Son (2007) and Ali & Zhuang (2007) emphasize that inclusive growth involves the creation of economic opportunities through growth, which should be available to all segments of society, particularly people experiencing poverty. Inclusive growth refers to the speed and distribution of growth (Kraay, 2004; Berg & Ostry, 2017; Anand et al., 2013). Growth is inclusive if it is sustainable and effectively reduces poverty. These definitions based on that the growth process can create new economic opportunities that are not evenly distributed. Due to certain conditions or market failures, these opportunities have been limited for people with low incomes. As a result, the poor benefit less from the growth occurring than those who are not poor.

Several studies have examined the relationship between development processes in various countries and inclusive growth. UNDP (2022) stated that a decrease in low-income individuals, mortality rates, or gender gaps did not accompany the increase in economic growth in India. Crafts (1997) found that high economic growth in the UK during the Industrial Revolution was not accompanied by increased life expectancy or decreased infant mortality rates. In Indonesia, several studies indicate a phenomenon of low inclusive growth. Hayashi et al. (2014), Yusuf et al. (2014), Gonzalez & Resosudarmo (2016), and Indra et al. (2018) mentioned that economic development in Indonesia in the last one to two decades has not only been marked by improving macroeconomic performance but also worsening inequality.

According to Dartanto (2015), the declining elasticity of economic growth to poverty reduction, inequality, and unemployment throughout the 1990s and 2000s in Indonesia served as evidence of the issue of less inclusive growth. The following are some causes of this phenomenon: First, Indonesia's economy has evolved toward a more service-oriented and capital-intensive sector such as mining, finance, and telecommunications, which generates fewer job prospects, particularly for unskilled labor. As a result, people experiencing poverty need to take advantage of the benefits of an expanding economy. Second, the productivity of the industrial and service sectors is more than seven and three times that of agriculture, respectively. As a result, employees in the service and manufacturing industries benefit more than those in agriculture. In addition to these factors, inclusive growth indicators in Indonesia are also considered vulnerable to shocks.

The latest BPS data shows that during COVID-19, poverty, unemployment, and inequality rates remained stagnant or even tended to increase compared to the pre-pandemic period.

Rapid growth is required for poverty reduction (Kraay, 2004; Felipe, 2009). However, Berg & Ostry (2011) add the necessity for broad-based sector coverage and equity-based measures to create sustained, inclusive growth. Anand et al. (2013) discovered that macroeconomic stability, trade openness, investment, moderate inflation, and labor force education quality are all characteristics that contribute to inclusive growth in emerging nations. Meanwhile, the IMF (2017) highlights essential factors in driving inclusive growth, such as the role of technology (ICT), access to education, a relatively equal distribution of worker income across sectors, and financial factors (and investment), which are represented by the private sector credit-to-GDP ratio.

Investment is one of the factors that contribute to inclusive development. In general, investments deemed capable of promoting inclusive growth are those that not only stimulate the economy but also ensure that development outcomes can be distributed equitably across all segments of society. Thus, Shariah investing, which promotes the values of divinity and justice while remaining a component of the Shariah economy, can play an important role (Can, 2009). With the addition of the name Shariah to economic items such as investments, Shariah investments should have similar goals to those of the fundamental economic system. In this environment, it is anticipated that Shariah investment will contribute to economic development and more inclusive growth. This study is motivated by the possibility of Shariah-compliant investments fostering inclusive development.

A suitable approach for establishing a connection between shariah investment and inclusive growth is to examine it from two distinct perspectives: first, shariah investment as a component of general investment, and second, shariah investment as an integral element of Islamic economics and finance. In this manner, numerous theoretical and empirical literature examining the relationship between the two can be located. From the first perspective, the inclusive growth paradigm is related to the social welfare model's theoretical premise. This paradigm emphasizes the significance of public investment, as reflected in government budgets, in achieving equal access to opportunities, distribution efficiency, and wealth distribution to alleviate poverty (Blau, 2014). The Keynesian demand-side paradigm asserts that productive investment and the provision of public goods and services can stimulate aggregate demand, which can absorb labor (reduce unemployment) and stimulate growth (Easterly & Rebelo, 1993).

From the second perspective, the relationship between the Islamic economy and finance and inclusive growth can be recognized through the Islamic economy and finance's inherent risk-sharing characteristics and actual economic and financial transactions. Real sector assets and shared risk among participants—including financing institutions—support all contracts in Islamic finance. In addition, compared to conventional instruments, Islamic financial instruments are perceived to be relatively stable and more resilient to unforeseen disruptions. A second aspect of Islamic economics and finance is the promotion of economic welfare and social justice following Shariah principles. Islamic financial instruments also emphasize morality and ethics in business, respect for property rights and contractual

obligations, the pursuit of good governance, and additional social redistributive and philanthropic instruments such as zakat, waqf, and sadaqah. Due to these characteristics, the Islamic economy and finance are inextricably attached to aspects of inclusive growth.

The primary purpose of this study is to investigate the role of Shariah investment (as measured by Shariah stocks and sukuk) in inclusive growth in Indonesia. In addition to Shariah investment, this study incorporates other control factors from disparate literature as predictors of inclusive growth. This study stems from the fact that empirical studies explicitly examining the role of Shariah investment in inclusive growth in Indonesia still need to be expanded. Some similar empirical studies examining this issue in Indonesia and across countries include Ibrahim & Indra (2021), which examined the impact of Islamic products on inclusive growth in Indonesia—furthermore, Majid & Kassim (2015) investigated the role of Islamic financial institutions more broadly, including Islamic stocks, bonds, and banking, on growth. Banna & Alam (2020) analyzed the efficiency of Islamic banking for sustainable growth. Amin et al. (2015) discussed Malaysia's Islamic finance and GDP-based economic growth. Fasih (2012) examined the role of Islamic banking in inclusive growth in India.

In contrast to these previous studies, this paper implements various inclusive growth measures. Shariah investment and other potential drivers are independently regressed with inclusive growth measures such as poverty rates, inequality, unemployment, the human development index, and the inclusive growth composite index, aggregating the previously stated four variables. This strategy will likely yield a more thorough analysis and a more comprehensive range of estimation outcomes, which can explain the impact of Shariah investment and other relevant variables on Indonesia's inclusive growth. This study is expected to contribute to future policy initiatives to enhance Indonesia's inclusive growth.

The originality this research lies in its focus on exploring the relationship between Shariah-compliant investments and inclusive growth in Indonesia. While there might be existing research on Shariah investment or inclusive growth separately, this study brings a novel perspective by investigating the potential impact of Sharia-compliant investments on promoting inclusive economic growth in the context of Indonesia. This research also delves into the intersection of Islamic finance, particularly Shariah-compliant investments, and inclusive growth. This combination represents a fresh and innovative approach, as previous studies might have explored inclusive growth in conventional financial systems but not in the context of Islamic finance. The research offers policy insights by investigating the impact of Shariah-compliant investments on inclusive growth. It could shed light on how Islamic finance can be harnessed to promote economic development that benefits a broader segment of the population.

## METHODS

This study applies two main methods, namely principal component analysis (PCA) and time series econometric models. Both methods utilize secondary data from various official institutions, such as the Central Statistics Agency (BPS), Bank Indonesia (BI), and

the Financial Services Authority (OJK). The main variables in this study are classified into two types: first, indicators that represent inclusive growth, namely the poverty rate, inequality, unemployment rate, and the human development index. The data were collected from the BPS. Second, indicators that represent Sharia investment, namely the Jakarta Islamic Index (JII), which represents Sharia stocks, and Sukuk, which represents Sharia bonds. Although there are various other types of Sharia investment instruments, these two are regarded as established and have expanded significantly as Sharia investment instruments in Indonesia.

In this study, the PCA method is used to create an inclusive growth index from four separate indicators: poverty, inequality, unemployment, and HDI. As a result, this study will examine five variables of inclusive growth, four of which are individual welfare indicators and one of which is the overall composite index. The use of composite indices provides an advantage in depicting the variations of inclusive growth indicators within a single indicator. PCA is a common method for creating a composite index from a set of variables that are considered to have meaningful similarities. In practice, the PCA method can be used to create a composite index by assigning different weights to its constituent indicators using data-driven approaches. PCA is designed to minimize the dimensionality of a dataset with several connected variables while keeping as much variation as feasible (Hash-Vaughn, 2017; Johnson & Wichern, 1982). Although the data is reduced in its implementation, its original features are not diminished. This technique is carried out by converting the original variables into new, uncorrelated variables. The resulting new variables are referred to as principal components.

The Principal Component Analysis (PCA) method offers several benefits and advantages in data analysis and dimensionality reduction, such as reducing the data's dimensions while still preserving the essential information. It does this by finding new variables, called principal components, that combine the original features. These principal components are chosen in such a way that they capture the most significant patterns and variances in the data. It also allows us to represent the data in a lower-dimensional space.

One of the significant advantages of PCA is its ability to help us visualize data in a more manageable and informative way. Plotting the principal components allows us to get insights into how the data points relate. This can reveal clusters of similar data points or trends that might not have been apparent in the original high-dimensional space. Moreover, PCA can help us identify and handle collinearity issues when two or more highly correlated features. It transforms these correlated features into uncorrelated principal components, which can be beneficial in various statistical analyses.

This study also employs a time series regression model to examine the influence of Shariah investment on inclusive growth indicators in Indonesia. To complete the analysis, it also includes several control variables as determinants of inclusive growth, namely the economic conditions represented by gross domestic product (GDP), the dynamics of the price level of goods and services measured by inflation, and aggregate investment measured by gross fixed capital formation. All variables were collected at the national level from 2011–2020. Given that the analysis in this study covers the COVID-19 period, the analysis will also involve the pandemic event. In this study, the pandemic impact will

be represented by a dummy variable equal to one during the pandemic period (March 2020–December 2021) and zero before the pandemic (before March 2020). Including the pandemic effect is expected to minimize bias in measuring the influence of Sharia investment on inclusive growth, as the pandemic that occurred in the first quarter of 2020 had some impact on these inclusive growth indicators.

This study employs five distinct inclusive growth indicators: poverty, inequality, unemployment, HDI, and a composite inclusive growth index that is a linear combination of the four preceding measures. Given the high levels of poverty, inequality, and unemployment, as well as the low level of HDI suggesting less inclusive growth, the HDI indicator will be expressed in the form of its inverse, with a high inverse HDI signifying a low HDI. As a result, the composite growth index comprises four indicators: poverty, inequality, unemployment, and the inverse HDI. An increasing composite inclusive growth index suggests less inclusive growth, and vice versa, based on the characteristics of its components.

Furthermore, the predictors of inclusive growth are classified into two types: main predictors, which include Sharia stocks and sukuk as Sharia investment representations, and control predictors, which include macroeconomic variables such as output level (GDP), total investment (gross fixed capital formation), inflation, and the dummy of the COVID-19 period. The model specification for measuring the impact of Sharia investment on inclusive growth metrics is expressed as follows:

$$PI_t = \beta_0 + x_t\beta_1 + z_t\beta_2 + \phi DCOV_t + \varepsilon_t \quad (1)$$

Where

- PI : The indicators of inclusive growth consist of the poverty rate, inequality rate, unemployment rate, HDI, and the composite index of inclusive growth.
- x : The vector of Shariah-compliant investment variables consists of JII (Shariah Stocks) and Sukuk (Shariah Bonds)
- y : The control variable vector consists of GDP, total investment, and inflation
- DCOV : Covid-19 Dummy; 1 if pandemic period (March 2020-December 2021) and 0 if non-pandemic period (before March 2020)

## RESULT AND DISCUSSION

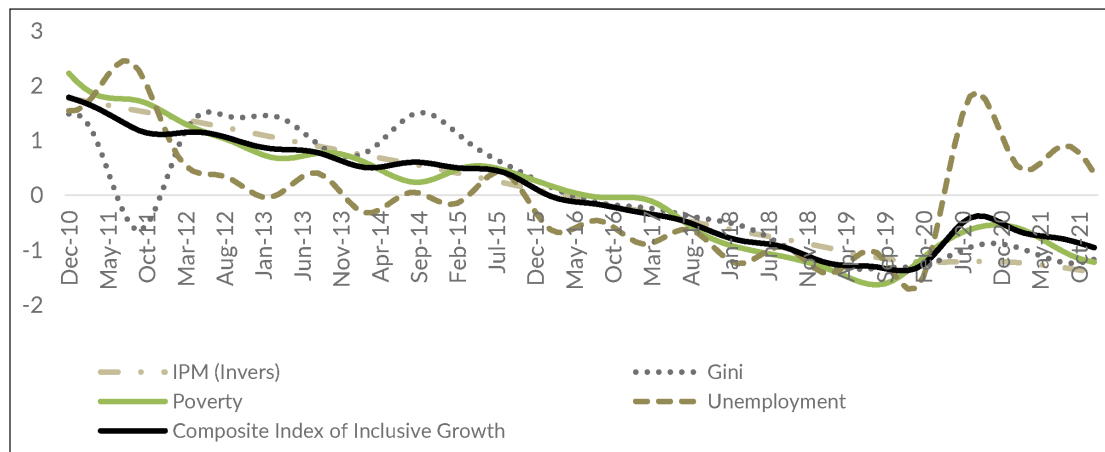
This section summarizes the four inclusive growth indicators throughout the observation period. The four indicators can be shown to have fluctuated, but their movements tend to improve from early 2011 until February 2020, or before the COVID-19 pandemic. Furthermore, during the COVID-19 era (March 2020–December 2021), the four indicators are likely to be under pressure, and some indicators, such as poverty, unemployment, and inequality, are likely to worsen.

According to BPS data, Indonesia's average poverty reduction rate was 1.76% every semester from 2011 to 2019 (pre-Covid-19). However, throughout the COVID-19 period (March 2020–December 2021), the average poverty rate climbed by 0.76% per semester. Meanwhile, the unemployment rate, which had declined by 1.45% every semester on

average before COVID-19, came under substantial pressure during the COVID-19 period. The average unemployment rate climbed by 6.29% per semester from March 2020 to December 2021, which was greater than the increase in the poverty rate during the same period. A similar picture emerged when the rate of inequality was examined. During the five years before COVID-19, the inequality rate consistently decreased with an average of 0.6% per semester. However, during COVID-19, the inequality rate tended to increase with an average increase of 0.07%. The pandemic also impacted the performance of the Human Development Index (HDI). From 2011 through 2019, the HDI grew by an average of 0.87% per year. Although the HDI could still grow positively during the COVID-19 period, its growth rate slowed to an average growth rate of 0.26%.

Indonesia's inclusive growth dynamics from 2011 to 2021 can also be observed through its aggregate indicators. This investigation utilized the PCA method, resulting in weights for each constituent indicator. The HDI variable was implemented as its inverse to facilitate comprehension of the final composite index, indicating that the higher the inverse HDI, the lower the HDI quality. This HDI transformation is intended to have the same meaning (direction) as the other three indicators: poverty, unemployment, and inequality. Consequently, a decrease or increase in the inverse HDI, poverty, unemployment, and inequality indicates improved (or worse) inclusive development quality. The composite index travels in the same direction as its constituent indices. From 2011 to the beginning of the COVID-19 era (February 2020), the composite index declined, indicating that inclusive growth in Indonesia improved. Nevertheless, the composite score tends to increase from March 2020 to the end of 2021, indicating a decline in the inclusive growth character of Indonesia.

**Figure 1. Development of Inclusive Growth Indicators in Indonesia, 2011-2021**



Estimates of the impact of Shariah investment on inclusive growth in Indonesia are provided in Table 1. Estimation was conducted with two distinct specifications: first, only Shariah investment variables (JII and Sukuk) were used as primary predictors and second, prospective control predictors such as GDP, total investment, inflation, and the COVID-19 dummy were included. This methodology was applied to every category of dependent variable, including poverty, inequality, unemployment, IPM, and the inclusive

growth composite index. Consequently, ten distinct estimation results will be generated. This estimation method aims to capture the influence of each predictor, particularly Shariah investment, on inclusive growth in a more complete manner.

Overall, the estimated coefficients' signs and significance align with theoretical expectations. In each estimation case, the predictor variables are found to have a significant joint effect on the dependent variable. Additionally, the predictors used in the model can adequately explain the variation in the movement of the dependent variables. This is evident from the adjusted R<sup>2</sup> values ranging from 54.6% to 98.9%. However, based on the estimation results, almost every equation suffers from autocorrelation and heteroskedasticity problems. This result is indicated by the significant values of the Breusch-Godfrey and Breusch-Pagan tests at the 5% significance level. Although the equations exhibit symptoms of autocorrelation and heteroskedasticity, as stated by Pindyck and Rubinfeld (2013), autocorrelation and heteroskedasticity only affect the efficiency of the estimates, while the parameter estimates remain unbiased and consistent. However, to avoid bias in concluding the significance level of each predictor variable resulting from these issues, the model estimation will apply Huber-White robust standard errors in each case.

Table 1 demonstrates that the estimated coefficients of JII and Sukuk are significant across various estimation scenarios. Despite divergent results, the sign of the calculated coefficients for both factors indicates that they significantly impact inclusive growth in Indonesia. This conclusion holds true in the vast majority of estimation scenarios, demonstrating that JII and Sukuk substantially impact the inclusion of control variables. Shariah stocks (JII) were found to play a significant role in virtually all development metrics, such as poverty and unemployment reduction and HDI improvement. The negative sign of the shariah stock coefficient (JII) concerning the composite index variable suggests that shariah stocks contribute to inclusive development quality. In the meantime, Sukuk contributes considerably to poverty reduction, inequality reduction, HDI improvement, and inclusive growth quality enhancement. Based on these findings, Shariah investment promotes inclusive growth to some extent. Shariah stocks contribute to all-inclusive growth metrics by reducing inequality, while Sukuk stocks contribute by reducing unemployment.

The above mentioned findings can be explained principally by positioning Shariah-compliant equities and sukuk as part of Islamic investment and finance. Sukuk is an alternative funding source for government development projects, one of which is the construction and equalization of public infrastructure. This public infrastructure development typically includes economic transportation infrastructure, education infrastructure, health infrastructure, and additional public infrastructure. The strengthening and equalization of public infrastructure contribute to increased community access, particularly for lower-income groups (including the impoverished). Therefore, they have access to facilities that provide their means of subsistence and basic requirements. In the meantime, strengthening Shariah stocks as one of the capital market's instruments contributes to the fortification and expansion of capital market-listed businesses. Expanding their enterprises will contribute to the advancement of the economy, particularly in terms of labor absorption and the creation of broader community employment opportunities.

In some aspects, the findings above confirm previous studies. Anand et al. (2013) found the role of investment represented by total investment, FDI, bank credit, and government consumption towards inclusive growth. Furthermore, studies by Hastuti (2018) and Latifah (2020) suggest that Sukuk can play a role in inclusive growth in Indonesia. Similarly, the findings of Adeosun et al. (2020) suggest that public investment can trigger inclusive growth by promoting access to opportunities through job creation and a productive labor force in African countries. The study by Osman (1991) proposed an Islamic social business model that can address market and government policy failures and, thus, poverty and inequality issues. Similarly, the studies by Ibrahim and Indra (2021) and Fasih (2012) found the role of Islamic banking in inclusive growth. The study by Kang & Martinez-Vazquez (2022) found that investment (FDI), accompanied by the strengthening of the agricultural sector, manufacturing industry, and infrastructure, plays a significant role in reducing the number of low-income people.

The estimation results in Table 1 also indicate the role of control variables in inclusive growth in Indonesia. Improved economic conditions and stability, represented by GDP level (output), total investment, and inflation stability, support the quality of inclusive growth in Indonesia. Anand et al. (2013) also found that macroeconomic stability and moderate inflation can support inclusive growth in emerging market countries. On the other hand, this study also found that the impact of the COVID-19 pandemic, which hit Indonesia in the first quarter of 2020, significantly reduced the quality of inclusive growth in Indonesia. This result can be understood because COVID-19 has heavily pressured Indonesia's economic activities. BPS data shows that from the second quarter of 2020 to the first quarter of 2021, Indonesia's economic growth (year-on-year) consistently contracted or grew negatively for four consecutive quarters. This situation, in turn, affects the socioeconomic conditions of the people. BPS recorded that the poverty rate in Indonesia increased from 9.78% in March 2020 to 10.19% in September 2020. Similarly, unemployment increased from 4.94% in February 2020 to 7.07% in August 2020. This description somewhat explains that COVID-19 has reduced the quality of inclusive growth in Indonesia.

## CONCLUSION

This study found that Shariah investment promotes inclusive growth to some extent. In this study, it was found that Shariah stocks (JII) have a significant impact on all inclusive growth indicators, such as poverty and unemployment reduction, as well as the HDI. In addition, Sukuk plays a significant role in reducing poverty and inequality, bolstering the HDI, and enhancing the quality of inclusive growth. The estimation results also revealed that both variables have a substantial impact on the inclusive growth composite index. In addition, the estimation results revealed the role of control variables in inclusive growth. The stability of the economy, as measured by the level of GDP, total investment, and inflation, is one of the factors that contributes to the high quality of inclusive growth in Indonesia. This study also discovered that the COVID-19 pandemic that struck Indonesia in the first quarter of 2020 had a substantial impact on inclusive growth quality in Indonesia.

Table 1. Determinants of Capital Efficiency and Its Impact on GRDP Per Capita Growth in East Java

| Variable             | Composite Index of Inclusive Growth |                   | Poverty           |                   | Inequality        |                   | Unemployment      |                   | Human Development Index |                   |
|----------------------|-------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------------|-------------------|
| Intercept            | 35.77<br>(1.349)                    | 62.95<br>(4.473)  | 6.072<br>(0.123)  | 8.115<br>(0.490)  | -0.698<br>(0.154) | 0.063<br>(0.361)  | 8.416<br>(0.547)  | 8.254<br>(1.046)  | 3.356<br>(0.024)        | 2.146<br>(0.057)  |
| Shariah stocks       | -1.861<br>(0.113)                   | -0.231<br>(0.181) | -0.197<br>(0.010) | -0.066<br>(0.019) | 0.013<br>(0.011)  | 0.058<br>(0.016)  | -0.475<br>(0.044) | -0.183<br>(0.057) | 0.040<br>(0.002)        | 0.008<br>(0.002)  |
| Sukuk                | -0.947<br>(0.049)                   | -0.651<br>(0.102) | -0.091<br>(0.004) | -0.073<br>(0.011) | -0.044<br>(0.002) | -0.040<br>(0.007) | 0.022<br>(0.016)  | -0.036<br>(0.023) | 0.032<br>(0.001)        | 0.008<br>(0.001)  |
| Output               |                                     | -2.616<br>(0.496) |                   | -0.227<br>(0.066) |                   | -0.138<br>(0.052) |                   | 0.368<br>(0.127)  |                         | 0.121<br>(0.008)  |
| Total Investment     |                                     | -1.130<br>(0.472) |                   | -0.058<br>(0.064) |                   | 0.042<br>(0.046)  |                   | -0.660<br>(0.149) |                         | 0.010<br>(0.008)  |
| Inflation            |                                     | 0.049<br>(0.018)  |                   | 0.001<br>(0.002)  |                   | 0.002<br>(0.002)  |                   | 0.011<br>(0.005)  |                         | -0.001<br>(0.000) |
| Dummy Covid-19       |                                     | 0.636<br>(0.066)  |                   | 0.057<br>(0.008)  |                   | 0.025<br>(0.004)  |                   | 0.195<br>(0.020)  |                         | 0.003<br>(0.001)  |
| Adjusted-R2          | 0.913                               | 0.971             | 0.921             | 0.961             | 0.777             | 0.826             | 0.546             | 0.824             | 0.96                    | 0.989             |
| F-Statistic          | 694.6                               | 739.9             | 765.6             | 549.2             | 230.4             | 105.7             | 80.53             | 104               | 1705                    | 1948              |
| Breusch-Pagan Stat   | 19.77                               | 15.4              | 28.53             | 14.92             | 29.35             | 50.33             | 42.5              | 26.04             | 4.33                    | 8.803             |
| Breusch-Godfrey Stat | 101.1                               | 92.64             | 97.79             | 95.52             | 117.6             | 107.7             | 113.3             | 100.9             | 77.1                    | 112               |

Note:

( ) : Standard Error

\*\*\* : Significant at 1%

\*\* : Significant at 5%

Source: Author's Calculation Results (2023).

The fact that Shariah investment has a significant influence on inclusive growth indicators suggests that Shariah investment contributes to some extent to improving the quality of inclusive growth in Indonesia. Despite the fact that Sukuk plays a significant role in a number of inclusive growth indicators, its function in reducing unemployment rates remains limited (not significant). This situation may be explained in part by the fact that Sukuk-funded development programs are not ostensibly centered on labor-intensive, large-scale programs. Similarly, the increase in Shariah stocks, which reflects the expansion of private company enterprises, has not contributed to the reduction of inequality, although it has been shown to reduce unemployment rates.

The results indicate that corporate expansion can increase employment opportunities. However, that this expansion is still centered on specific sectors, excluding sectors with a broad equalizing influence, such as agriculture, the largest job creator. This is why Sharia-compliant equities have not yet proven effective in reducing inequality. This finding suggests that Sharia investments (Sharia stocks and sukuk) should be focused on development projects, such as public infrastructure, that seek to improve the community's access to new economic opportunities, particularly for those with lower incomes.

Additionally, inflation stability can boost the performance of inclusive growth in Indonesia. Consequently, macroeconomic stability and moderate inflation can support Indonesia's inclusive growth. This fact suggests that policymakers should increase investment and sustain economic performance by boosting productivity in sectors with the potential to generate substantial employment opportunities. Policymakers must ensure inflation stability by regulating the prices of essential commodities, which disproportionately impact the lower-middle-income population.

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## Determinants of Indonesian Sugar Import

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### Abstract

*Indonesian sugar imports have increased due to a steady increase in sugar consumption, while domestic sugar output has increased but has not kept pace with consumption. This study aims to examine the impact of sugar consumption, income per capita, sugarcane harvested area, and sugarcane productivity on sugar imports in Indonesia. The data in this study include time series data from 1995 to 2021 that were analyzed using multiple regression. Sugar consumption and income per capita have a statistically significant positive effect on sugar import, whereas sugarcane harvested area and sugarcane productivity significantly negatively affect sugar import. Several policy options for reducing sugar imports are recommended, including reducing sugar consumption through education and healthy lifestyle programs, extending sugarcane-harvested areas, and rejuvenating and building new sugar mills.*

### Keywords:

sugar import; sugar consumption; income per capita; sugarcane harvested area; sugarcane productivity

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## INTRODUCTION

The agricultural sector has a significant contribution to national income. Based on data from the Central Statistics Agency (BPS), in 2022, the agricultural, forestry, and fishery sectors contributed 12.40 percent to the Gross Domestic Product (GDP). The agricultural sector's contribution to GDP at current prices was Rp 2,429 trillion, the third largest after the manufacturing sector and wholesale and retail trade, car and motorcycle repairs. Plantation crops are the most significant contributor to the added value of the agricultural sector. However, this is not the case for sugarcane, although sugar plays a very strategic role with various product variants, including consumption of sugar, bioethanol, bioelectricity, chemicals, and bio manure (Solomon, 2016). The productivity of sugarcane plantations in Indonesia continues to decline, resulting in lower domestic sugar production and the need for imports to meet national sugar consumption. This condition can put a strain on the balance of payments.

Furthermore, sugar import has a significant negative impact on local farmers. Based on the simulation of Fudhlaa et al. (2021), an increase in sugar imports will significantly decrease the income of sugarcane farmers. Indonesia is the third-largest consumer of sugar in the world and a significant sugar importer (Solomon et al., 2016). This is because Indonesia's sugar consumption continues to rise, while domestic sugar production increase cannot keep up. Import is thus required to ensure food security (Popescu, 2022). Sugar imports into Indonesia increased from 2009 to 2021. The highest import volume in the last ten years was 5.54 million tons in 2020. In 1930, Indonesia experienced a sugar heyday, propelling it to the world's second-largest sugar-exporting country after Cuba (Marpaung et al., 2011). However, sugar production in Indonesia has been volatile over the last few years, with production falling short of consumption.

Import is determined mainly by income; when there is an increase in income, import will also increase. Domestic demand, which is affected by population size, significantly impacts imports. Foreign exchange rates also affect imports. An increase in the value of foreign currencies relative to the rupiah causes an increase in the price of imported goods, as many domestic products contain a significant number of imported components. Consequently, domestically produced items containing imported components will also become more costly. Sugar imports based on Rahayu (2017), Hairani et al. (2014), Rumánková & Smutka (2013), and Nurjanah (2015) are influenced by sugar consumption and income per capita. As the population increases, so does the demand for sugar, while domestic industries such as food and beverage manufacturing and pharmaceuticals also continue to expand.

Hermawan & Rasbin (2012) argue that the decline in sugar production is due to the limited development of new sugarcane plantations, the conversion of agricultural land for non-agricultural needs, and competition with other commodities. A reduction in agricultural land area will affect output. When the quantity of production exceeds the quantity of demand, a shortage exists, encouraging imports. In Indonesia, sugarcane plantations are divided into two categories, community plantations and commercial

plantations, based on their cultivation method. The large plantations are then separated into large private plantations and large state plantations. Until 2021, the total sugarcane area in Indonesia was 449 thousand hectares.

Aside from rebuilding old sugar mills, it is also essential to focus on the productivity of sugarcane plantations to improve sugar production on farms. The low use of technology in farming and the inefficiency of sugar mills led to a drop in sugarcane productivity (Yunitasari et al., 2015). Sugarcane in Indonesia has a low level of productivity and ranks 55th in the world, indicating that agricultural technology innovation is required to increase sugarcane productivity (Ministry of Agriculture, 2019).

Previous research analyzed various factors that affect sugar imports, including income (Hairani et al., 2014; Rahayu, 2017; Najafi et al., 2020), the exchange rate (Najafi et al., 2020; Saputra & Swara, 2014), sugar consumption (Hairani et al., 2014; Muhaimin & Sari, 2019; Rahayu, 2017; Saputra & Swara, 2014), domestic sugar production/stock (Fuller et al., 2019; Mudzofar & Bowo, 2020; Muhaimin & Sari, 2019; Rahayu, 2017; Saputra & Swara, 2014). Despite the importance of sugarcane productivity and harvested area, to the best of the authors' knowledge, the previous studies did not investigate these variables as determinants of sugar import.

This study examines whether sugar consumption, income per capita, sugarcane harvested area, and sugarcane productivity affect the volume of imports in Indonesia during 1995-2021. Therefore, this study contributes theoretically to the existing literature by introducing new independent variables, which is extremely useful for formulating policies to reduce sugar import dependency.

## METHODS

This study employs a quantitative methodology and secondary data sources. The secondary data includes sugar consumption, income per capita, sugarcane harvested areas, and productivity. The data were collected through the official website of the Central Statistics Agency, the Ministry of Agriculture, and the USDA Foreign Agricultural Service.

Indonesia's sugar imports are measured in tons from 1995 through 2021. Sugar consumption includes the direct sugar consumption by households and the indirect sugar consumption. Income per capita is Gross Domestic Product (GDP) per capita based on constant prices calculated from the total GDP for a given year divided by the total population. *Land* is the area farmers use to cultivate sugarcane and is measured in hectares (Ha). Productivity is the production of sugar from large state sugarcane plantations, large private plantations, and smallholder plantations in Indonesia, measured in tons per ha.

This study applied Multiple linear regression analysis to time series data to examine the effect of sugar consumption, income per capita, sugarcane harvested area, and sugarcane productivity on sugar imports in Indonesia. Because multicollinearity and autocorrelation were detected after analyzing absolute data, the data were then converted to the natural logarithm (ln) with the following model:

$$\ln M_t = \alpha + \beta_1 \ln CON_t + \beta_2 \ln INC_t + \beta_3 \ln LAND_t + \beta_4 \ln PROD_t + \varepsilon_t$$

Where:

M = sugar import

CON = sugar consumption (ton)

INC = income per capita (Rupiah)

LAND = sugarcane harvested area (Ha)

PROD = sugarcane productivity (ton/Ha)

The ordinary least squares (OLS) is used to estimate the multiple regression model. This method aims to find the smallest possible residual value through the sum of the residual squares. This OLS model is ideal with the Gauss-Markov theorem which will produce an estimator that is unbiased, linear and has a minimum variance or best linear unbiased estimators (BLUE). The Jarque-Bera (J-B) test was used in this study to determine normality. The VIF method was used to detect multicollinearity, which indicates the degree to which an independent variable is explained by other independent variables. The Glejser method was used to detect the presence of heteroscedasticity in the model. The Durbin Watson (DW) test is used to determine whether there is a correlation between the residuals in period  $t$  and period  $t-1$  in a regression model. The coefficient of determination, F test, and t test were then performed.

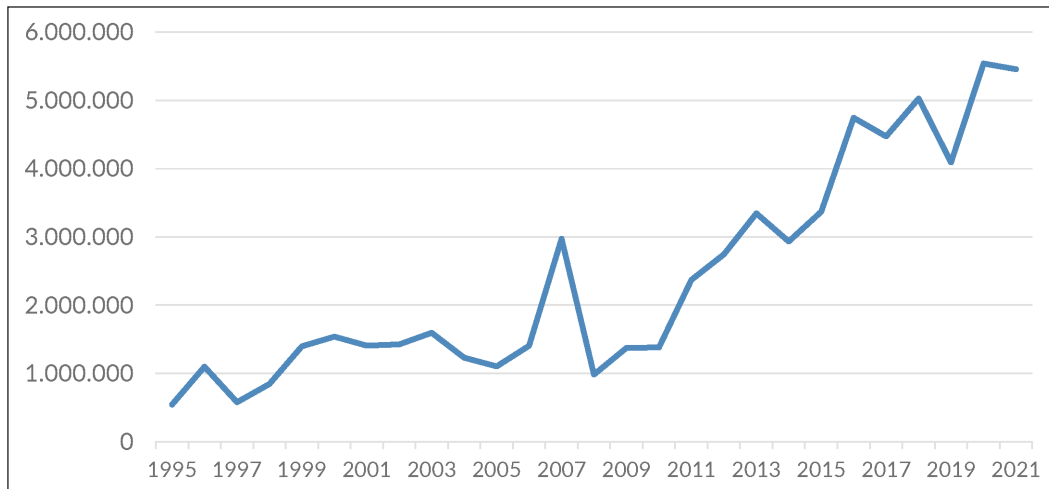
## RESULT AND DISCUSSION

Indonesia is listed as one of the world's major importers of sugar. The sugar industry in Indonesia, which was thriving then, is in a drastically different state now. In 1930, the success of the sugar trading industry made Indonesia the second-largest sugar exporter in the world after Cuba (Marpaung et al., 2011). Indonesia began to import sugar in 1967 and continues to do so today (Muhaimin & Sari, 2019). Every year, Indonesia imports sugar because domestic production is insufficient to meet domestic demand. Indonesia imports raw, refined, and white crystal sugar (Arifin, 2008). The government permits sugar import through the Ministry of Trade by adhering to the Minister of Trade's Regulation (Ministry of Trade, 2015) No.117/M-DAG/PER/12/2015. Since the domestic supply of sugar is insufficient to meet demand, importing sugar is possible. However, after imports were made, Indonesia's sugar balance was in surplus due to the discrepancy between supply and demand. According to the 2016 Food Consumption Bulletin, there was a surplus in the sugar balance of around 1.43 million tons in 2014 and approximately 1.04 million tons in 2015.

As shown in Figure 1 2008, imports decreased significantly by 9.8 thousand tons compared to the previous year of 2.91 million tons. From 1995 to 2021, the year 2020 saw the highest sugar imports. In 2019, Indonesia's sugar imports decreased considerably from 5.02 million tons in 2018 to 4.09 million tons. In 2020, however, it increased significantly. Despite fluctuations, sugar imports into Indonesia tend to increase. Prabowo (2014) stated that according to the criteria in Law No. 18 of 2012 concerning Food,

sugar is a staple food ingredient for people in Indonesia after rice, chicken eggs, tofu and tempeh, broiler chicken, fresh mackerel, and fresh milkfish. Sugar is also required by several industries, including the food and beverage and pharmaceutical industries. The sugar industry, which has existed since the Dutch colonial period, uses sugarcane as a raw material for its production, and it is now expanding into refined sugar production alongside the development of the manufacturing industry.

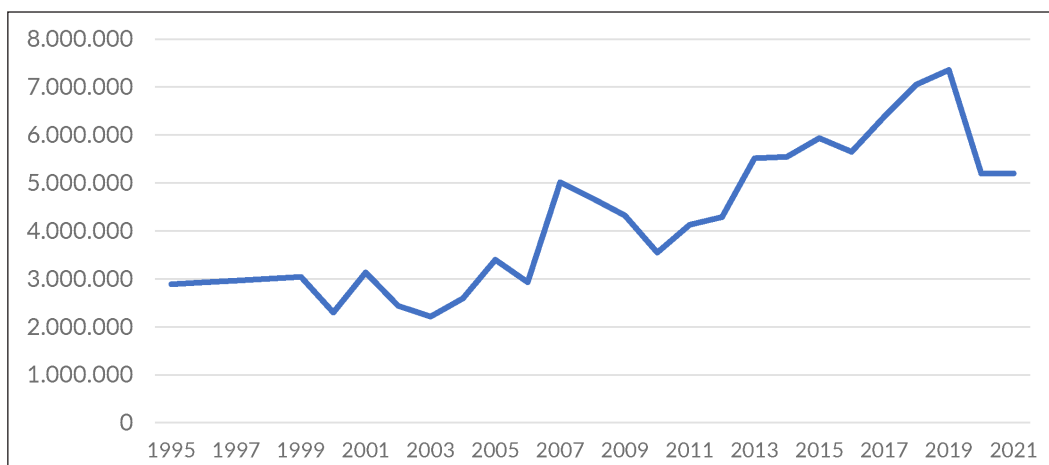
**Figure 1. Indonesia's Sugar Import 1995-2021 (in tons)**



Source: Statistic of Indonesia 2011-2022

Domestic sugar consumption continues to rise, particularly among households. However, overall national sugar consumption, including household and industrial sugar consumption, is increasing. According to Ingesti & Handojo (2019), the increase in income was one of the factors that contributed to the increase in domestic sugar consumption. Figure 2 depicts Indonesia's sugar consumption from 1995 to 2021.

**Figure 2. Indonesia's Sugar Consumption 1995-2021 (in tons)**



Source: USDA (2010-2021) & Central Bureau of Statistics (2011)

Figure 2 indicates that from 1995 to 2019, sugar consumption in Indonesia tends to increase. Nevertheless, in 2020, the figure decreased significantly. The level of income per capita describes the people's prosperity. In other words, rising income per capita means people can consume goods and services in larger quantities and/or higher quality. As shown in Table 1, Indonesia's income per capita increases yearly. Indonesia's GDP per capita at constant prices in 2021 represents its most significant achievement. In 2020, Indonesia's sugar imports reached a record high of 5.54 million tons.

**Table 1. Income per capita and Sugar Import in Indonesia 2010-2021**

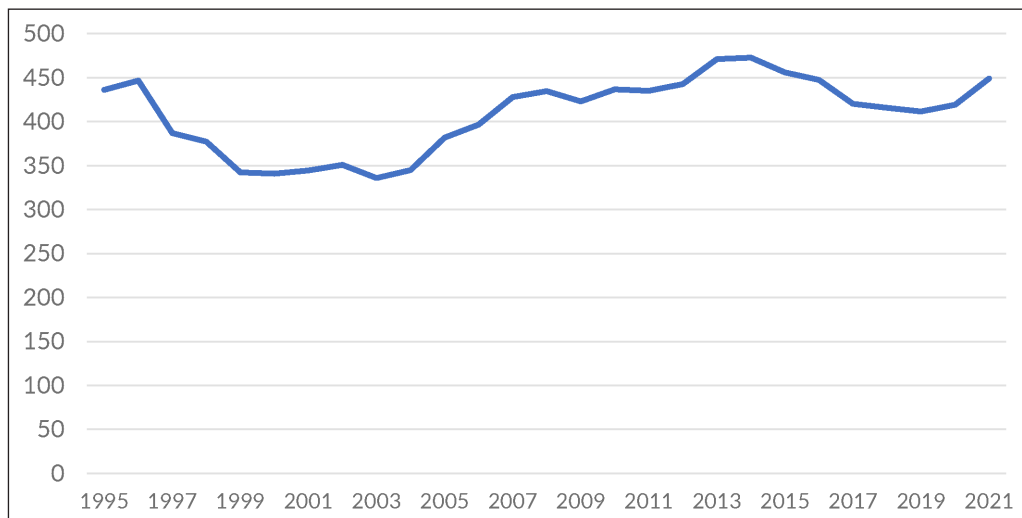
| Year | Income per capita (Rupiah) | Sugar Import (Ton) |
|------|----------------------------|--------------------|
| 2010 | 28,778,200                 | 1,382,525          |
| 2011 | 30,115,400                 | 2,371,250          |
| 2012 | 31,484,500                 | 2,743,778          |
| 2013 | 32,781,000                 | 3,343,803          |
| 2014 | 33,965,400                 | 2,933,823          |
| 2015 | 35,161,900                 | 3,369,941          |
| 2016 | 36,468,600                 | 4,746,047          |
| 2017 | 37,851,400                 | 4,472,179          |
| 2018 | 39,340,600                 | 5,028,854          |
| 2019 | 40,844,000                 | 4,090,053          |
| 2020 | 57,566,813                 | 5,539,679          |
| 2021 | 61,428,152                 | 5,455,144          |

Source: Statistics of Indonesia 2011-2022

Java has numerous sugarcane centers based on sugarcane production, harvested area, and the number of sugarcane producers (Ingesti & Handojo, 2019). Sugarcane planting can take place on either paddy fields or dry areas. Sugarcane productivity potential is generally higher in paddy fields than in dry fields. The primary water source for dry fields is rainfall, which is only available during the rainy season. Therefore, the distribution and frequency of water cannot be controlled, and the planting technique requires specific care. Sugarcane acreage can be expanded on dry fields since irrigation land for sugarcane is becoming increasingly scarce owing to competition from other agricultural commodities (Tando, 2017).

Due to the lack of expansion of sugarcane plantations, the emergence of new sugar mills has not increased production. From 2009 to 2019, eleven new sugar mills were constructed on Java, although sugar production has declined from 2.59 million tons in 2012 to 2.22 million tons in 2019 (Association, 2020). The development of sugarcane harvested area in Indonesia can be seen in Figure 3.

Figure 3. Sugarcane harvested Area in Indonesia 1995-2021 (in 000 Ha)



Source: Statistics of Indonesian Sugarcane (2012-2022)

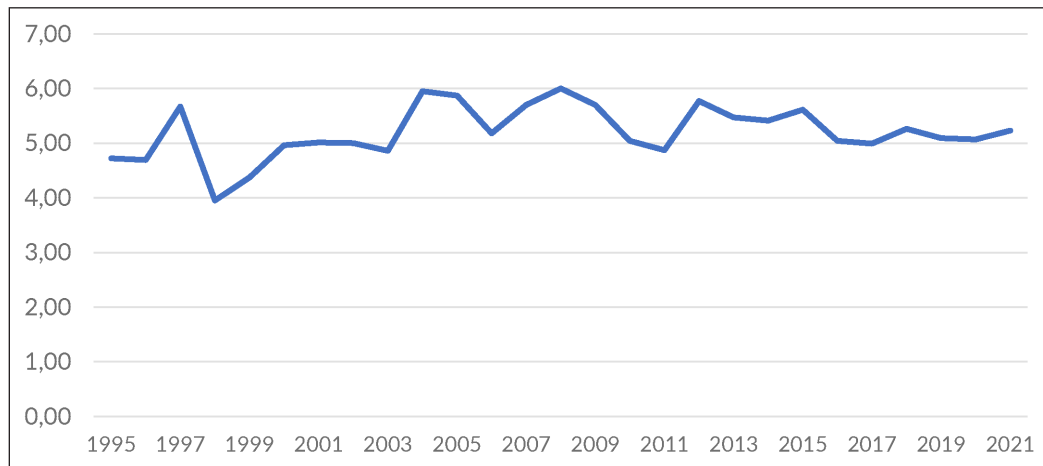
As shown in Figure 3, the area of sugarcane plantations in Indonesia decreased from 472,68 thousand hectares in 2014 to 411,44 thousand hectares in 2019 but increased in 2020 and 2021. In 2018, private plantations covered 110,98 thousand hectares, whereas large state plantations covered only 68,93 thousand hectares, and smallholder plantations dominated the total sugarcane area of 235,76 thousand hectares.

The productivity of sugarcane is one of the issues associated with sugar production. One reason Indonesia's sugar production has not grown significantly is low sugarcane productivity. Low sugarcane production will reduce the availability of raw materials for the sugar industry, resulting in suboptimal output in quantity and quality. Low sugarcane productivity can result in a decline in the domestic sugar industry's performance (Zainuddin & Wibowo, 2018; Ingesti & Handoyo, 2019).

Indonesia's sugarcane productivity is relatively small compared to other countries. Based on Ministry of Agriculture (2019), sugarcane productivity in Indonesia ranks 55th in the world. After implementing the sugarcane Community Intensification (TRI) program in 1975, sugarcane productivity continued to decline due to producers' tendency to prioritize sugarcane production volume over sugar content. In Indonesia, the highest sugarcane yield recorded was 12 tons/ha in 1970. However, achieving 7 tons/ha of sugarcane productivity in recent years has become increasingly challenging. Figure 4 depicts the evolution of Indonesian sugarcane productivity from 1995 to 2021.

From 1995 to 2021, as depicted in Figure 4, sugarcane yields in Indonesia fluctuated between 4 and 6 tons per hectare. Sugarcane yields have always been 6 tons per hectare. Figure 4 also demonstrates that the trend of sugarcane yield has increased but tends to plateau. This result indicates that sugarcane productivity in Indonesia has changed little over the past quarter-century. According to the Indonesian People's Sugarcane Farmers Association, this condition results from the crisis of superior seedlings, demanding access to financing, a need for plant-cutting personnel, and ever-shrinking land resources.

Figure 4. Indonesia's Sugarcane Productivity 1995-2021 (ton/ha)



Source: Ministry of Agriculture (2020)

This study uses the Ordinary Least Squares (OLS) model to analyze the factors that influence sugar imports in Indonesia. Because absolute data analysis revealed multicollinearity and autocorrelation, the data were converted to the natural logarithm (ln). After converting the data to natural logarithms, the analysis reveals that the OLS model passes all classical assumption tests and has a high adjusted R squared value of 80.6103%. Table 2 displays the estimation result of the regression model.

Table 2. Estimation of Multiple Linear Regression Model

| Variable | Coefficient | t-Statistic | p-value |
|----------|-------------|-------------|---------|
| C        | 18.43471**  | 2.21863     | 0.0371  |
| ln(CON)  | 0.854496**  | 2.687477    | 0.0135  |
| ln(INC)  | 0.405403*** | 4.817910    | 0.0001  |
| ln(LAND) | -1.662032** | -2.109358   | 0.0465  |
| ln(PROD) | -1.256813*  | -1.883758   | 0.0729  |

Table 2 shows that all independent variables (sugar consumption, income per capita, sugarcane harvested area, and sugarcane productivity) significantly impact sugar import. The t-test indicates that sugar consumption and income per capita positively affect sugar import, while sugarcane harvested area and productivity have a negative effect.

The result indicates that sugar consumption has a positive impact on sugar import. This result implies that sugar imports will increase as sugar consumption rises. This finding supports the first hypothesis. The result of this study also supports Hairani et al. (2014) and Saputra & Swara (2014) that sugar consumption positively affects sugar imports. This condition is because sugar consumption reflects sugar demand. If an adequate supply does not meet the high demand for sugar, imports will increase. Sugar demand may rise due to lifestyle changes (Sugiyanto, 2007). The agricultural sector is vital as an upstream industry that provides raw materials for various industries, such as food and beverage.

In addition to necessities, sugar is an essential raw material for the food and beverage processing and pharmaceutical industries. The presence of sugar is almost always inherent in every need and human lifestyle today, both on a large scale in industry and on a small scale in households. In addition, sugar mills in Indonesia import all of their raw materials for raw crystal sugar ((Kurniasari et al., 2015). If sugar consumption continues to rise without sufficient production, sugar import will persist.

This study finds that income per capita positively influences Indonesia's sugar import from 1995 to 2021. This result indicates that rising income per capita will increase sugar imports. This result is consistent with the second hypothesis. It confirms the economic theory, which states that income per capita has a direct relationship with consumption, such as a higher income can result in higher consumption expenditures and vice versa. Household income is closely related to consumption. If there is an increase in income, it will increase spending on consumption. Suriani & Putra (2012) and Saputra & Swara (2014) find that income per capita positively affects domestic sugar demand. When demand for sugar rises but production remains insufficient to meet demand, sugar import will increase.

The result shows that the sugarcane harvested area significantly and negatively impacts sugar imports. This result indicates that the reduction of sugarcane plantations will increase sugar imports. This result corroborates the third hypothesis. The land is one of the critical resources that support the agricultural production. Given that production will become increasingly inefficient as the land narrows, the size of farmland is crucial.

Apriawan et al. (2016) find that increased harvested area increases sugarcane production. However, as population density increases, the harvested area decreases as it is shifted to non-agricultural usage (Pipitpukdee et al., 2020). Furthermore, the area under sugarcane cultivation has been dramatically reduced due to the pressure of cereals and other short-duration crops, resulting in lower sugarcane production (Rahman et al., 2016). The sugar industry requires large quantities of sugarcane of the desired quality to maximize sugar production in quantity and quality. Sugarcane plantations must be expanded to produce more significant quantities of sugar to satisfy this demand. For example, Russia has moved from a sugar importer to an exporter due to increased harvested area and output per hectare (Maitah & Smutka, 2016).

The result indicates that sugarcane productivity has a significant negative influence on sugar import, supporting the fourth hypothesis. This hypothesis was based on the premise that Indonesia's lower sugarcane productivity relative to other nations demonstrates how low sugarcane production is relative to sugar-producing nations such as Brazil and India (USDA, 2018). Increased productivity leads to increased production, which reduces reliance on imported goods (Siringo & Daulay, 2014). However, stagnant sugarcane productivity has been a significant agricultural challenge (Solomon, 2016). Sustainable agro-techniques, climate-robust cultivars, biointensive modules, and need-based equipment must be created for increased sugarcane yield. Reduced production costs, increased sugar content, higher product pricing, and close collaboration between sugar mills and farmers

will contribute to the desired increase in productivity (Arun & Premkumar, 2022). To encourage the growth of the sugar industry, Keerthipala (2016) emphasizes the significance of eco-friendly agricultural practices

## CONCLUSION

This study investigates whether sugar consumption, income per capita, sugarcane harvested area, and sugarcane productivity affect the volume of imports in Indonesia during 1995-2021. This study contributes theoretically to the existing literature by introducing new independent variables helpful in formulating policies to reduce sugar import dependency. During 1995-2021, sugar consumption and income per capita had a statistically significant positive effect on sugar import, while sugarcane harvested area and sugarcane productivity had a statistically significant negative effect on sugar import. Since domestic sugar production is insufficient to satisfy Indonesia's growing demand for sugar, import is the optimal solution to this problem. However, it is necessary to make long-term efforts to prevent the continued reliance on sugar imports.

The policy implications of the findings are, among others, the need to control sugar consumption through education and healthy lifestyle campaigns. In addition to import, it is necessary to strengthen the domestic sugar industry by, among other things, establishing or expanding sugarcane plantations based on a comprehensive land suitability analysis and adding and revitalizing sugar mills. Most factories are old and have low productivity rates due to underinvestment. Sugarcane productivity can be increased by applying good agricultural practices and entrepreneurial attitudes. As for limitation, this study utilizes only data on total sugar imports, with no description of the types of sugar imported into Indonesia. If further research can characterize sugar imports, it will be easier to determine which types of sugar imports are the most prevalent each year.

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# Optimizing Hajj Fund Management through Islamic Finance Instrument

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## Abstract

*The management of Hajj funds must be done effectively using a rigorous standardized risk management approach. This study aims to create a Hajj fund management model using Islamic financial instruments through the optimal portfolio method and strategic asset allocation. The model was built using historical data from 2010–2022, involving Islamic deposits, government sukuk (SBSN), corporate sukuk, and Islamic stocks, which were analyzed with the Markowitz portfolio equation in Excel Solver. The result showed that the optimal portfolio yields an 8.50% expected return with a 4.00% risk; strategic asset allocation produces an 8.25% return with a 2.99% risk. The policy implication of this research is the need to review the initial deposit of pilgrims and explore alternative investments to bridge the gap between the actual cost of Hajj and pilgrims' payments while improving returns.*

## Keywords:

hajj fund; investment; optimal portfolio; strategic asset allocation; Markowitz model

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## INTRODUCTION

The concept of Hajj fund management in Indonesia is a crucial issue due to the size of the Hajj fund, the long waiting period for the departure of prospective pilgrims, and the high expectations of the management results. The main challenges are high expectations from the public and investment risks, fluctuations in the Sharia financial market, and the increasing cost of organizing the Hajj pilgrimage. Indonesia, as a country with an immense Muslim majority, is highly interested in performing the fifth pillar of Islam, which is reflected in the number of Hajj applicants (Karimah & Iskandar, 2020). Table 1 shows the data on the number of hajj registrants and waiting time for each province.

**Table 1. The Number of Hajj Registrants and Waiting Time for Prospective Pilgrims**

| Province               | Number of Hajj Registrants | waiting time for prospective pilgrims |
|------------------------|----------------------------|---------------------------------------|
| Aceh                   | 132.507                    | 35                                    |
| North Sumatera         | 153.063                    | 22                                    |
| West Sumatera          | 100.658                    | 26                                    |
| Riau                   | 118.359                    | 27                                    |
| Jambi                  | 84.676                     | 33                                    |
| South Sumatera         | 147.491                    | 25                                    |
| Bengkulu               | 33.884                     | 35                                    |
| Lampung                | 147.016                    | 25                                    |
| Bangka Belitung Island | 26.641                     | 29                                    |
| Riau Island            | 26.903                     | 27                                    |
| Dki Jakarta            | 213.994                    | 29                                    |
| West Java              | 775.953                    | 31                                    |
| Central Java           | 877.986                    | 33                                    |
| Yogyakarta             | 97.465                     | 34                                    |
| East Java              | 1.112.897                  | 36                                    |
| Banten                 | 237.765                    | 28                                    |
| Bali                   | 17.685                     | 29                                    |
| NTB                    | 148.434                    | 38                                    |
| NTT                    | 13.799                     | 24                                    |
| West Kalimantan        | 47.711                     | 27                                    |
| Central Kalimantan     | 40.828                     | 29                                    |
| South Kalimantan       | 134.440                    | 39                                    |
| East Kalimantan        | 82.998                     | 44                                    |
| Northern Kalimantan    | 12.104                     | 41                                    |
| North Sulawesi         | 10.638                     | 18                                    |
| Central Sulawesi       | 41.040                     | 24                                    |
| South Sulawesi         | 248.280                    | 49                                    |
| Southeast Sulawesi     | 49.248                     | 28                                    |
| Gorontalo              | 14.795                     | 18                                    |
| West Sulawesi          | 34.981                     | 40                                    |
| Maluku                 | 14.248                     | 19                                    |
| North Maluku           | 19.547                     | 26                                    |
| West Papua             | 24.092                     | 21                                    |
| Papua                  | 11.394                     | 26                                    |

Source: Siskohat Ministry of Religious Affairs of the Republic of Indonesia RI 2023, data processed (2023)

Table 1 shows that the total number of prospective pilgrims reached 5.253.520, while on the other hand, the quota provided by the government of Saudi Arabia is limited. The Hajj quota is a limit on the number of Indonesian pilgrims given by the Kingdom of Saudi Arabia government based on the provisions of the Organization of the Islamic Conference (OIC) as stipulated in the Minister of Religious Affairs Regulation Number 14 of 2012. The quota for Indonesian pilgrims is outlined in a memorandum of understanding between the Minister of Religion of the Republic of Indonesia and the Minister of Hajj of the Kingdom of Saudi Arabia regarding preparing the Hajj every year before the Hajj operation. The Minister of Religious Affairs uses this memorandum of understanding to set national, provincial, and special hajj quotas with the principles of fairness and proportion. The presence of quotas results in long queues in Indonesia called waiting lists, a severe obstacle to prospective pilgrims. The limited quota and the high interest of Indonesian Muslims have resulted in protracted queues of pilgrims (Bramayudha & Irawan, 2023).

Table 1 above shows that the lowest waiting lists for prospective pilgrims are in West Papua province, Maybrat district, and East Kalimantan province: Mahakam Ulu district, East Kalimantan province, which are 12 and 17 years old, respectively. The most extended waiting period occurs in Bantaeng, Sidrap, Pinrang, Pare-pare, and Wajo districts of South Sulawesi Province, which is 41–46 years, and on average, this waiting period occurs for 24–25 years. This condition will continue to grow as the number of Hajj applicants increases daily.

The financial management of Hajj starts with an initial deposit of IDR 25,000,000 for prospective pilgrims, which is included in the Hajj Implementation Fee (BPIH). The President determines the amount deposited through a designated Sharia Bank or national commercial bank managed by the Minister of Religious Affairs.

Indonesia's Hajj administration fund has created a wave of complex debates regarding the financial management of the Hajj. Research on Hajj funds is usually conducted in countries with larger Muslim populations, such as Indonesia, India, Lebanon, Tunisia, Dubai, and Qatar (Ladki & Mazeh, 2017). Several researchers have proposed ideas about managing Hajj funds in various investment instruments. Sarniti & Wirduyaningsih (2020) researched the optimization of Hajj fund management through the synergy of the Hajj fund scheme and productive zakat. Ismal & Septiana (2019) discuss the management of Hajj funds through portfolio formation in the money market, while Aziz (2018) and Jumali (2018) discuss Hajj financial management by focusing on aspects such as wakalah and cost accountability. Muneeza (2018) compared Hajj financial management in Indonesia, Malaysia, and the Maldives. Karimah & Iskandar (2020) delves into the potential of infrastructure-based sukuk as an alternative investment option for optimizing Hajj fund management. Pratiwi et al. (2019) focus on optimizing Hajj funds through Islamic banks.

These debates range from the number of Muslims who register as prospective Hajj pilgrims to the deposit funds they must pay. The length of the waiting period before departing for Hajj has also become an inevitable topic. All these elements can make

the Hajj fund a promising source of long-term investment (Setyawan et al., 2020). This investment potential is evident in the amount of funds under management, which reached a spectacular figure of \$145.7 trillion in 2020, according to the audited 2021 BPKH Annual Report. With an average waiting period of 25 years, some even reaching 48 years, according to the Ministry of Religion's Siskohat 2023, this fund is a valuable asset that can be optimally utilized for the benefit of the people. The management of Hajj deposit funds can benefit pilgrims by reducing the costs associated with organizing Hajj and improving the quality of services (Abidin, 2016). The benefits of these funds are not only limited to increasing returns but also involve the development of the Islamic finance industry and potential economic growth, which is growing in Indonesia (Hulwati et al., 2023). Furthermore, Rusydiana et al. (2021) found that the research suggestion is to look for alternative investment management of Hajj funds.

Approaches to investment management include the "Portfolio Theory" proposed by Markowitz in 1952, which states that return and risk are interrelated and measurable, allowing the determination of the appropriate level of risk for each level of return in a portfolio (Markowitz, 1952). This concept gave birth to "Modern Portfolio Theory," which suggests that risk can be managed by assembling several securities into a portfolio. In this case, the standard deviation or variance measures risk (Markowitz, 1952). This theory has been supported by ideas such as the Treynor Ratio, which includes the variables Market Value, Time, and Risk (Treynor, 1962), and the Sharpe Ratio, which uses standard deviation to measure the appropriateness of portfolio returns (Sharpe, 1964). These ideas, including the Modern Portfolio Theory, Treynor Ratio, and Sharpe Ratio, can help investment managers such as BPKH construct an optimal portfolio to achieve desired investment returns with an acceptable level of risk.

The use of Markowitz's theory in portfolio formation has been widely investigated. Becker et al. (2013) compared the traditional Mean Variance by Markowitz with Michaud's "resampled efficiency", finding that Markowitz's optimization method performs better. Tu & Zhou (2011) combined the "naive" 1/N method with other advanced strategies in the study, finding that the combination of strategies was superior in performance to the 1/N strategy. In Indonesia, some researchers have also applied the Markowitz Model. Chasanah et al. (2017) concluded that optimal portfolio formation with the Markowitz Model is more dominant than the Single Index Model. Meliala & Sukarno (2023) constructed optimal portfolios for stocks from different sectors in Indonesia. The success of Markowitz's theory in various studies confirms its relevance in investment management practice.

Implementatively, Markowitz's theory will be used to form strategic asset allocation. Several researchers have used asset allocation strategies for investment management and have shown that investment returns can be maximized through asset allocation strategies. Among these studies include strategic asset allocation of pension funds, an application of Markowitz portfolio theory (Menjeri, 2018), A simplified perspective of the Markowitz portfolio theory (Kumar, 2018), sustainability in supplier selection and order allocation: combining integer variables with Markowitz portfolio theory (Kellner & Utz, 2019), the

application of Markowitz portfolio theory to producing the world's major field crops (Vasylieva, 2020), and strategic asset allocation with illiquid Alternatives (Luxenberg et al., 2022).

Previous research has yet to specifically find an ideal Hajj fund management model with an optimal, liquid, low-risk investment portfolio following sharia provisions based on consideration of market conditions. Previous research (Setyawan et al., 2020; Witjaksono & Bustomi, 2021) has only looked for the best combination of investment instruments based on investor scenarios. This research contributes to studying the asset allocation model for the Hajj Financial Management Agency, which is expected to provide alternative investment portfolios to obtain optimal benefit value.

This study aims to create a Hajj fund management model using Islamic financial instruments through the optimal portfolio method and strategic asset allocation. For the Hajj Financial Management Agency (BPKH), it is essential to adopt an optimal investment fund allocation strategy by utilizing various financial instruments that match the best combination of risk and return or following the predetermined investment target. Practically, the novelty of this research is to provide an alternative optimal asset allocation strategy for Hajj funds in Indonesia based on Islamic financial instruments, including the Islamic money market and capital market, considering three critical aspects: policy, market timing, and instrument selection.

## METHODS

Markowitz's portfolio selection approach is used to determine the optimal portfolio, aiming to maximize returns at a certain risk level. The first simulation uses modern portfolio theory data from 2010–2022, while the second uses a strategic asset allocation strategy based on economic and market conditions. Data from bullish, normal, and recession conditions are used. Data analysis is done by calculating through the application of the Markowitz model, which consists of several steps as follows: First, determining the Individual Instrument Return Value of Islamic Banking deposit return is found using the formula:

$$R_{\text{B}} = \frac{R_y}{12}$$

where is  $R_{\text{B}}$ : monthly return  $R_y$ : annualized return.

Next up is the sukuk sovereign (SBSN)/ sukuk corporation:

$$R_{\text{B}} = \frac{P_t - P_{t-1} + C}{P_{t-1}}$$

Where is  $R_{\text{B}}$ : Return Sukuk,  $P_t$ : Sukuk price for the period,  $P_{t-1}$ : Sukuk price in previous period,  $C$ : profit sharing or margins.

$$\text{Islamic stocks: } R_{\text{B}} = \frac{IHSI_t - IHSI_{t-1}}{IHSI_{t-1}}$$

where is  $IHSI_t$ : The individual stock price index in month  $t$ ,  $IHSI_{t-1}$ : Individual stock price index in month  $t-1$

Second, determining the expected return of individual instruments

$$E(R_i) = \sum_{i=1}^n p_i (r_i)$$

Where is,  $E(R_i)$ : expected return of instrument  $i$  (%);  $p_i$ : probability of an event (return) (%);  $r_i$ : rate of return of instrument  $i$  (%).

Third, determining Individual Instrument Risk

$$\sigma_i^2 = \frac{\sum_{j=1}^N [(R_{ij} - E(R_i))^2]}{n-1},$$

Where is  $\sigma_i^2$ : Variance of investment in assets  $i$ ,  $\sigma_i$ : Standard Deviation,  $R_{ij}$ : Return on investment  $i$  in condition  $j$ ,  $E(R_i)$ : Expected Return on Investment  $i$ ,  $N$ : Number of observation.

Fourth, determine the expected return portfolio by using the following formula:

$$E(R_p) = \sum_{i=1}^n (W_i) \cdot (E(R_i))$$

Where is,  $E(R_p)$ : Expected Return Portfolio,  $W_i$ : The Weight Of I-Securities Portfolio,  $E(R_i)$ : Expected Return Individual.

Fifth, determine the expected portfolio risk (variance and standard deviation)

$$\sigma_p = \sqrt{\sigma_i^2},$$

Where is,  $\sigma_p^2$ : Variance of portfolio investment,  $\sigma_p$ : Standard Deviation of Portfolio. Afterwards, you can determine with the formula, Covariance =  $E\{[R_i - E(R_i)] \cdot [R_j - E(R_j)]\}$ .

Sixth, determining the optimal portfolio alternative. Calculates the expected return and risk of a portfolio of equal proportions. The expected return of a portfolio is the weighted average return of each stock in the portfolio in percentage terms. portfolio in percentage terms. It is calculated by accumulating the product of individual expected returns and individual stock proportions. The expected return of each company's portfolio is calculated using the following equation:

$$E(R_p) = \sum_{i=1}^n (W_i) \cdot (E(R_i))$$

Where is,  $E(R_p)$ : Expected Return Portfolio,  $W_i$ : The Weight Of I-Securities Portfolio,  $E(R_i)$ : Expected Return Individual

Portfolio risk is the chance of failure of an investment in a portfolio in percentage terms. Calculating portfolio risk requires measuring the standard deviation of each company. The difference is found because the portfolio has more than one stock.

Another variable included is covariance, which measures the relationship of the movement of one stock to another.  $\text{Min } \sigma_p^2 = W_1^2 \sigma_1^2 + W_2^2 \sigma_2^2 + 2W_1 W_2 \text{Cov}(R_1 R_2)$   
Constraints:  $W_1 + W_2 + W_i = 1$ ,  $W_1, W_2 + W_i \geq 0$ ,  $\text{Max } E(R_p) = \sum_{i=1}^n (W_i) \cdot (E(R_i))$ .  
Constraints:  $W_i (E(R_i)) = 1$ ,  $W_1, W_2 \geq 0$ , where is,  $\sigma_p^2$ : Variance of portfolio investment,  $\sigma_p$ : Standard Deviation of Portfolio,  $W_1$ : proportion of security 1 portfolio,  $W_2$ : portfolio proportion of security 2,  $\text{Cov}(R_1 R_2)$ : Covariance of security 1 and 2.

## SHARPE RATIO

The relative return to risk analysis used in this study is the Sharpe ratio. The Sharpe ratio measures how much return is expected to be generated for each unit of total risk. A

positive Sharpe ratio indicates that the investment portfolio formed can provide additional investment returns greater than the risk-free asset. The risk-free asset indicator used in this study is the BI rate. The higher the positive value of the Sharpe ratio, the better the portfolio performance or the smaller the Sharpe ratio, the riskier the investment portfolio (Sharpe, 1964).

Measuring portfolio performance, the Sharpe ratio bases its calculation on the concept of a capital allocation line as a benchmark, by dividing the portfolio risk premium by its standard deviation. Thus, the Sharpe ratio can be used to measure the risk premium for each unit of risk in the portfolio. To calculate the Sharpe ratio, the following equation can be used:

$$Sp = \frac{E(R_p) - R_f}{\sigma_p}$$

Where is, Sp: Sharpe ratio,  $R_p$ : Return portfolio.,  $R_f$ : risk free,  $\sigma_p$ : risk portfolio. The optimal portfolio is selected based on the rate of return, the given risk, and the portfolio optimization of the Sharpe index. Investors tend to avoid risk (Fabozzi & Modigliani, 2009), so it tends to choose the portfolio with the lowest risk in each category. Then when risk levels are equal, portfolios that offer the highest returns are usually chosen more favorably. In the other hand, when aiming for the same level of return, preference leans towards portfolios with lower risk.

## RESULT AND DISCUSSIONS

Strategic asset allocation is used to get the best combination of investment placement. This study will find a portfolio model with the best combination using Islamic banking deposits, state sukuk, corporate sukuk, and Islamic stocks. Islamic banking deposits are the most stable investment instruments, as shown in Table 2. Sukuk government and corporate sukuk are generally relatively safe with high return achievements. Meanwhile, Islamic stocks are investment instruments vulnerable to various economic conditions, making them very volatile and high-risk.

The results of the calculation of returns on Islamic financial instrument data from 2010-2022 are presented in Table 2. Based on Table 2, the return investment profile shows that Islamic Banking Deposits have a minimum value of 0.0316, a maximum value at the largest return value in the study period of 0.0732, and a mean or average of 0.055162. The standard deviation of Islamic banking deposits is 0.0126. The mean value shows the average expected return value of 5.52%, and the standard deviation, which shows the risk value, has a value of 1.26%. This result means that Islamic banking deposits provide an expected annual return of 5.52% with a risk level of 1.26%. Government Sukuk/SBSN has a minimum value of -0.0521, a maximum value at the largest return value in the study period of 0.1289, and a mean or average of 0.07859. The standard deviation owned by Government Sukuk (SBSN) is 0.05237. The mean value shows the average return value of 0.07859, and the standard deviation, which shows the risk value, has a value of 0.05237. This result means that Government Sukuk (SBSN) provides a return per year of 7.86% with a risk level of 5.24%.

**Table 2. Profile Investment Return Individual (in %)**

| Year | Return                   |                  |                   |                |
|------|--------------------------|------------------|-------------------|----------------|
|      | Islamic Banking Deposits | Government Sukuk | Sukuk Corporation | Islamic stocks |
| 2010 | 0.0732                   | 0.1075           | 0.0939            | 0.2706         |
| 2011 | 0.0630                   | 0.0997           | 0.1143            | 0.0078         |
| 2012 | 0.0627                   | 0.0938           | 0.0361            | 0.1054         |
| 2013 | 0.0479                   | -0.0521          | 0.0183            | -0.0200        |
| 2014 | 0.0731                   | 0.1165           | 0.0990            | 0.1853         |
| 2015 | 0.0666                   | 0.0690           | 0.0966            | -0.1260        |
| 2016 | 0.0555                   | 0.1087           | 0.1409            | 0.1613         |
| 2017 | 0.0591                   | 0.1289           | 0.1227            | 0.0752         |
| 2018 | 0.0519                   | 0.0186           | 0.0333            | -0.0845        |
| 2019 | 0.0468                   | 0.1231           | 0.1441            | 0.0284         |
| 2020 | 0.0443                   | 0.1125           | 0.0933            | -0.0917        |
| 2021 | 0.0316                   | 0.0668           | 0.0857            | -0.1150        |
| 2022 | 0.0414                   | 0.0287           | 0.0644            | 0.0439         |

Source: Data Processed (2023)

Sukuk Corporation has a minimum value of 0.0183, a maximum value at the most considerable return value in the study period of 0.1441, and a mean or average of 0.08789. The standard deviation owned by Sukuk Corporation is 0.04000. The mean value shows the average return value of 0.8789, and the standard deviation, which shows the risk value, is 0.04000. This result means that Sukuk Corporation provides a return per year of 8.79% with a risk level of 4.00%. Islamic stocks have a minimum value of -0.1260, a maximum value at the largest return value in the study period of 0.2706, and a mean or average of 0.03390. The standard deviation owned by Islamic stocks is 0.12357. The mean value shows the average return value of 0.0339, and the standard deviation, which shows the risk value, is 0.12357. This result means that Islamic stocks provide a return per year of 3.39% with a risk level of 12.36%.

The subsequent managerial action involves computing the risk (standard deviation) over the entire duration of the study for each instrument. Risk corresponds to the square root of variance; thus, the risk calculation aligns with the variance calculation. This process can be facilitated using the “=stdeva” function in Microsoft Excel software, using the returns for each instrument across the study period as arguments to determine the risk associated with each instrument. The following are the results of the calculation of expected return and risk from the two simulations that will be carried out.

**Table 3. Profile of Expected Return and Risk Instrument Modern Portfolio Theory**

| No | Investment Instruments   | E (Ri) | Risk   |
|----|--------------------------|--------|--------|
| 1  | Government Sukuk (SBSN)  | 7.86%  | 5.24%  |
| 2  | Sukuk Corporation        | 8.79%  | 4.00%  |
| 3  | Islamic Banking Deposits | 5.52%  | 1.26%  |
| 4  | Islamic Stocks           | 3.39%  | 12.36% |

Source: Data Processed (2023)

Furthermore, Table 3 shows that the highest return expectation is in the Sukuk Corporation instrument of 8.79%, followed by Government Sukuk of 7.86%, then Islamic Banking Deposits provide an expected return of 5.52%, and Islamic Stocks give the lowest return expectation of 3.39%. Then, the highest individual instrument risk per year is found in the Islamic Stocks instrument, amounting to 12.36%; the second and third orders are Government Sukuk 5.24% and Sukuk Corporation 4.00%. Islamic Banking Deposits obtain the lowest risk at 1.26%.

Meanwhile, the expected return and risk with the strategic asset allocation approach are shown in Table 4, which shows that in a bullish market, Government Sukuk provides an expected return of 11.54% per year, Sukuk Corporation 11.41% per year, Islamic Banking Deposits 6.52% per year, and Islamic Stocks 17.31% per year. The highest risk is in Investment Instruments Islamic Stocks at 8.03%, and the lowest is in Government Sukuk (SBSN) at 0.98%. Then, in normal market conditions, Government Sukuk provides an expected return of 8.24% per year, Sukuk Corporation 8.89% per year, Islamic Banking Deposits 4.91% per year, and Islamic Stocks 1.41% per year. The highest risk is in investment instruments like Islamic stocks (8.08%), and the lowest is in Islamic banking deposits (1.37%). Whereas in market recessions, Government Sukuk provides an expected return of 3.70% per year, Sukuk Corporation 6.04% per year, Islamic Banking Deposits 5.27% per year, and Islamic Stocks of -8.06% per year. Investment Instruments show the lowest risk during market recessions in Islamic Banking Deposits at 0.98%.

**Table 4. Profile of Expected Return and Risk Instruments Strategic Asset Allocation**

| No | Investment Instruments   | Bullish |       | Normal |       | Recessions |       |
|----|--------------------------|---------|-------|--------|-------|------------|-------|
|    |                          | E (Ri)  | Risk  | E (Ri) | Risk  | E (Ri)     | Risk  |
| 1  | Government Sukuk (SBSN)  | 11.54%  | 0.98% | 8.24%  | 3.61% | 3.70%      | 7.07% |
| 2  | Sukuk Corporation        | 11.41%  | 2.18% | 8.89%  | 4.21% | 6.04%      | 4.04% |
| 3  | Islamic Banking Deposits | 6.52%   | 0.93% | 4.91%  | 1.37% | 5.27%      | 0.98% |
| 4  | Islamic Stocks           | 17.31%  | 8.03% | 1.41%  | 8.08% | -8.06%     | 4.42% |

Source: Microsoft Excel (Data Processed)

After obtaining the expected return and risk of investment instruments, the variance and covariance matrix of each portfolio can be found. Tables 5 and 6 show the positive

or negative relationship of each investment instrument that can help BPKH diversify in the formation of the optimal portfolio. The following are the results of the calculation of the variance and covariance matrix of the two simulations carried out:

**Table 5. Variance Covariance Matrix of Modern Portfolio Theory Approach**

|                          | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |
|--------------------------|------------------|-------------------|--------------------------|----------------|
| Government Sukuk         | 0.002531         | 0.001529          | 0.000227                 | 0.002421       |
| Sukuk Corporation        | 0.001529         | 0.001477          | 0.000070                 | 0.001140       |
| Islamic Banking Deposits | 0.000227         | 0.000070          | 0.000147                 | 0.000866       |
| Islamic Stocks           | 0.002421         | 0.001140          | 0.000866                 | 0.014092       |

Source: Data Processed (2023)

The correlation coefficient between securities also plays an important role in reducing portfolio risk, with a value of +1 indicating a perfect positive correlation, 0 indicating no correlation, and -1 indicating a perfect negative correlation (Lee et al., 2016). Next, substitute the covariance matrix into the optimal portfolio combination model using Microsoft Excel Solver to get the optimal portfolio combination results (Chao et al., 2019).

**Table 6. Variance Covariance Matrix of Strategic Asset Allocation Approach**

| Market Bullish           |                  |                   |                          |                |
|--------------------------|------------------|-------------------|--------------------------|----------------|
|                          | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |
| Government Sukuk         | 0.00007          | 0.00002           | -0.00002                 | -0.00050       |
| Sukuk Corporation        | 0.00002          | 0.00036           | -0.00015                 | -0.00083       |
| Islamic Banking Deposits | -0.00002         | -0.00015          | 0.00006                  | 0.00040        |
| Islamic Stocks           | -0.00050         | -0.00083          | 0.00040                  | 0.00484        |
| Market Normal            |                  |                   |                          |                |
|                          | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |
| Government Sukuk         | 0.00104          | 0.00069           | 0.00020                  | 0.00038        |
| Sukuk Corporation        | 0.00069          | 0.00142           | -0.00005                 | -0.00090       |
| Islamic Banking Deposits | 0.00020          | -0.00005          | 0.00015                  | 0.00063        |
| Islamic Stocks           | 0.00038          | -0.00090          | 0.00063                  | 0.00522        |
| Market Recessions        |                  |                   |                          |                |
|                          | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |
| Government Sukuk         | 0.00375          | 0.00197           | 0.00006                  | -0.00190       |
| Sukuk Corporation        | 0.00197          | 0.00122           | 0.00011                  | -0.00111       |
| Islamic Banking Deposits | 0.00006          | 0.00011           | 0.00007                  | -0.00021       |
| Islamic Stocks           | -0.00190         | -0.00111          | -0.00021                 | 0.00147        |

Source: Data Processed (2023)

Table 7 shows the optimal portfolio combination with the modern portfolio theory approach. Each model's portfolio with the highest Sharpe index value is considered the optimal portfolio; therefore, the eighth portfolio alternative with a Sharpe number of "0.9124" is the most optimal. Combining portfolios with Islamic financial instruments such as government sukuk (SBSN), sukuk corporations, Islamic banking deposits, and Islamic stocks forms various portfolio returns and risks.

**Table 7. Optimal Portfolio Combination of Islamic Financial Instruments Modern Portfolio Theory Approach**

| Alternatives | Weights          |                   |                          |                | Return | Risk   | Sharpe  |
|--------------|------------------|-------------------|--------------------------|----------------|--------|--------|---------|
|              | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |        |        |         |
| 1            | 0.00%            | 0.00%             | 0.00%                    | 100.00%        | 3.39%  | 11.87% | -0.1230 |
| 2            | 4.16%            | 5.03%             | 1.98%                    | 88.82%         | 3.89%  | 10.70% | -0.0898 |
| 3            | 30.83%           | 11.53%            | 0.00%                    | 57.64%         | 5.39%  | 7.79%  | 0.0693  |
| 4            | 56.29%           | 18.23%            | 0.00%                    | 25.47%         | 6.89%  | 5.37%  | 0.3801  |
| 5            | 66.66%           | 20.96%            | 0.00%                    | 12.38%         | 7.50%  | 4.79%  | 0.5536  |
| 6            | 73.45%           | 22.75%            | 0.00%                    | 3.80%          | 7.90%  | 4.61%  | 0.6612  |
| 7            | 42.91%           | 57.09%            | 0.00%                    | 0.00%          | 8.39%  | 4.12%  | 0.8594  |
| 8            | 31.04%           | 68.96%            | 0.00%                    | 0.00%          | 8.50%  | 4.00%  | 0.9124  |

Source: Data Processed (2023)

Table 8 shows the optimal portfolio combination with the strategic asset allocation approach in a bullish market. Based on calculating the optimal portfolio in bullish conditions, it can provide seven (7) alternative portfolios. The optimal portfolio based on these data is in alternative 1, which is seen from comparing the Sharpe index with other portfolio alternatives because it has the highest Sharpe number (12.298). This alternative is suitable for use with BPKH's risk-averse position but still gets maximum returns.

**Table 8. Optimal Portfolio Combination of Islamic Financial Instruments Strategic Asset Allocation Approach (Bullish Market)**

| Alternatives | Weights          |                   |                          |                | Return | Risk  | Sharpe |
|--------------|------------------|-------------------|--------------------------|----------------|--------|-------|--------|
|              | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |        |       |        |
| 1            | 14.84%           | 15.46%            | 69.71%                   | 0.00%          | 8.02%  | 0.26% | 12.298 |
| 2            | 14.98%           | 15.60%            | 55.64%                   | 13.77%         | 9.52%  | 0.99% | 4.699  |
| 3            | 20.02%           | 20.93%            | 36.13%                   | 22.93%         | 11.02% | 1.41% | 4.382  |
| 4            | 23.70%           | 24.86%            | 18.10%                   | 33.34%         | 12.52% | 1.96% | 3.909  |
| 5            | 17.49%           | 17.88%            | 11.33%                   | 53.29%         | 14.02% | 3.44% | 2.669  |
| 6            | 10.19%           | 10.08%            | 5.60%                    | 74.14%         | 15.52% | 5.00% | 2.135  |
| 7            | 1.74%            | 1.63%             | 0.83%                    | 95.80%         | 17.02% | 6.64% | 1.834  |

Source: Data Processed (2023)

Table 9 shows the optimal portfolio combination with the strategic asset allocation approach in the normal market. Based on the calculation of the optimal portfolio under normal circumstances, it can provide six (6) alternative portfolios. The optimal portfolio based on these data is in alternative 5, which is seen from comparing the Sharpe index with other alternative portfolios because it has the highest Sharpe number (1.137).

**Table 9. Optimal Portfolio Combination of Islamic Financial Instruments Strategic Asset Allocation Approach (Market Normal)**

| Alternatives | Weights          |                   |                          |                | Return | Risk  | Sharpe |
|--------------|------------------|-------------------|--------------------------|----------------|--------|-------|--------|
|              | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |        |       |        |
| 1            | 8.92%            | 9.77%             | 4.57%                    | 76.74%         | 2.91%  | 5.54% | -0.350 |
| 2            | 17.67%           | 21.28%            | 5.75%                    | 55.30%         | 4.41%  | 4.07% | -0.108 |
| 3            | 28.73%           | 38.83%            | 6.35%                    | 26.09%         | 6.50%  | 2.67% | 0.619  |
| 4            | 27.48%           | 52.32%            | 5.97%                    | 14.23%         | 7.41%  | 2.61% | 0.981  |
| 5            | 24.10%           | 67.08%            | 5.00%                    | 3.82%          | 8.25%  | 2.99% | 1.137  |
| 6            | 17.63%           | 77.13%            | 3.30%                    | 1.95%          | 8.50%  | 3.23% | 1.131  |

Source: Data Processed (2023)

Table 10 shows the optimal portfolio combination with the strategic asset allocation approach in market recessions. Based on calculating the optimal portfolio in a recession, it can provide seven (7) alternative portfolios. The optimal portfolio based on these data is in alternative 6, which is seen from comparing the Sharpe index with other alternative portfolios because it has the highest Sharpe number (0.357).

**Table 10. Optimal Portfolio Combination of Islamic Financial Instruments Strategic Asset Allocation Approach (Market Recessions)**

| Alternatives | Weights          |                   |                          |                | Return | Risk  | Sharpe |
|--------------|------------------|-------------------|--------------------------|----------------|--------|-------|--------|
|              | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |        |       |        |
| 1            | 0.00%            | 63.86%            | 0.00%                    | 36.14%         | 0.94%  | 1.33% | -2.933 |
| 2            | 0.00%            | 74.50%            | 0.00%                    | 25.50%         | 2.44%  | 1.88% | -1.282 |
| 3            | 0.00%            | 85.15%            | 0.00%                    | 14.85%         | 3.94%  | 2.53% | -0.358 |
| 4            | 0.00%            | 95.79%            | 0.00%                    | 4.21%          | 5.44%  | 3.22% | 0.185  |
| 5            | 0.00%            | 97.96%            | 0.00%                    | 2.04%          | 5.75%  | 3.36% | 0.268  |
| 6            | 0.00%            | 82.27%            | 17.72%                   | 0.01%          | 5.90%  | 2.94% | 0.357  |
| 7            | 0.00%            | 95.26%            | 4.73%                    | 0.01%          | 6.00%  | 3.35% | 0.343  |

Source: Data Processed (2023)

Table 11 shows the recommended optimal portfolio combination using the strategic asset allocation approach considering market timing selection. Investment options for government sukuk, sukuk corporations, Islamic banking deposits, and Islamic stocks provide a return on bullish market conditions based on historical data of 8.02% with a

risk of 0.26%. In normal market conditions, it can provide a return of 8.25% with a risk of 2.99%. However, when the market is experiencing a recession, the optimal portfolio return only provides a return of 5.90% with a risk of 2.94%.

**Table 11. Recommendations for Optimal Portfolio Combination of Islamic Financial Instruments Strategic Asset Allocation Approach**

| Market Timing | Weights          |                   |                          |                | Return | Risk  | Sharpe |
|---------------|------------------|-------------------|--------------------------|----------------|--------|-------|--------|
|               | Government Sukuk | Sukuk Corporation | Islamic Banking Deposits | Islamic Stocks |        |       |        |
| Bullish       | 14.84%           | 15.46%            | 69.71%                   | 0.00%          | 8.02%  | 0.26% | 12.298 |
| Normal        | 24.10%           | 67.08%            | 5.00%                    | 3.82%          | 8.25%  | 2.99% | 1.137  |
| Recession     | 0.00%            | 82.27%            | 17.72%                   | 0.01%          | 5.90%  | 2.94% | 0.357  |

Source: Data Processed (2023)

These results show that the four portfolios are suitable for use in various market conditions. However, the role of investors and investment policy determines the return and risk received. For example, in a bullish position, if investors want maximum return with a risk that can still be tolerated, the portfolio choice is in alternative 7 (see Table 8). The portfolio can provide an expected return of 17.02% with a risk of only 6.64%. Seeing the increasing development of Islamic stocks in Indonesia, Islamic stocks can be an alternative to optimizing investment in Hajj fund management (Deananda & Wirdyaningsih, 2020). This analysis follows the risk profile of BPKH, which tends to avoid risk (risk-averse). This condition is reasonable due to regulations that limit investment in BPKH to being as far away as possible from losses because any losses will be borne together (joint responsibility).

Hajj fund revenue comes from Bipih deposits, which are deposits of prospective pilgrims. The position of Hajj financial managed funds at the end of 2022 was recorded at IDR 166.0 trillion. Based on data from the BPKH financial report in 2022, BPKH-managed funds are currently allocated 29.5%, or 48.9 trillion rupiahs, in the BPS-BPIH fund placement portfolio with most placements in deposits in Islamic banks and 70.5%, or 117.1 trillion rupiahs, in the investment portfolio with most investments in securities. Table 12 shows the total returns obtained by BPKH in its placements and investments from 2018 to 2022 are 5.3%, 6.3%, 5.4%, 6.9%, and 6.3%, respectively, or an annual average of 6.04%. Through these placements and investments, the level of profitability/return in the form of the value of the Hajj financial management funds investment portfolio is obtained.

**Table 12. Total Return on Management Results BPKH 2018 - 2022**

|             |                          | In % |     |     |     |     |
|-------------|--------------------------|------|-----|-----|-----|-----|
| Rentability | Total Return (Yield, %)  | 5.3  | 6.3 | 5.4 | 6.9 | 6.3 |
|             | Return on Placement (%)  | 4.7  | 5.4 | 4.0 | 3.7 | 3.3 |
|             | Return on Investment (%) | 6.3  | 7.3 | 6.4 | 7.9 | 7.4 |

Source: BPKH Financial Report 2018 - 2021 (Audited), BPKH Financial Report 2022 (Unaudited), BPKH Finance Sector

The actual cost of Hajj has experienced an upward trend from year to year. In the 2018 Hajj season, the actual cost of Hajj reached 69.2 million; in 2019, it rose to 70.6 million; in 2020, it fell to 68.6 million; it rose again in 2021 to 76 million; and it reached 97.8 million in 2022. Although there were no Hajj departures in 2020 and 2021 due to the COVID-19 pandemic, the BIPIH paid by prospective Hajj pilgrims generally experienced a significant increase, thus driving expectations of increased costs through the value of benefits. The increase in the cost of organizing the Hajj pilgrimage may pose a risk to the sustainability of the Hajj fund. Generally, the public perceives that the cost of Hajj per pilgrim is only around IDR 35.2 million, with an initial deposit of IDR 25 million and a final deposit of IDR 10.2 million. However, the actual cost reaches Rp 97.9 million, including airline tickets, accommodation, transport, and others. In reality, pilgrims get a subsidy (indirect cost) of around IDR 58.03 million from the development of the initial deposits of pilgrims who depart and wait. The number of pilgrims departing with waiting pilgrims reaches 1 to 23 or 221 thousand to 5 million pilgrims. The mismatch between the actual cost of Hajj and the deposit paid by the congregation (Bipih or direct cost) in the long run can threaten the financial sustainability of Hajj if adjustments are not made (BPKH, 2020).

The average increase in the value of benefits, BIPIH and BPIH Hajj RI, from 2010 to 2023 was 15.77%, with the initial Bipih fixed at Rp. 25 million. This increase was attributed to exchange rate fluctuations and inflation during the pandemic. However, the increase in BPIH did not increase the congregation's settlement deposit, increasing BPKH's responsibility. Therefore, BPKH must consider alternative investment options and cooperation that can potentially increase investment returns (Hulwati et al., 2023).

Suppose a simulation is carried out based on the results of the analysis. In that case, the average increase in the value of benefits (BIPIH and BPIH Hajj RI) is as follows: Increase in benefits from 2010 to 2023 by 15.77%. The initial Bipih has remained fixed since 2010 at Rp. 25 million. While the increase in Bipih on average per year from 2010–2023 amounted to 4%, the increase in BPIH per year from 2010–2023 amounted to 7.75%. Then, the total increase in BIPIH and BPIH on average per year from 2010 to 2023 amounted to 11.75%. Then, the simulation based on the current conditions in 2023 in the management of Hajj is as follows:

1. Prospective pilgrims who register in 2023 pay an Initial Deposit of IDR 25 Million and must wait at least 11 years for the opportunity to go on Hajj.
2. BPKH will manage the Initial Deposit Fund for at least 11 years.
3. Assuming that the BPIH will increase by 7.75% per year, and the BPIH for 2023 is IDR90.00 million/congregation, the BPIH in 11 years will be IDR166.72 million.
4. If the Bipih is also assumed to increase by 4% per year, then the 2023 Bipih is 49.89 million; at 11 years, it is IDR 71.84 million. So, the Repayment Deposit in 2023 is 49.89 million, which will also increase to 71.84 million.
5. Thus, the Initial Deposit Fund of Prospective Pilgrims deposited to be managed by BPKH must at least get a Total Benefit (Virtual Account) of IDR166.72 million - IDR25 million - IDR71.84 million = IDR69.88 million.

6. The Total Benefit of Rp69.88 million must be obtained from the management of funds of Rp25 million for 11 years, which means that it must get a compounded return of 13% per year.
7. To be able to cover the Bipih and BPIH gap, BPKH must be able to place and invest in instruments that provide a minimum return of 13%

Meanwhile, table 7 shows that the formation of optimal portfolios in Islamic financial instruments such as deposits in Islamic banks, state sukuk, corporate sukuk, and Islamic stocks was only able to generate a return of 8.50% with a risk level of 4.00%. Such an optimal portfolio is formed due to the asset class that occupies the highest weights, having minimal risk and high return expectations. Investments with minimal risk but still getting adequate returns are usually very favored by investors. However, the results of this calculation also provide seven other alternative investment models, which can be selected according to the specified investment policy and market timing. The optimal portfolio combination in this research produces a smaller return than other studies that use direct investment placement. For example, Setyawan et al. (2020) resulted in a combined return of 14.70% in the moderate scenario, 26.62% in the aggressive condition, and 7.76% when using the conservative scenario.

Furthermore, table 8 results simulations based on market condition scenarios (market timing selection) in bullish conditions obtained a return of 8.02% and a risk of 0.26%. Meanwhile, strategic asset allocation using other portfolio alternatives can be an option to pursue profits when the market is bullish, for example, by considering Islamic Stocks as an alternative investment option when economic and market conditions are bullish. This result can be seen from the optimal portfolio choices in alternatives 2, 3, 4, 5, 6, and 7. These alternatives provide portfolio returns and risks that can be adjusted to the BPKH risk profile. Islamic Stocks are proven to provide double-digit expected return portfolios when the market is bullish.

In normal conditions, a return of 8.25% and a risk of 2.99% are obtained (see table 9). When the market is normal, strategic asset allocation can follow alternative recommendation five by placing many funds in Sukuk Corporation and Government Sukuk (SBSN). This condition states that when the market is normal, choosing investment instruments like Islamic stocks still has a high risk. In contrast, Islamic banking deposits are stable but do not yield better returns when compared to Sukuk.

In recessionary conditions, a return of 5.90% and a risk of 2.94% are obtained (see Table 10). Strategic asset allocation during a market recession suggests that specific investment instruments like Islamic stocks should not be used due to their high volatility. Government Sukuk, on the other hand, may also be affected by deteriorating economic conditions and may not be a suitable choice in recessionary circumstances. Conversely, Sukuk Corporation consistently yields positive returns in recessionary markets, making it a preferred choice for many fund placement strategies. Islamic banking deposits are also favoured as they serve as cash reserves during economic downturns. Analyzing the investment return profiles of various Islamic financial instruments, it becomes evident

that deposits remain stable under all research period conditions, unlike other Islamic financial instruments.

The largest investment allocation in the strategic asset allocation approach based on market timing is in deposits and sukuk. Following Syakir's (2020) assertion, as cited in Witjaksono & Bustomi (2021), financial instruments and investments in the form of deposits and Sukuk are deemed capable of enhancing the benefits' value through the utilization of capital market instruments and the implementation of strategies like tax-saving, allocation towards maturity, and those categorized as available for sale. In addition, the placement of Hajj fund investment in deposits is an alternative investment allocation that gets the best sentiment with a percentage of positive sentiment of 50%, neutral 50%, and negative 0% (As-Salafiyah, 2022). However, it is worth noting that this research presents an alternative potential return of up to 17.02% (refer to Table 8). Nevertheless, this level of return is not applicable for BPKH due to the associated risk, which stands at 6.64%, and the allocation does not adhere to the diversification principle, as it predominantly invests in Islamic stocks.

The current placement and investment of BPKH, with restrictions on regulations, could be more optimal for obtaining returns. The average yield per year is 6.04%, the placement yield is 4.22%, and the investment return is 7.06% per year, below the optimal portfolio return on Islamic financial instruments. The management of Hajj funds faces challenges such as low benefit value in virtual accounts, a decline in Hajj registrants due to economic turmoil, and a lack of returns to cover the gap. Witjaksono & Bustomi (2021) suggested that BPKH can implement a strategic allocation strategy to optimize its investment funds. This strategy involves selecting a combination of financial instruments that offer the best balance between return and risk or are in line with the investment target that has been set previously.

To tackle the mentioned challenges, endeavors to increase the returns on the value of benefits derived from managed Hajj funds can be undertaken through the following approaches: 1) increasing the number of Hajj registrants; 2) enhancing the investment yield on the value of benefits managed by BPKH; 3) refining the efficiency of BPIH per pilgrim; and 4) raising the initial deposit of BPIH per congregation (Pujiharto et al., 2022). According to Hendrizal et al. (2023), the increase in Bipih aims to sustain the value of benefits for pilgrims who will depart in the coming years.

The sustainability of Hajj fund management needs to be maintained with efforts focused on increasing indirect costs through appropriate investments. Law No. 34/2014 of the Hajj Financial Management Agency (BPKH) provides a legal basis for managing Hajj funds through various investment instruments. Following the BPKH strategic plan 2022-2027, the allocation of hajj funds is placed in the form of current accounts, savings, and deposits at BPS BPIH (Bank Receiving Deposits for Hajj Pilgrimage Costs), with a maximum proportion of 30% of the total hajj financial management funds. Investments are also made through sharia instruments, gold, direct investment, and others. In the first three years of operation, Islamic banking investments can reach 50%, then drop to 30%.

Gold investments, direct investments, and other investments are limited, but securities investments are not restricted. In 2022, BPKH will increase its focus on direct investment domestically and in Saudi Arabia to achieve efficiency in BPIH. This result aligns with the findings of Ali & Mandalia (2021) research, which suggests that improved returns on Hajj funds can be achieved through direct investment schemes in transportation, hotels, convention businesses, and souvenir provision.

## CONCLUSION

The optimal portfolio forms a portfolio return and risk variation of 8.50% for return and a standard deviation/risk of 4.00%. This simulation recommends allocating Hajj fund investment assets to Government Sukuk/SBSN at 31.04%, Sukuk Corporation at 68.96%, deposits in Islamic banks at 0.00%, and Islamic stocks at 0.00%. Through strategic asset allocation and market timing for active portfolio approaches, Hajj fund management strategies in Islamic financial instruments produce several portfolio alternatives. In bullish conditions, the optimal portfolio lies in alternative 1, with the highest Sharpe ratio of 12.298, providing a return of 8.02% and a risk of 0.26%, distributed on Government Sukuk, Sukuk Corporation, and Islamic Banking Deposits. Under normal conditions, the optimal portfolio in alternative 5 has a Sharpe ratio of 1.137, generating a return of 8.25% and a risk of 2.99%, allocated to Government Sukuk, Sukuk Corporation, Islamic Banking Deposits, and Islamic Stocks. Under recessionary conditions, the optimal portfolio lies in alternative 6 with a Sharpe ratio of 0.357, giving a return of 5.90% and a risk of 2.94%, and allocations to Sukuk Corporation, Islamic Banking Deposits, and Islamic Stocks. Each condition offers portfolio alternatives with different returns and risks.

This study shows that Islamic financial instruments can generate higher returns than the current investments made by BPKH, but more is needed to overcome the annual BPIH increase. The government should adjust risk, investment allocation, and initial BPIH amount regulations. Regulations for Hajj finances should also be improved, as most of it is invested in low to medium-risk deposits and government securities. The limitations of Islamic investment instruments and the lack of equity structure in BPKH's financial management are also fundamental. BPKH should consider diversified investment alternatives, such as cooperation with investment managers, Islamic stocks on the Indonesia Stock Exchange, sukuk with investment-grade ratings, and Islamic mutual funds.

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# The Effect of Monetary Variable Shocks on Indonesian Portfolio Investment

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## Abstract

*Monetary variables can affect portfolio investment in the short or long term. The previous studies rarely discuss the effects of monetary variables in the long and short term on portfolio investment. This study looks at monetary indicators that affect investment portfolios in Indonesia. The methodology used in this research is to use the Vector Error Correction Model (VECM) to see the response of several variables in the short and long term. The findings suggest that monetary policy should pay special attention to Indonesia's money supply (M2) and savings to influence portfolio investment in the short term. The monetary policy transmission mechanism can use the money and expectation channels to optimize monetary variables to control investment. Meanwhile, in the long run, monetary policy portfolio investment control needs to pay attention to interest rates and savings and adjust to the set inflation target, which can be used in the interest rate channel.*

## Keywords:

Saving; investment; interest rates; money supply; monetary policy

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## INTRODUCTION

Household consumption, the business sector for investment, and the foreign sector for export-import have influenced Indonesia's economic growth in recent years (Badan Koordinasi Penanaman Modal, 2021). These three variables are interconnected; when one variable decreases, it will immediately affect the other two variables. Investment is one of the main driving forces of the Indonesian economy, especially during the economic recovery period when a pandemic hit it.

Investment has a positive correlation with infrastructure development in Indonesia. The amount of GDP significantly affects the slow growth of infrastructure (Banerjee et al., 2020; Ekeocha et al., 2022; Rinika et al., 2021). The increase in GDP will support the government's development efforts, while the government will also be more active in building infrastructure to support and attract investors (Kyriacou et al., 2019; Wang et al., 2019; Xu et al., 2021). The completer and more available the infrastructure in Indonesia, the more investment coming into Indonesia will also increase. This investment is also able to create a favorable business climate. The more investment or investment made in Indonesia; the more new businesses will emerge. In the last few years up to the pandemic, portfolio investment has received much attention from the Indonesian people. The Indonesian people are starting to look at this portfolio investment because investors can divide their capital into specific types of investment, and investors get the most minimal risk in investing. (Nur Safitri et al., 2020; Spuchlakova et al., 2015; West et al., 2021).

By exercising reasonable control and management of investment, the driving wheels of Indonesia's economic growth will be stable and even increase. The size of the investment in a country is strongly influenced by fluctuating monetary variables (Dang et al., 2020). Monetary variables have a multiplier effect because their influence impacts not only the monetary variable itself but also the real sector, government spending, and the external sector, so it will ultimately affect a country's economic growth. Economic variables, especially those closely related to the monetary sector, need to be monitored for movements and shocks that occur in them because they will affect other variables or even affect themselves in the long or short term.

In a broader and general sense, macroeconomic and fiscal policies implemented in a country can affect investment. (Ani & Onu, 2022; Lassance & Vrins, 2021; Mutuku & Ng'eny, 2014). When discussing investment, it is much more specific; portfolio investment, which is part of private investment, will be significantly influenced by market capitalization, the weighted average rate of return on deposits, trade openness, and wide money circulation (M2). (Lassance & Vrins, 2021; Seetharaman et al., 2017; Sharif Chaudhry et al., 2014).

In previous research, discussions on investment tended to be related to investment in general, so it took time to identify whether the investment discussed was direct or indirect. The previous study also examined the variables that affect investment, seen from various monetary and fiscal variables. Still, it did not distinguish the period of influence

of multiple variables on investment. On the other hand, this research will sharpen the research that has been done before in attempting to analyze the impact of shocks that occur in monetary variables on portfolio investment in the long term or short term, which has not previously been discussed. This study also specifies portfolio investment, not investment in general. The variables used in this study are also more focused on monetary variables in the hope of providing a specific description of what monetary policy should do to control investment portfolios in Indonesia. The research contributes to assisting the government in establishing a monetary policy transmission mechanism that can be applied in managing portfolio investment activities that enter Indonesia in the short and long term. This study aims to see the effect of monetary variables in Indonesia when experiencing short-term or long-term shocks and whether they impact portfolio investment.

## METHODS

This research includes applied research, which uses secondary data measured in a time series. The data source is taken from the Statistik Ekonomi dan Keuangan Indonesia (SEKI), from 2008 in the first quarter to 2022 in the third quarter. The step estimation method used in this study is as follows:

The first step must be to test the stationarity of the data, also known as the unit root test (Gujarati, 2004). The first step is to test the stationarity of the data by testing it at the degree level; if it is still not stationary, it will continue from the first-order to the second-order difference.

In determining the level of stationarity of data, pay attention to the following models;

$$Y_t = \delta Y_{t-1} + U_t \quad (1)$$

When the above equation is reduced by  $Y_{t-1}$ , on the right and left sides, obtained

$$Y_t - Y_{t-1} = \delta Y_{t-1} - Y_{t-1} + U_t \quad (2)$$

$$\Delta Y_t = (\delta - 1)Y_{t-1} + U_t \quad (3)$$

We can simplify the equation with:

$$\Delta Y_t = \beta Y_{t-1} + U_t \quad (4)$$

Determining the number of lags (order) used in the Vector Autoregressive VAR or VECM model, The Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) criteria used in determining the amount of lag. The lag selected in this study is the model with the smallest AIC value, with the following formula;

$$\ln(\text{AIC}) = \ln \frac{\sum u_i^2}{n} + \frac{2k}{n} \quad (5)$$

$$\ln(\text{SIC}) = \ln \left( \frac{\sum u_i^2}{n} \right) + \frac{k}{n} \ln(n) \quad (6)$$

Where,  $\hat{u}_i^2$  = the sum of the squared residuals; k = number of independent observations; n = number of observations.

The cointegration test carries out the long-term balance of the observed research variables. The Johansen cointegration test uses trace statistical analysis and or test statistics for the maximum eigenvalue and critical value at the confidence level = 5% with the following steps:

$$LR_{tr}(r|k) = -T \sum_{i=r+1}^k \log(1 - \lambda_i) \quad (7)$$

The maximum eigenvalue test statistic:

$$LR_{max}(r|k) = -T \sum_{i=r+1}^k \log(1 - \lambda_i) = LR_{tr}(r|k) - LR_{tr}(r+1|k) \quad (8)$$

For  $r = 0, 1, \dots, k-1$ , with

$$\lambda_i = \text{The largest eigenvalue to } -i \text{ from the matrix} = (\lambda_1 \leq \lambda_2 \leq \dots \leq \lambda_n) \quad (9)$$

$T$  = The number of observed observations

$K$  = The number of dependent variables

This study used the Vector Error Correction Model (VECM) in data analysis. VECM is an analysis used when variables that will not be stationary using Vector Autoregressive (VAR) (Usman et al., 2017). In modern econometric analysis, to build a relational model between economic variables in a non-structural way, you can use the VAR and VECM models. (Zou, 2018). We can use VECM analysis to find the relationship and shocks between variables in the short and long term. So to write the equation of the monetary variables that affect portfolio investment in Indonesia, partially it can be written as follows:

$$PF = C_1 + a_{1i} \sum_{i=1}^k SB_{t-k} + a_{1i} \sum_{i=1}^k M_{t-k} + a_{1i} \sum_{i=1}^k S_{t-k} + a_{1i} \sum_{i=1}^k INF_{t-k} + \varepsilon_1 \quad (10)$$

$$SB = C_2 + a_{2i} \sum_{i=1}^k PF_{t-k} + a_{2i} \sum_{i=1}^k M_{t-k} + a_{2i} \sum_{i=1}^k S_{t-k} + a_{2i} \sum_{i=1}^k INF_{t-k} + \varepsilon_2 \quad (11)$$

$$M = C_3 + a_{3i} \sum_{i=1}^k PF_{t-k} + a_{3i} \sum_{i=1}^k SB_{t-k} + a_{3i} \sum_{i=1}^k S_{t-k} + a_{3i} \sum_{i=1}^k INF_{t-k} + \varepsilon_3 \quad (12)$$

$$S = C_4 + a_{4i} \sum_{i=1}^k PF_{t-k} + a_{4i} \sum_{i=1}^k SB_{t-k} + a_{4i} \sum_{i=1}^k M_{t-k} + a_{4i} \sum_{i=1}^k INF_{t-k} + \varepsilon_4 \quad (13)$$

$$INF = C_5 + a_{5i} \sum_{i=1}^k PF_{t-k} + a_{5i} \sum_{i=1}^k SB_{t-k} + a_{5i} \sum_{i=1}^k M_{t-k} + a_{5i} \sum_{i=1}^k S_{t-k} + \varepsilon_5 \quad (14)$$

In conducting its analysis, VAR has specific instruments that have particular functions in explaining the interactions between variables in the model. The tools include the Impulse Response Function (IRF) and Variance decomposition (VD). IRF is used to see the vector moving average, which aims to see how long the shock of one variable affects other variables. VD to determine which variables have a significant role in changing the variable and other variables.

## RESULT AND DISCUSSIONS

Shocks caused by financial variables affecting Indonesian investment portfolios can turn into short-term and long-term. In the short run, portfolio investments are sensitive to the money supply (M2) and savings shocks. Still, portfolio investments are insensitive to shocks caused by interest rates and inflation in the short run. On the other hand, in the long run, portfolio investments respond to shocks from interest rates, savings, and inflation. In contrast, monetary (M2) shocks do not affect Indonesian portfolio investments in the long run.

The data used in this research is time series data. The problems of time series data are generally stochastic (having a non-stationary trend). The ADF (Augmented Dickey-Fuller) test uses a 5% significance level, as shown in Table 1. If the t-ADF value is less than the critical MacKinnon value, then it is concluded that it is stationary (does not contain a unit root). The unit root test is carried out at the level up to the second difference. Most variables do not pass the level and first difference tests, so the level of stationarity is at the second difference. The stationarity results are also reinforced by Figure 1. Figure 1 shows that each research variable is statistically at the degree of second difference because each variant shows a stationary trend. Based on the stationarity test that has been carried out using the Augmented Dickey-Fuller Test (ADF), it can be concluded that the variables used in this study do not tend to fluctuate so that they can be used to estimate the model.

**Figure 1. Second Difference Stationarity of Portfolio Variables, Interest Rates, Amount of Money in Circulation, Savings, and Inflation**

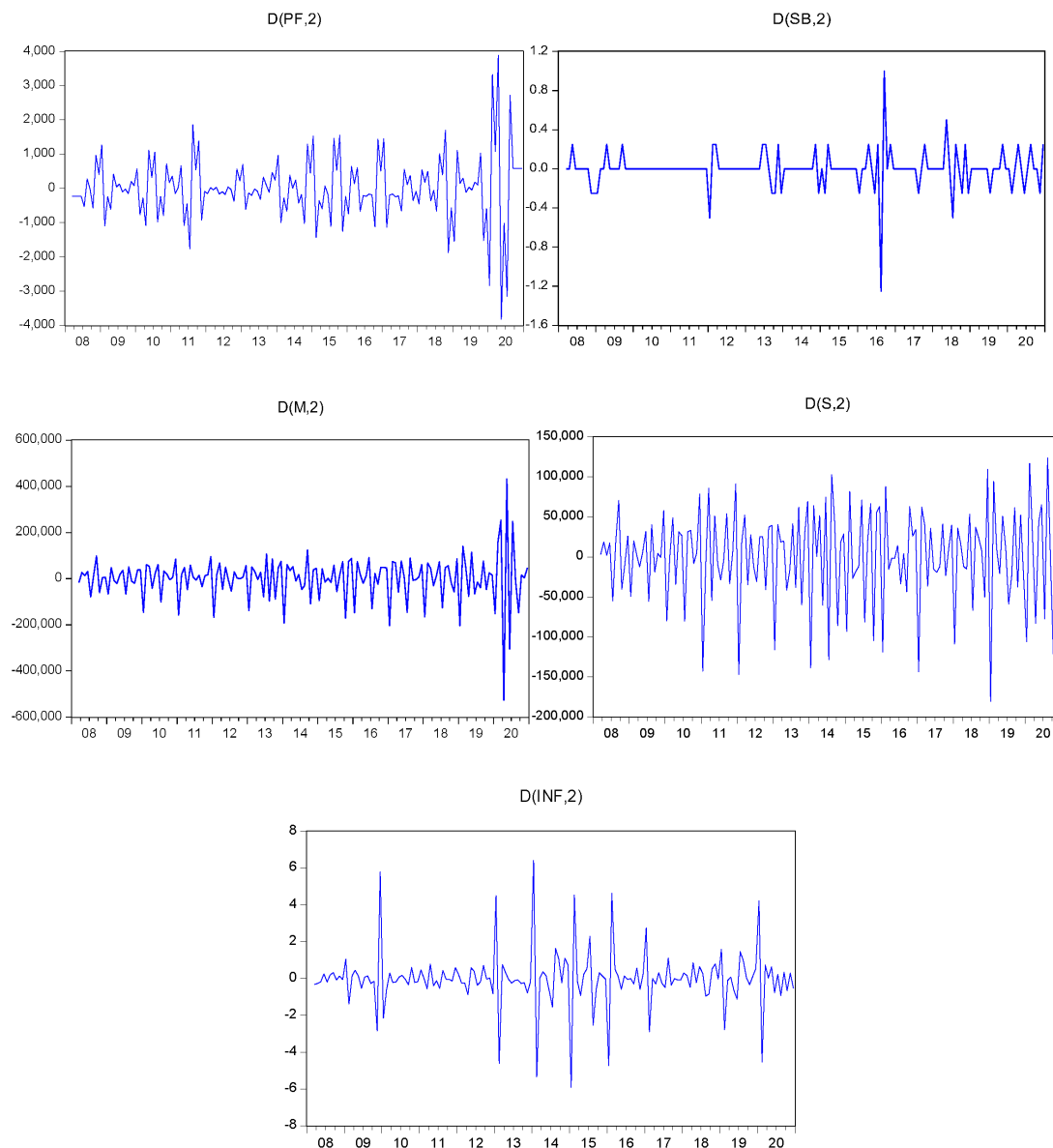


Table 1. ADF Test (Augmented Dickey-Fuller)

| Data | Critical Value | Level     |           | First Difference |           | Second Difference |           |
|------|----------------|-----------|-----------|------------------|-----------|-------------------|-----------|
|      |                | Stat. ADF | p.value   | Stat. ADF        | p.value   | Stat. ADF         | p.value   |
| PF   | 5%             | -3.734558 | -2.881400 | -5.898573        | -2.881685 | -7.112792         | -2.881830 |
| SB   | 5%             | -1.701121 | -2.880336 | -6.958871        | -2.880211 | -9.057193         | -2.880722 |
| M    | 5%             | 1.763227  | -2.881685 | -1.414085        | -2.881685 | -8.064005         | -2.881685 |
| S    | 5%             | 1.374094  | -2.881685 | -1.908580        | -2.881685 | -7.663622         | -2.881685 |
| INF  | 5%             | -2.336054 | -2.880088 | -12.74347        | -2.880211 | -7.663622         | -2.880591 |

Before performing VECM testing, it must determine the optimal lag in VECM estimation. Choosing the optimal lag is essential to overcome the occurrence of autocorrelation in the VECM system. The optimal lag length will search using the available information criteria. The selected lag candidates are the length of the lag according to the requirements of Likelihood Ratio (LR), Final Prediction (FPE), Akaike Information Critic (AIC), Schwarz Information Criterion (SC), and Hannan – Quin Crition (HQ).

Table 2. Determination of Lag Length

| Lag | LogL      | LR        | FPE       | AIC       | SC        | HQ        |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|
| 0   | -5110.105 | NA        | 1.86e+24  | 70.06993  | 70.17210  | 70.11144  |
| 1   | -4965.763 | 276.8194  | 3.62e+23  | 68.43511  | 69.04818  | 68.68421  |
| 2   | -4877.110 | 163.9473  | 1.52e+23  | 67.56315  | 68.68711  | 68.01984  |
| 3   | -4808.775 | 121.6934  | 8.40e+22  | 66.96951  | 68.60437* | 67.63379  |
| 4   | -4776.407 | 55.42312  | 7.63e+22  | 66.86860  | 69.01434  | 67.74046  |
| 5   | -4742.068 | 56.44873  | 6.78e+22  | 66.74066  | 69.39729  | 67.82011  |
| 6   | -4677.490 | 101.7328* | 3.99e+22* | 66.19849* | 69.36602  | 67.48553* |
| 7   | -4653.641 | 35.93687  | 4.14e+22  | 66.21425  | 69.89267  | 67.70888  |
| 8   | -4635.639 | 25.89333  | 4.67e+22  | 66.31012  | 70.49943  | 68.01233  |

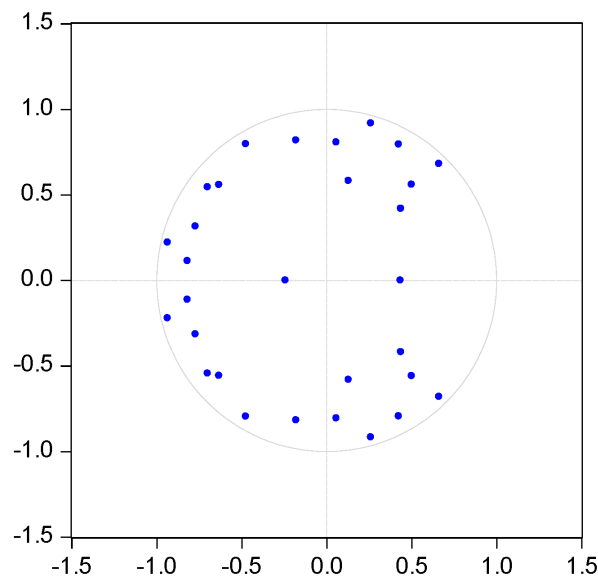
Table 2 concluded that the sixth lag is the best lag length, where the majority of the criteria for Likelihood Ratio (LR), Final Prediction (FPE), Akaike Information Criterion (AIC), and Hannan – Quin Crition (HQ) are found at lag 6, while Schwarz Information Criterion (SC) is in lag 3. The function of conducting data stability tests on research variables is that when the data is stable. The results of the Variance Decomposition (VD) and Impulse Response Functional (IRF) analysis performed on VECM estimation can predict the variables analyzed automatically. A VECM system is stable if all roots or roots have a modulus of less than one. The results of data stability can result in Table 3.

**Table 3. Roots of Characteristic Polynomials**

| Root                  | Modulus  | Root                  | Modulus  |
|-----------------------|----------|-----------------------|----------|
| -0.935128 - 0.222092i | 0.961140 | -0.179694 + 0.817908i | 0.837415 |
| -0.935128 + 0.222092i | 0.961140 | -0.771578 + 0.315424i | 0.833561 |
| 0.261140 + 0.917972i  | 0.954394 | -0.771578 - 0.315424i | 0.833561 |
| 0.261140 - 0.917972i  | 0.954394 | -0.817263 - 0.113781i | 0.825146 |
| 0.661959 - 0.680459i  | 0.949323 | -0.817263 + 0.113781i | 0.825146 |
| 0.661959 + 0.680459i  | 0.949323 | 0.058000 - 0.805907i  | 0.807991 |
| -0.473918 - 0.795681i | 0.926125 | 0.058000 + 0.805907i  | 0.807991 |
| -0.473918 + 0.795681i | 0.926125 | 0.500339 - 0.559087i  | 0.750278 |
| 0.424757 + 0.794548i  | 0.900958 | 0.500339 + 0.559087i  | 0.750278 |
| 0.424757 - 0.794548i  | 0.900958 | 0.437422 - 0.419222i  | 0.605875 |
| -0.700012 - 0.545130i | 0.887233 | 0.437422 + 0.419222i  | 0.605875 |
| -0.700012 + 0.545130i | 0.887233 | 0.128720 + 0.580566i  | 0.594664 |
| -0.632330 - 0.557228i | 0.842819 | 0.128720 - 0.580566i  | 0.594664 |
| -0.632330 + 0.557228i | 0.842819 | 0.434373              | 0.434373 |
| -0.179694 - 0.817908i | 0.837415 | -0.242543             | 0.242543 |

The results of data stability testing, it that there is no modulus < 1 value and that the variables used in the study are already in stable condition. Data stability testing can also be done in another way, as shown in Figure 2. In Figure 2, each point within this circle proves that the variable used is stable. Later, the Variance Decomposition (VD) and Functional Response Impulse (IRF) analysis results will show that the VECM estimation can predict the observed variable. From the results of these tests, it can be that the data used in estimating the VECM model is stable and can be used to analyze in the short and long term in VECM analysis.

**Figure 2. Inverse Roots AR Characteristic Polynomial**



The purpose of the cointegration test in this study is to determine whether the group of variables that are not stationary at that level meets the requirements of the integration process, namely where the variables are stationary at the same degree, namely the second difference. Based on the results shown in Table 4, the cointegration test in this study used the cointegration test from the Johansen Trace Statistics test.

This test determines whether there is a long-term effect on the variables to be studied. If there is cointegration, then proceed with VECM. However, VECM cannot continue if it is unstable. Based on the Johansen Trace Statistic test results above, the results show that the variables are cointegrated in the long run, which by the trace statistic > critical value of 5%. So, in the long run, the variables will influence each other, which is shown by the asterisk. So, after various stages and stationary data at the second difference level and cointegration occurs, the Vector Error Correction Model (VECM) is the final estimation model suitable for use.

The Granger causality test (Granger Causality Test) is to see whether the two variables have a reciprocal relationship. In other words, does one variable have a significant causal relationship with different variables because each variable in the study has the opportunity to become an endogenous or exogenous variable? The bivariate causality test in this study used the VAR Pairwise Granger Causality Test and used a five percent significance level. The following table presents the analysis results of the Bivariate Granger Causality test. The results of the Granger Causality Test are shown in Table 5.

**Table 4. Cointegration Test Johansen Trace Statistics Test**

| Hypothesized<br>No. of CE(s)                                     | Eigenvalue | Trace<br>Statistic     | 0.05<br>Critical Value | Prob.** |
|------------------------------------------------------------------|------------|------------------------|------------------------|---------|
| None *                                                           | 0.460054   | 265.9096               | 69.81889               | 0.0000  |
| At most, 1 *                                                     | 0.357541   | 175.3156               | 47.85613               | 0.0000  |
| At most, 2 *                                                     | 0.278041   | 110.2751               | 29.79707               | 0.0000  |
| At most, 3 *                                                     | 0.222970   | 62.38442               | 15.49471               | 0.0000  |
| At most, 4 *                                                     | 0.158111   | 25.29977               | 3.841466               | 0.0000  |
| <b>Unrestricted Cointegration Rank Test (Maximum Eigenvalue)</b> |            |                        |                        |         |
| Hypothesized<br>No. of CE(s)                                     | Eigenvalue | Max-Eigen<br>Statistic | 0.05<br>Critical Value | Prob.** |
| None *                                                           | 0.460054   | 90.59409               | 33.87687               | 0.0000  |
| At most, 1 *                                                     | 0.357541   | 65.04043               | 27.58434               | 0.0000  |
| At most, 2 *                                                     | 0.278041   | 47.89071               | 21.13162               | 0.0000  |
| At most, 3 *                                                     | 0.222970   | 37.08465               | 14.26460               | 0.0000  |
| At most, 4 *                                                     | 0.158111   | 25.29977               | 3.841466               | 0.0000  |

**Table 5. Granger Causality Test**

| Null Hypothesis:              | Obs | F-Statistic | Prob.  |
|-------------------------------|-----|-------------|--------|
| M does not Granger Cause INF  | 150 | 2.70018     | 0.0165 |
| INF does not Granger Cause M  |     | 2.47968     | 0.0262 |
| PF does not Granger Cause INF | 150 | 0.05389     | 0.9994 |
| INF does not Granger Cause PF |     | 1.75766     | 0.1123 |
| S does not Granger Cause INF  | 150 | 2.94077     | 0.0099 |
| INF does not Granger Cause S  |     | 1.56111     | 0.1631 |
| SB does not Granger Cause INF | 150 | 0.64438     | 0.6945 |
| INF does not Granger Cause SB |     | 0.08732     | 0.9974 |
| PF does not Granger Cause M   | 150 | 4.24689     | 0.0006 |
| M does not Granger Cause PF   |     | 1.68817     | 0.1284 |
| S does not Granger Cause M    | 150 | 3.28348     | 0.0048 |
| M does not Granger Cause S    |     | 0.83274     | 0.5466 |
| SB does not Granger Cause M   | 150 | 0.53472     | 0.7811 |
| M does not Granger Cause SB   |     | 1.84678     | 0.0945 |
| S does not Granger Cause PF   | 150 | 1.52410     | 0.1747 |
| PF does not Granger Cause S   |     | 0.92532     | 0.4789 |
| SB does not Granger Cause PF  | 150 | 0.82188     | 0.5548 |
| PF does not Granger Cause SB  |     | 0.48481     | 0.8188 |
| SB does not Granger Cause S   | 150 | 1.93585     | 0.0793 |
| S does not Granger Cause SB   |     | 2.33458     | 0.0354 |

Inflation variables do not significantly impact portfolio investment and vice versa. The money supply variable does not substantially affect the portfolio investment variable (0.1284), rejecting the null hypothesis. Therefore, there can be a unidirectionality between the investment portfolio variables and the money supply. Only investment portfolio variables affect the money supply, not vice versa. (Otiwu, 2022; Elhendawy, 2022; Filho, 2017). Interest rate variables do not significantly affect portfolio investment and vice versa. Portfolio investment variables have no statistically significant effect on interest rate variables, as evidenced by Prob values greater than 0.05, namely 0.1747 and 0.4789. Each accepts the null hypothesis. Therefore, there is no mutual causality between savings and investment portfolio variables (Seftarita et al., 2019; Shakil et al., 2018; Waqas et al., 2015).

The results of the VECM estimation will show short-term and long-term relationships between portfolio investment, interest rates, money supply, savings, and inflation. In this estimation, portfolio investment is the dependent variable, while the independent variables are interest rates, money supply, savings, and inflation. The results of the VECM

estimation to analyze the short-term and long-term effects of the dependent variable on the independent variables can be found in Table 6.

Table 6. Relationship between Monetary Variables and Portfolio Investment in the Short Term

| Variable     | t - Statistic     |                   |                   |                   |                   |
|--------------|-------------------|-------------------|-------------------|-------------------|-------------------|
|              | D(PF,2)           | D(SB,2)           | D(M,2)            | D(S,2)            | D(INF,2)          |
| CointEq1     | [-1.70710]        | <b>[-2.83510]</b> | [-1.14370]        | [ 1.04768]        | <b>[ 5.43623]</b> |
| D(PF(-1),2)  | [ 0.27416]        | [ 0.55908]        | [ 0.95291]        | [ 0.06647]        | <b>[-2.81250]</b> |
| D(PF(-2),2)  | [ 1.96300]        | [ 1.08115]        | <b>[-3.26378]</b> | <b>[-2.08566]</b> | <b>[-2.88636]</b> |
| D(PF(-3),2)  | <b>[-11.2632]</b> | [ 1.89914]        | [-0.74799]        | [-1.24761]        | [-1.84193]        |
| D(PF(-4),2)  | [-0.15117]        | [-1.12712]        | [ 0.71154]        | [ 1.26290]        | [-1.65307]        |
| D(PF(-5),2)  | [ 0.49514]        | [-0.41806]        | <b>[-2.53355]</b> | [-1.43942]        | [-1.35958]        |
| D(PF(-6),2)  | <b>[-7.14840]</b> | [ 1.93730]        | [-1.13418]        | [-0.53571]        | [-0.35038]        |
| D(SB(-1),2)  | [-0.57667]        | <b>[-6.13307]</b> | [ 1.60248]        | <b>[ 2.41636]</b> | [-0.74796]        |
| D(SB(-2),2)  | [ 0.46502]        | <b>[-2.24723]</b> | [ 0.41921]        | [ 0.48382]        | [-0.19850]        |
| D(SB(-3),2)  | [-0.54729]        | [-1.74018]        | [ 1.07255]        | [ 0.52750]        | [-0.64269]        |
| D(SB(-4),2)  | [ 1.63662]        | [-1.35028]        | [ 0.46872]        | [-0.18736]        | [-0.94767]        |
| D(SB(-5),2)  | [ 1.74694]        | [ 0.23060]        | [ 0.73568]        | [ 1.47476]        | <b>[-2.39784]</b> |
| D(SB(-6),2)  | [-0.11597]        | [ 0.01255]        | [ 1.24887]        | [ 0.85996]        | [-0.84770]        |
| D(M(-1),2)   | <b>[ 2.23346]</b> | <b>[ 2.92932]</b> | <b>[-3.56529]</b> | [-1.26357]        | <b>[-4.99376]</b> |
| D(M(-2),2)   | [ 1.35132]        | <b>[ 2.43979]</b> | <b>[-2.92524]</b> | [-1.44709]        | <b>[-3.96429]</b> |
| D(M(-3),2)   | [-0.14920]        | [ 1.60447]        | [-2.33403]        | [-1.45261]        | [-3.17569]        |
| D(M(-4),2)   | [-1.17883]        | [ 1.17288]        | [-2.38626]        | [-1.16729]        | [-1.75187]        |
| D(M(-5),2)   | [-1.44951]        | [ 0.57764]        | [-1.14530]        | [-0.99380]        | [-0.62962]        |
| D(M(-6),2)   | [-0.60379]        | [-0.13532]        | [ 0.42435]        | [-0.04718]        | [-0.34570]        |
| D(S(-1),2)   | <b>[-2.44200]</b> | <b>[-3.43281]</b> | [-0.50586]        | <b>[-3.16410]</b> | <b>[ 5.53997]</b> |
| D(S(-2),2)   | [-1.59858]        | <b>[-3.59589]</b> | [-1.23051]        | <b>[-2.65356]</b> | <b>[ 4.77828]</b> |
| D(S(-3),2)   | [ 0.03083]        | <b>[-3.51166]</b> | [-1.21712]        | [-1.76154]        | <b>[ 4.02709]</b> |
| D(S(-4),2)   | [ 1.53847]        | <b>[-4.10523]</b> | [-1.56918]        | <b>[-2.01823]</b> | <b>[ 2.76430]</b> |
| D(S(-5),2)   | <b>[ 2.28156]</b> | <b>[-3.25449]</b> | <b>[-2.49074]</b> | <b>[-2.04878]</b> | [ 1.24833]        |
| D(S(-6),2)   | [ 1.42017]        | <b>[-2.09006]</b> | <b>[-2.18484]</b> | [-1.07520]        | [ 1.01823]        |
| D(INF(-1),2) | [-1.26700]        | [-2.36418]        | [-1.78856]        | [ 0.29002]        | [ 1.77699]        |
| D(INF(-2),2) | [-1.38257]        | <b>[-2.35687]</b> | [-1.09075]        | [-0.08091]        | [ 1.95528]        |
| D(INF(-3),2) | [-1.46986]        | <b>[-2.68431]</b> | [-0.89928]        | [ 0.06217]        | <b>[ 2.47271]</b> |
| D(INF(-4),2) | [-1.48148]        | <b>[-3.37140]</b> | [-0.43559]        | [-0.01178]        | <b>[ 2.94494]</b> |
| D(INF(-5),2) | [-1.28137]        | <b>[-3.82200]</b> | [-0.77678]        | [ 0.02582]        | <b>[ 2.77955]</b> |
| D(INF(-6),2) | [-0.02657]        | <b>[-4.88050]</b> | [-0.46984]        | [-0.29699]        | [ 1.21874]        |

In the short term, changes in portfolio investment at lag three and six significantly affect the current portfolio investment. Meanwhile, the circulation of the money supply in M2 affects portfolio investment in lag 1; savings affect the portfolio in lags 1 and 5, while inflation in the short term does not affect the portfolio in the short term. Meanwhile, the changes in the investment portfolio do not affect interest rates. The shock caused by the variable interest rate and the money supply (M2) in lags 1 and 2 will impact portfolio investment. The shock generated by savings from the initial lag to the end impacts portfolio investment. The shock caused by inflation at lags 2 to 6 impacted short-term portfolio investment.

The shock caused by interest rates and inflation in the short term does not affect the money supply (M2). Portfolio investment involves lags 2 and 5 on the money supply (M2). As for the shock caused by the money supply (M2) itself, it affects lags 1 and 2 on the M2 variable. The shock caused by saving impacts lags 5 and 6 on the money supply (M2). Besides that, the shock caused by the money supply (M2) and inflation has no effect on savings in the short term. Savings respond to the shock that occurs in portfolio investment in lag 3. The shock in interest rates is only answered at the beginning of lag one by savings, while savings respond to the shock caused by the savings itself at lags 1, 2, 4, and 5 in the short term. The shock caused by interest rates and inflation is responded to by inflation in the last lag in the short term. In contrast, the shock caused by portfolio investment, money supply (M2), and savings are responded to at the initial lag by inflation in the short term.

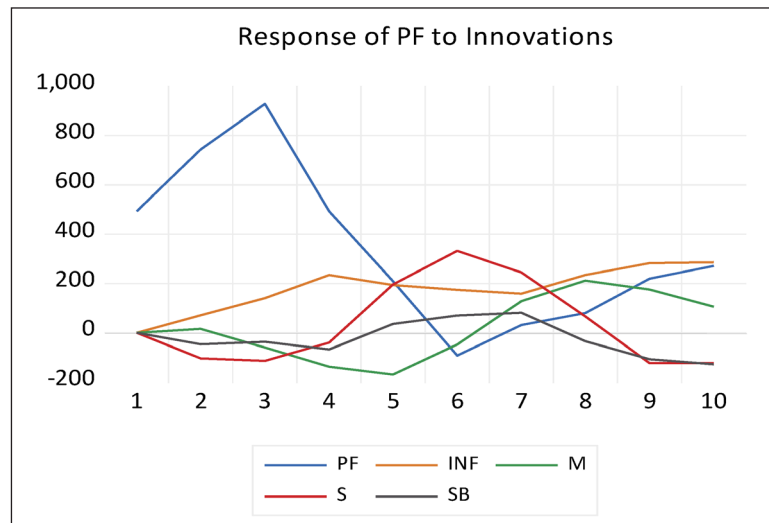
In the long term, the shock caused by inflation affects portfolio investment (Boughrara & Dridi, 2017; Oyerinde, 2019; Singh & Joshi, 2019). The shock caused by interest rates is responded to by portfolio investment (Arintoko & Insukindro, 2017; Çayır, 2021; Khajavi et al., 2020). The shock that occurs in inflation in the long term is also responded to by portfolio investment (Fan et al., 2018; Tekin, 2021). The money supply (M2) has no impact on investment portfolios in Indonesia in the long run.

**Table 7. Relationship between Monetary Variables and Portfolio Investment in the Long Term**

| Variable  | t - Statistik |            |            |            |
|-----------|---------------|------------|------------|------------|
|           | D(SB(-1))     | D(M(-1))   | D(S(-1))   | D(INF(-1)) |
| D(PF(-1)) | [ 4.08156]    | [-1.81162] | [ 2.07258] | [-5.87294] |

Based on the impulse response function (IRF) in Figure 3, at the beginning of the period up to period nine, the portfolio investment response was still very fluctuating (up and down) since the shock occurred in the observed monetary variables, namely inflation, interest rates, savings and the money supply (M2). Furthermore, after the 9th period, the fluctuations began to decrease. Inflation was no longer as volatile as in the previous period. In other words, the IRF chart shows stability.

Figure 3. Portfolio Impulse Response Function to Monetary Variables



The variance decomposition in this study is to see the ability of the monetary variable to influence investment portfolios in Indonesia. Table 6 shows that the power of inflation, the money supply (M2), savings, and interest rates to affect portfolio investment has increased in each period. Monetary variables at the beginning of the period cannot affect investment portfolios. Still, the longer the period used, the more monetary variables can influence investment portfolios in Indonesia.

Table 8. Portfolio Variance Decomposition to Monetary Variables

| Period | SE.      | PF       | INF      | M        | S        | SB       |
|--------|----------|----------|----------|----------|----------|----------|
| 1      | 493.7536 | 100.0000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| 2      | 902.7293 | 97.76096 | 0.620421 | 0.031266 | 1.330410 | 0.256947 |
| 3      | 1309.431 | 96.73389 | 1.454922 | 0.222861 | 1.391469 | 0.196861 |
| 4      | 1427.522 | 93.32252 | 3.919958 | 1.119000 | 1.248823 | 0.389700 |
| 5      | 1479.048 | 88.94796 | 5.359988 | 2.340041 | 2.928351 | 0.423655 |
| 6      | 1531.050 | 83.36886 | 6.297197 | 2.277223 | 7.455813 | 0.600906 |
| 7      | 1566.343 | 79.69587 | 7.048123 | 2.850990 | 9.559633 | 0.845383 |
| 8      | 1601.568 | 76.47758 | 8.873213 | 4.482147 | 9.315111 | 0.851944 |
| 9      | 1658.565 | 73.06889 | 11.17171 | 5.309289 | 9.238292 | 1.211818 |
| 10     | 1717.474 | 70.65025 | 13.20461 | 5.330911 | 9.130397 | 1.683831 |

Several two-way causality relationships between monetary variables are analyzed in influencing investment portfolios in Indonesia. There is a two-way causality between the variable inflation and the amount of money in circulation. When there is a change in the money supply, it will affect the movement of inflation in a country. This result aligns with causality studies on inflation and interest rates positively correlated in several countries

(Ceesay & Njie, 2021; Cheti & Ilembu, 2021; Sharew Denbel et al., 2016). Inflation also has a two-way causality relationship with interest rates; this reinforces the statement that interest rates are a monetary variable that can effectively control inflation in a country (Amata et al., 2016; Mirza & Rashidi, 2018; Nawab et al., 2021). Indonesia's interest rate and money supply variables also have a two-way causality relationship. Based on the analysis of the research conducted, the interest rates given by financial institutions, both from the point of view of savers and borrowers, will affect the amount of money circulating in society. An increase in interest rates tends to reduce the amount of money circulating in the community and vice versa (Barakat et al., 2015; Li, 2017; Rasool et al., 2020).

Furthermore, this study also found a causal relationship in several monetary variables. A one-way causality relationship occurs in the savings and inflation variables, where savings can influence inflation in Indonesia. Still, inflation is unable to affect the circulation of savings. (Dash & Kumar, 2018). Most of the savings in Indonesia are still very much influenced by the amount of one's income and interest rates. Savings can also affect the amount of money circulating in a country (Beshir, 2017; Silaswara et al., 2020). The more enthusiastic the public is in carrying out saving activities, the more money in circulation sourced from financial institutions has the potential to change. Still, the money supply in Indonesia cannot affect the amount of savings in Indonesia, according to the previous explanation. Savings can also control inflation in a country (Ben Naceur et al., 2014; Borowski & Jaworski, 2023; Milenković et al., 2020). The high nominal savings will be able to reduce inflation in Indonesia. Conversely, if the savings rate decreases, it will impact the amount of money in circulation in society and increase even more, eventually leading to an increase in the inflation rate.

Then, we will look at the primary variable in this study, namely portfolio investment. Portfolio investment has a two-way causality relationship with savings. When savings experience an increase in volume, it will have an impact on reducing portfolio investments made by the community; this is quite reasonable because it is by the theory that a portion of the remainder of all expenditures that the community has made will be stored in the form of savings or investment. So that people will choose to make portfolio investments or carry out saving activities (Akinbobola et al., 2017; Pujari & Mamilla, 2022). A one-way causality relationship occurs in portfolio investment with the money supply. The increasing number of investment portfolios in a country can reduce the money supply in society because portfolio investment is one of the instruments to control the money supply in a country (Tamunosiki, 2017). Meanwhile, the results of the causality analysis between inflation and portfolio investment show no connection. This result is because the driving factor determining portfolio investment is not due to the inflation conditions in a country but instead due to the profits obtained by someone who invests. (Fratzcher et al., 2021; Schumacher, 2018).

In the short term, the monetary variables affecting portfolio investment are the money supply (M2) and savings. People's desire to hold money will influence the decision to make portfolio investments in the short term (Kasthuri & Nirmala, 2019; Mamvura & Sibanda, 2020). The more people hold money for consumption or just

in case, the fewer people's decisions to make portfolio investments and vice versa. In the short term, it can be ascertained that there will be more and more public needs to consume goods or services or for certainty as a precaution. There is still uncertainty in the economy, which will significantly affect the decision to make portfolio investments in the short term.

The size of people's savings kept in financial institutions such as banks also influences the decision to make portfolio investments in the short term. The greater the public's desire to save, the less portfolio investment will be made, and vice versa (Alper, 2018; Bacchetta et al., 2022; Di Tella & Sannikov, 2021). One of the obstacles in Indonesia related to the low level of portfolio investment activity is the need for knowledge related to risk management expertise and management related to portfolio investment. Most people prefer to save money in banks because they are considered safer.

In the long term, portfolio investment in Indonesia is influenced by monetary variables, which, when implemented, will have an impact sometime later. Monetary variables impacting long-term portfolio investment are interest rates, savings, and inflation. In the long run, the influence of interest rates is quite reasonable, considering the interest rates applied for saving or credit cannot be felt directly by economic actors. New economic actors can feel the impact of interest rates after a change in the determination of interest rates (Aryento et al., 2022; Detemple & Rindisbacher, 2005; Lian et al., 2019). For example, when lending rates in Indonesia are increased, borrowers will not immediately feel this. Still, they will only feel the impact when they later pay installments on credit they accessed through financial institutions.

Savings is the only monetary variable in this study that has a short-term or long-term impact on portfolio investment in Indonesia. This is reasonable, considering that the greater the yield provided by financial institutions when people save, the more the public will automatically increase their savings at financial institutions. Meanwhile, the community will only feel the effects of saving activities in the future, depending on the type of savings they choose.

Changes in inflation in Indonesia have a long-term influence on portfolio investment. The interest rate or profit sharing and the inflation conditions in a country at maturity determine the gains or losses that portfolio investment actors obtain. So, the current inflation effect will not affect portfolio investment. Future inflation when payment is due, or profit-sharing will affect how much investment will be made now and the profit that will be obtained at maturity. (Edo & Kanwanye, 2022; Lian et al., 2019).

## CONCLUSION

The shock caused by monetary variables influencing investment portfolios in Indonesia can turn into short-term and long-term. In the short term, portfolio investment responds to shocks in the money supply (M2) and savings, while portfolio investment does not respond to shocks caused by interest rates and inflation in the short term. Meanwhile, in the long term, portfolio investment responds to shocks caused by interest

rates, savings, and inflation. In contrast, shocks to the money supply (M2) do not affect portfolio investment in Indonesia in the long term.

In the short term, a monetary policy transmission mechanism can use the money and expectation channels to optimize monetary variables to control investment portfolios in Indonesia. The use of the money channel is entirely justified because, in the short term, the money supply will significantly influence the public to hold money for consumption, prudent, or saving activities. In the end, these three activities will affect investment portfolios in Indonesia. Meanwhile, using the expectation path can also be an alternative to monetary policy in controlling portfolio investment in the short term. The line of expectation will affect people's expectations of holding money or making portfolio investments. Still, of course, this line of anticipation can be used much more frequently when there is uncertainty about the economic conditions that exist in Indonesia in the short term.

In the long term, the transmission mechanism that relies on portfolio investment in Indonesia is almost the same as the policy carried out in the short term. In the long term, a new transmission policy option can be used, namely monetary policy transmission through the interest rate channel. The interest rate channel policy is adequate, primarily related to portfolio investment. Considering that portfolio investment is an investment that can be taken advantage of in the future where the profit obtained will depend on the interest rate given at maturity. This is the reason why the interest rate channel policy has an essential role in controlling portfolio investment in Indonesia in the long term.

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## Does Financial Inclusion Affect Health among Older Adults? Evidence from Indonesia

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### Abstract

*While financial inclusion is widely acknowledged as a means to enhance the welfare of all ages, currently, there is no empirical research examining its effects on the health of older adults in Indonesia. This study, therefore, aims to fill the gap by investigating the impact of financial inclusion on the health of older adults in Indonesia using data from the March 2021 National Socio-Economic Survey (SUSENAS). The binary logistics regression was used to assess that effect. The findings reveal that financial inclusion positively benefits the health of older adults in Indonesia, highlighting the importance of policy-making that promotes financial inclusion programs to improve the health outcomes of older adults.*

### Keywords:

financial inclusion; health; older adults

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## INTRODUCTION

Population aging is now a widespread issue. The elderly population has grown dramatically in terms of total numbers and share of the overall population worldwide. In 2020 there will be 727 million elders worldwide (UN, 2020). By 2050, it is estimated that there will be 1.5 billion people on this planet. Indonesia's demographic structure is also affected by the aging population phenomenon, as seen by the country's projected elderly population proportion in 2020, which will be more than 10% (BPS, 2021). Based on demographic data, it is predicted that in 2045, more than one-fifth of the population in Indonesia will be over 65 years old. According to the Sustainable Development Goals (SDGs), which aim to provide a healthy life and increase the welfare of all citizens of all ages, goal three specifically, this phenomenon is an essential factor to consider when developing development plans. Enhancing the welfare of aging people is one of them.

Although population aging can be considered an achievement for a country as it improves people's quality of life and health, it also has crucial socio-economic and health implications (United Nations, 2015). The most significant concern for older people is their health condition, which deteriorates with age. As many as 22-23 adults out of 100 are afflicted by illness, and almost half of older adults (43.22 percent) have physical and psychological issues (BPS, 2021). These health concerns are caused by functional, physiological, social, and biochemical changes, which diminish older adults' capacity to carry out normal activities (Aguiar & Macário, 2017; Ramos-Jimenez et al., 2009). Older adults will decrease their physical condition, increase health issues, and become more susceptible to illness as they age. As a result, older adults will have to pay more for healthcare (Mooventhana & Nivethitha, 2017).

Financial inclusion is essential as a primary social development method, specifically among the less privileged. This condition is understandable, as financial inclusion is considered an SDGs' enabling factor (World Bank, 2020). Due to retirement and social isolation, identified as crucial social determinants of health in older adults, older adults with unpredictable earnings have relatively easy access to financial services (Gyasi et al., 2019). Financial inclusion can facilitate individuals' ability to save for such unanticipated medical bills, curbing catastrophic healthcare costs and leading to better health outcomes.

Most studies on older adults' health are focused more on determinant factors, with relatively fewer empirical studies investigating the specific influence of the financial sector on their health outcomes. Using family assets as a financial instrument, Bialowolski et al. (2023) found that improved saving habits and effective financial management can protect against unfavorable well-being and health outcomes in middle-aged and older adults. Several studies on aging and older persons also report the health advantages of social and economic opportunities, such as financial inclusion. According to a study conducted by Li et al. (2022), engaging in high-risk or low-risk financial activities was found to impact the health of middle-aged and older individuals positively. Ettman et al. (2021) found that low-income adults in the United States who possess family savings and own a home demonstrate a correlation with improved mental health outcomes. Another study

by Gyasi et al. (2021) found a significant connection between financial inclusion and the functional status of physical health among older adults in Ghana.

Enhanced financial capacity empowers older individuals to have increased autonomy over their financial and external circumstances, effectively manage their economic resources, and attain better health outcomes (Gyasi et al., 2019). Research shows a negative association between financial literacy, inclusive financial practices, and poor overall health outcomes (Xiao & Tao, 2022). Having fundamental financial tools like bank accounts can significantly impact the health outcomes of elderly individuals in a positive manner (Aguila et al., 2016).

In other literature, Michael McWilliams (2009) found that adults with insurance need help accessing recommended healthcare, receiving lower-quality care, and encountering inferior health outcomes compared to their insured counterparts. Similarly, Ma & Oshio (2020) conducted research that demonstrated the favorable effects of social insurance on the health of middle-aged and older adults residing in rural China. Enhancing the financial management skills of older adults remains vital in promoting their financial capabilities, well-being, and overall health (Allmark & Machaczek, 2015).

Existing empirical studies on elderly health in Indonesia have predominantly focused on examining socio-demographic determinants, as evidenced by studies conducted by Astutik et al. (2021), Juanita et al. (2022), Pengpid & Peltzer (2018), and Sutinah & Maulani (2022). However, research that analyzes the relationship between financial inclusion and health outcomes among older adults has never been carried out in Indonesia. This gap presents an intriguing opportunity to explore the potential impact of evidence-based strategies, such as financial inclusion, in addressing the health challenges associated with aging, as emphasized by the World Health Organization (WHO, 2015). By investigating this underexplored area, this study brings forth a fresh perspective. It contributes to the current understanding of the intersection between financial inclusion and the health of older adults in Indonesia.

This study has several contributions. Firstly, this is the initial study to investigate the effects of financial inclusion on the health of older adults in Indonesia. Second, in this study, three dimensions of inclusive finance, encompassing access to bank services, insurance, and e-banking, are utilized to create an index for assessing financial inclusion's impact on older adults' health status. Third, research in this area typically focuses on city or provincial levels, whereas the author utilizes secondary data from the national level.

This study aimed to examine the effects of financial inclusion on health status among older adults in Indonesia. This research addresses a significant research gap by investigating the effects of financial inclusion on the health of older adults in Indonesia. To our knowledge, this study represents the first-ever examination of this relationship in the Indonesian context. By exploring the impact of financial inclusion on the health outcomes of older adults, this research contributes to the existing literature on financial inclusion and aging population health. The distinctiveness of this study lies in its utilization of a multi-dimensional index that incorporates three dimensions of inclusive finance.

Additionally, the study's focus on the specific context of Indonesia offers valuable insights insight into the government in formulating policies related to the potential benefits of financial inclusion programs for enhancing the health and well-being of older adults in Indonesia.

## METHODS

This study uses cross-sectional data from the Susenas (Survei Sosial Ekonomi Nasional) survey held by Badan Pusat Statistik (BPS) that contains information regarding households' social and economic characteristics and elderly individuals. The secondary data were explicitly utilized in March 2021. The sample from Susenas in March 2021 covers all provinces and districts/cities in all regions of Indonesia. This research examines how financial inclusion affects older adults' health status. The unit of analysis used is individuals aged 60 years and over, following the WHO definition of elderly, so the number of samples that will be used in this study is 122,694 individuals.

In assessing the health of the elderly, this study uses health complaints as the dependent variable. The health complaint of older adults is indicated by the presence or absence of health complaints felt by older adults in the last month obtained from the March 2021 Susenas KOR module. Health complaints are the condition of a person experiencing health or psychiatric problems, both due to frequent disorders/illnesses, such as fever, cough, runny nose, diarrhea, headaches, or due to acute illness, chronic disease (although he has not had any complaints for the past month), due to an accident, crime or other health complaints. The complaints in question are physical and psychological. In this study, health complaint is a binary variable, where 0 will be given to older adults who do not experience health complaints, while one will be given to older adults who have health complaints.

The primary independent variable was financial inclusion, which is defined according to the World Bank (2020) as an individual having affordable access to financial products and services, including transactions, payments, savings, credit, and insurance. Hence, numerous studies utilize indicators such as credit accessibility, savings accessibility, bank accessibility, and insurance accessibility as crucial components of inclusive finance (Mialou et al., 2017).

This research uses a multi-dimensional index that considers three dimensions of inclusive finance, including access to bank services and access to insurance, as applied to the study of Churchill & Marisetty (2020) and Abor et al. (2018) as well as access to e-banking (Zins & Weill, 2016).

The financial inclusion status was assessed using a deprivation score for financial access, following the approach used in previous studies by Murendo et al. (2021) and Churchill & Marisetty (2020). We attribute an equal weight of 1/3 to each dimension, and the financial access deprivation score for *i*-th older adults is calculated using the following formula:

$$d_i = w_1 I_{1i} + \dots + w_k I_{ki} \quad (1)$$

Where  $I_k$  is the k-th indicator of multi-dimensional financial inclusion measurement, which will have a value of 1 if the older adult experiences a deprivation on the k-th indicator and 0 if it does not experience a deprivation on the k-th indicator. As a result, the total score for financial access deprivation will vary from 0 to 1.

A cut-off of 0.5 is used to determine the financial inclusion status of an older adult, as was done by Churchill & Marisetty (2020) and Zhang & Posso (2019). If the financial access deprivation score is less than 0.5, our measure of financial inclusion is equal to 1; otherwise, it is equal to 0.

The study also considers additional independent variables, including characteristics of older adults like age, gender, marital status, education, employment status, and residential area. This research uses the binary logistic regression analysis method. The binary logistic regression model is used to analyze data when the response variable is a binary scale variable with one or more explanatory variables that can be either quantitative or qualitative using dummy variables (Hosmer et al., 2013). In the binary logistic model, the dependent variable has two possible values (binary), "1" if it satisfies specific given criteria and "0" otherwise (Dawood et al., 2019). The absence of relationship continuity between the dependent and independent variables is one of the benefits of the logit model. Furthermore, the dependent variable is not required to have a normal distribution. Additionally, it does not require protection against heteroskedasticity (Yah, 2020). The research model is as follows:

$$HC_i = \beta_0 + \beta_1 FI_i + \beta_2 AGE_i + \beta_3 GEN_i + \beta_4 MAR_i + \beta_5 EDU_i + \beta_6 EMPL_i + \beta_7 AREA_i + \varepsilon \quad (2)$$

Where the health complaint (**HC**) is a dependent variable that is influenced by the financial inclusion status (**FI**) and socio-economic characteristics of older adults such as age (**AGE**), gender (**GEN**), marital status (**MAR**), level of education (**EDU**), employment status (**EMPL**), and residential area (**AREA**).

The estimation results of the logistic regression model coefficients necessitate interpretation in the form of odds ratios (OR) and marginal effects, as direct interpretation is not applicable. According to Greene (2003), the coefficients in the logistic regression model are difficult to interpret or cannot be interpreted directly as the effect of changes in the independent variables on the response variable as in linear regression. Therefore, the value of the odds ratio and marginal effect can be used to provide a better understanding of the logistic regression model. Odds ratios are used to find out how much the tendency of an observation with certain characteristics ( $X=1$ ) to experience a successful event ( $Y=1$ ) is how many times it is compared to observations that have other characteristics ( $X=0$ ). Meanwhile, Cameron & Trivedi (2005) also state that the value of the marginal effect is able to measure the effect of changing one unit of the independent variable on the probability of the i-th category.

## RESULT AND DISCUSSION

Based on the health status of the older adults, Table 1 shows that 59.98 percent of older adults had no health complaints in the past month. The remaining 40.02 percent are elderly who experience health complaints. Although most older adults have not experienced health complaints in the last month, it should be noted that 30.97 percent of older adults have health complaints. The elderly require intervention to improve their health conditions.

Based on the classification of financial inclusion, 54.03% of the elderly aged 60 years and over reported being financially included, while 45.97% reported not being financially included. Table 1 describes the samples by their characteristics. Based on the socio-demographic characteristics, it can be seen that 52.24% of the sample were women, and more than half of them (59.14%) lived in rural areas. Regarding education, 85% of the sample have a junior high school or below education attainment, while the other 15% have a high school or above education attainment. In addition, 62.05% of the sample are married, while the other 37.95% are unmarried (including single, divorced, or widowed). The sample distribution based on the employment status showed that 47.20% of the sample are unemployed, 34.70% are employed in the agriculture sector, and 18% are employed in the non-agriculture sector.

**Table 1. Sample Characteristics**

| Variable                           | Percentage |
|------------------------------------|------------|
| <b>Health Complaints</b>           |            |
| Not experiencing health complaints | 59.98      |
| Experiencing health complaints     | 40.02      |
| <b>Financial Inclusion</b>         |            |
| Not Inclusive                      | 45.97      |
| Inclusive                          | 54.03      |
| <b>Gender</b>                      |            |
| Female                             | 52.24      |
| Male                               | 47.76      |
| <b>Marital Status</b>              |            |
| Not Married                        | 37.95      |
| Married                            | 62.05      |
| <b>Education</b>                   |            |
| High school or above               | 15.00      |
| Junior high school or below        | 85.00      |
| <b>Employment</b>                  |            |
| Unemployed                         | 47.20      |
| Employed in Agriculture Sector     | 34.70      |
| Employed in Non-agriculture Sector | 18.10      |
| <b>Area</b>                        |            |
| Urban                              | 40.86      |
| Rural                              | 59.14      |

Source: Author's Calculation Results (2023).

In developing countries, where a significant portion of the population lacks access to essential financial services, ensuring access to and utilization of such services has emerged as a critical policy concern (Demirgüç-Kunt et al., 2020). This research explores the correlation between financial inclusion, socio-economic characteristics, and the health issues faced by the elderly population.

The empirical results of logistic regression are presented in Table 2. The F test's significance value is 0.000, which is less than the significance level of 0.05. This result implies that all the independent variables collectively exhibit a statistically significant relationship with the dependent variable. The Pseudo R<sup>2</sup>-value of 0.0066 means that all independent variables can explain the dependent variable of 66%. Table 2 shows the effect of financial inclusion and characteristics on the health complaints of older adults in Indonesia. The result is that financial inclusion is negative and significant on health complaints. In addition, characteristics, namely age, education, and region, positively and significantly affect health complaints. While marital status and employment have a negative and statistically significant influence on health complaints, gender in this study has no significant effect.

**Table 2. Estimation Result of Financial Inclusion Effect on Health Complaints among Older Adults**

| Variable                              | Coefficient              | Odds Ratio | Marginal Effects |
|---------------------------------------|--------------------------|------------|------------------|
| Financial Inclusion                   | -0.0562***<br>(-0.0122)  | 0.9453     | -0.0135***       |
| Age                                   | 0.0128***<br>(-0.000878) | 1.0129     | 0.00307***       |
| Gender                                | 0.0183<br>(-0.0136)      | 1.0185     | 0.00439          |
| Marital Status                        | -0.0417***<br>(-0.0137)  | 0.9591     | -0.0100***       |
| Education                             | 0.213***<br>(-0.0179)    | 1.2372     | 0.0511***        |
| Employment                            |                          |            |                  |
| Agriculture Sector                    | -0.246***<br>(-0.0151)   | 0.7815     | -0.0591***       |
| Non-Agriculture Sector                | -0.219***<br>(-0.0172)   | 0.8036     | -0.0526***       |
| Area                                  | 0.0378***<br>(-0.013)    | 1.0385     | 0.00907***       |
| Constant                              | -1.308***<br>(-0.0652)   |            |                  |
| Observations                          | 122,694                  | 122,694    | 122,694          |
| R <sup>2</sup> /Pseudo R <sup>2</sup> | 0.0066                   |            |                  |
| Prob (F-test/Chi2)                    | 0.0000                   |            |                  |

The figures in parentheses indicate the standard error. \*, \*\*, \*\*\* represent significance at the level of 10%, 5% and 1%, respectively.

Source: Author's Calculation Results (2023).

Our findings indicate that financial inclusion exerts a notable and statistically significant influence on reducing health complaints among older adults. This result is evident from the coefficient of -0.0562, highlighting that higher levels of financial inclusion are associated with decreased health complaints in older adults. The odds ratio value for financial inclusion is 0.9453, which means that older adults with financial inclusion have a 0.9 times smaller chance of having health complaints than older adults who do not have financial inclusion. Based on the magnitude of the marginal effect of -0.0135, it means that an increase in financial inclusion in the elderly will reduce health complaints in the elderly by 1.35 percent.

This result is consistent with the study by Gyasi et al. (2019, 2021), which suggested that financial service inclusion and engagement can lead to improved health-related outcomes, protecting older adults from the negative consequences of health shocks and that financial inclusion programs may be vital for older individuals who are likely to experience functional limitations, ultimately leading to better physical health functioning among older adults.

A previous study by Immurana et al. (2021) found that financial inclusion enhances health in Africa. In Asia, Xiao & Tao (2022) found that financial inclusion increases life expectancy and helps individuals afford better quality health inputs, leading to better health outcomes. This finding suggests that financial inclusion plays a significant role in enabling individuals to access health-related goods and services, thus positively impacting human health. This observation aligns with the research conducted by Ofosu-Mensah Ababio et al. (2021), who found that financial inclusion effectively promotes health development by reducing poverty and income inequality. Furthermore, these findings support the study by Churchill et al. (2020), which demonstrates the poverty-reducing solid effect of financial inclusion, ultimately leading to improved population health.

There are several ways financial inclusion can improve the health of older adults. Firstly, research studies have consistently identified low physical activity as a significant modifiable risk factor for functional impairments among older adults (Babych et al., 2018; Paterson & Warburton, 2010; Tomás et al., 2017). The ability to actively participate in financial market activities and manage day-to-day financial tasks can directly contribute to older individuals' functional strength and capacities (Gyasi et al., 2019). This condition can help counteract or delay the onset of activity limitations associated with advancing age (McCracken & Phillips, 2017). Furthermore, financial capability underscores the importance of individuals acquiring knowledge, skills, and necessary financial services to manage their finances effectively, thereby building financial security (Morrow-Howell & Sherraden, 2014). Research findings highlight the direct association between access to financial services, such as owning a bank account and having health insurance, and improved financial stability.

Moreover, Guan et al. (2022) and Huang et al. (2020) stated that engaging in financial markets can reduce stress, thus enhancing older individuals' psychological health and well-being. It is well-established that improved mental and psychological well-being correlate with better physical health and overall functioning (Han et al., 2021; Stoeckel & Litwin, 2016). Therefore, the availability and utilization of financial services can facilitate individuals' access to health-enhancing goods and services, ultimately strengthening their immune system and improving overall health (Chireshe & Ocran, 2020).

The results demonstrate that financial inclusion programs can provide wider opportunities beyond traditional income measures and are particularly important for older individuals who may face functional limitations. Financial inclusion can assist individuals in managing healthcare expenses through savings, resulting in improved health outcomes. Additionally, financial inclusion enables individuals to afford higher-quality healthcare inputs, leading to better health outcomes. Therefore, these findings substantiate the notion that financial inclusion is a suitable means of empowering older individuals to enhance their quality of life and overall well-being concerning health.

Hence, our research findings align with existing evidence, indicating that enhancing participation in the financial sector is a significant pathway toward enhancing physical health and independence among older individuals. However, our findings differ from a previous study that found no association between having a bank account and physical health among older adults (Aguila et al., 2016). This inconsistency can be attributed to socio-cultural differences between older populations in the United States and Indonesia.

In addition to the influence of financial inclusion, specific social, economic, and demographic characteristics can also affect the health of the elderly. The age variable has a positive coefficient value, meaning the older we get, the more health complaints we will have in older adults. These findings are consistent with Santoni et al. (2015), who revealed that the prevalence of poor health status increased with age among older adults. Older age is associated with health and disability shocks, which can lead to wealth declines at older ages (Takechi et al., 2022; Tang et al., 2022; Van Blijswijk et al., 2015). Furthermore, the marital status divided into married and unmarried (divorced/divorced/not married) in this study demonstrates a negative and statistically significant influence on health complaints. Older adults with married status are less likely to experience health complaints than single ones. In line with previous research, Ford & Robitaille (2023) have found that married individuals report better physical health and have lower rates of chronic diseases than unmarried individuals. The elderly health benefits of marriage may be due to various factors, such as social support, financial stability, and healthier lifestyle behaviors (Liu et al., 2020; Robards et al., 2012).

The health status of older adults is closely linked to the level of education they have attained. Those with a greater level of education were much less likely to experience health issues. The results show that older adults with junior high school education and below have a 1.2372 times higher chance of experiencing health complaints than those with senior high school education and above. In line with the results of previous studies, it was revealed that higher levels of education in adults are associated with improved health outcomes, as evidenced in higher self-reported health and lower illness, death, and disability rates. (Raghupathi & Raghupathi, 2020; Zajacova & Lawrence, 2018). It is considered that education empowers individuals to adopt better lifestyle decisions and increases career prospects, which can lead to better health outcomes (Tan et al., 2022). Therefore, improving access to education will help reduce health disparities and improve overall health outcomes, which can have positive economic impacts by increasing human capital.

Employment status demonstrates a negative and statistically significant influence effect on health complaints. Based on the magnitude of the marginal effect, older adults

who work in agriculture and non-agriculture have a smaller chance of experiencing health complaints than older adults who do not work. In line with previous studies, according to a study by Prazeres & Santiago (2015), elderly retirees are significantly more likely to suffer from multimorbidity by 4.4 times compared to older adults still working. Already retired from work, the absence of work reduces the economic condition of older adults, and this can indirectly affect the health condition of older adults. This condition is because working can provide physical and mental stimulation, which can benefit overall health (Malik et al., 2022; Staudinger et al., 2016).

Health status among older adults can also differ based on the classification of the area of residence. Older adults residing in rural areas are more likely to report health complaints than those in urban areas. This study is similar to Zhang et al. (2022), which stated that rural older adults face health-related quality of life disadvantages compared to urban areas. Elderly individuals residing in rural areas may encounter distinct challenges and are at an increased risk of experiencing health complaints compared to older adults living in urban areas, including shortages of healthcare professionals, a lack of transportation options, and lower incomes and education levels.

## CONCLUSION

The study's findings present compelling evidence in support of the notion that financial inclusion plays a significant and positive role in improving the health of older adults. By prioritizing financial inclusion initiatives tailored to the needs of this demographic, there is a greater likelihood of experiencing improved health outcomes. Furthermore, the study highlights the contribution of specific socio-economic factors, including marital status, education, employment, and residential area, to the health of older adults. Overall, the findings shed light on how financial inclusion positively impacts the health of senior citizens.

The government can formulate policies to enhance the health of older adults by promoting their financial inclusion. To enhance the well-being and quality of life for older adults in Indonesia, targeted social policies and micro-level initiatives to maintain and restore good health should include extending financial inclusion choices and encouraging specific financial inclusion policies and programs for the elderly. The government can develop and implement policies that support financial inclusion for the elderly, such as providing easy banking access, strengthening financial literacy, and developing financial products that suit the needs of the elderly. On the other hand, the government needs to strengthen cooperation between the financial and health sectors. For example, the government could encourage collaboration between financial institutions and health service providers to develop affordable and affordable health programs for the elderly. In addition, it is also necessary to increase the financial literacy of the elderly. The government can launch a financial literacy campaign explicitly aimed at the elderly by providing precise and easy-to-understand information about the benefits of financial inclusion for their health. This campaign can help the elderly understand the importance of sound financial management and utilize financial products that suit their needs.

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## Banking Selection Criteria among Millennials: Insights from Islamic and Conventional Banks

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### Abstract

*The increasing number of millennials presents an enticing market opportunity for business. Understanding their preferences is the key to attracting their sympathy and interest. Thus, this study aims to analyze banking selection criteria for Islamic and conventional banks among the young generation. A group of students represents the millennial group in this study. Data is collected through questionnaire instruments, and factor analysis is employed to capture millennials' preference for banking. The finding highlights a relatively lower level of knowledge and awareness among millennials regarding the products and services offered by Islamic banks. Interestingly, among them, an inverse relationship exists between the criteria for selecting Islamic and conventional banks. Factors associated with banking preference among millennials are managerial performance and service quality, religiosity, recommendations, and finances. This study provides valuable insights for banking industry players, enabling them to understand millennial banking preferences better and formulate suitable marketing strategies.*

### Keywords:

conventional bank; millennial; Islamic bank; religiosity; banking selection criteria

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## INTRODUCTION

Demographic groups are divided into four generations: baby boomers, generation X (Gen-Xer), millennials, and Generation Z (Ali & Purwandi, 2016). Baby boomers are the generation born after World War II and aged between 51 and 70. Meanwhile, generation X is the generation born between 1965 and 1980. Furthermore, millennials are those born between 1981-2000 or those who are currently aged between 15 and 34 years. On the other hand, generation Z is the generation born after the year 2000 until the present.

Interestingly, according to data from the Central Bureau of Statistics (BPS), the population categorized as millennials reached approximately 34 percent or around 83 million of the total population of Indonesia in 2020. Millennials are a productive age group that will be the backbone of Indonesia's economy in the future. Millennials are also commonly referred to as the younger generation. Millennials are a unique generation and differ from other generations. The emergence of smartphones influences their behavior, mindset, values, and preferences, the widespread use of the internet, and the rise of social media networks (Ali & Purwandi, 2016). The many millennial groups make them an economically attractive market segment (Thwaites & Vere, 2000; Tootelian & Gaedeke, 2008; Tucker & Jubb, 2018). As a result, business players are competing to attract their interest and attention. Commercial banking entities, for example, target them as a potential source of future income (Thwaites & Vere, 2000). It is necessary to conduct in-depth studies on their preferences, attitudes, behaviors, and the factors that influence them to garner the sympathy and interest of millennials. A comprehensive understanding of millennial preferences is the key to capturing their market.

Millennial preferences in selecting products and service criteria differ from those of other generations. They are generally independent and active. In banking, for instance, Thwaites & Vere (2000) find that young people make independent decisions in choosing banks and are not influenced by their surroundings, such as parents and friends. Moreover, Narteh & Owusu-Frimpong (2011) find diversity in behavior among young people. Furthermore, the segment of the young generation is relatively responsive to marketing activities carried out by business entities (Thwaites & Vere, 2000). Several studies have been conducted to understand consumer preferences for Islamic banking. Erol & El-Bdou (1989), Metawa & Almosawi (1998), Naser et al. (1999) find that religious issues are considered important criteria for customers in their banking selection process. In contrast, Muhammad Awan et al. (2011) and Dusuki & Abdullah (2007), on consumer preferences for Islamic banking, find that religion is only one of the primary considerations in choosing Islamic banking services. Instead, customers prioritize product attributes and service quality when selecting Islamic banking. Meanwhile, Mansour et al. (2010) found that low-cost criteria were the highest consideration for customers in choosing Islamic banking services in the UK. In the Indonesian market context, Rama (2020) finds that Islamic banking customers experience more price expectations in their decision-making process.

Furthermore, Echchabi & Alaniyi (2012) find that convenience is the main reason for choosing Islamic banks in Malaysia. Rama (2017) identifies a high frequency of customer switching incidents in Islamic banks, which were driven by customer satisfaction, service quality, shariah compliance, prices, and involuntary switching. Based on the findings of relevant previous studies, there is a literature gap in the study of behavior and preferences among millennials, particularly regarding criteria for selecting Islamic and conventional banks. Therefore, studying millennial behavior is fascinating to fill this research gap.

The Current study explores banking selection criteria among millennials, comparing their preferences towards Islamic and conventional banks using a survey method with factor analysis. The findings indicate that millennials prioritize attributes related to ATMs and the security of personal data and financial transactions. Islamic and conventional customers show contrasting banking selection criteria. Shariah-related attributes appeal more to Islamic customers, while financial attributes are more crucial for conventional customers in their bank selection process. From factor analysis, millennials consider management performance and service quality, religiosity, close family members' recommendations, and finances as the primary determinants in their banking preferences. This study contributes to the literature in several ways. *First*, it offers empirical evidence that sheds light on consumer preference theory, specifically focusing on the demographic group and their banking selection. This study mainly compares Islamic and conventional customers' preferences on banking selection. *Second*, the study enriches banking literature by identifying factors determining millennials in their bank selection process. This study provides evidence of the importance of service quality, religiosity, recommendations, and financial in shaping bank patronage.

## METHODS

In this study, the millennial generation is represented by a group of students. The student demographic is a fascinating research object when studying banking preference and selection criteria. Gerrard & Cunningham (2013) and Thwaites & Vere (2000) have recognized students as a unique market segment with distinct characteristics, making them a worthwhile subject for analyzing their economic behavior. The choice of UIN Syarif Hidayatullah Jakarta students is grounded in the campus's reputation to mirror the diversity of Indonesian society, particularly the younger generation. This campus encompasses faculties dedicated to Islamic and 'secular' studies, drawing students from various ethnicities, backgrounds, and religious affiliations from across Indonesia. The selection of respondents is guided by criteria such as bank account ownership and the proportional distribution of students across faculties.

The primary data were collected through survey instruments. The instrument used a five-point Likert-type scale ranging from "very unimportant" to "very important". The attributes utilized in this as criteria for bank selection are an extension of previous research conducted by researchers such as Al-Khatib et al. (2009), Awan & Bukhari (2011), Dusuki & Abdullah (2007), Echchabi & Alaniyi (2012), Gerrard & Cunningham (2013), Metawa & Almosawi (1998), and Thwaites & Vere (2000). Table 1 shows the attributes of the banking selection criteria.

A variety of statistical analyses were employed, including the Friedman test, Kruskal-Wallis test, and factor analysis. The Friedman test was utilized to assess the impact and significance of diverse factors on the preference criteria for bank selection (Dusuki & Abdullah, 2007). The Kruskal-Wallis test is using to determine whether there are differences in characteristics between Islamic bank customers and conventional bank customers in terms of their banking preferences. Factor analysis was conducted to elucidate the structural relationships among various selection criteria, identifying a set of common criteria often referred to as factors. Thus, factor analysis aims to extract information inherent in the initial criteria and convert it into a fresh set of dimensions referred to as factors. The factor analysis approach classifies a number of observable variables into a factor (see Awan & Bukhari, 2011; Dusuki & Abdullah, 2007; Echchabi & Alaniyi, 2012; and Gerrard & Cunningham, 2013).

**Table 1. Attributes of Banking Selection Criteria**

| No | Banking selection criteria                                  |
|----|-------------------------------------------------------------|
| 1  | Avoidance of usury                                          |
| 2  | Prisence of a shariah supervisory board                     |
| 3  | Products and services in accordance with shariah principles |
| 4  | Haigher profit-sharing rates                                |
| 5  | Lower service and administrative fees                       |
| 6  | Lower financing costs                                       |
| 7  | Convinient ATM locations                                    |
| 8  | Avaibility of ATMs in various locations                     |
| 9  | 24-hour ATM services                                        |
| 10 | Diverse ATM services                                        |
| 11 | Attractive interior design of the bank                      |
| 12 | Appearance and attitude of bank staffs                      |
| 13 | Profesionalism of bank staffs                               |
| 14 | Knowledge of bank staffs                                    |
| 15 | Fast and efficient services                                 |
| 16 | Easy of opening an account                                  |
| 17 | Variety of products and services                            |
| 18 | Avaibility of credit cards                                  |
| 19 | Easy of conducting financial transactions                   |
| 20 | Avaibility of parking space                                 |
| 21 | SMS banking                                                 |
| 22 | Internet banking                                            |
| 23 | Use of cutting edge technooogy                              |
| 24 | Family recommendation                                       |
| 25 | Friend recommendation                                       |
| 26 | Better financial bank performances                          |
| 27 | Higher bank reputation                                      |
| 28 | Attractive bank advertisements                              |
| 29 | Effective bank management                                   |
| 30 | Security of financial transaction information               |
| 31 | Customer data security                                      |

## RESULTS AND DISCUSSION

Table 2 presents the respondent profile. Out of the 450 questionnaires distributed to potential respondents, only 375 could be processed for the subsequent stage. As a result, roughly 83 percent of the total distribution garnered responses. This high response rate is a strong indicator of the reliability and generality of the instrument (Dusuki & Abdullah, 2007). This high response rate is mainly influenced by a self-administered approach employed in this study, which entails directly distributing questionnaires to the respondents.

Table 2 shows that roughly 58 percent of the respondents are female, while the remaining 42 percent are male. Out of the total respondents, only about 33.1 percent have Islamic bank accounts or are customers of Islamic banks. Conversely, 66.9 percent of the respondents have a conventional bank account. These findings suggest that students have lower Islamic bank accounts. This lower bank account ownership aligns with Islamic banks' national market share, accounting for less than 10 percent of the total national banking assets.

**Table 2. Respondent Profile**

| Category                      | Frequency | Percentage (%) |
|-------------------------------|-----------|----------------|
| Gender                        |           |                |
| Male                          | 157       | 41,9           |
| Female                        | 218       | 58,1           |
| Total                         | 375       | 100,0          |
| Bank type                     |           |                |
| Islamic bank                  | 124       | 33,1           |
| Conventional bank             | 251       | 66,9           |
| Total                         | 375       | 100,0          |
| Type of bank account          |           |                |
| Current                       | 4         | 1,1            |
| Savings                       | 347       | 92,5           |
| Deposit                       | 17        | 4,5            |
| Others                        | 7         | 1,9            |
| Total                         | 375       | 100,0          |
| Duration of bank relationship |           |                |
| < 1 year                      | 106       | 28,3           |
| 1 - 3 years                   | 190       | 50,7           |
| 3 - 5 years                   | 67        | 17,9           |
| 5 - 10 years                  | 9         | 2,4            |
| > 10 years                    | 3         | ,8             |
| Total                         | 375       | 100,0          |

For the usage of banking products, respondents (students) display a variety of banking activities. Most of them primarily hold savings accounts, with approximately 4.5 percent having deposit accounts and only 1.1 percent having checking accounts. This result indicates that students generally utilize banking services for daily transactions rather than investment purposes, such as deposit accounts. To gain insight into why customers select a specific bank, one can also consider the duration of their relationship with that bank. Information about the length of the customer-bank relationship is crucial for predicting banking preference criteria. Approximately 51 percent of respondents have maintained their current bank relationship for about 1-3 years, while around 28 percent have been customers for less than a year. Meanwhile, roughly 21 percent of Islamic bank customers have been with their banks for over three years. Consequently, most respondents have established longstanding relationships with their banks, signifying loyalty toward them.

Table 3. Level of Awareness of Islamic Banking Products

| Islamic banking products | Recognized (%) |      | Used (%) |      |
|--------------------------|----------------|------|----------|------|
|                          | Yes            | No   | Yes      | No   |
| Wadiah                   | 36             | 64   | 19,7     | 80,3 |
| Mudharabah saving        | 36,8           | 63,2 | 8,8      | 91,2 |
| Mudharabah deposit       | 30,7           | 69,2 | 2,9      | 97,1 |
| Musyarakah               | 30,4           | 69,6 | 2,7      | 97,3 |
| Ijarah                   | 29,1           | 70,9 | 1,3      | 98,7 |
| Murabahah                | 30,7           | 69,3 | 1,1      | 98,9 |
| Sharf                    | 21,6           | 78,4 | 1,3      | 98,4 |

Table 3 reports the level of knowledge and awareness among the millennial generation (students) regarding Arabic terminology used in Islamic banking products. Respondents exhibit relatively limited familiarity with terms commonly used in Islamic banking, including *wadiah*, *mudharabah*, *musyarakah*, *ijarah*, *murabahah*, and *sharf*. The highest popularity is *mudharabah* savings (36.8 percent), followed by *wadiah* (36 percent). In contrast, awareness of terms such as deposit *mudharabah*, *musyarakah*, and *ijarah* stands at only about 30 percent. *Sharf* is the least recognized term, with approximately 22 percent of respondents being familiar with the term. This finding is in line with Gerrard & Cunningham (2013) on Islamic banks of Singapore involving both Muslim and non-Muslim respondents, which show that while Muslim respondents generally possess some understanding of Islamic teaching terms like *riba* and *shari'ah*, they often lack familiarity with the Arabic terms used in Islamic banking products.

The limited understanding of the millennial generation regarding Islamic banks is undoubtedly a significant concern that activists of Islamic economics should seriously consider. This deficiency in knowledge and awareness of Islamic banks manifests in their relatively low level of participation in Islamic banking, as reflected by their lower ownership of Islamic bank accounts. As depicted in earlier Table 2, it becomes apparent that only approximately 38 percent of the respondents possess Islamic bank accounts. This result

highlights the direct relationship between the public's comprehension and familiarity with Islamic banks and their engagement in selecting Islamic bank accounts.

**Table 4. The Rank of Banking Preference Criteria**

| Faktor                                                      | Mean   | Std. Deviation | Mean Rank | Rank     |
|-------------------------------------------------------------|--------|----------------|-----------|----------|
| 24-hour ATM service                                         | 4,1387 | ,94613         | 21,28     | 1        |
| Easy of opening an account                                  | 4,1653 | ,80730         | 21,23     | 2        |
| Customer data security                                      | 4,1493 | ,82675         | 21,12     | 3        |
| Customer transaction information security                   | 4,1627 | ,79953         | 21,10     | 4        |
| Availability of ATMs in various locations                   | 4,0933 | 1,03641        | 21,06     | 5        |
| Convenient ATM locations                                    | 4,1120 | ,83265         | 20,96     | 6        |
| Fast and effective services                                 | 4,1147 | ,87458         | 20,85     | 7        |
| Use of cutting-edge technology                              | 4,1147 | ,81770         | 20,71     | 8        |
| Higher bank reputation                                      | 4,0427 | ,81647         | 19,86     | 9        |
| Easy of conducting financial transactions                   | 4,0400 | ,81824         | 19,83     | 10       |
| Effective bank management                                   | 4,0453 | ,82447         | 19,71     | 11       |
| Professionalism of bank staffs                              | 4,0080 | ,81263         | 19,37     | 12       |
| Variety of bank products and services                       | 4,0000 | ,79772         | 19,11     | 13       |
| Internet banking                                            | 3,9653 | ,84104         | 18,88     | 14       |
| Better financial bank performances                          | 3,9600 | ,81168         | 18,76     | 15       |
| SMS banking                                                 | 3,9120 | ,89577         | 18,35     | 16       |
| Diverse of ATM services                                     | 3,9067 | ,87712         | 18,33     | 17       |
| Appearance and attitude of bank staffs                      | 3,8880 | ,86416         | 18,10     | 18       |
| Knowledge of bank staffs                                    | 3,8373 | ,88824         | 17,42     | 19       |
| Family recommendation                                       | 3,7813 | ,93086         | 17,23     | 20       |
| Avoidance of usury                                          | 3,7387 | 1,08513        | 16,84     | 21       |
| Availability of parking space                               | 3,7360 | ,98228         | 16,59     | 22       |
| Presence of a shariah supervisory board                     | 3,7013 | ,93441         | 16,03     | 23       |
| Lower service and administrative fees                       | 3,6720 | 1,00886        | 15,99     | 24       |
| Products and services in accordance with shariah principles | 3,6773 | ,99458         | 15,89     | 25       |
| Attractive bank advertisement                               | 3,5973 | 1,01090        | 15,26     | 26       |
| Availability of bank credit                                 | 3,5707 | 1,04175        | 15,19     | 27       |
| Financial and profitability                                 | 3,5867 | ,90886         | 14,82     | 28       |
| Attractive interior design of the bank                      | 3,5627 | ,90198         | 14,60     | 29       |
| Friend recommendation                                       | 3,4453 | 1,01411        | 13,97     | 30       |
| Low interest rate on loan                                   | 3,3813 | 1,12396        | 13,71     | 31       |
| Campus recommendation                                       | 3,3227 | 1,02633        | 13,05     | 32       |
| Earning interest                                            | 2,9200 | 1,16500        | 10,09     | 33       |
| High interest rates on savings accounts                     | 2,8533 | 1,16653        | 9,70      | 34       |
| N                                                           |        |                |           | 375      |
| Chi-Square                                                  |        |                |           | 1690,860 |
| df                                                          |        |                |           | 33       |
| Asymp. Sig.                                                 |        |                |           | 0,000    |
| a. Friedman Test                                            |        |                |           |          |

Table 4 displays the results of the Friedman test conducted on 31 banking selection criteria among the millennial generation. The chi-square value stands at 1690.860, with a degree of freedom (df) value of 33. This result is statistically significant, as indicated by the p-value of 0.000, less than 0.05. This value signifies a substantial difference in the average values of all the attributes within the banking selection criteria, suggesting that the sample is drawn from distinct populations.

Furthermore, the table also shows the mean rank values for each criterion, revealing the top five criteria considered most important by Islamic and conventional bank respondents. These criteria include (1) 24-hour ATM service, (2) ease of opening an account, (3) customer data security, (4) customer transaction information security, and (5) the availability of ATMs in various locations. These findings align with Almossawi (2001) on the preferences of Bahraini students regarding banking selection criteria. Such a study finds that attributes associated with ATMs, such as ATM convenience, extensive ATM networks, and 24-hour ATM service, ranked the highest importance when choosing a bank. Similarly, Thwaites & Vere (2000) identify the presence of ATMs on campus and the number of ATM networks as the top and fifth-ranked criteria, respectively, in the bank selection process among UK students. Hence, criteria related to ATMs are pivotal in shaping the banking preferences of the millennial generation in Indonesia. Additionally, the ease of opening a bank account is another highly significant criterion. This finding is consistent with Awan & Bukhari (2011) that the ease of accessing banking services is among the most critical factors in banking selection criteria.

Other critical criteria are security considerations, encompassing customer data privacy and transaction security. These results validate the study of Gerrard & Cunningham (1997), which ranked bank confidentiality as the third most crucial criterion for banking customers, both from Islamic and conventional banks, in Singapore. This attribute gains relevance in the context of rising customer demands for the privacy of their personal data and financial transactions. Technological advancements have raised concerns about data confidentiality and security.

Conversely, criteria such as (1) high-interest rates on savings accounts, (2) earning interest, (3) campus recommendation, (4) low interest rates on loans, and (5) friend recommendations occupy the bottom five positions in banking preferences. Profit-related motives do not emerge as the primary consideration for respondents when selecting a bank in this study. This preference aligns with the respondent profile depicted in Table 2, which shows that most respondents use banking services for precautionary savings and daily transactional needs, primarily through savings accounts. These findings diverge significantly from studies by Awan & Bukhari (2011) and Gerrard & Cunningham (1997), which underscore the significance of profitability attributes as crucial criteria in banking selection.

Table 5 provides the results of the Kruskal-Wallis test for Islamic and conventional banks. The table reveals an inverse relationship in the average ranking of selection criteria between customers of Islamic and conventional banks. For Islamic bank customers, the

top five criteria in selecting an Islamic bank are as follows: (1) the presence of a Sharia supervisory board, (2) products and services following shariah principles, (3) avoidance of usury, (4) appearance and attitude of bank staffs, and (5) better financial bank performances. The first three criteria are closely linked to religiosity attributes.

**Table 5. Rank of Selection Criteria for Islamic and Conventional Banks**

| Factors                                                     | Mean Rank    |      |            |      | Significance |         |
|-------------------------------------------------------------|--------------|------|------------|------|--------------|---------|
|                                                             | Islamic bank | Rank | Conv. bank | Rank | Chi-Square   | Sig.    |
| Presence of a shariah supervisory board                     | 231,03       | 1    | 166,74     | 34   | 32,613       | ,000*   |
| Products and services in accordance with shariah principles | 229,61       | 2    | 167,44     | 33   | 30,384       | ,000*   |
| Avoidance of usury                                          | 225,17       | 3    | 169,64     | 32   | 23,610       | ,000*   |
| Appearance and attitude of bank staffs                      | 196,14       | 4    | 183,98     | 31   | 1,309        | ,253    |
| Better financial bank performance                           | 191,65       | 5    | 186,20     | 30   | ,266         | ,606    |
| Friend recommendation                                       | 190,72       | 6    | 186,66     | 29   | ,131         | ,717    |
| Professionalism of bank staffs                              | 190,19       | 7    | 186,92     | 28   | ,097         | ,755    |
| Financial and profitability                                 | 189,87       | 8    | 187,08     | 27   | ,063         | ,801    |
| Attractive interior design of the bank                      | 189,35       | 9    | 187,33     | 26   | ,034         | ,854    |
| Knowledge of bank staffs                                    | 187,68       | 10   | 188,16     | 25   | ,002         | ,964    |
| Lower service and administrative fees                       | 187,32       | 11   | 188,33     | 24   | ,008         | ,928    |
| Easy of opening bank account                                | 185,80       | 12   | 189,09     | 23   | ,096         | ,756    |
| Convenient ATM location                                     | 184,78       | 13   | 189,59     | 22   | ,210         | ,647    |
| Higher bank reputation                                      | 184,66       | 14   | 189,65     | 21   | ,218         | ,640    |
| Family recommendation                                       | 182,78       | 15   | 190,58     | 20   | ,518         | ,472    |
| Customer data security                                      | 181,19       | 16   | 191,36     | 19   | ,899         | ,343    |
| Campus recommendation                                       | 180,04       | 17   | 191,93     | 18   | 1,115        | ,291    |
| Fast and efficient services                                 | 179,06       | 18   | 192,41     | 17   | 1,535        | ,215    |
| Variety of bank products and services                       | 178,56       | 19   | 192,66     | 16   | 1,857        | ,173    |
| Diverse of ATM services                                     | 178,36       | 20   | 192,76     | 15   | 1,716        | ,190    |
| Easy of conducting financial transactions                   | 175,39       | 21   | 194,23     | 14   | 3,198        | ,074*** |
| Customer transaction information security                   | 174,36       | 22   | 194,74     | 13   | 3,575        | ,059*** |
| Effective bank management                                   | 173,90       | 23   | 194,96     | 12   | 3,857        | ,050*** |
| Attractive bank advertisement                               | 171,58       | 24   | 196,11     | 11   | 4,698        | ,030**  |
| Availability of parking space                               | 170,92       | 25   | 196,44     | 10   | 5,310        | ,021**  |
| 24-hour ATM service                                         | 170,54       | 26   | 196,62     | 9    | 5,674        | ,017**  |
| Low interest rate on loan                                   | 170,29       | 27   | 196,75     | 8    | 5,353        | ,021**  |
| Internet banking                                            | 163,37       | 28   | 200,17     | 7    | 11,656       | ,001**  |
| Use of cutting-edge technology                              | 162,82       | 29   | 200,44     | 6    | 12,190       | ,000*   |
| SMS banking                                                 | 158,06       | 30   | 202,79     | 5    | 16,961       | ,000*   |
| Availability of bank credit                                 | 157,33       | 31   | 203,15     | 4    | 16,642       | ,000*   |
| Earning interest                                            | 154,10       | 32   | 204,75     | 3    | 19,255       | ,000*   |
| Availability of ATM in various locations                    | 151,38       | 33   | 206,09     | 2    | 24,785       | ,000*   |
| High interest on savings account                            | 150,77       | 34   | 206,39     | 1    | 23,214       | ,000*   |

This result suggests that factors associated with religiosity, notably the compliance of Islamic banking operations with Sharia principles, are essential for customers when choosing an Islamic bank. In contrast, religiosity attributes do not carry the same level of importance for conventional bank customers. The significance of religiosity attributes in banking selection criteria aligns with Erol & El-Bdou (1989), Metawa & Almosawi (1998), and Naser et al. (1999). Additionally, the appearance and attitude of bank staff and the performance of Islamic banks are considered pivotal factors in the selection process of Islamic banks. This finding aligns with Abbas et al. (2003) and Dusuki & Abdullah (2007), which emphasize the importance of attributes related to Islamic bank staff, including their attitude, knowledge, and appearance, in choosing an Islamic bank.

In contrast, for conventional bank customers, the top five criteria in banking selection criteria are (1) high-interest rates on savings accounts, (2) availability of ATMs in various locations, (3) earning interest, (4) the availability of credit card, and (5) SMS banking. These rankings are based on their mean rank values. In Islamic banks, these same five criteria occupy the bottom positions regarding importance. The differences in criteria between conventional and Islamic bank customers are statistically significant. Additionally, attributes such as cutting-edge technology, internet banking, low interest rates on loans, 24-hour ATM service, parking availability, attractive bank advertisements, effective bank management, customer information security, and ease of conducting financial transactions are statistically significant.

As shown in Table 5, the findings suggest that conventional bank customers prioritize attributes related to financial benefits, such as high interest rates on savings accounts and low-interest rates on loans, when making their banking selections. This result aligns with Gerrard & Cunningham (2013), highlighting that interest rate attributes are the foremost consideration for non-Muslims when choosing a bank. Furthermore, attributes associated with the amenities offered by banks, such as ATM networks, credit cards, technology (SMS banking, internet banking), and the bank's reputation, are considered essential factors for patronaging a bank.

**Table 6. KMO and Bartlett test**

|                                                  |                    |          |
|--------------------------------------------------|--------------------|----------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. |                    | ,833     |
| Bartlett's Test of Sphericity                    | Approx. Chi-Square | 2583,150 |
|                                                  | df                 | 136      |
|                                                  | Sig.               | 0,000    |

Factor analysis was conducted to elucidate the interconnectedness of selection criteria by identifying shared criteria sets commonly known as factors. The results from the KMO (Kaiser-Meyer-Olkin) and Bartlett's tests in Table 6 demonstrate a KMO value of 0.833, which is greater than 0.5, suggesting the relevance of factor analysis for uncovering the factors that influence the selection criteria for choosing banks.

**Table 7. Results from Factor Analysis in Banking Selection Criteria**

| Characteristics                                             | Loading | Communalities |
|-------------------------------------------------------------|---------|---------------|
| <b>Factor 1: Performance and service quality</b>            |         |               |
| Effective bank management                                   | ,767    | ,643          |
| Higher bank reputation                                      | ,764    | ,775          |
| Use of cutting-edge technology                              | ,761    | ,786          |
| Fast and efficient services                                 | ,755    | ,748          |
| Better financial bank performance                           | ,753    | ,667          |
| Customer transaction information security                   | ,747    | ,624          |
| Easy of opening account                                     | ,699    | ,518          |
| SMS banking                                                 | ,530    | ,400          |
| <i>Eigenvalue</i>                                           | 5,321   |               |
| <i>Percentage of Variance</i>                               | 31,302  |               |
| <i>Cumulative %</i>                                         | 31,302  |               |
| <b>Factor 2: Religiosity</b>                                |         |               |
| Presence of a shariah supervisory board                     | ,868    | ,585          |
| Products and services in accordance with shariah principles | ,843    | ,444          |
| Avoidance of usury                                          | ,759    | ,739          |
| <i>Eigenvalue</i>                                           | 2,104   |               |
| <i>Percentage of Variance</i>                               | 12,374  |               |
| <i>Cumulative %</i>                                         | 43,676  |               |
| <b>Factor 3: Family and friends</b>                         |         |               |
| Friend recommendation                                       | ,824    | ,684          |
| Campus recommendation                                       | ,820    | ,608          |
| Family recommendation                                       | ,624    | ,614          |
| <i>Eigenvalue</i>                                           | 1,765   |               |
| <i>Percentage of Variance</i>                               | 10,384  |               |
| <i>Cumulative %</i>                                         | 54,059  |               |
| <b>Factor 4: Financial</b>                                  |         |               |
| Earning interest                                            | ,864    | ,622          |
| Low interest rate on loan                                   | ,782    | ,628          |
| High interest rate on savings account                       | ,722    | ,621          |
| <i>Eigenvalue</i>                                           | 1,516   |               |
| <i>Percentage of Variance</i>                               | 8,918   |               |
| <i>Cumulative %</i>                                         | 62,978  |               |

Table 7 presents the results of the Rotated Component Matrix, offering insights into the number of factors established and the criteria grouped within these factors. All the criteria used for bank selection exhibit loading factor values exceeding 0.50, indicating the absence of issues regarding validity and reliability. Based on those results, four distinct factors are identified. Factor 1 encompasses six criteria: effective bank management, higher bank reputation, cutting-edge technology, fast and efficient services, better bank

financial performance, customer transaction information security, and ease of opening an account. Given the criteria in Factor 1, this factor may be designated as the "management performance and service quality" variable. With an Eigenvalue of 5.321, Factor 1 explains 31.3 percent of the variance.

Next, Factor 2 emerges from criteria such as the presence of a Sharia supervisory board, products, and services following shariah, and avoidance of usury. Collectively, this factor accounts for 43.7 percent of the variance. Given the criteria in Factor 2, it can be identified as the "religiosity" variable. Approximately 10.4 percent of the variation in bank selection criteria is explained by the religiosity factor. In addition, Factor 3 can be labeled as the "family and friends" variable, encompassing criteria such as recommendations from friends, campus, and family members. The family- and- friends variable explains 10.4 percent of the variation in bank selection criteria. Factors 1, 2, and 3 contribute to 54 percent of the variance. Finally, Factor 4 comprises three selection criteria: earning interest, low interest rates on loans, and high-interest rates on savings accounts. Considering the criteria in Factor 4, it may be defined as the "financial" variable. The percentage of variance explained by Factor 4 is a modest 8.9 percent. Cumulatively, Factor 4 accounts for 63 percent of the overall model variance.

The results of the factor analysis in Table 7 reveal that the factors behind millennials' bank selection criteria are management performance and service quality, religiosity, recommendations from family and friends, and financial aspects. These findings are consistent with some earlier studies, such as Almosawi (2001), Dusuki & Abdullah (2007), Gerrard & Cunningham (2013), Mansour et al. (2010), and Echchabi & Alaniyi (2012). For instance, Echchabi & Alaniyi (2012) find that attributes related to service quality and convenience are quantitatively significant factors in selecting a bank, while religious motivation qualitatively plays a significant role in choosing an Islamic bank. Inadequate service quality provided by Islamic banks can lead to customer switching (Rama, 2017; Rama & Kassim, 2013).

## CONCLUSION

The rapid growth of the millennial generation in Indonesia has become an attractive prospect for businesses. They exhibit distinct behaviors, mindsets, and preferences compared to other demographic groups. Given their potential future financial income, this demographic's demand for banking products and services is expected to grow. Hence, understanding the banking preferences of millennials is a compelling endeavor, both theoretically and practically.

The study uncovers a remarkably low awareness and knowledge among millennials regarding Arabic terms used in Islamic banking products and services. To our surprise, millennials, as represented by a group of university students, particularly those from UIN Syarif Hidayatullah Jakarta, are unfamiliar with commonly used Arabic terms in Islamic banking. This finding is surprising, given that UIN Syarif Hidayatullah is an Islamic university where students are expected to be well-versed in various Arabic terms, including

those related to financial products and Islamic banking. This situation may stem from the fact that specific terms related to Islamic banking are only familiar to students in faculties related to economics, finance, and Islamic business law.

In addition, the findings demonstrate that millennials prioritize attributes related to ATMs and the security of personal data and financial transactions. Dissatisfaction with data security and confidentiality can adversely affect the relationship between customers and the bank, potentially leading to customer migration to other banks. Furthermore, Islamic and conventional customers show contrasting banking selection criteria. Shariah-related attributes appeal more to Islamic customers, while financial attributes are more crucial for conventional customers in their bank selection process. The findings from the factor analysis highlight that young generations consider criteria linked to management performance and service quality, religiosity, recommendations from close family members, and finances as the primary determinants of their banking preferences.

For future research direction, it is essential to note that a group of students exclusively represented the millennial segment in this study. Students may not fully reflect the behaviors and preferences of the entire millennial generation. Therefore, expanding the sample group of millennials in future research is advisable to derive more generalized conclusions. Additionally, conducting statistical analyses based on demographic characteristics is recommended for future research. Such demographic analyses would provide insights into more varied behavioral patterns based on the developed categories. Finally, increasing the sample size in future research is essential to gain more robust research findings.

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# The Happiness of the Sandwich Generation in Bali: the Roles of Family, Social, and Balinese Culture

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## Abstract

*The sandwich generation in Bali, especially Gianyar, which is still thick with its culture, has a dual role in the family, as caregivers for children and parents, breadwinners, and is actively involved in community activities. This study aims to analyze the influence of cultural norms in moderating the effect of family roles and social support on the happiness of the sandwich generation. The samples were 203 generations of sandwiches obtained through accidental sampling techniques and analyzed using Moderated Regression Analysis (MRA). The results showed that cultural norms, social support, and family roles significantly influence the happiness of the sandwich generation. Meanwhile, cultural norms were not variables that moderate the effect of family roles and social support on the happiness of the sandwich generation. This study proposed two central policies to break the sandwich generation chain in Gianyar Regency: socializing the importance of financial literacy so that in the future, a person does not depend on his child for life and forming a parent empowerment group to reduce the burden of the sandwich generation.*

## Keywords:

cultural norms; family roles; happiness; social support

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## How to Cite:

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## INTRODUCTION

Subjective welfare, namely happiness, is one of the measurements of population welfare in the Sustainable Development Goals (SDGs) or Sustainable Development Goals (TPB). Happiness is a measure of the overall feeling of well-being or subjective well-being. Happiness or life satisfaction measures how much a person assesses his quality of life well. Asia is currently undergoing demographic change due to the transition of the adult to the old age bracket, resulting in an aging population. This demographic transformation affects society and its socio-cultural norms. This condition also affects families who live in Asian countries, including Indonesia, since joint family arrangements are a common practice in almost all Asian countries, where the care of elderly parents is considered mandatory and becomes a responsibility of the child. The "Sandwich Generation" term was commonly used in the United States during 1981, defined as middle-aged people around 30-45 years old, living with parents and children who are elderly and responsible for caring for children and parents.

The sandwich generation is people (usually middle-aged) who have a dual role, namely being responsible for their children who still live together at home and also being responsible for their parents and in-laws. The position between two generations makes a person like a sandwich. PEW Research Center data shows that the sandwich generation feels happier daily than others, but the sandwich generation feels more rushed than others. This condition is because the sandwich generation has to care for its parents and children, which is very rushed. However, the current generation prefers to care for children and their parents without choosing one of them. If it is forced to choose, the current generation prefers to care for their children compared to their parents. In addition, the most significant generational choice is to take care of the children and their parents, causing the sandwich generation to occur.

The sandwich generation divides their resources between their children and their aging parents. In its development over the past few years, as the millennial generation has begun to be in a time to care for their aging parents, the dynamics of the definition of the "sandwich generation" has transitioned to become a "sandwich generation group" consisting of four generations of interdependent families. Ahmad et al. (2018) state that the sandwich generation faces conflict when family responsibilities and work demands must be completed simultaneously. Furthermore, the potential for this conflict is higher in groups of low-income individuals and affects the quality of life of the sandwich generation (Noor & Isa, 2020).

The sandwich generation is forced between the demands of children and parenting responsibilities. Simultaneously, they must deal with work-family conflict when family responsibilities and pressures collide with work and demands (Maon et al., 2016). Work and family conflicts always arise in low-income groups, affecting their work and family life satisfaction (Ahmad et al., 2016). Therefore, the sandwich generation fulfills a dual responsibility in the form of child support and care of elderly parents. The sandwich generation tends to be reluctant to withdraw from their filial obligations to their parents even though sometimes caring for the elderly becomes challenging due to various chronic

diseases of old age. According to Phua et al. (2016), the sandwich generation in Asian countries feels responsible for caring for elderly family members as a measure of the respect and duties expected of a son or daughter. In this regard, Phua et al. (2019) state that Asians have stronger feelings of guilt than Americans. Therefore, Asian people always try hard to do their best for the welfare of their families, including Indonesians (Ahmad et al., 2016). Financial problems sometimes make the sandwich generation feel stressed, so social support is needed to energize them.

Based on SPTK data for 2017 and 2021, the level of happiness in Bali has decreased by 1.04%. However, the older the Balinese, the higher the level of happiness, where the happiness of residents aged 41-64 years is higher than those aged less than 40 years. This condition is because sandwich generation residents have to pay for and take care of their children and parents. Gianyar is one of the areas in Bali that is still thick with its culture, so the sandwich generation has to be active in *mebraya* not to be ostracized by the surrounding community. The culture of caregivers for children and parents is also a culture that must be carried out in Gianyar. Balinese culture is indeed known to have uniqueness compared to other cultures. Being born with Balinese culture is required to face social reality in a culture that plays a role and is influential in life's order and customary rules. In Balinese culture, a married son must care for and support his children and parents. If a son is married, he will have one roof and one kitchen with his parents so that when they have children, they will have additional responsibilities, namely caring for and supporting their children. This fact shows that the Balinese culture obliged to remain with their parents after marriage still occurs today. One thing related to Balinese culture that a person must carry out after marriage is *mebanjar*. *Mebanjar* is defined as participation in events such as religious events that are related to culture and bond. Someone who does the *Banjar* must participate in mutual cooperation whenever there is a religious ceremony, maintain the environment, and help (*ayah-ayahan*) related to the continuity of religious ceremonies.

*Banjar* is known as a way of dividing administrative areas that only exists in Bali, which has a function as a legal unit with certain regional boundaries and is under the sub-district or village and has the same role as the pillars of the community (Baihaqi, 2022). *Banjar* in an *adat banjar* area is tasked with assisting (*ngayah*) in traditional villages in organizing religious and cultural activities in the local village. The sandwich generation in Bali is inseparable from the cultural norms in the *banjar* where they live. Apart from having responsibilities towards children and parents, cultural norms are also the responsibility of the sandwich generation as *krama banjar*. Every religious activity in Bali is always guided by the teachings of Tri Hita Karana so that in carrying out organizational activities, harmony among members is well established (Baihaqi, 2022).

Carrying out duties as a *Banjar* member must be kept from interactions with other members. As a Balinese cultured person who participates in *Banjar* activities, he is required to cooperate in various activities in the *Banjar* along with other members. In Bali, someone who is married, works, and is obliged to take care of their children and parents tends to be in a hurry when there are activities in the *Banjar* that require them

to participate before a religious ceremony takes place. If we rarely participate in activities in the *Banjar*, we will usually be subject to a fine in the form of money and a week of *Banjar* (excommunication). So, it is not uncommon for someone to pay someone else to represent their family in helping activities (*ngayah*) in the *Banjar* when it is busy. If someone is already active, it will be easy for him to get social support from other people around his residence who are still in the same hamlet. According to Wijesinghe et al. (2015), social support can make the sandwich generation feel calmer than others. In contrast, according to Schleider et al. (2015), the family's role is essential in the sandwich generation to avoid sinking into feeling stressed and tired. It can interfere with his subjective well-being, namely his happiness.

According to Kusumaningrum (2018), social support is the support received by those closest to the individual. Social support can be obtained from family, friends, and support from people around the residence who are still in the same hamlet. Social support is a form of comfort, attention, appreciation, or assistance that individuals receive from other people or a group. Social support can be in the form of emotional, appreciation, instrumental, information, and group support.

The sandwich generation, who gets good social support from friends, tends to be more able to control themselves so that their feelings are not too late in their enormous responsibility because the sandwich generation has a more significant number of family dependents when compared to the non-sandwich generation. The more significant number of family dependents causes the sandwich generation to have financial obligations that tend to be higher and a smaller proportion of free time than the non-sandwich generation. In Standard Economic Theory, individual happiness is derived from satisfaction, which is influenced by income and leisure. In addition, status as the sandwich generation also has a negative impact on marital conditions and health, causing stress, anxiety, and sadness. This condition indicates that the sandwich generation needs social support. In line with the results of this study, research by Hopps et al. (2017) in the United States found that groups of individuals who care for their parents feel more pressure when compared to those who do not have similar responsibilities.

The time taken to look after and pay for children and parents, plus having to pray in *Banjar*, makes the generation of sandwiches rush, so the role of the family is very much needed. Families that support each other in matters of *ngayah* tend to make the sandwich generation feel helped because they are able to reduce the burden of obligations that must be carried out. In Bali, the role of a wife who can help her husband in terms of *ngayah* and participate in fulfilling the family's finances will significantly help her husband live his life as the sandwich generation. With the role of the family and the wife's support, the sandwich generation will feel they have space to manage life and design their own family's future and not feel burdened alone. Some sandwich generation who are classified as low-income admit that they can barely save, let alone invest because their income is used up to cover the basic needs of themselves, their families, and their parents. Therefore, they do not dare to dream of increasing their welfare, let alone having their own home.

According to previous research, individuals who can achieve their desires in the family or a social environment will feel happier (Purwaningsih, 2021). In addition, Zhang et al. (2018) analyze the living conditions of households in China, showing that the number of family members and the head of the family play an important role in household happiness. Meanwhile, research by Huang et al. (2017) states that women play an essential role in a happy household life. Happiness is usually influenced by how wealthy a person is and in terms of health and other factors (Tsegei, 2018). Previous research by Cheng et al. (2016) shows that the role of the head of the family in creating family happiness is enormous.

Previous research by Evans et al. (2016) examined the female sandwich generation and found its result that the female sandwich generation had six balanced strategies in carrying out the dual roles of caregivers for parents and children, namely: maintaining health and well-being, suppressing perfectionism, managing time and energy, relinquishing responsibility, maintaining social relationships and reciprocity. Rari et al. (2022) conclude that the variables that directly affect happiness are health and income, while the number of family dependents and free time do not have a direct effect. The results of their research also stated that parents in large families are not considered a burden for the sandwich generation.

Previous research by Hartini (2022) found results that the subjective well-being of the sandwich generation decreased because it has a dual role, namely caring for and providing financial support for parents and their children. The demanding sandwich generation needs to maintain their subjective well-being in good quality. This condition explains that if the level of caregiver burden increases, it will decrease the level of subjective well-being.

The difference between this study and previous research is in the research variables. Previous studies have focused on responsibility, health, well-being, perfectionism, free time, social relations, number of family members, health conditions, and monthly household income. In this study, the variables focused on cultural norms, family roles, and social support on the happiness of the sandwich generation. The novelty of this study lies in examining the influence of culture in moderating the role of the family on happiness. In previous research, this is the first time anyone has investigated cultural variables, especially culture in Gianyar Regency, Bali Province.

Noor & Isa (2020), highlighting the sandwich generation concept that focuses on the responsibility of caring for parents and children in Malaysia. Their research showed that finances, emotions, a bleak future, stress, lack of savings, and time management are the main problems facing the sandwich generation in Malaysia. The contribution of this research is expected to provide strategies for the sandwich generation in maintaining and increasing their happiness in their roles, namely as caregivers and participating in activities in the community.

## METHODS

This research was conducted in Gianyar Regency, Bali Province. This locale was chosen because Gianyar Regency is one of the areas in the Province of Bali with forms of

cultural norms and local wisdom, one of which is strong Tri Hita Karana. Forms of local wisdom in society can be in the form of culture (values, norms, ethics, beliefs, customs, customary law, and special rules). This research focuses on studying the variables of cultural norms, social support, family roles, and the happiness of the sandwich generation in Gianyar Regency.

The variables used in this study are cultural norms (X1), which adopt the Tri Hita Karana culture in Hindu religious teachings according to Bhagawad-Gita (III.10), namely Parahyangan, Pawongan, and Palemahan. The social support variable (X2) is measured by indicators according to Kusumaningrum (2018): Family Support, Friend Support, and Support of other people around the residence. Family role variable (X3) as measured by indicators according to Fahrudin (2012) and Noor & Isa (2020), namely: husband's role, family openness, and frequency of conflicts in the family. The Happiness Variable (Y) measured according to Evans et al. (2016), namely: (1) Sleep, nutrition, meeting health needs, and exercise, (2) Time out, pampering leisure, and (3) Reward.

The population in this study is the entire object that is the research target, namely the sandwich generation in Gianyar Regency. Based on the generation theory in the literature review, the sandwich generation is a generation that enters the X and Y generations born in 1969-1988 and is currently 35-54 years old. Based on population data from the Central Bureau of Statistics for Gianyar Regency, the total population of Gianyar Regency who entered the sandwich generation category, aged 35-54 years, was 153,800. Sample (n) was obtained through a non-probability sampling technique, namely by accidental sampling. The sample was determined using an accidental sampling technique. It was determined by taking respondents who were available at a research location that was appropriate to the research context, namely the working sandwich generation who already have children and are supporting their parents. Sampling in this study is per district in Gianyar Regency (7 districts) with the same number of samples. This sampling is due to the unavailability of specific data regarding sandwich generation in Gianyar Regency, so that the proportion is the same and all sub-districts in Gianyar Regency are represented, sampling is carried out per sub-district with the same number of 29 sandwich generations. The number of sub-districts in Gianyar Regency is seven, where each sub-district is proportional to 29 sandwich generations, so a sample of 203 sandwich generations is obtained. The data collection method uses a questionnaire, namely structured interviews.

The first stage is carried out through literature study, by collecting data or literature from the research results to get a general overview and to plan the appropriate analysis to solve the problems. The research data were analyzed by moderating variable regression or Moderated Regression Analysis (MRA) using Smart PLS because MRA is a way that can be used to test the moderating effect by using a program by including the moderating variable then the multiplication between the independent variables and the moderating variables (Ghozali, 2021). This will usually lead to a non-linear relationship so that the measurement error of the estimated MRA coefficient when using latent variables becomes inconsistent and biased. So the solution that can be done is to use a structural equation

model where SEM can correct this measurement error by including the effect of interaction into the model using the Smart PLS program (Ghozali, 2021). The mathematical equation is described as follows:

$$Y_1 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_3 X_1 + \beta_5 X_3 X_2 \quad (1)$$

Where:

$Y_1$  = The happiness of the sandwich generation

$X_1$  = Cultural Norm

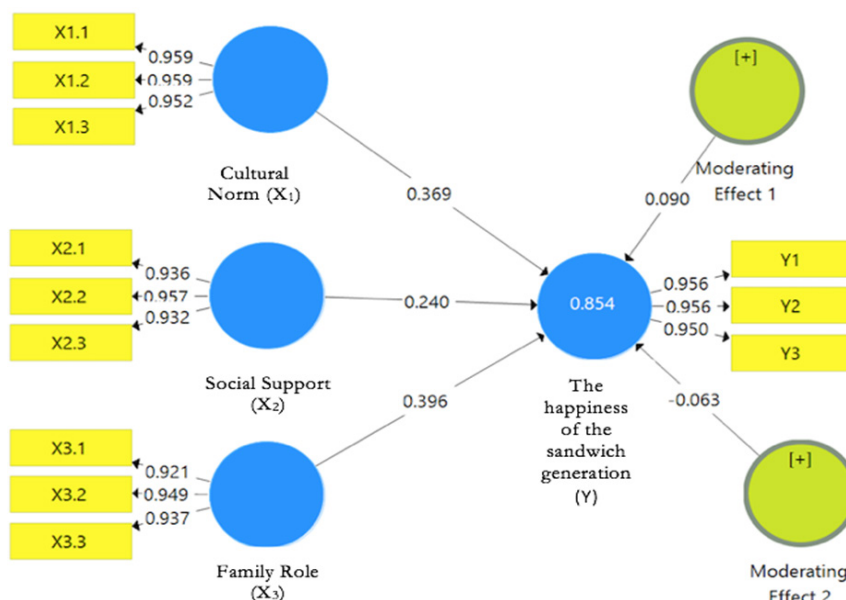
$X_2$  = Social support

$X_3$  = Family role

## RESULTS AND DISCUSSION

The results of testing the validity and reliability of the instrument showed that the research instrument for all variables is valid and reliable. Likewise, the validity and reliability tests of construct indicators of latent variable cultural norms, social support, family roles, and happiness with reflexive indicators are valid and reliable. The value of the Goodness of Fit structural model in the PLS analysis is a predictive-relevance (Q2) value, obtained by 85.2%, meaning that the model can explain empirical phenomena about the variables that affect happiness by 85.2%. The rest is influenced by errors and other variables that still need to be included in the model.

Figure 1. Full Structural Model



The factor loading value showed the weight of each dimension as a measure of each variable. Dimensions with extensive factor loading indicated that this dimension is the strongest (dominant) variable measurer. The cross-loading value in this study was obtained greater than 0.6, so it can be stated that the data in the study are valid. The

square root value of each AVE was obtained for (0.957; 0.942; 0.936; 0.954), which is greater than the correlation of each construct, so it can be said that the model is valid when viewed from discriminant validity. The value of Cronbach's alpha and Composite reliability for each variable is more significant than 0.70, so it can be stated that the data in the study are reliable. The results of hypothesis testing can be seen in Table 1 and Figure 2.

The results of the data analysis in Table 1 showed that cultural norms have a positive and significant effect on the happiness of the sandwich generation in Gianyar Regency, which is indicated by the coefficient value of 0.369. This result means that if cultural norms increase by 1 point from the respondent's answer, the happiness of the sandwich generation will increase by 0.369 points assuming other variables are constant. Social support showed a positive influence on the happiness of the sandwich generation in Gianyar Regency, which is indicated by the coefficient value of 0.240. This result means that if social support increases by 1 point from the respondent's answer, the happiness of the sandwich generation will increase by 0.240 points, assuming that other variables are constant.

**Table 1. Statistical Path Coefficient Test Results**

|                                                                          | Original Sample | Sample Mean | Standard Deviation | t-statistics | P Values |
|--------------------------------------------------------------------------|-----------------|-------------|--------------------|--------------|----------|
| Cultural Norm ( $X_1$ ) -> The happiness of the sandwich generation (Y)  | 0.369           | 0.347       | 0.096              | 3.882        | 0.000    |
| Social support ( $X_2$ ) -> The happiness of the sandwich generation (Y) | 0.240           | 0.237       | 0.080              | 3.011        | 0.003    |
| Family role ( $X_3$ ) -> The happiness of the sandwich generation (Y)    | 0.396           | 0.403       | 0.083              | 4.747        | 0.000    |
| Moderating Effect 1 -> The happiness of the sandwich generation (Y)      | 0.090           | 0.076       | 0.081              | 1.116        | 0.265    |
| Moderating Effect 2 -> The happiness of the sandwich generation (Y)      | -0.063          | -0.062      | 0.081              | 0.784        | 0.433    |

Source: Data processing (2023)

The role of the family also showed a positive influence on the happiness of the sandwich generation in Gianyar Regency, which is indicated by a coefficient value of 0.396. The analysis of Table 1 on moderating effect 1 showed that cultural norms cannot moderate the effect of family roles on the happiness of the sandwich generation in Gianyar Regency, which is indicated by a significant level of 0.265. This result means that the size of cultural norms cannot influence the family's role in the happiness of the sandwich generation in Gianyar Regency.

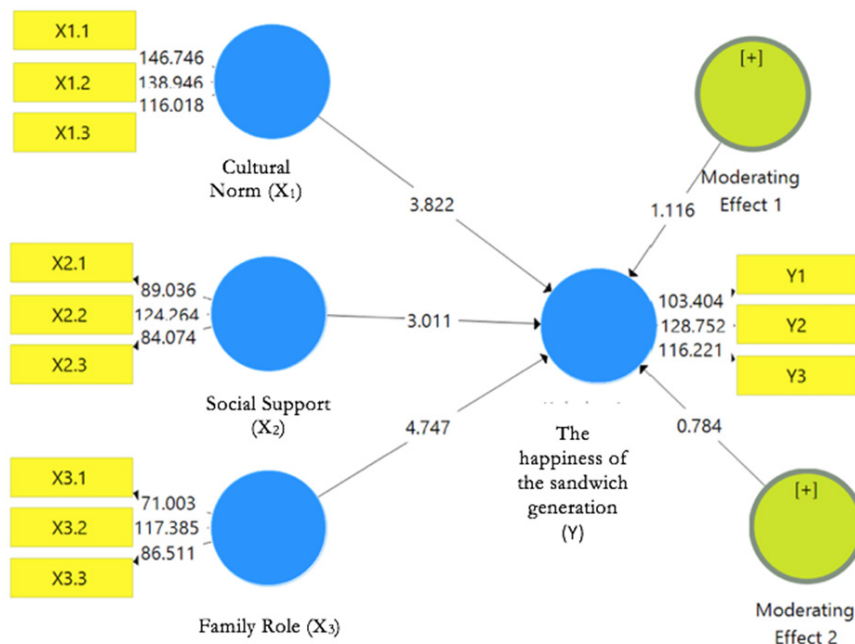
Cultural norms are also unable to moderate the effect of social support on the happiness of the sandwich generation in Gianyar Regency, which is shown by a significant level of 0.433. This result means that the size of cultural norms cannot influence the family's role in the happiness of the sandwich generation in the Gianyar Regency. An

overview of the results of the Moderated Analysis Regression (MRA) analysis is shown in Figure 2.

The results of the analysis in the table 1 showed that the relationship between cultural norms (X1) on happiness (Y), social support (X2) on happiness (Y), and family role (X3) on happiness (Y), which has a positive and significant effect by comparing t values -count that is greater than the t-table which is 1.96 and by comparing the P-Values which is smaller than alpha 0.05. Meanwhile, cultural norms (X1) are not a variable that moderates the effect of family roles (X3) and social support (X2) on happiness (Y), with P-Values of 0.265 and 0.433, which are more significant than 0.05.

The results of the analysis showed that cultural norms have a positive effect on the happiness of the sandwich generation. This condition is indicated by the t-statistic value of 3.882. This result means that the greater the cultural norms, the greater the happiness of the sandwich generation. The cultural norms variable consists of three indicators, namely *Parahyangan* (harmonious relationship between humans and God which is manifested by *yadnya* in everyday life), *Pawongan* (harmonious relationship between humans and humans manifested by *pitra*, receipt, or *manusa yadnya*), and *Palemanghan*, namely the relationship between harmony between humans and their natural environment which is manifested by *tumpek wariga*).

Figure 2. Moderated Analysis Regression (MRA) Results Diagram



Cultural norms positively affect the happiness of the sandwich generation in Gianyar Regency because they apply cultural norms in their lives, such as praying every day, namely the process of calming themselves, in which praying will make the sandwich generation feel calmer than others. Activities carried out by the sandwich generation in

their neighborhood related to cultural norms, such as cooperation or *ngayah* at every religious ceremony, will also make the respondents in this study feel calmer and happier. The activities carried out in the environment where they live, which allow the respondent to interact with the people around them, will cause the respondent to forget for a moment fatigue as a sandwich generation. This result aligns with Baihaqi (2022) that every religious activity is, of course, always guided by Tri Hita Karana's teachings so that harmony among members is well established in activities.

Some of the problems faced by respondents in applying cultural norms were that respondents felt they were unable to do some of the things ordered when applying cultural norms, such as when directed to make *kelabang* (strengths from coconut leaves) for religious ceremonies but the respondent could not, so the respondent that is the sandwich generation will feel uncomfortable and often get ridiculed from the surrounding environment. Several strategies were used by respondents when they encountered problems like this, namely, respondents choosing to carry out other activities that they felt capable of doing.

Research results by Wilai et al. (2020) show that living together without problems is a core category of family happiness, which involves close relationships, mutual care, and security. Families need to balance these components when dealing with stress. Health professionals must focus on caring and communication within families to increase family happiness. Sulastrri & Kusuma research (2022) shows that culture is closely related to happiness. Rahman & Wongkaren (2022) also show that cultural norms positively affect happiness. Previous research by Matsunaga et al. (2018) showed that cultural factors influence the importance assigned to subjective and contextual happiness dimensions. Different cultural backgrounds also influence Several aspects of happiness (Song et al., 2020). Previous research by Rajhans et al. (2016) and Liu et al. (2021) showed that cultural variation is the initial stage of the life cycle that a person feels in his life that affects happiness.

The results of the analysis showed that social support has a positive effect on the happiness of the sandwich generation. Social support in this study is information and feedback from other people, which shows that a person is loved and cared for, valued and respected, and is involved in a network of communication and reciprocal obligations. The social support variable consists of three indicators: family support (support from family such as relatives), friend support (support from peers), and support from other people around the place where they live in one hamlet. Social support positively affects sandwich generation happiness in Gianyar Regency because the support obtained by respondents in this study, namely sandwich generation, causes respondents to feel they have a place to express their feelings and thoughts. Relatives or friends of the respondent who are the interaction partner and exchange of thoughts from the respondent will generally calm the respondent when a problem occurs. Respondents with a place and support from relatives or friends around their residence will feel happier because this sandwich generation does not feel alone but has received support from those around them. Social support can make individuals feel calm, cared for, and loved and develop self-confidence and competence.

Some of the problems the sandwich generation faces in the surrounding environment, namely jealousy in the environment around where they live, make them uncomfortable. Respondents felt that if their family looked harmonious and could meet their needs, it would cause some people around them to show jealousy, which was shown by spreading rumors that were not true about their household. Some respondents were ignorant of their neighbor's jealousy, which caused the respondent to be more awake and happy.

Previous research conducted by Delle et al. (2016) and Cabanas & Gonzalez-Lamas (2022) states that happiness is achieved by a person when he achieves satisfaction with life. Their research combines subjective, psychological, and broader social, relational, or contextual dimensions to support happiness. Other socially related aspects of happiness have been identified by Doh & Chung (2020), the dimensions of social support which are considered to reflect "inner harmony" and "social harmony" which can create happiness. Regulating positive emotions and good social behavior is the key for someone to feel happy in their surroundings (Reyes-Garcia et al., 2021). Shapouri (2022) showed that social support positively affects happiness. To achieve this happiness, working women need social support from the people around them, including family, colleagues, husbands, and children. Social support positively affects happiness (Guo et al., 2018; Su et al., 2022).

There are several possible mechanisms linking social capital and happiness. Individuals with solid relationships with family, friends, neighbors, and the community have better physical health and can indirectly improve their subjective well-being. Rahman & Wongkaren (2022) state that social capital positively and significantly affects happiness. Good relationships with friends, family, and society make a person avoid loneliness so that they will feel happier. This result means that in Gianyar Regency, children, and their parents are only sometimes a burden for the head of the household or their partner.

The results of the analysis showed that the role of the family has a positive effect on the happiness of the sandwich generation. The role of the family has a positive effect on the happiness of the sandwich generation, which means that the more significant the role of the family, the greater the happiness of the sandwich generation. The support obtained by the respondents in this study, namely the sandwich generation, especially from their partner, greatly influenced their happiness. The sandwich generation, who gets support from their partners in caring for children and parents, will feel happier because they do not feel alone carrying out their obligations. Openness from partners also greatly affects the happiness of the sandwich generation. With openness, the respondents feel more valued, which will minimize conflicts in the household.

Some of the respondents in this study hoped to create happiness for their children and their parents, to repay their parents who had given birth and cared for them. Hence, the respondents, the sandwich generation, wanted to make their parents happy. However, in doing so, there were still some respondents who encountered a problem, namely, when the respondent was working, the parents felt tired because they were taking care of children from the sandwich generation, and it was not uncommon for their parents to complain because they were never given rewards, such as being invited to go on walks. Parents who feel tired will be more easily offended in the family, causing irritable feelings

that can trigger problems in the family, which will undoubtedly disrupt the happiness of the sandwich generation.

Subsequent studies have shown that decreasing mental health status due to various household problems affects happiness (Shevlin et al., 2021). Improvements in life satisfaction and happiness have been studied and influenced by family roles (Greyling et al., 2021) and (Gutierrez-Cobo et al., 2022). A study by Henseke et al. (2022) states that the size of the role of the family influences happiness. Previous research has also stated that individuals valued more by those around them will feel happier (Bimonte et al., 2022; Paz et al., 2022). Parents who live with the sandwich generation can help the sandwich generation carry out their duties and responsibilities at home, such as taking care of their children. Zhahira & Utami (2017) showed that the role of the family has a positive and significant effect on happiness. Indraswari (2019) also showed that the role of the family has a positive and significant effect on happiness.

Cultural norms cannot moderate the influence of family roles on the happiness of the sandwich generation. This result means that the size of the cultural norms does not affect the family's role in the sandwich generation's happiness. Sandwich generation happiness is a state or feeling of being calm and happy. The happiness variable in this study is measured by three indicators: sleep, nutrition, meeting health needs and exercise, time out, pampering leisure, and reward. The study results indicate that some respondents feel happy because they have received support from their surroundings and families and because of applying cultural norms in their lives. Cultural norms are said to be unable to moderate the effect of family roles on sandwich generation happiness in Gianyar Regency because respondents feel cultural norms are not a determinant in supporting their partners.

The dominant application of cultural norms in the household is carried out by the parents of the sandwich generation (mothers) because the respondents and their spouses are more busy working in their daily lives, so when there are mutual cooperation activities such as mebraya or ngayah it is more often done by their parents. In addition, cultural norms do not moderate the effect of family roles on the happiness of the sandwich generation because cultural norms such as ngayah or mutual cooperation can be represented by other people who are then given monetary rewards. This condition shows that cultural norms are not a variable that strengthens or weakens the support of the respondent's spouse, namely the sandwich generation.

Research by Sudarji et al. (2022) states that the Sandwich Generation in this study interprets multigenerational parenting because it is an obligation to care for parents or in-laws and their children. This obligation is often stressful and can lead to intergenerational conflicts. On the other hand, living with or close to parents or in-laws is also beneficial because parents or in-laws can help watch over their children or help with other household chores. Research by Daniels (2019) showed that culture is the root of tradition influencing happiness. The dimensions of happiness appear to be uniform across cultures so that cultures can shape ways of pursuing happiness. PFuchsman (2016) states that cultural changes influence happiness.

Cultural norms cannot moderate the effect of social support on the happiness of the sandwich generation. This condition means that the size of cultural norms does not affect social support on the happiness of the sandwich generation. The analysis results in this study also showed that cultural norms cannot moderate the effect of social support on the happiness of the sandwich generation in Gianyar Regency. The study results indicated that some respondents feel happy because they have received support from their surroundings and families and because of applying cultural norms in their lives.

Cultural norms are said to be unable to moderate the effect of social support on the happiness of the sandwich generation in Gianyar Regency because respondents feel that cultural norms do not guarantee a good relationship with the surrounding environment. Even though when carrying out joint activities such as *ngayah* and mutual cooperation, respondents can communicate with their surroundings, this does not guarantee that they can reduce the burden experienced by the sandwich generation because they feel that some people around them are jealous of their family. In addition, cultural norms related to social support are related to hiring someone to represent themselves in Banjar activities, where the respondent must pay the amount of wages for the services of the person who represents him. This condition is why social norms cannot moderate the effect of social support on the happiness of the sandwich generation. The primary source of stress for the Sandwich Generation is when all the demands come together. The stress that arises has more impact on the participants' emotional aspects, such as feelings of sadness, guilt, and unstable emotions. The sandwich generation needs social support to carry out its dual roles well and to help deal with pressure (Dewi & Wiksuana, 2022).

## CONCLUSION

The study's results show that cultural norms, social support, and family roles positively affect the sandwich generation's happiness in Gianyar Regency. Cultural norms cannot moderate the effect of family roles and social support on the happiness of the sandwich generation in the Gianyar Regency. This condition shows the importance of cultural norms, social support, and the role of the family in supporting the sandwich generation in carrying out their role as caregivers and breadwinners and remaining active in activities around their homes.

There are two main policy recommendations from this research to break the chain of sandwich generation in Gianyar Regency. First, socializing the importance of financial literacy so that a person does not depend on his child for life in the future. Second, forming a parent empowerment group to reduce the burden of the sandwich generation.

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## Impacts of Covid-19 Pandemics and Wealth on Household Consumption in Java Island

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### Abstract

*Household consumption, which has changed due to the COVID-19 pandemic, can survive by using their wealth to restore consumption levels. The current research analyzes the impact of the COVID-19 pandemic and the role of wealth in household consumption in Java, which has the largest share of the economy. Using panel data from 119 regencies/cities in Java Island during the 2017-2021 period due to data availability shows that there have been changes in household consumption patterns during the pandemic. The results of the panel data analysis show that the COVID-19 pandemic has a negative effect on household consumption. In contrast, wealth positively affects household consumption in almost all provinces on the island of Java. These results suggest increasing asset ownership for households to maximize wealth, positively affecting household consumption, mainly when shocks occur.*

### Keywords:

household consumption; impact of covid-19; panel data regression; wealth

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## INTRODUCTION

Changes in household consumption patterns can impact changes in the economy. Economic, social, demographic, and other factors can influence changes in consumption. According to the theory of life cycle and permanent income, household consumption's main factor is household income (Modigliani & Brumberg, 1954; Friedman, 1957; Ando & Modigliani, 1963). Hall (1987) states that wealth has a strong influence on consumption. Meanwhile, Pigou (1941) explains that there is a positive relationship between wealth and consumption. Oliver (1990) suggests that a more comprehensive view of economic well-being can be obtained by incorporating the characteristics of wealth. It shows that household wealth has a vital role in household consumption.

Various studies on the impact of the covid-19 pandemic have been carried out in the last two years during the pandemic (Baker et al., 2020; Christelis et al., 2020; Wu, 2020; Trianto, 2021; Xiong et al., 2021; Davis, 2021; Roll et al., 2022). The results of those studies revealed that the COVID-19 pandemic caused changes in household consumption patterns and had a negative impact on consumption. The effect of the COVID-19 pandemic has also caused a recession in Indonesia. Negative growth of -2,96% in household consumption, as the largest source of GDP, caused the economy to grow -5,35% in the second quarter of 2020. Meanwhile, the contribution of the provincial group on Java Island, about 58.75% of GDP, experienced a negative growth of -2.51%.

The rapidly changing condition due to the COVID-19 pandemic has forced households to adjust their consumption. Friedman (1957) states that wealth is a reserve for the household when unforeseen circumstances occur. According to the Global Wealth Report (CSRI 2020), the total Indonesian wealth has experienced a total increase of USD 319 billion in 2021. In addition, based on the World Inequality Report, the wealthiest 10% of Indonesians will have a total wealth equal to 60% of total household wealth in 2021. This result shows that total household wealth increased, accompanied by an increased wealth gap during the pandemic.

Empirically, Alp and Seven (2019) stated that household wealth, which was approached through a combined construction and stock price index, positively affected household consumption. Hanspal et al. (2020) stated that changes in income and wealth significantly affected US households when the COVID-19 pandemic occurred. The role of wealth in household consumption during a pandemic as a reserve and having positive effects still needs to be proven.

Various studies show that the role of household wealth on consumption is positive (Shen et al., 2015; Paiella & Pistaferri, 2017; Alp and Seven, 2019; Andreu, 2021). Household wealth is the accumulation of results owned by the household. Approaches to measuring household wealth in previous studies varied from stock prices to housing and equity markets. In contrast to previous studies, this study uses a district/city-level household wealth index derived from SUSENAS with the Principal Component Analysis (PCA). It determines the impact of household wealth on household consumption at the district/city level due to different policies and effects due to the COVID-19 pandemic.

The total household consumption in Java Island is the largest source of the

consumption component of the National GDP (BPS 2021). The wider the impact of COVID-19 from 2020 to 2021, the more the regencies/cities experience negative growth in household consumption. Differences in the status of mobility restrictions in each district/city on Java Island, which has the highest number of COVID-19 cases, affect households in maintaining their consumption levels.

Many studies have shown the impact of the COVID-19 pandemic and wealth on household consumption. This study aims to fill in some gaps left by previous research by exploring the effect of the COVID-19 pandemic on household consumption while considering the factor of household wealth, which is the source of restoring consumption level. The strength and novelty of this study lie in its use of a more extensive data set and building variable household wealth index using the Principal Component Analysis (PCA).

Given the limited literature on the topic and the background and formulation of the problem, this study aims to examine the determinants of household consumption by considering the factors of the COVID-19 pandemic and household wealth in Java Island. Based on the description above, this study aims to provide an overview of changes in household consumption patterns in Java before and during the COVID-19 pandemic and to analyze their determinants.

The result of this study is expected to provide helpful information for governments, specifically of Java Island, as they consider policies related to handling the COVID-19 pandemic and boosting household wealth that can increase household consumption. This research is also expected to be a valuable reference for future studies, particularly those focused on the relationship between the impacts of the COVID-19 pandemic, household wealth, and household consumption.

## METHODS

The data used in this study are from the National Social and Economic Survey (SUSENAS) and the GRDP data according to expenditure from the Central Bureau of Statistics. Due to data availability, it used panel data from data from 119 regencies/cities in Java Island during the 2017-2021 period. The data was used from 6 provinces on Java Island with 119 districts/cities analysis units. The data used in the study is shown in the Table 1.

Table 1. Variables, Descriptions, and Data Sources in Research

| Variables                               | Description and Source                                                                                       |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Household Consumption Expenditures (C)  | Data on average per capita household consumption expenditure per month (BPS)                                 |
| Household Income (Y)                    | Gross Regional Domestic Product per capita can reflect the population's average income. (BPS)                |
| Household Wealth (W)                    | Household wealth index approach formed from SUSENAS data using the Principal Component Analysis (PCA). (BPS) |
| Government Consumption Expenditures (G) | Data from the government spending component of GRDP by use.(BPS)                                             |
| Total Population (Pop)                  | Total population in souls for each district/city. (BPS)                                                      |
| Pandemic                                | Dummy variable of the covid-19 pandemic                                                                      |

The analytical method used in this study is a descriptive statistical method to explain household consumption patterns and the condition of household wealth in Java Island before and during the Covid-19 pandemic. Meanwhile, the panel data regression analysis evaluates the impact of wealth and determinants of household consumption in Java before and during the Covid-19 pandemic. The descriptive statistical method used to explain household consumption patterns tests the difference in the averages of two populations to determine differences in patterns before and during the pandemic.

#### Test of the Average Difference of Two Independent Samples

Testing two independent samples is one of the parametric tests used to analyze differences between two independent samples with normally distributed data. The null hypothesis in this test is that the mean of each group is the same or not different. The statistical test used is as follows (Liao, 2011):

Assuming the variants are the same:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Assuming the variants are not the same:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_p \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Description:

$\bar{x}_1$ : sample mean 1;  $\bar{x}_2$ : sample mean 2;  $s_1^2$ : sample standard deviation of 1;  $s_2^2$ : sample standard deviation of 2;  $s_p$ : combined standard deviation;  $n_1$ : number of samples 1;  $n_2$ : number of samples 2.

#### Mann-Whitney test

This test has a non-parametric used to analyze the difference between two independent samples with non-normally distributed data. The results of the two samples are arranged, sorted, and given serial numbers.

Meanwhile, the panel data analysis method was used to analyze the impact of wealth and household consumption determinants in Java before and during the Covid-19 pandemic. The statistical descriptive method used to explain household consumption patterns tested the difference in the averages of two populations to determine differences in patterns before and during the pandemic. The model specifications in this study refers to researches by Alp and Seven (2019) and Wu (2020), modified to be:

$$LnC_{it} = \alpha_0 + \beta_1 LnY_{it} + \beta_2 W_{it} + \beta_3 LnG_{it} + \beta_4 D_{it} + \beta_5 LnPop_{it} + \varepsilon_{it}$$

Where:

LnC: Average household consumption expenditure per capita; LnY: GRDP per capita; W: Household wealth index; LnG: Government spending; D: dummy economic crisis

during the covid-19 pandemic (before 2020=1, from 2020=0); LnPop: Total population;  $\varepsilon$ : term error; i: District/City ; t: Period. This model is estimated using the panel data econometrics.

## RESULTS AND DISCUSSION

The COVID-19 pandemic has caused changes in household consumption patterns with negative effects on household consumption. Meanwhile, wealth has a positive impact on household consumption in Java. Household consumption includes food and non-food consumption and can be grouped by sub-group according to SUSENAS. During the last five years, when the pandemic started in 2020, there was a change in people's consumption on the island of Java. Table 2 shows the difference in the percentage of household consumption by commodity groups, including food and non-food, before and during the pandemic, which has been tested statistically with an average difference test with a significance level of 5%.

Based on the Shapiro-Wilk normality test, the data used is usually normally distributed. The data for the commodity groups of processed food and beverages, clothing, durable goods, taxes, and party supplies were usually distributed. Meanwhile, the data for the commodity group of foodstuffs, cigarettes, housing, and goods and services had yet to be distributed. The test for a normally distributed data group is the Independent Sample Test, and the non-normally distributed data group is the Mann-Whitney Test. The results of the tests are shown in Table 2. Table 2 shows the change in the percentage of commodity groups for household consumption of food and non-food before and during the pandemic.

**Table 2. Results of Testing the Percentage of Household Consumption Expenditure by Commodity Groups Before and During the Pandemic on Java Island**

| Commodity                   | Average of Household Consumption (%age) |                 | Testing                 | p-value  |
|-----------------------------|-----------------------------------------|-----------------|-------------------------|----------|
|                             | Before Pandemic                         | During Pandemic |                         |          |
| Food Material               | 14.9                                    | 16.33           | Mann-Whitney test       | 0.692    |
| Processed Food and Beverage | 18.07                                   | 17.42           | Independent Sample test | 0.046**  |
| Cigarette                   | 15.22                                   | 15.9            | Mann-Whitney test       | 0.851    |
| Housing                     | 14.50                                   | 17              | Mann-Whitney test       | 0.465    |
| Goods and Service           | 15.89                                   | 14.92           | Mann-Whitney test       | 0.787    |
| Clothes                     | 2.79                                    | 2.51            | Independent Sample test | 0.007*** |
| Durable Goods               | 5.7                                     | 5.1             | Independent Sample test | 0.460    |
| Taxes                       | 3.1                                     | 3.8             | Independent Sample test | 0.000*** |
| Party requirement           | 1.9                                     | 1.5             | Independent Sample test | 0.035**  |

Source: Author Computation, 2023

Note: \*\*\* is significant at the 1% level, \*\* at the 5% level, and \* at the 10% level

The commodity group that experienced a significant increase was the tax commodity group. In contrast, the commodity groups that experienced decreases were the food and beverage, clothing, and party necessities. The average consumption allocations for the prepared food and beverage, clothing, and party commodity groups decreased around 0.64%, 0.28%, and 0.38%, respectively. The results of changes in this commodity group align with Hean and Chairassamee (2021), explaining that total consumption dropped dramatically. These spending patterns are consistent with those found in developed countries, where households increase their spending on at-home activities but reduce out-of-home expenditures. These results are in line with Xiong (2021), which shows that the clothing consumption group has decreased during the pandemic (2020 and 2021) in Zhejiang, China, and Trianto (2021), which states that prepared food consumption has decreased in 2020 in 30 provinces in Indonesia. Meanwhile, based on the results of a survey on public behavior during a pandemic conducted by BPS, around 40% of stalls/restaurants selling prepared food and drinks and about 20.4% of shopping centers were temporarily closed during the implementation of the PPKM in June 2021 (BPS 2021). These results indicate that there are restrictions on mobility due to the COVID-19 pandemic, forcing people to adjust their consumption needs.

The food commodity group experienced an increase in several provinces in Java, although this change was not statistically significant. The average consumption allocation for the food commodity group experienced an increase of 0.38% during the pandemic, around 23.92%. These results indicate that people prefer to meet their food needs by processing their food. Trianto (2021) shows that the average percentage of spending on groceries after the COVID-19 pandemic has increased compared to before the pandemic. This result is also in line with the research by Grunert et al. (2021,) proving that the consumption of food ingredients such as fruit and vegetables increased during the pandemic in 2020 in 10 European countries.

**Table 3. Estimates of Household Consumption Determinants**

| Variables              | Coefficient |
|------------------------|-------------|
| C                      | -2.1366     |
| LnY                    | 0.6049***   |
| LnG                    | 0.0853*     |
| W                      | 0.1501***   |
| D                      | -0.6058***  |
| LnPop                  | 0.5738***   |
| R-Squared              | 0.9793      |
| Adjusted R-Squared     | 0.9739      |
| F-statistic            | 181.4641    |
| Prob                   | 0.0000      |
| Chow Test Statistic    | 28.7465     |
| (p-value)              | 0.0000      |
| Hausman Test Statistic | 112.4985    |
| (p-value)              | 0.0000      |

Source: Author Computation (2023)

Note: \*\*\* is significant at the 1 % level, \*\* at the 5 % level, and \* at the 10 % level

The tax commodity group experienced a significant increase. The average allocation for tax payments paid by households has increased to 3.83% during the pandemic, or an increase of 0.72% compared to before the pandemic (3.12%). This tax commodity group is a tax paid by households, including land and building taxes, vehicle taxes, levies, and insurance. The increase in this tax commodity group could be due to several regulations regarding tax rates, such as land and building taxes, which experienced an increase. One example is the regulation regarding the rise in land and building tax rates regarding the increase in rates in 2021 in the DI Yogyakarta Province based on the Regional Regulation of the City of Yogyakarta Number 10 of 2020.

This study uses a panel data analysis method to answer the second objective, the impact of household wealth and other determinants on household consumption. The testing begins with choosing the best model between the standard effect model (CEM) and the fixed effect model (FEM) using the Chow test. The test results suggest selecting the fixed effect model (FEM). It is followed by choosing the best model between the fixed effect model (FEM) and the random effect model (REM) using the Hausman test. The test results indicate that the fixed effect model (FEM) is the best. The estimation results of the model, together with the Chow and Hausman tests, are in Table 3.

After several tests, the selected panel data regression equation is the fixed effects model with cross-section weight and generalized least squares to overcome the violated classical regression assumptions. From the results of processing using Eviews 12, the statistical values are presented in Table 3. The total household consumption model has a significant statistical F value at the 1% level, meaning that the model is feasible to use because it can explain the diversity of independent variables. Based on Table 3, the Adjusted R squared value of 0.973937 indicates that 97.39% of the variability in household consumption can be explained by the variability in the independent variables with a confidence level above 95%.

The variables affecting total consumption are household income, household wealth index, government expenditure, the dummy variable of the COVID-19 pandemic, and population. The negative direction of the dummy variable of the economic crisis due to covid-19 in the total household consumption model and the household food consumption model followed those of other studies that have analyzed the effect of the pandemic on household consumption (Wu, 2020; Baker et al., 2020; Chirtelis et al., 2020).

The random walk theory states that consumption follows a random walk or depends on unpredictable circumstances. Unpredictable circumstances such as the COVID-19 pandemic cause uncertainty and make households adjust their consumption levels. The dummy variable of the COVID-19 pandemic has a negative and significant effect on household consumption on the island of Java. These results align with Wu (2020), which shows a negative effect of the pandemic uncertainty index (PUI) on household consumption in 138 countries. The same results from this study are also in line with Baker et al. (2020) and Chirtelis et al. (2020), which state that household consumption has decreased due to the COVID-19 pandemic. Even though the approach used to measure

the impact of the COVID-19 pandemic in this study is different, the results obtained are the same as in other studies related to the impact of the COVID-19 pandemic.

The pandemic dummy variable with a negative and significant effect occurs in almost all provinces on Java Island (Table 4). It shows that the economic crisis when the covid-19 pandemic occurred decreased public consumption, including consumption throughout the island of Java. According to BPS data, as much as 30% to 50% of regions/cities in each province will experience a decline in household consumption growth during 2020-2021. Most COVID-19 cases are on the island of Java, which causes stricter restrictions on mobility compared to other regions. Uncertain circumstances and large-scale restrictions make it difficult for households to buy necessities. This significant decline destabilized the Indonesian economy because a large consumption share of economic growth came from the island of Java.

**Table 4. Estimating Determinants of Household Consumption by Province**

| Province     | Coefficient |           |           |            |           |
|--------------|-------------|-----------|-----------|------------|-----------|
|              | LnY         | W         | LnG       | D          | LnPop     |
| Jakarta      | 0.20412     | 0.1379    | -0.0373   | -0.0817*   | 0.1671**  |
| West Java    | 0.1561      | 0.1848*** | 1.2453*** | -0.0385*** | 0.0573    |
| Central Java | 0.4973***   | 0.1699**  | 0.5254**  | -0.0833**  | 0.4790    |
| Yogyakarta   | 0.1934      | 0.2190*   | 1.5219**  | -0.0308*** | 0.3303*** |
| East Java    | 0.5308**    | 0.0938**  | 0.0679    | -0.0509*** | 0.6539**  |
| Banten       | 0.3493***   | 0.4307*** | 0.1463*   | -0.1179*** | 0.3013**  |

Source: Author Computation, 2023

Note: \*\*\* is significant at the 1 % level, \*\* at the 5 % level, and \* at the 10 % level

The amount of household consumption expenditure depends on the household's income level. The household income variable using the per capita GRDP approach positively and significantly influences household consumption. If household income increases by 1%, household consumption will increase by 0.6%. These results show that income can increase household consumption according to consumption theory. This result aligns with Varlamova and Larionova (2015), Iheonu and Nwachukwu (2020), and Alp and Seven (2019). It can be seen in Table 4 that the per capita GRDP variable has a positive and significant effect on Central Java Province, East Java Province, and Banten Province. The most significant influence is the Province of East Java. When household income increases by 1 %, total consumption in East Java Province increases by 0.53 %. Alp and Seven (2019) stated that changes in consumption are more sensitive to changes in income because, in the long term, the most influential dominant factor is income (the per capita GRDP).

Abosedra et al. (2021) stated that changes in consumption are more responsive to changes in declining income. As the results of those studies show, the number of regions/cities that experienced a decline in household consumption growth in line with the decline in per capita GRDP growth reached more than half of the regions/cities in

Java Island. It shows that the amount of income or the more prosperous the household influences, increasing the household's consumption.

In contrast to the current and future income received by a household, the wealth owned by a household is an accumulation of income and savings owned by the household. More accumulation in a certain period can affect household consumption at a certain point. In the long run, the life cycle theory explains that consumption will depend on wealth when income suddenly drops. The results of the household wealth index obtained in this study show a positive role of household wealth on household consumption. An increase of 1% in household wealth will increase household consumption by 0.15%. The positive impact of household wealth is in line with Alp and Seven (2019), Hanspal et al. (2020), and Andreu (2021). In each province, household wealth has a positive and significant influence, except for DKI Jakarta, on total household consumption. The most significant influence of the household wealth index on household consumption is in Banten Province.

Household wealth includes financial assets, non-financial assets, and durable goods. The limitations of this study's approach to measuring household wealth are using a household wealth index constructed from household characteristics and durable goods ownership due to limited data availability. The results of this study indicate that households with a higher wealth index also have high consumption levels in the 2017-2021 period. The existence of a pandemic quickly reduced income, but wealth, which was the accumulation of assets owned by households, did not decline quickly. This result aligns with May et al. (2020), which stated that increased household wealth supported household consumption when disposable income growth was weak between 2013 and 2017 in Australia.

Government spending has a positive relationship with household consumption. The positive influence of government spending is in the research of Varlamova and Larionova (2015). If government spending increases by 1%, total household consumption will increase by 0,085%. The positive and significant influence of government spending on total consumption occurs in West Java Province, Central Java Province, and D.I. Province. These results differ from Wu (2020), which states that government spending negatively and significantly affects household consumption during a pandemic. The positive impact of government spending can show that government programs are on target. Chirtelis (2021) shows that targeted government intervention can reduce the financial problems of low-income households and households with unstable jobs. Government interventions such as social assistance, assistance for MSME business actors, and health insurance assistance intended for the community can help people deal with uncertainties during a pandemic, such as decreased income and health problems. The assistance received helps households maintain their consumption levels. Government spending effects such as fiscal policy can reduce the duration and intensity of shocks caused by the pandemic and stimulate economic activity to survive the pandemic (Faria-e-Castro, 2021). Thus, the intervention will support household consumption and contribute to economic recovery.

Another factor that affects household consumption is population. According to the Malthus model, the higher the population, the higher the consumption needs. The total population positively and significantly influences household consumption. An increase of 1% of the population consumption will increase the total household consumption by 0.75%. Varlamova and Larionova (2015) mention that the population positively influences household consumption. This result is supported by the modeling results in each province, which also show that population size positively influences the household consumption model except in Central Java Province.

## CONCLUSION

The results of the descriptive analysis indicate that changes in household consumption patterns have significant changes in consumption patterns for food and beverage commodities, clothing, taxes, and party needs. The estimation results of panel data regression analysis on the total household consumption model show that the variables of household income, household wealth, population, and government spending have a positive and significant effect on household consumption. The dummy variable of the economic crisis in the COVID-19 pandemic has a negative effect on household consumption. Panel data regression analysis by province is in line with and supports the results of the household consumption model in Java.

The government should pay more for household consumption of non-food goods and services, such as durable goods and valuables because these commodities will become household assets. Providing incentives for business actors, increasing employment opportunities, and job training for people of productive age can be one of the efforts to increase household income. Household wealth has a positive impact on household consumption. Efforts to improve household welfare can be carried out by allowing households to increase their asset ownership. For example, adding assets such as gold by buying mini gold and the livable housing program for the underprivileged is easy. In future research, the dynamic panel analysis method can explore the short-term and long-term effects of determinants of household consumption and use a pandemic variable approach using the ratio of the number of cases to the population.

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## Untapped Potential of Manufacturing MSEs in Bali Amidst the Covid-19 Pandemic

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### Abstract

*The macro health impact of the COVID-19 pandemic that resulted in an economic slump in Bali exposed the need for economic development outside the tourism sector. Manufacturing Micro and Small Enterprises (MSEs) is one sector that contributes significantly to the economy, export value, and employment, particularly during moments when the tourism sector is down. This study aims to determine the performance of manufacturing MSEs during 2018-2021 using Cobb-Douglas stochastic frontier production function analysis. The Technical Inefficiency (TE) value of manufacturing MSEs in Bali was 22.24% over 2018-2021. The impact of COVID-19 on each ISIC and business location has a varied impact on the production value of MSEs Manufacturing. The gender of the business owner, financial service, age of workers, and source of raw materials are inefficiency variables that significantly affect production value. However, the training received by manufacturing MSEs had no significant effect. The findings from this study can be used as a basis for government policy in further developing the untapped potential of manufacturing MSEs in Bali regarding impacts upon Bali's tourism sector during the pandemic.*

### Keywords:

stochastic frontier; enterprises; efficiency; macro health shock; gender; cobb-douglas

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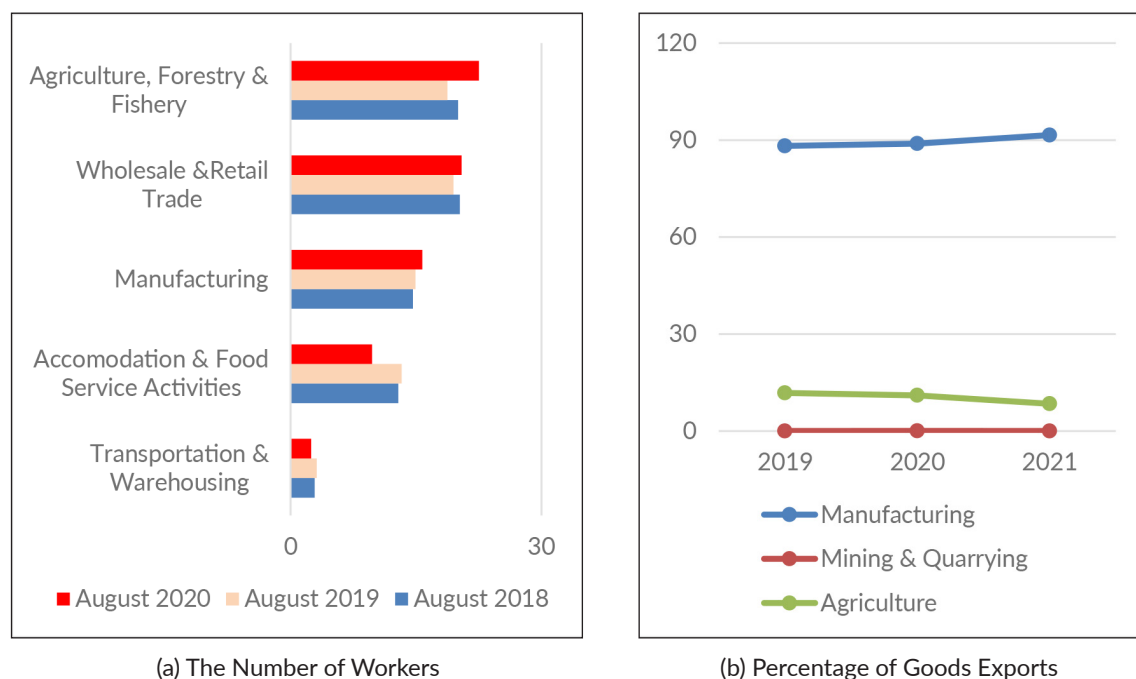
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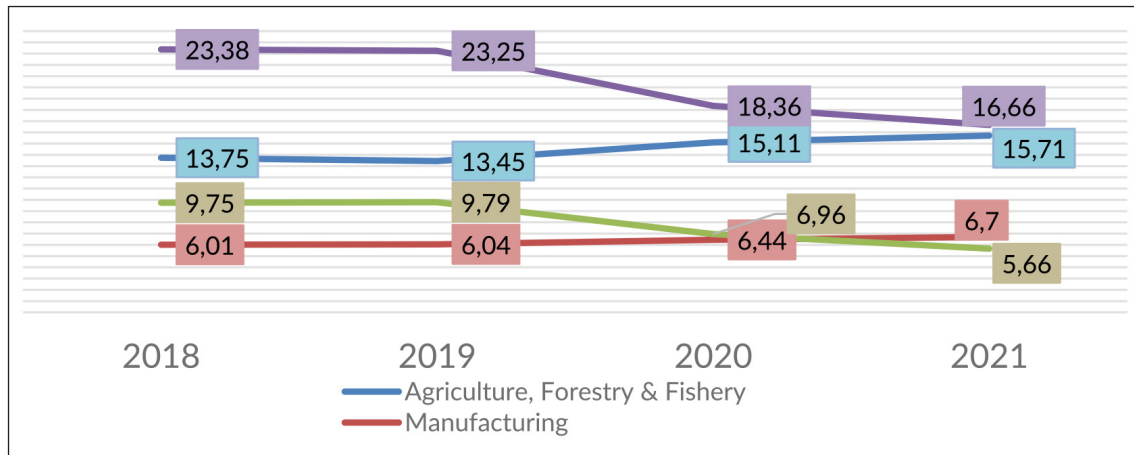
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## INTRODUCTION

The macro health shock due to COVID-19 was felt across all sectors globally. However, with restrictions on people's movements, the impact was especially felt by those predominately tourism-dependent economies. This condition was particularly true in the context of Bali. The pandemic exposed the fragilities of the economy in the province and the need to identify other potential sectors for growth. The increasing trend of manufacturing's contribution to the Bali economy over 2018-2021 indicates that Bali's manufacturing has the potential to be developed (BPS Province of Bali, 2022). The manufacturing sector in Bali has much potential, and this can be seen from the absorption of the number of manufacturing workers who occupy the third largest position after the agricultural and wholesale sector in August 2020 (BPS Province of Bali, 2020). Bali's manufacturing potential is also evidenced by data on manufacturing exports, wherein manufacturing accounts for the most significant percentage of the total (BPS Province of Bali, 2022). Based on the 2016 Economic Census results, the number of manufacturing businesses in Bali was 116,000, with 87.89% manufacturing Micro and Small Enterprises (MSEs) (see Figure 1). The contribution of the manufacturing sector to the Balinese economy can be seen from the consistent increase in the manufacturing industry's contribution during 2019-2021 to the Bali economy when other sectors experienced fluctuations. However, the fact that the percentage contribution of manufacturing is still below other sectors indicates that the potential of manufacturing MSEs needs to be studied in order to review their performance and the potential growth of manufacturing MSEs in Bali in the future.

**Figure 1. The Number of Workers, Percentage of Goods Exports, Distribution of Gross Regional Domestic Product of Bali at Current Market Prices, by Industry (Percent), 2017-2021**





(c) Distribution of Gross Regional Domestic Product of Bali at Current Market Prices

Source : (a) (BPS Provinsi Bali, 2020) (b) (BPS Province Bali, 2022b) (c) (BPS Province Bali, 2022a)

This study uses data from the Annual Micro and Small Industry Survey (*IMK Tahunan*) conducted by the Central Agency on Statistics (BPS). BPS uses the International Standard Industrial Classification (ISIC) to classify manufacturing business fields in the Annual IMK survey. Some previous studies that examined manufacturing performance used technical efficiency for evaluation and policy-making material (Al-Durgham & Adeinat, 2020). Estimations of the efficiency of companies in Jordan with a stochastic frontier showed an average technical efficiency value of 74% from 2009-2017. Other research related to manufacturing conducted in Malaysia (Fahmy-Abdullah et al., 2021) found that the technical efficiency value was 81% in 2015 and showed that technical inefficiency factors such as the level of education and training could reduce the weight of company inefficiency. In Indonesia, a study conducted by (Astanto et al., 2022) on manufacturing companies using data from 2010-2014 indicated a technical efficiency value of 88.15%. The stochastic frontier production function has been widely used in various fields of processing manufacturing (Akite et al., 2022; Lu et al., 2022), agriculture (Akite et al., 2022), health (Sickles et al., 2022), taxation (Fisseha, 2022; Mohanty et al., 2022)

This study complements research conducted by (Purwa, 2022), who evaluated manufacturing micro and small enterprises (MSEs) in Bali based on two-digit ISIC business types by showing that the results of the pandemic had an impact on the total income of Manufacturing MSEs in Bali using a stochastic frontier production Cobb-Douglas function. (Purwa, 2022) examines how the gender and age of entrepreneurs, capital ownership, Micro Credit Program (KUR), and internet usage all affect the production value of manufacturing MSEs in 2019-2020 using *IMK Tahunan* data. Conversely, this study will examine other variables that have not been studied by looking at the business location (*Sarbagita* and non-*Sarbagita*) of manufacturing MSEs, the impact of cooperative and bank loans, managerial, production, and marketing training, and the source of raw materials used on the production value of manufacturing MSEs.

In addition, this study examines the relationship between the value of TE and the production value of manufacturing MSEs in Bali using data from 2018-2021. This

study aims to describe the condition of manufacturing MSEs based on business location (*Sarbagita* and non-*Sarbagita*) and ISIC during the COVID-19 pandemic. Besides that, this research also examines what variables affect the production value of Manufacturing MSEs in Bali. Finally, this research measures the technical efficiency (TE) value of manufacturing MSEs in 2018-2021 in Bali.

## METHODS

This study used 8,589 samples of MSEs businesses from the results of the *IMK Tahunan* survey consisting of 4,336 samples of MSEs Bali businesses in 2018-2019 and 4,253 samples of MSEs Bali businesses over 2020-2021. 2018-2019 represent the years before the Covid-19 pandemic, and 2020-2021 represent the conditions during the Covid-19 pandemic.

This study employed fixed capital, Number of employees, business location (*Sarbagita* and non-*Sarbagita*), business categorization according to International Standard Industrial categorization (ISIC), and macro health shocks as independent variables, using *IMK Tahunan* Survey of Bali data. The technical inefficiency used in this study was variables of age, gender, education of the entrepreneurs, place of business, year of operation, cooperative membership, Micro Credit Program (KUR), partnerships, cooperative services, Bank services, Foundation services, managerial training, production training, marketing training, age and education of the majority of workers, the composition of capital, and sources of raw materials. This study examined the effect of Covid-19 on production value data MSEs from 2018 to 2021, a complete explanation is in Appendix 1.

Cobb-Douglas Stochastic Frontier Analysis (SFA) was used to study TE of the MSEs business from 2018 to 2021. The Cobb-Douglas SFA used data by transferring it to a linear form utilizing a logarithm (Nicholson & Synder, 2008). Cobb Douglas SFA in this study was used to describe the relationship of the independent variable (X), namely fixed capital, Number of workers, business location (*Sarbagita* and non-*Sarbagita*), International Standard Industrial Classification (ISIC), macro health shocks, and Technical Inefficiency on the dependent variable (Y), namely the production value of the MSEs business. This research uses the Maximum Likelihood Estimation (MLE) as follows:

$$\ln Y_i = \beta_0 + \ln \beta_1 X_1 + \ln \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + (V_i - U_i)$$

where

$$U_i = \delta_0 + \delta_1 Z_1 + \delta_2 Z_2 + \delta_3 Z_3 + \dots + \delta_{19} Z_{19} + w_i$$

Where:

- $Y_i$  = Business production value of MSEs
- $X_1$  = Fixed capital of MSEs business
- $X_2$  = Number of business workers in the MSEs
- $X_3$  = Business location MSEs (*Sarbagita* and non-*Sarbagita*)
- $X_4$  = Two digits ISIC
- $X_5$  = Health macro shock

- $V_i$  = A random variable that cannot be controlled  
 $U_i$  = Non-negative random variable or called technical inefficiency  
 $Z_i$  = Technical Inefficiency

Technical efficiency (TE) of the company using the following formula:

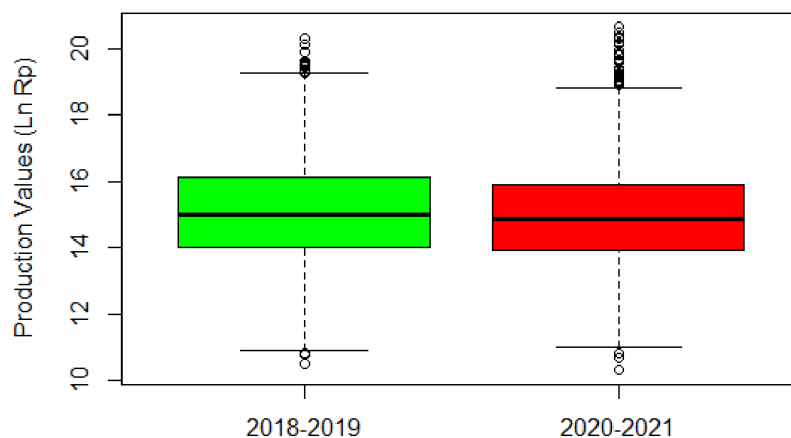
$$TE_i = \frac{y_i}{\exp(x_i\beta + v_i)} = \frac{\exp(x_i\beta + v_i - u_i)}{\exp(x_i\beta + v_i)} = \exp(-u_i)$$

Efficiency results from a company's effectiveness, is evaluated regularly to determine its performance. Efficiency is one of the parameters used to measure the performance of a person or business unit by measuring factors of production and how the performance of an industrial industry is achieved. In this case, the more efficient a business is, the better the business performance so far in using existing resources. This study used R statistical software.

## RESULTS AND DISCUSSION

Figure 2 shows the production value of manufacturing MSEs before and during the macro health shock. Based on the decrease in the value of the first quartile, median, and third quartile of MSEs business conditions, this figure also shows a decrease in the production value generated by manufacturing MSEs businesses. This data shows that the COVID-19 pandemic impacts the decline in the production value of manufacturing MSEs in Bali. This condition is the case for both *Sarbagita* and non-*Sarbagita*, even though the production value of the MSEs business in the *Sarbagita* area is higher than that of non-*Sarbagita*. Nevertheless, these two business locations experience a decrease in production value when macro-health shocks occur, as shown in Figure 3.

Figure 2. Production Value of MSEs Enterprises Based on Macro Health Shock Conditions

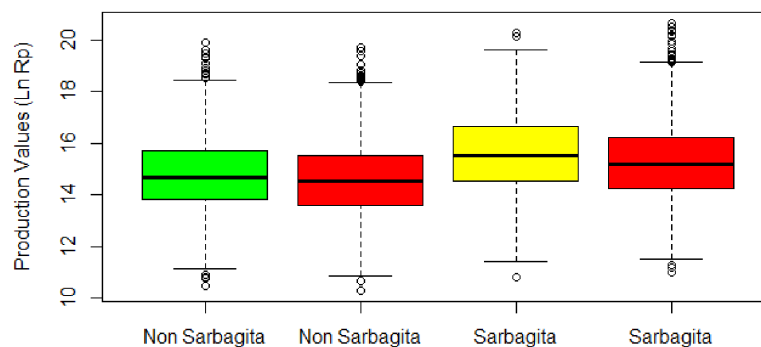


Source: Yearly Data MSEs 2019-2021 Processed

Meanwhile, when viewed from the types of ISIC in Figure 4, the impact of macro health shocks on the production value of MSE businesses is different for each kind of ISIC. ISIC with codes 3, 4, 5, 6, 7, 9, 20, and 21 are ISIC 13 (Textiles),

ISIC 14 (Apparel), ISIC 15 (Leather), ISIC 16 (Wood), ISIC 17 (Paper Goods), ISIC 20 (Chemicals and Goods from Chemicals), ISIC 32 (Other Processing Industries) experienced a decrease in production value due to macro health shocks. In contrast, some ISIC experienced increased production value during macro health shocks, such as ISIC 10 (Food), ISIC 11 (Beverage), ISIC 12 (Tobacco processing), ISIC 26 (Computers, Electronic, and Optical products), ISIC 27 (Electrical Equipment), and ISIC 31 (Furniture).

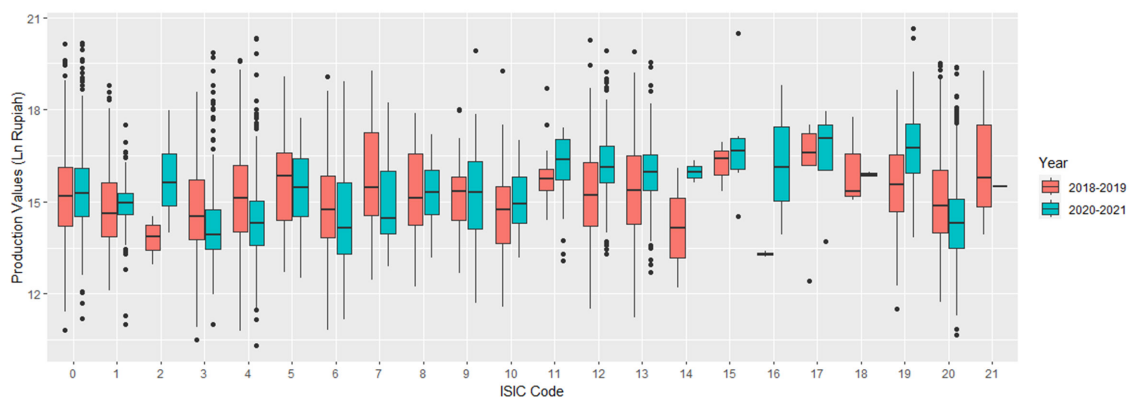
Figure 3. Production Value of MSES Enterprises by Business Area in Macro Health Shock Conditions



Source: Yearly Data MSEs 2019-2021 Processed

Table 2 shows the result of Cobb Douglas SFA with MLE by using R statistical software. Table 2 shows the significant estimation results for the Cobb-Douglas SFA. The interpretation of the estimated dummy coefficient in this study was used to see the independent variable's significance (Giles, 2011). Fixed capital and the number of workers were discovered to have a positive impact on production. A 1% increase in fixed capital increases the production value by 0.10%, and a 1% increase in the number of workers increases the production value by 0.67%. Meanwhile, the impact of macro health shocks on production value showed a negative result (-33.55%). The business location in the Sarbagita area positively impacted the production value by 55.33%.

Figure 4. Production Value of MSES Enterprises Based on ISIC in Macro Health Shock Conditions



Source: Yearly Data MSEs 2019-2021 Processed

When viewed from KBLI, it shows that KBLI with codes 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, and 20, namely ISIC 11 (Beverage), ISIC 12 (Tobacco Processing), ISIC 13 (Textile), ISIC 14 (Apparel), ISIC 15 (Leather), ISIC 16 (Wood), ISIC 17 (Paper), ISIC 18 (Printing), ISIC 20 (Chemicals Products), ISIC 21 (Pharmaceuticals), ISIC 23 (Other Non-Metallic Mineral Products), and ISIC 32 (Other Manufacturing) has a significantly different effect on the production value of the reference category, ISIC 10 (food). ISIC 32 (Other Manufacturing) with the main product in Bali called the *banten* (Balinese Hindu needs), and *the Banten* equipment industry has a negative effect on the production value of MSEs businesses (-34.71%).

**Table 2. Estimation Result of The SFA Model with Cobb Douglass Production Function**

| Variable                                      | Estimates  | std. Error |     |
|-----------------------------------------------|------------|------------|-----|
| (Intercepts)                                  | 15.1239427 | 0.3221917  | *** |
| log('Capital')                                | 0.0972329  | 0.008302   | *** |
| log('Labour')                                 | 0.6651847  | 0.0280674  | *** |
| `Covid-19`1                                   | -0.4087855 | 0.0374869  | *** |
| Sarbagita1                                    | 0.4403846  | 0.0307309  | *** |
| `Isic`1                                       | -0.305206  | 0.0807822  | *** |
| `Isic`2                                       | -0.8551982 | 0.4650359  | .   |
| `Isic`3                                       | -0.4029126 | 0.0638029  | *** |
| `Isic`4                                       | -0.4556146 | 0.0528273  | *** |
| `Isic`5                                       | -0.3411957 | 0.1147549  | **  |
| `Isic`6                                       | -0.4634189 | 0.0516174  | *** |
| `Isic`8                                       | -0.5395676 | 0.1665795  | **  |
| `Isic`9                                       | -0.4806988 | 0.1640083  | **  |
| `Isic`10                                      | -0.4579903 | 0.1780287  | *   |
| `Isic`12                                      | -0.2078551 | 0.0620179  | *** |
| `Isic`20                                      | -0.426332  | 0.0472194  | *** |
| <b>Technical Inefficiency</b>                 | Estimates  | std. Error |     |
| Z_(Intercept)                                 | 0.951887   | 1.1475726  |     |
| Z_`Gender Owner`1                             | -0.2440611 | 0.0494492  | *** |
| Z_`Businesses Located`                        | 0.3791026  | 0.062814   | .   |
| Z_`KUR`1                                      | -0.4725259 | 0.0738548  | *** |
| Z_`Cooperative Service`1                      | -0.1506027 | 0.0587352  | *   |
| Z_`Bank Service`1                             | -0.2202037 | 0.1034336  | *   |
| Z_`The age group of the majority of workers`1 | -0.4652761 | 0.3879543  | .   |
| Z_`Raw Material from Bali`1                   | 0.3373258  | 0.1616032  | *   |
| Z_`Raw Material other Province`2              | 0.5928885  | 0.1267917  | *** |
| Z_`Managerial training`                       | 0.3586949  | 0.3586949  |     |
| Z_`Production training`                       | -0.0924956 | -0.0924956 |     |
| Z_`Marketing training`                        | -0.414413  | -0.414413  |     |

Significant. codes: \*\*\*10%, \*\*5%, \*1%  
SFA mean efficiency: 0.2224759

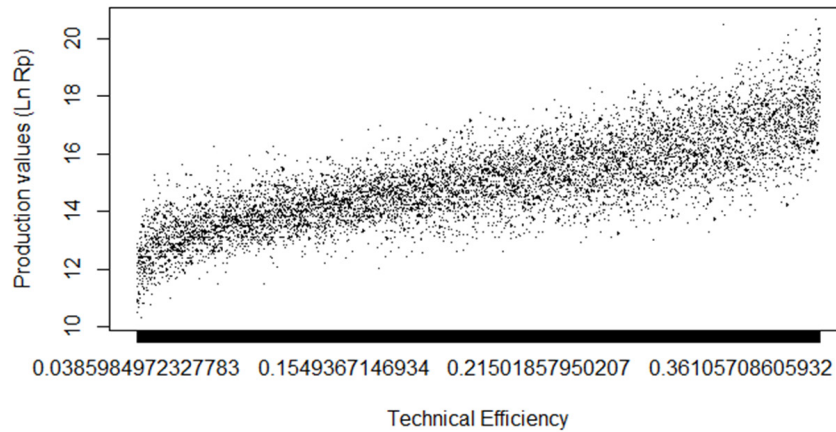
ISIC 11 (Beverage) with its main product Balinese arak, ISIC 12 (Tobacco Processing) with its primary product tobacco, ISIC 13 (Textile) with its main product Balinese woven cloth (*Tenun*), ISIC 14 (Apparel) with its main product *kebaya* clothes and apparel, ISIC 15 (Leather and Leather Goods and Footwear) with its main product Balinese dance wear, ISIC 16 (Wood) with its main product of Balinese handicrafts, ISIC 17 (Paper and Paper Products) with its primary product paper packaging goods, ISIC 18 (Printing) with its main product of printing, ISIC 20 (Chemicals and Chemical Products) with its main product of incense, ISIC 21 (Pharmaceuticals) with its main product *loloh/jamu*, ISIC 23 (Other Non Metallic Mineral Products) with its main product bricks (*batako*) and, ISIC 32 (Other Manufacturing) with its main product *Banten*, are business types that significantly affect the business value of MSEs, but the impact is still negative compared with reference category ISIC 10 (Food).

The technical inefficiency in the estimation results above is interpreted using calculations by multiplying the results again by -1 because technical inefficiency is a negative form in the Cobb-Douglas SFA. The male gender of the business owner has a significant positive impact on the production value by 21.66% compared to the female business owner. MSEs businesses located in buildings still have a significant adverse effect on the production value by -46.10%, or in other words, MSEs businesses located in permanent buildings increase the value of technical inefficiency compared to those located in non-permanent/semi-permanent buildings.

Another finding obtained from this estimate is that MSEs businesses participating in the Micro Credit Program (KUR), cooperative services, and Bank services have significant results that have a positive effect on the production value of 37.66%, 36.67%, 13.98%, and 19.76% or significantly has an impact on reducing the weight of technical inefficiencies in the model. Concerning human resources, this estimate yields results: MSEs businesses with the majority of workers in the 15-64 year age group (productive age group) have a positive effect on the production value of = 37.20% compared to MSEs businesses where most workers are under 15 years old. The source of raw materials for MSEs in Bali, such as from foreign sources, has a significantly different impact compared to MSEs businesses that source raw materials from Bali or other provinces in Indonesia. MSEs businesses that use raw materials from Bali and other provinces in Indonesia contribute negatively to the production value of MSEs businesses, respectively by -80.92% and -40.12%, with the comparison category being foreign sources of raw materials.

The average technical efficiency of MSEs in Bali from 2018 to 2021 is 22.25%. This fairly low-efficiency value indicates that the efficiency value of manufacturing MSEs in Bali still needs to be improved to maximize performance. The technical efficiency value of MSEs business in Bali has a positive relationship with the production value of the MSEs business. Figure 5 shows that the relationship of TE value to production value is positive. A rise in the value of technical efficiency can improve Manufacturing MSEs company performance, allowing for an increase in production value (Figure 5). Improving the business performance of MSEs can be accomplished by reducing variables that significantly affect the value of inefficiency.

Figure 5. MSEs Business Production Value Based on Technical Efficiency



Source: Yearly Data MSEs 2019-2021 Processed

Macro health shocks caused by the Covid-19 pandemic negatively affected MSE businesses in Bali by -33.55%. This result shows that Bali's MSEs manufacturing experienced a negative impact from the pandemic. However, the decline did not reach 50% of the pre-pandemic production value, which means that Bali manufacturing MSEs survived the Covid-19 pandemic. Manufacturing MSEs have made various business adaptations to persevere during the Covid-19 pandemic (Abdallah, 2021; Ardolino et al., 2022; Liu et al., 2021). When viewed based on business location, the *Sarbagita* area (Denpasar City, Badung, Gianyar, and Tabanan Regencies) has a more excellent production value of 55.33% compared to other districts in Bali. This condition shows that the location of the business in an integrated urban area affects the production value obtained by MSEs manufacturing. Several related studies regarding the relationship between business location and business success have also been conducted and resulted in the same thing wherein the business location has a significant positive effect on business success (Alkusani & Ilmafa'ati, 2021; Kakooza et al., 2023).

During the macro health shock, ISIC manufacturing MSEs experienced production value changes. Manufacturing MSEs with ISIC 10 (Food), ISIC 11 (Beverage), ISIC 12 (Tobacco processing), ISIC 26 (Computers, Electronic, and Optical products), ISIC 27 (Electrical Equipment), and ISIC 31 (Furniture) experienced an increase in production during the macro health shock. This fact shows that Balinese people, during the health macro health shock, consumed more food and beverages from the production of manufacturing MSEs, and due to the impact of restrictions on social activities, the purchase of computers and furniture also experienced an increase in demand. ISIC 32, which produces Balinese Hindu needs called *upakara* is the most significant business in Bali, whose production value is still under food manufacturing. This condition is similar to ISIC 21, which produces *loloh* (herbal drink), ISIC 13 which produces *kain tenun* (Balinese woven cloth), ISIC 14 with *kebaya* (Balinese woman cloth), ISIC 15 with Balinese dance clothing, and ISIC 16 with Bali wood handicraft, is a production with local wisdom of Bali which has the potential to be developed as an export commodity due to uniqueness

that can not be found in other regions. The high selling power of products with local wisdom in micro and small businesses was found in previous studies such as those conducted by Ningsih et al. (2019) and Gunawan (2017).

Fixed capital and the number of workers were discovered to have a significant positive impact on production. This result shows that manufacturing MSEs in Bali is still labor-intensive and requires more fixed capital to grow. The fact that managerial, production, and marketing training do not significantly affect the production value of manufacturing MSEs in Bali also indicates that the government needs to create new programs related to appropriate training for manufacturing MSEs in Bali. Studies related to human resources, which have an essential influence on the progress of manufacturing businesses, have also been studied by Rabiun et al. (2020) and Muogbo et al. (2013).

The male business owner has a significant positive impact on the production value by 21.66% compared to the female business owner. There is a difference in MSE business challenges, with a higher proportion of female entrepreneurs suffering competitive problems than male entrepreneurs. Gender disparity exists; male business owners are socio-culturally viewed as superior to female business owners, indicating that women still have fewer options for managing MSEs than males. This condition is inextricably linked to Balinese women's numerous responsibilities in their traditional everyday lives and the family sphere. Other study results showed that women's rural businesses are not significantly smaller than those of men. Women's income is lower and more sensitive to business and industry variables (Tillmar et al., 2022). Anggadwita et al. (2022) showed that social perceptions are issues that women consider in entrepreneurship. Balinese women have limited access to entrepreneurship due to differences in access to technology and marketing amid a culture of gender inequity (Setini et al., 2020).

MSEs businesses located in permanent buildings have a more inefficiency value than those that operate in non-permanent/semi-permanent buildings. This result is related to the fact that MSEs businesses in Bali earn less money than they should while using semi-permanent for business. This condition is also associated with renting a non-permanent business location, which is cheaper than a permanent one, especially if it is in a strategic place. This result is in line with previous research which shows that manufacturing enterprises pay attention to strategic factors in determining a business location (Ellram et al., 2013).

The Micro Credit Program (KUR), cooperative services, and bank services have significant results that positively affect the production value. Macro health shocks cause MSEs businesses to require capital to continue operations; however, the micro-credit program (KUR), cooperative services/assistance, and bank services/assistance have proven to reduce the value of MSEs business inefficiency. Therefore, the financial assistance program for MSEs businesses in Bali should be developed evenly in the future so that the benefits become apparent in MSEs businesses in Bali. Several related studies also find that financial support is effective for MSEs financial support to grow (Kakooza et al., 2023).

MSEs businesses with the majority of workers in the 15-64 year age group (productive age group) have a positive effect on the production value of 37.20%, and this result shows that workers in the productive age group (15-64 years) have a more efficient impact on MSEs businesses in Bali because older workers have lower scores in ability than younger workers (Børing & Grøgaard, 2023). The source of raw materials from Bali and other provinces in Indonesia contributes negatively to the production value of MSEs businesses, with the comparison category being foreign sources of raw materials. This condition is related to MSE businesses in Bali that use raw materials from abroad, which are contract manufacturing businesses whose raw materials come from original equipment manufacturers (OEMs) located abroad. The high value of contract manufacturing with low risk makes contract manufacturing more efficient than others. This result aligns with research (2019), which states that future contract manufacturing is a promising business in India (Børing & Grøgaard, 2023).

The average technical efficiency of MSEs in Bali from 2018 to 2021 is 22.25%. Manufacturing MSEs in Bali needs to be improved to maximize performance. The relationship of TE value to production value is positive. A rise in the value of technical efficiency can improve Manufacturing MSEs company performance, allowing for an increase in production value. Improving the business performance of MSEs can be accomplished by reducing variables that significantly affect the value of inefficiency. The TE value of manufacturing MSEs needs to be increased again by making the right policies to develop the potential of manufacturing MSEs in Bali. Market mechanism strategy and government policy intervention can increase manufacturing productivity.

Based on the results of this study, in order to increase the potential of Bali's manufacturing MSEs, new policies are needed. Firstly, increasing access to information related to financial assistance, cost efficiency, and business development for manufacturing MSEs, especially for women business owners and businesses located in non-*Sarbagita*. Secondly, assistance related to marketing, production and managerial strategy for MSEs in manufacturing businesses, especially those that produce products with Balinese local wisdom. Thirdly, improve the quality of human resources by providing training programs and marketing strategies that are right on target according to the manufacturing sector being cultivated.

## CONCLUSION

The results of this study indicate that the impact of the COVID-19 pandemic shows the same pattern, namely a decrease in production value in the *Sarbagita* and non-*Sarbagita* regions. However, when viewed based on ISIC, it shows a different pattern in each ISIC for production value. Based on the results of Cobb-Douglas SFA, the COVID-19 pandemic, *Sarbagita* region, and several ISIC categories significantly affect the production value of manufacturing MSEs. Male business owners, non-permanent business locations, financial assistance from KUR, cooperatives, and banks, productive workers aged (15-64) years, and raw materials from abroad in manufacturing activities increase the

efficiency of manufacturing MSEs in Bali. Managerial training, production, and marketing activities were found to have little influence on the manufacturing efficiency of MSEs. The TE value of 22.25% indicates a need for policies related to improving the efficiency of MSEs in the processing industry sector in Bali by paying attention to variables that significantly affect the efficiency of manufacturing MSEs and variables that do not.

Policies related to equal access to information on capital assistance, cost efficiency, and business development, assistance related to marketing, production, and managerial strategies for improving the quality of human resources of manufacturing MSEs need to be considered for maximizing the potential of manufacturing MSEs in Bali, particularly as a critical element of locally relevant disaster and pandemic preparedness plans.

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## Appendix 1. Variable Dependent and Independent

| Variables                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dependent                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Production Value                                        | The value of the goods produced includes semi-finished goods and income from industrial services ( <i>maklon</i> ) for one month in rupiah units.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Independent                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Fixed capital                                           | Value of land, business buildings/buildings, machinery, equipment, and tools owned by the MSEs business in rupiah units.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Total manpower                                          | The Number of workers in the businessMSEspaid or unpaid (if family worker) by person unit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| International Standard Industrial Classification (ISIC) | ISIC is presented in five ISIC digits for complete digits and two ISIC digits for general classification digits. This study uses 22 categories, beginning with ISIC 10 (Food) as a reference category (ISIC 11 (Beverage) = 1; ISIC 12 (Tobacco Processing) = 2; ISIC 13 (Textile) = 3; ISIC 14 (Apparel) = 4; ISIC 15 (Leather and Leather Goods and Footwear) = 5; ISIC 16 (Wood, Wood and Cork Products Excluding Furniture and Woven Products from Bamboo, Rattan and The Like) = 6; ISIC 17 (Paper and Paper Products) = 7; ISIC 18 (Printing and Reproduction of Recording Media) = 8; ISIC 20 (Chemicals and Chemical Products) = 9; ISIC 21 (Pharmaceuticals, Medicinal Chemical and Botanical Products) = 10; ISIC 22 (Rubber and Plastic Products) = 11; ISIC 23 (Other Non Metallic Mineral Products) = 12; ISIC 25 (Fabricated Metal Products, Excepts Machinery and Equipment) = 13; ISIC 26 (Computers, Electronic and Optical Products) = 14; ISIC 27 (Electrical Equipment) = 15; ISIC 28 (Machine and Equipment NEC) = 16; ISIC 29 (Motorized Vehicles, Trailers, and Semi Trailers) = 17; ISIC 30 (Other Transport Equipment) = 18; ISIC 31 (Furniture) = 19; ISIC 32 (Other Manufacturing) = 20, and ISIC 33 (Repair and Installation for Machines and Equipment) = 21) |
| Business Location                                       | The business location of MSEs is located in the area of Denpasar City, Badung Regency, Gianyar, and Tabanan ( <i>Sarbagita</i> ). In contrast, the businessMSEsthose located in Jembrana, Klungkung, Karangasem, Bangli, and Buleleng Regencies are included in business locations non- <i>Sarbagita</i> . The measurement scale uses categorical.<br><br>0 = non- <i>Sarbagita</i> ; 1 = Location of <i>Sarbagita</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Health macro shock                                      | Conditions caused by the Covid-19 pandemic use data from 2018 to 2021, divided into two periods: before the Covid-19 pandemic (2018-2019) and during the Covid-19 pandemic (2020-2021). The categorical measurement scale uses the following:<br><br>0 = conditions before the Covid-19 pandemic; 1 = during the Covid-19 pandemic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Technical Inefficiency                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Age of business owner of MSEs                           | Age of business owner conditions at the time of data collection.<br><br>0 = age 0-14 years; 1 = age 15-64 years; 2 = age 65+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| MSEs entrepreneur/business owner gender                 | 0 = female ; 1 = male                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Education of MSEs Entrepreneur                          | The last level of education is completed.<br><br>0 = did not finish elementary school; 1 = graduated from elementary school; 2 = graduated from junior high school; 3 = graduated from high school & vocational school; 4 = graduated from DI/DII/DIII; 5 = graduated from undergraduate education (DIV/S1) ; 6 = Graduated from Master (S2)/Doctorate (S3) education                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Place of business                                       | Places where MSEs operates<br><br>0 = producing in around/non-permanent buildings; 1 = producing in a fixed building                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Operational year                                        | The year the MSEs business started.<br><br>0 = before 2000 ; 1 = during or after 2000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Cooperative membership                                  | Cooperative members status.<br><br>0 = UMK businesses are not included in cooperative members; 1 = UMK businesses are included in cooperative members                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

| Variables                                | Description                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Micro Credit Program (KUR)               | Business status of MSEs in KUR.<br>0 = the MSEs business do not use KUR; 1 = the MSEs business use KUR                                                                                                                                                                                                                                                                                     |
| Partnership                              | Cooperation relationships with other businesses/companies (including BUMN/ BUMD) that are mutually beneficial, strengthening, and supportive<br>0 = no partnership; 1 = establish a partnership                                                                                                                                                                                            |
| Services/assistance from the cooperative | Manufacturing MSEs obtained Services/Assistance from the cooperative.<br>0 = no cooperative services/assistance; 1 = there is cooperative services/ assistance                                                                                                                                                                                                                             |
| Services/assistance from the bank        | Manufacturing MSEs obtained Services/Assistance from the bank.<br>0 = no bank services/assistance; 1 = there is bank service/assistance                                                                                                                                                                                                                                                    |
| Services/assistance from the foundation  | Manufacturing MSEs obtained Services/Assistance from foundations.<br>0 = no Foundation services/assistance; 1 = there is Foundation services/assistance                                                                                                                                                                                                                                    |
| Managerial guidance/training/ counseling | Manufacturing MSEs obtained Managerial guidance/training/ counseling conducted by the company or external parties.<br>0 = no guidance/counseling in the form of managerial material; 1 = there is guidance/counseling in the form of managerial material                                                                                                                                   |
| Production Guidance/training/ counseling | Manufacturing MSEs obtained Production guidance/training/ counseling conducted by the company or external parties.<br>0 = no guidance/counseling in the form of production materials; 1 = there is guidance/counseling in the form of production materials                                                                                                                                 |
| Marketing guidance/training/ counseling  | Manufacturing MSEs obtained guidance/training/marketing counseling conducted by the company or external parties<br>0 = no guidance/counseling in the form of marketing materials; 1 = there is guidance/counseling in the form of marketing materials                                                                                                                                      |
| The age group of the majority of workers | The average age of workers is dominant in the MSEs business.<br>0 = age 0-14 years; 1 = age 15-64 years; 2 = age 65+                                                                                                                                                                                                                                                                       |
| The majority of workers' education       | The average education is dominant in workers in the MSEs business.<br>0 = did not finish elementary school; 1 = graduated from elementary school; 2 = graduated from junior high school; 3 = graduated from high school & vocational school; 4 = graduated from DI/DII/DIII; 5 = graduated from undergraduate education (DIV/S1) ; 6 = Graduated from Master (S2)/Doctorate (S3) education |
| Capital composition                      | Manufacturing MSEs Ownership of venture capital<br>0 = capital from family loans; 1 = own capital; 2 = capital from bank, cooperative, government and private loans                                                                                                                                                                                                                        |
| Ingredients source                       | Manufacturing MSEs with The origin of the raw material source area used for production.<br>0 = raw materials from abroad; 1 = raw materials from outside the province of Bali within the country of Indonesia; 2 = raw materials from Bali                                                                                                                                                 |

## Informal Traffic Controller: Study on Shadow Economy in Indonesia

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### Abstract

*The urban low-income segment of society survived on their earnings in the informal sector. This study examines the informal traffic controllers in the shadow economy framework who assist incoming cars at traffic-congested intersections and turning lanes in the main cities to earn income. This paper originates from the preliminary study of "Pak Ogah": the Portrait of Shadow Economy in the Greater Area of Jakarta. The field study was conducted at 60 congested intersections and turning lanes on roadways where the informal traffic controller groups operated. The study employs a mixed method of qualitative and quantitative procedures and conducts a triangulation strategy. The study's implications suggest that the shadow economy was created by institutional failure to anticipate the negative impact of urban development policy.*

### Keywords:

shadow economy; informal economy; congestion; poverty

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## INTRODUCTION

Main cities in Indonesia emerged as political and economic centers and witnessed progressive development. Enormous population growth and social change in main cities affected the urban spatial planning to support the needs of residents' housing and rapid mobility. Residential construction and road development are carried out to support activities and mobility. Simultaneously, the peripheral areas previously Jakarta's buffer zone transformed into the outskirts' new cities. The peripheral areas, previously rural areas, have been affected by the rapid changes in Jakarta. Megaproject construction and superblocks of integrated areas comprise real estate, commercial, and recreational facilities carried out by giant developers in the Greater Area of Jakarta during 1992-2007 (Herlambang et al., 2018).

The significant infrastructure and housing construction expansion in Jakarta to its peripheral areas by public and private sectors have converted rural land into new cities –while private developers alone converted almost 300,000 ha of rural land. The new cities are located between the rural hinterland and urban fringe, defined as peri-urban areas with mixed rural-urban characteristics (Winarso et al., 2015). The Greater Area of Jakarta, namely Jabodetabek, an acronym for Jakarta, Bogor, Depok, Tangerang, and Bekasi, is an urban agglomeration that extends from Jakarta's metropolitan center to neighboring cities or regents, which is discussed as peri-urban areas. The Greater Area of Jakarta features diversified labor employment that ranges from rural to urban employment, as well as a mixed population of poor migrants looking for informal jobs with multiple income-generating activities to a privileged class with steady careers. The features of population and spatial diversification create social segregation that develops concentrations of specific classes and demographic groups based on their apparent spatial occupancy and facilities. The Greater Area of Jakarta, or Jabodetabek, became the most populated city with a total population of 31,240,709 based on the 2020 census. Enormous population and land use have made Jabodetabek a dense area for people's activities and movements, causing traffic congestion.

Traffic congestion in Indonesia increased more than doubled between 1985 and 2000, corresponding to the growth of private vehicle users (Yudhistira et al., 2017). Traffic congestion has caused substantial economic losses that would reach Rp65 trillion in 2020, according to JICA and Bappenas (2004) projection. Although Jakarta has built an extensive public transit system, traffic congestion has yet to be eliminated. Economic losses from increased vehicle running expenses, longer travel times, environmental harm from carbon dioxide concentration, and the psychological stress caused by traffic congestion are all costly beyond measure.

Amidst severe congestion in the Greater Area of Jakarta, groups of dominantly youth members benefit from 'helping' drivers who are caught in traffic jams, attempting to cross the lane among congested roads. They operate during the traffic police's absence, expecting a very small amount of money tip about Rp500 to Rp2,000 from the drivers in return. The informal traffic controllers are easy to find in congested crossroads or

turning lanes, indicating many activities throughout the Greater Area of Jakarta. Public nicknamed as "Pak Ogah" or "Mr. No" taken from the popular 1980s to 1990s TV series describing a lazy male character, only willing to help or do something if he is given Rp100 in exchange. Informal traffic controllers implicitly expect a tip to compensate their service to the drivers. The tip increases from Rp500 to Rp2,000, the adjusted amount of Rp100. They do not hesitate to risk themselves to stop and block other drivers' lanes where potential "clients" –drivers with difficulty crossing the congested road- are about to cross over the road.

The phenomenon of the informal traffic controller reflects the low socioeconomic segment defined by Hart (1973) in the 1970s as the unskilled and illiterate urban sub-proletariat generating informal income through extremely small-scale self-employed occupations afterward referred to as the informal sector. Although production and distribution of goods and services are the legal areas of work to offer in the informal sector, illicit works are also available. Informal traffic controllers pursue low-paying, risky work. The potential semi-extortionary nature of transactions between informal traffic controllers and drivers is the rationale for classifying this labor as "underground" employment that works inside the shadow economy framework and works 'below the radar' of the regular economic system (Berdiev et al., 2020).

Studies on shadow economy increase on macroeconomics approach to gauge the size of shadow economy and tax evasion in developed and developing countries; shadow economy and corruption; and unregistered economic activities that escape tax to gross national product (GDP) in OECD countries (Dreher & Schneider, 2010; Medina & Schneider, 2018, 2019; Stiglitz & Pieth, 2016; Tahmasebi & Rocca, 2015; Williams & Schneider, 2016). The infamous side of the shadow economy for its definition and measuring challenges, which correlate to the vast and complicated concerns it must address either in developed and emerging markets or developing countries, appeared as well (Andreev et al., 2018; Berdiev et al., 2020; Medina & Schneider, 2018; William & Schneider, 2013).

According to Andrii and Terziev (2020), shadow economy research focuses on general issues such as shadow economy estimation and size to the analysis of urban poverty, low income, drugs, and abuse problems in illegal and semi-illegal jobs. It occurred in 2014–2015, coinciding with an increase in the number of papers on the shadow economy associated with poverty in developing countries, shadow economy and income inequality in Asian countries and Africa (Berdiev et al., 2020; Esaku, 2021; Huynh & Nguyen, 2020; Tran, 2021). In those studies, the production of goods and services in the informal sector, either legally or unlawfully, and in between, as well as underground and illicit terms, were also conducted. This paper, which originated from the preliminary study on "Pak Ogah": The Portrait of Shadow Economy in the Greater Area of Jakarta, examines the shadow economy and urban low-income people who create illicit, semi-illegal activities to earn a living at the traffic congestion roadways.

This research examines the informal traffic controllers' mode of production, shared income, and group solidarity to protect the source of their marginal earnings by situating the shadow economy concept in the socioeconomic context of Indonesia's urban marginal group realities. Previous studies that have become the primary references are the study conducted by Tran (2021) on the critical role of underground work in the informal sector in providing livelihood to disadvantaged segments in developing countries. Meanwhile, Esaku (2021) emphasizes the failure to absorb the population, resulting in semi-unskilled unemployment in many developing countries, particularly Uganda, and the emergence of the shadow economy. Those studies concern low-income households that rely on the informal sector and underground work that might be their only source of income and have increased the shadow economy.

The gap between the informal traffic controllers study, and the referenced studies is due to the type of the empirical data and the research method. Tran (2021) and Esaku (2021) examine shadow economies and income inequality in developing countries using panel data over a certain period. Tran (2021) examines the 7-ASEAN countries, including Indonesia. The studies show that unemployment boosts the shadow economy. The result of their studies raises the question: How do the situation and social setting of unemployment and income inequality boost Indonesia's shadow economy? Therefore, our research focuses on the informal traffic controller and employs Husserl's phenomenology inquiry to transform the meaning of statistical results on inequality and the shadow economy in the urban sub-proletariat or low-income segment to make the data on the ground. We might claim novelty from the research based on the topic matter; even the technique and approach are frequent in development studies.

## METHODS

The study employs a mixed method of qualitative and quantitative procedures and conducts a triangulation strategy to converge or confirm findings from different data sources. Each research approach creates its technique, yet each has distinct and complementary qualities (Newman, 2003). The method is based on data acquired in a natural setting, where human behavior and events occur. The data is reached in an observation without participation or a non-interactive, complete observation. We used behavioral surveillance techniques to keep the fieldwork safe because it occurs in potentially harmful situations. At this stage, a qualitative procedure is employed.

In observation, this study uses primary data gathered using a semi-structured data collection instrument. The data, consisting of income, mode of production, number of group members, condition and types of roadways, operating location, and number of vehicles that are caught in traffic congestion, is recorded directly in the sample areas. The data is treated as a distribution of the frequency of individual values, or frequency distribution, and the mean, or average, describing the central tendency of income in observation locations, is used to estimate income in sample areas for the entire year. A quantitative approach is employed at this stage to gain the expected data. Expected data can be shown in Table 1.

The study area is selected using purposive sampling and consists of Central Jakarta, South Jakarta, East Jakarta, South Tangerang, Depok, and Bekasi. Jakarta represents the core area: Central Jakarta is the business center; South Jakarta and East Jakarta are upper and middle-low residential areas. South Tangerang Selatan, Depok, and Bekasi represent the current peri-urban cities. Due to source restrictions, the study is conducted without Bogor Cities, one of the agglomeration regions of the Jakarta Greater Area of Jabodetabek. Nonetheless, the absence of Bogor would not affect the geographical analysis. Field data was collected at 60 traffic-congested locations spread across 39 urban villages (*kelurahan*) in six sample areas. Observation is conducted at peak traffic periods of 7-9 a.m. or 4-7 p.m. on weekdays, Monday to Friday, with a 10-minute time frame of surveillance.

**Table 1. Expected Data Acquired and Data Treatment**

| No | Data                                               | Expected Data Acquired                                                                                                                                                     | Data Treatment                                                                                          |
|----|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 1  | Detailed location                                  | Street; landmark; urban village ( <i>kelurahan</i> )                                                                                                                       | Description of detailed information of traffic congested location                                       |
| 2  | Observation date and time                          | Observation date and time                                                                                                                                                  | Information of detailed date and time of observation                                                    |
| 3  | Road conditions                                    | Good, moderate, damage classification                                                                                                                                      | Frequencies and percent                                                                                 |
| 4  | Type of roads                                      | Secondary arterial road, collector road, local road and residential road                                                                                                   | Frequencies and percent                                                                                 |
| 5  | Type of traffic congested location                 | Rotating/u-turn; turning road (left/right sided); T-junction and/crossroad                                                                                                 | Frequencies and percent                                                                                 |
| 6  | Number of group members                            | Grouping/classification                                                                                                                                                    | Frequencies and percent                                                                                 |
| 7  | Estimated income at the observation time and place | Count the number of cars passing and the number of anticipated tips provided by drivers at the observation station during peak congested times for 10-minute surveillance. | Estimated total number of respective observation place, mean of income, calculation of estimated income |

Source: data collection instrument

In-depth interviews with key informants drawn from the ranks of informal traffic controllers were also conducted. The quantitative and qualitative data are collected concurrently, and the data and findings are integrated with data analysis with field notes and theoretical categories. Some partial overlap in conducting mixed-method occurred. Nonetheless, there was no misunderstanding in data interpretation; on the contrary, utilizing both made the field findings more comprehensive.

## RESULT AND DISCUSSION

The study's key findings show that the sample areas in which the six cities are located are the dilemma and problematic cities. The Greater Area of Jakarta, or Jabodetabek, is the most overcrowded in all of the cities of Indonesia. As an urban agglomeration, Jabodetabek has transformed into a growth pole, as seen by a rise in the regional minimum wage, with Bekasi achieving the highest 2022 minimum wage rate. On the contrary, some poor individuals earn money through inconceivable activities, anticipating a tip of Rp500-Rp2,000 in the middle of a congested road. The lack of sound spatial regulation and growth pressure are producing drastic changes and social segregation in adjacent outskirt regions. The social division of labor extends from the most sophisticated, highest-paying jobs to the unlawful activities of the informal sector, which are challenging to designate as a job: the informal traffic controller.

Jakarta has had a tremendous population growth rate since the 1980s. In the 1960s, the annual population growth rate was 2.6%, rising to 4% in the 1970s. Urban employment rates per annum have risen to 5.7%, compared to 1.6% in rural regions (Sethuraman, 1974). In the 1980s, only 22% of the population resided in urban areas. Despite a slowdown between 2000-05, it increased to 43% in 2005. The growing population in urban regions has more than doubled in thirty years, indicating a demographic shift from rural to urban areas. According to Indonesian population growth, the country is moving to an urban-based population (Meng & Manning, 2010).

Previously, Jakarta had become a significant migration destination area. However, in the last decade, migration destination has shifted to peri-urban regions such as Tangerang District, Bekasi District, Bogor District, Depok City, and Bekasi City, the peri-urban of Jakarta, according to Susenas 2013, 2017 and 2021. The total urban population in 2020 has reached 56.7%, with the total population in Jabodetabek based on the recent census (2020) reaching 31,240,709 (see Table 2) and may still grow. Population growth rates in Jakarta were relatively lower at 1.19% in 2019, while Depok City, Bekasi District, and Tangerang Selatan City show higher growth rates at 3.57%, 3.95%, and 3.04%, respectively.

Table 2. Population of The Greater Area of Jakarta

| Census year | DKI Jakarta | Bodetabek  | The Greater Area of Jakarta |
|-------------|-------------|------------|-----------------------------|
| 1961        | 2,904,533   | 2,794,712  | 5,699,245                   |
| 1971        | 4,546,492   | 3,483,537  | 8,030,029                   |
| 1980        | 6,503,449   | 5,413,271  | 11,916,720                  |
| 1990        | 7,259,257   | 8,878,256  | 16,137,513                  |
| 2000        | 8,347,083   | 12,842,626 | 21,189,709                  |
| 2010        | 9,607,787   | 17,839,240 | 27,447,027                  |
| 2020        | 10,562,088  | 20,678,621 | 31,240,709                  |

Source: Indonesian Central Bureau of Statistics 2020

While the middle-upper classes of residents have better employment opportunities, people with low incomes are pursuing income in the informal sector. Traffic congestion and socioeconomic configuration in Jabodetabek have turned traffic congestion into an informal opportunity for low-skilled labor. In this situation, where the drivers are trapped in congested roads, low-income segments have seen an opportunity to get a small amount of money by helping drivers get out of the traffic jams. Usually, when traffic congestion occurs, the police act to get the roadways back in order. Nonetheless, the traffic police are on hand at particular times to unravel the traffic congestion. When the police were absent, Pak Ogah, alone or in a group, took the initiative to regulate traffic or, more precisely, to give vehicles caught in traffic jams the chance to pass. Several drivers, particularly those driving four-wheeled vehicles, would tip the informal traffic controller for their efforts to get them out of a congested road. At many observed congestion locations, peak traffic periods even started before 7 a.m. and reached the highest spike on hump days of Monday to Wednesday. While observation is conducted on weekdays from 7-9 a.m. and 4-6 p.m. from Monday to Friday. Nonetheless, weekdays in the morning and evening after office hours can be said to be the nightmare of traffic congestion that is found at the 60 observed locations in 39 urban villages as follows (see Table 3).

**Table 3. Traffic Congestion Observation Areas**

| Location          |                |                     |
|-------------------|----------------|---------------------|
| City/Municipality | Sub-district   | Urban Village       |
| Jakarta Pusat     | Sawah Besar    | Pasar Baru          |
|                   | Sawah Besar    | Mangga Dua Selatan  |
|                   | Tanah Abang    | Kebon Melati        |
|                   | Tanah Abang    | Kebon Kacang        |
|                   | Tanah Abang    | Bendungan Hilir     |
| Jakarta Selatan   | Pancoran       | Pancoran            |
|                   | Cilandak       | Cilandak Barat      |
|                   | Cilandak       | Lebak Bulus,        |
|                   | Kebayoran Lama | Grogol Selatan,     |
|                   | Setiabudi      | Guntur              |
| Jakarta Timur     | Pulo Gadung    | Pulo Gadung         |
|                   | Matraman       | Utan Kayu Utara     |
|                   | Duren Sawit    | Duren Sawit         |
|                   | Kramat Jati    | Kramat Jati         |
|                   | Kramat Jati    | Batu Ampar          |
| Tangerang Selatan | Ciputat        | Sawah Baru          |
|                   | Pondok Aren    | Pondok Jaya         |
|                   | Pondok Aren    | Pondok Kacang Timur |
|                   | Ciputat Timur  | Cempaka Putih       |
|                   | Ciputat Timur  | Pondok Ranji        |
|                   | Pondok Aren    | Jurang Mangu Barat  |
|                   | Pondok Aren    | Pondok Betung       |

| City/Municipality | Location       |                                      |
|-------------------|----------------|--------------------------------------|
|                   | Sub-district   | Urban Village                        |
| Depok             | Beji           | Beji (in front of Depok Town Square) |
|                   | Beji           | Pondok Cina                          |
|                   | Beji           | Kemiri Muka                          |
|                   | Pancoran Mas   | Depok                                |
|                   | Pancoran Mas   | Depok Jaya                           |
|                   | Pancoran Mas   | Rangkapan Jaya Baru                  |
|                   | Bojongsari     | Bojongsari                           |
|                   | Sawangan       | Sawangan Lama                        |
| Bekasi            | Sawangan       | Sawangan Baru                        |
|                   | Bekasi Barat   | Jaka Sampurna                        |
|                   | Bekasi Barat   | Kranji                               |
|                   | Telaga Asih    | Cikarang Barat                       |
|                   | Bekas Utara    | Marga Mulya                          |
|                   | Pondok Gede    | Jatibening                           |
|                   | Bekasi Barat   | Bintara Jaya                         |
|                   | Tambun Selatan | Setia Mekar                          |
|                   | Bekasi Timur   | Margahayu                            |

Source: field data collection 2022

Pak Ogah appears to prefer arterial roads (48.3%) over collector roads (25%), local roads (21.7%), and residential roads (0.5%) (see Table 4). They also identified to prefer good-condition roads (83.3%), strive to avoid even moderate-condition roads (16.3%), and never operate on bad-condition roads. Typical roadways give a better chance of receiving tips from car drivers. Although bad-conditioned local or residential roads sometimes require initiative to help vehicles caught in local traffic congestion, there needs to be a different type of road to attract the intention to help. It is a logical consideration behind the operational options. No matter how small the amount of money they received, tips became the primary purpose of their activities.

Table 4. Type of Road

| Type of road     | Frequency | Percent |
|------------------|-----------|---------|
| Arterial road    | 29        | 48.3    |
| Collector road   | 15        | 25      |
| Local road       | 13        | 21.7    |
| Residential road | 3         | 0.5     |

Source: Field data collection 2022

The informal traffic controllers either work in groups or individually, depending on the situation, without a steady work pattern. In 10-minute observation, individuals and

groups of 2 to 10 members of informal traffic controllers operated in observation areas are identified. The data show that the average number of informal traffic controller group members is 2-3. Nonetheless, the number of people involved is also flexible, unless the most congested loop of turning road located on Depok Square near Margonda, Depok City, has attracted at least 20 people involved.

**Table 5. Number of Group Members**

| Group members (person) | Frequency | Percent |
|------------------------|-----------|---------|
| 1                      | 23        | 38,3    |
| 2-3                    | 24        | 40      |
| 4-5                    | 11        | 18,3    |
| 6-7                    | 1         | 1,7     |
| 8-10                   | 1         | 1,7     |

Source: Field data collection 2022

The Pak Ogah is easily found at the loops of T-junction or crossroad (53.3%), a rotating or U-turn loop (28.3%), and a turning road (18.3%) (see Table 5). Four-wheeled vehicles or cars, especially those identified as personal cars, are the main potential targeted customers. The more complicated the driver's situation and effort to get them out of a congested road, the easier it is for drivers to tip. A site of observation was possible to earn Rp. 21.000-30.000 (36.7%) and Rp. 10.000-20.000 (35%) (see Table 6) as the two greatest earning classes based on the income acquired throughout a 10-minute observation.

**Table 6. Income Generated in a 10-Minute Observation**

| Amount (Rp)   | Frequency | Percent |
|---------------|-----------|---------|
| >9.000        | 7         | 11.7    |
| 10.000-20.000 | 21        | 35      |
| 21.000-30.000 | 22        | 36.7    |
| 31.000-40.000 | 5         | 8.3     |
| 41.000-50.000 | 4         | 6.7     |
| <51.000       | 1         | 1.7     |

Source: Field data collection 2022

Each location's average income acquired within a 10-minute observation is estimated at Rp.22,233. The estimated income is projected to be Rp.133,398 within an hour and Rp.533,395 within a 4-hour assumption congestion time of 7-9 a.m. and 4-6 p.m. on a weekday. If the weekdays are assumed to be five days a week, there are approximately 20 weekdays within a month. Accordingly, a congested location can earn an average

potential income in a month estimated at Rp. 10,667,395, and at Rp.128,008,740 for the entire year for each location. The maximum income in 60 observation locations earned by The Pak Ogah of social traffic controllers would be Rp.7,680,524,400. The most congested area, according to the total number of cars caught in traffic jams, is South Tangerang City a peripheral urban area, with 523 cars, and Central Jakarta City of, the core-area with 470 cars unable to drive properly due to severe traffic congestion during a 10-minute observation (see Table 7).

**Table 7. Total Money And Vehicles Circulation At Observed Traffic Congestion Location**

| Location        | Total Cars (unit) | Number of drivers giving tip | Cumulative of 10-minute observation time (minutes) | Cumulative money circulation in a 10-minute observation (Rp) |
|-----------------|-------------------|------------------------------|----------------------------------------------------|--------------------------------------------------------------|
| Central Jakarta | 470               | 185                          | 122                                                | 185,000                                                      |
| South Jakarta   | 304               | 206                          | 125                                                | 225,000                                                      |
| East Jakarta    | 398               | 120                          | 102                                                | 236,000                                                      |
| South Tangerang | 523               | 366                          | 116                                                | 268,000                                                      |
| Depok           | 348               | 227                          | 133                                                | 254,000                                                      |
| Bekasi          | 210               | 105                          | 125                                                | 160,000                                                      |
| <b>Total</b>    | <b>2253</b>       | <b>1029</b>                  | <b>(not calculated in total)</b>                   | <b>1,328,000</b>                                             |

Source: field data, treated, 2023

According to the data acquired, approximately 2253 cars were trapped in traffic jams, almost 50%, or 1029 drivers, spent money to cross lanes on congested roads, for a total invisible cost of Rp.1,328,000, and about 131 Pak Ogah were deployed at 60 traffic jam locations among Jakarta and its peri-urban areas within a 10-minute observation. It is essential to compare the income-received-based and driver-spending calculations to ensure the accuracy of money circulation estimation. Where Rp.1,328,000 is a 10-minute calculation, a one-hour projection estimation would be Rp.7,968,000, and a 4-hour congestion time in a day of 7-9 a.m. and 4-6 p.m. assumption during the weekday would be Rp.31.872,000. Hence, under the same assumption as the previous calculation, 20 days in a month are estimated at Rp.637,440,000. The final estimation of an entire year of weekdays is Rp.7,649,280,000. There is a gap in the calculation at Rp.31,244,400 of the estimated circulation of money using income-received-based or driver-spending-based calculations. Although the amount of the tip that informal traffic controllers collect is very small, the estimated cumulation amount is relatively high.

Despite the increase in income indicated by the 2022 provincial and city/regent minimum wages of DKI Jakarta Rp4,641,854, Bekasi City Rp.4,681,921, Depok City Rp.4,377,231, and South Tangerang City Rp.4,280,214, the informal employment with much lower income rather than minimum wage rate remains easy to find out. The informal sector employs a sizable proportion of urban workers. In general, 60% to 70% of the labor force is employed in the informal sector (Rothenberg et al.,

2016). According to the International Labour Organisation (ILO), the informal sector employs around 60% of the global workforce, with 85% working in the informal sector (Chacaltana et al., 2022). The reasons for the shadow economy to thrive differ in developed and emerging market countries.

The informal traffic controller has attracted mostly male youth grouping as it was seen to be helping drivers on congested roads. They work in a managed group where each member receives a fair shift. Some groups are complete with a light stick and an imitating traffic police vest to give an 'official' impression. Regardless of the nature of their activity, the informal traffic controller expects to be doing what is believed to be normal work. In reality, the informal traffic controller differs from other informal sector employees, such as street vendors, peddlers, domestic workers, and home garbage collectors, who supply actual goods and services. Despite the psychological burden and concealed denial of how they earn a living, the informal traffic controller works hard to ensure the sustainability of their actions amid traffic congestion. Operate only when traffic police are not present, keeping the shift running for the group members and avoiding friction that potentially made them banned by official authorities. This situation depicts how poor individuals depend to the mode of production that cannot be said to be a proper job.

The informal traffic controller has been an exciting topic of discussion because it can absorb urban unemployment of over 1000 young people in ten minutes at 60 congested locations and distribute an estimated annual revenue of around Rp7,6 trillion gathered from a trivial amount of tips. Ironically, there is a resemblance to the situation of "shared poverty." Shared poverty is the peasant's survival strategy in post-colonial rural Java. Labor surplus while marginal production falls to zero, the population continues to grow, and agricultural land narrows, resulting in unemployment, underemployment, or total unemployment. Income per capita in this sector fell to the "as long as you can live" or subsistence level. People in poverty shared scarce resources and employment, such as reducing the time spent cultivating on the same land to allow other family members to work. This "shared poverty" occurred in a different social setting and timeframe during the informal traffic controller experience. The urban poor in modern Indonesia, as seen in informal traffic controller groups, shared the opportunity with other group members to assist the drivers so that they may receive the tip as well.

The situation is also similar to the socioeconomic position when Keith Hart, a British anthropologist, coined the informal sector for the first time in 1973 through the activities of a low-income section of the urban sub-proletariat in Ghana, who migrated to the cities in search of better job opportunities. The opposite of the current situation is that the informal traffic controllers originally consisted of local people who resided in the city. According to the interviews, most of the informal traffic controllers are not outsiders. They were marginalized due to the enormous changes in the main cities that infiltrated the peripheral area, which was previously rural.

Informal traffic controllers also exhibit "disguised unemployment," which occurs when employment appears to be working but does not increase total output; hence, such employment is considered no better than no employment at all. Disguised unemployment was widespread in over-populated agricultural areas. Although disguised unemployment has historically occurred in agricultural areas, Jakarta and its peri-urban areas, in particular, are transitioning into over-populated urban areas with persistent rural characteristics. As a result, labor surplus that is not absorbed even by the regular informal sector—in this case, informal traffic controllers—shows that the major cities and new cities fail to offer jobs.

In line with the topic, this study depicts the findings of prior studies performed by Tran (2021) and Esaku (2021), who contend that unemployment and income inequality fuel the shadow economy in developing countries. According to the informal traffic controller study findings, urban unemployment has encouraged individuals to generate income in the underground economy, strengthening the shadow economy. The informal traffic controller is an unrecommended activity because the risks are not worth the reward and do not promise a future. It is essentially unlawful and vulnerable, implying that drivers do not require their assistance. However, they continue to engage in these activities.

Furthermore, the study's implications suggest that the shadow economy was created by institutional failure to anticipate the negative impact of urban development policy. Unemployment and income inequality, which became significant factors in increasing the shadow economy, are also impacted by poor regulation and the weakness of the authority holders who execute the development. The case of informal traffic controllers amid traffic congestion, regardless of local issues, is socially and economically concerning. Although Indonesia is currently classified as a middle-income country, the hidden poverty—depicted by the informal traffic controller activities—that might emerge as a middle-income trap should not be ignored.

## CONCLUSION

The informal or social traffic controller is an informal activity inside urban traffic congestion of groups of predominantly young males in their early productive age assisting four-wheeled drivers to pass the congested road by expecting the tip from the driver to reward their efforts. It is categorized as the mode of production of the informal sector that works inside the shadow economy based on the manner of income generation. The informal traffic controller in traffic congestion activities throughout the Greater Area of Jakarta is a microcosm of the vast and complicated shadow economy framework. However, through the Indonesian context's micro-case, we can understand the shadow economy comprehensively.

The case of informal traffic controllers in the shadow economy framework also reveals the problem behind invisible costs that emerged in congested areas. Traffic congestion might be the surface of the real problem of poor planning in the progressive growth of urban and peri-urban regions, resulting from access disparity to the low-income section. The urban poor strive to live by working in informal, illegal, harmful

underground jobs. This socioeconomic scenario reflects the fact that disparities in the center-periphery area have existed for a long time. On the contrary, due to growth in the central region infiltrating the periphery area, social segregation based on housing and income is happening in the peri-urban area, formerly the outskirts and hinterland area. The issue of the shadow economy in the case of the informal traffic controller correlates with society's moral economy. By rewarding unlawful activity on the road, road users and informal traffic controllers become submissive to coping with traffic congestion. In the case of informal traffic controllers, the shadow economies issue is tied to society's moral economy.

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## Socioeconomic and Demographic Causes of Crime Reporting in Indonesia

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### Abstract

*Studies on the nexus between socioeconomic and demographic factors and crime reporting still need to be completed in Indonesia. Therefore, this study aimed to investigate the socioeconomic and demographic causes of crime reporting in Indonesia using data from the 2021 National Socioeconomic Survey results. The data were analyzed using a binary logistic regression model. The unit of analysis was the population aged 15 years and older. The dependent variable was whether or not someone who experienced a crime reported it to the police. The independent variables were socioeconomic and demographic factors. The results of the study showed that a lower probability of reporting crime to the police was associated with being female, being younger, having higher educational attainment, living in urban areas, living in Java island, and working, implying the need to improve information, education, and communication on crime reporting among these groups.*

### Keywords:

socioeconomic; demographic; crime reporting

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## INTRODUCTION

Crime is an act or negligence act that violates the law. It can harm other people or damage the property of others, including public property. Crime includes threats, abuse, domestic violence, theft, possession of guns or illegal drugs, cybercrime, violence such as sexual assault and murder, and human trafficking. Crime has a negative impact on development, economic growth, and human welfare. Crime often hinders and reduces investment, triggers migration, increases transaction costs, and increases inequality (Jeke, 2021). It damages various factors in a country, including the welfare system, governance, and economic growth (Ghauri et al., 2022). Crime is an illegal act or any behavior that can harm the community (Haskell & Yablonsky, 1983; Mkutu et al., 2017) and can also refer to behavior, both act or negligence, defined by both the constitution and the law, which deserves punishment. Frequently, crime indicates violence (Mkutu et al., 2017). The World Health Organization (2010) defines *violence* as the intentional use of physical force or power, threatened or actual, against oneself, another person, or a group or community, which either results in, or has a high likelihood of resulting in, injury, death, psychological harm, maldevelopment, or deprivation.

Many studies have explained the negative impact of crime on a nation's economic growth and welfare. Crime was the major constraint to economic growth and development in Nigeria (Adekoya & Razak, 2017) and had a negative impact on long-term economic growth in Pakistan (Ahmad et al., 2014). Crime, particularly murder and robbery, had a negative impact on regional economic growth in all states in Mexico (Torres-Preciado et al., 2017). It resulted in an economic burden on society, with the socioeconomic costs of crime borne by society and the economy being relatively substantial (Czabański, 2008).

Official statistics recorded a significant increase in crime during the Gorbachev-Yeltsin era in Russia (Alexeev et al., 1995). Between 1985 and 1993, the number of crimes in general doubled, while the incidence of theft of private and government property tripled. Organized crime also increased. In 1993, a Minister of Internal Affairs report stated that there were as many as 3,000 to 4,000 structured criminal organizations operating throughout Russia. The general effects were economic collapse (Alexeev et al., 1995), loss of social norms, loosening of social norms, and the development of new methods of economic crime.

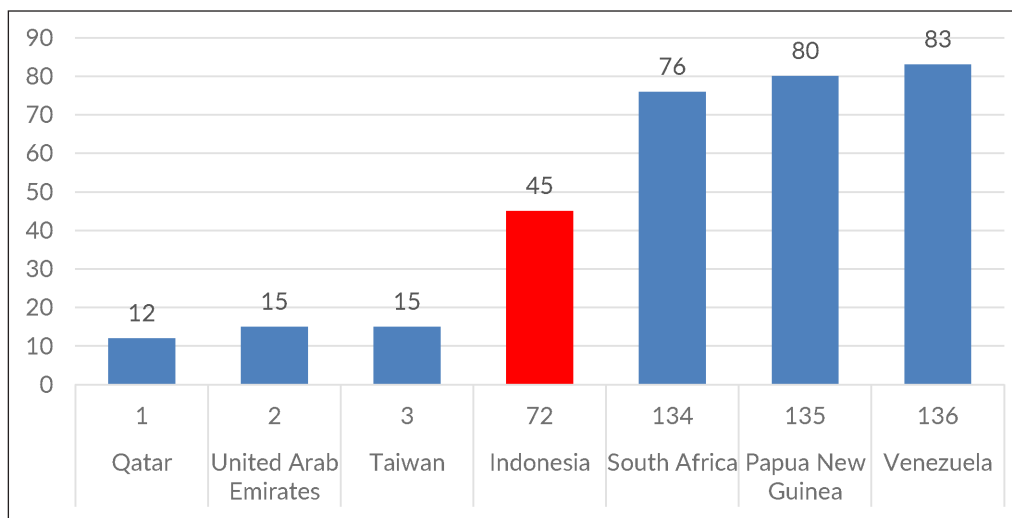
Using panel data from 26 countries from 1995-2009, Goulas and Zervoyianni (2015) found that crimes worsened welfare during bad economic periods and were not harmful when socioeconomic conditions were sufficiently satisfactory. Meanwhile, a study by Bullock et al. (2014) showed that crime had a worse impact on marginalized groups in society, as well as on women and the poor.

Yıldız et al. (2023) studied the causal relationship between crime and economic growth in many countries. They found that the crime rate had a significant and reciprocal relationship with economic growth, democratic governance, unemployment, and urbanization. Crime substantially increases costs to the individual, society, and country (McCollister et al., 2010). The economic benefit is obtained from crime reduction during

worsening economic conditions, pessimistic market sentiment, low return on savings, and low job opportunities. Meanwhile, increasing crime affects large resource allocation, public sector budget, and security expenses (Goulas & Zervovianni, 2015). In addition, crimes, including economic crimes, damage the economic and social stability of not only one country but other countries and reach the whole world. Crime also undermines the rule of law and democracy (Duri, 2021).

Figure 1 shows the countries with the highest and lowest crime rates worldwide. Indonesia ranked 72 out of 136 countries (World Population Review, 2023). The country with the lowest crime rate was Qatar (12 crimes per 100,000 inhabitants), followed by the United Arab Emirates (15) and Taiwan (15). The country with the highest crime rate was Venezuela (83), followed by Papua New Guinea (80) and South Africa (76). The crime rate in Indonesia was 45.

Figure 1. Global Crime Rate in Selected Countries in 2023



Source: World Population Review 2023 (author's compilation)

Victims' decision to report crime incidents to the police was a significant determinant of crime control (Asiama & Zhing, 2022). To understand the rational decision of victims, a binary logistic regression was employed to predict the likelihood of reporting a crime incident to the police, using the assumptions of rational theory and data from the National Crime Panel Victimization in 2018 in the United States. The assumption is that if a crime is reported to the police, there will be a reduction in the number of crimes committed.

The Federal Bureau of Investigation (2021) reported the background of victims who reported crimes in the United States in 2020. Of the 9,362,709 victims who reported, the most significant percentages were between the ages of 26 and 35 (23.8%), female (50.6%), and white (66%). Few studies have been conducted on the demographic and socioeconomic determinants of crime reporting (e.g., Tarling & Morris, 2010; Ranapurwala et al., 2016; Boateng, 2018; Zaykowski et al., 2019; Holliday et al., 2020; Mahasse, 2020). Tarling and Morris (2010) conducted a study using data from the British Crime

Survey. The study results show that those who were more likely to report experiencing crime were those who had higher incomes, worked, lived in underdeveloped areas, and had higher levels of education.

Ranapurwala et al. (2016) conducted a study using the 2008-2012 National Crime Victimization Survey in the United States on the background of victims reporting to the police. The study results show that the victims who tended to report to the police were aged between 20.8 and 52.7 years old, female, Caucasian, non-Hispanic, with a primary education, and with an income of less than \$25,000. Meanwhile, a study in Ghana found that age, marital status, and employment were determinants of whether victims reported crimes they experienced to the police (Boateng, 2018). Older, married, and working victims were more likely to report crimes they experienced to the police.

Zaykowski et al. (2019) conducted a study using data from the National Crime Victimization Survey from 1994 to 2016 in the United States. They found that respondents who were more likely to report the crimes they experienced were less than high school-educated and black females. Meanwhile, Holliday et al. (2020) carried out a study on reporting experienced intimate partner violence (IPV) to the police using the National Crime Victimization Survey from 2011-2015. They found that the respondents who were more likely to report were black women than white women and those between 18 and 35 years old. Further, Mahasse (2020) found that in European Union countries, the number of crime victims who reported to the police after the COVID-19 pandemic was 60% higher among women.

The general purpose of this study was to investigate the socioeconomic and demographic causes of crime reporting in Indonesia. The specific objectives were (i) to study the differences in crime reporting by socioeconomic and demographic factors and (ii) to examine the association between socioeconomic and demographic determinants and crime reporting in Indonesia. Several studies have been conducted on the determinants of crime in Indonesia. However, the number of studies on the determinants of crime reporting in Indonesia needs to be increased. Therefore, it is hoped that the findings from this study will contribute to understanding the nexus of socioeconomic and demographic factors with crime reporting and the policy formulation to improve security through crime reporting

## **METHODS**

This study employed data from the results of the National Socioeconomic Survey (Survei Sosial Ekonomi Nasional/SUSENAS) in 2021. Central Bureau of Statistics conducted the 2021 National Socioeconomic Survey in March 2021. It covered all provinces in Indonesia and was conducted to meet the need for social and economic development data at district, provincial, and national levels, including data on sustainable development goals. The data in this study were taken from individual data from the 2021 National Socioeconomic Survey with the unweighted number of respondents of 1,277,497.

The unit of analysis for this study was the population aged 15 years and over who had ever experienced a crime. The weighted number of the respondents in the study was

2,055,232. The dependent variable was whether the crime experienced was reported to the police ( $Y = 1$ ) or not ( $Y = 0$ ). This variable was formed from the question of whether a respondent had ever experienced at least one crime (R904), the frequency of experiencing theft (R905), the frequency of experiencing abuse (R907), the frequency of experiencing violent theft (R909), and the frequency of experiencing sexual harassment (R911). A value of 0 was assigned if the respondent had never experienced a crime and a value of 1 if the respondent had ever experienced at least one crime. Respondents who ever experienced at least one crime were also asked whether they reported the crime experienced to the police (R914). A value of 0 was assigned if the answer was no ( $Y = 0$ ) and a value of 1 if the answer was yes ( $Y \geq 1$ ), according to the number of crimes experienced and reported.

The independent variables were gender, age, marital status, education, place of residence, island of residence, and work status. Gender was categorized as male (GENDER = 1) and female (GENDER = 0), age was categorized as 15-29 years (AGE = 0), 30-54 years (AGE = 1), and 55+ years (AGE = 2), marital status was categorized as not yet married (MARITAL = 0) and married (MARITAL = 1), education was categorized into no education/not completed primary school/completed primary school (EDUCATION = 0), completed junior secondary school (EDUCATION = 1), completed senior secondary school (EDUCATION = 2), and completed university (EDUCATION = 3), place of residence was divided into urban area (URBAN = 1) and rural area (URBAN = 0), island of residence was grouped into Sumatera (ISLAND = 0), Java (ISLAND = 1), Bali and Nusa Tenggara (ISLAND = 2), Kalimantan (ISLAND = 3), Sulawesi (ISLAND = 4), and Maluku and Papua (ISLAND = 5), and work status was classified as working (WORK = 1) and not working (WORK = 0).

Data in this study were analyzed using univariate, bivariate, and multivariate analyses to assess sample characteristics, the percentage distribution of those who reported crime by demographic and socioeconomic factors, and the demographic and socioeconomic causes of crime reporting. A binary logistic regression model was used to investigate demographic and socioeconomic factors of crime reporting. This model has also been employed in a number of studies of crime reporting to the police (Kwak et al. 2019; Pulenyane & Montshiwa 2020; Asiama & Zhong 2022; McCann & Boateng 2022; Yigzaw et al. 2023; Shahbazov et al. 2023). The model was as follows:

$$\ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 \text{GENDER} + \beta_{21} \text{AGE1} + \beta_{22} \text{AGE2} + \beta_3 \text{MARITAL} + \beta_{41} \text{EDUCATION1} + \beta_{42} \text{EDUCATION2} + \beta_{43} \text{EDUCATION3} + \beta_5 \text{URBAN} + \beta_{61} \text{ISLAND1} + \beta_{62} \text{ISLAND2} + \beta_{63} \text{ISLAND3} + \beta_{64} \text{ISLAND4} + \beta_{65} \text{ISLAND5} + \beta_7 \text{WORK} + \varepsilon$$

In the model,  $p$  is the probability of reporting a crime to the police. Meanwhile,  $\beta_0$  is the model intercept,  $\beta_{kj}$  is the regression coefficient of the  $j$ th category of the  $k$ -th independent variable  $k$ , with  $k = 1, 2, \dots, 7$ , and  $\varepsilon$  is the error term.

The diagnostic test of multicollinearity was performed using the correlation coefficient. In addition, to measure the overall goodness of fit, Hosmer-Lemeshow test and Chi-square ( $\chi^2$ ) test were also performed. Furthermore, a scalar measure of the goodness of fit test of the was done by employing the Nagelkerke coefficient of determination ( $R^2$ ).

## RESULTS AND DISCUSSION

The results of the univariate, bivariate, and multivariate analyses are presented in Tables 1, 2, and 3, respectively. Table 1 shows that 90.4% of the respondents reported the crime they experienced to the police. In addition, the majority of the respondents were male (64.9%), were aged 30 to 54 years (44.6%), married (82.4%), had completed senior secondary school (34.2%), lived in urban areas (67.7%), lived on the island of Java (52.3%), and worked (74.0%). The results of the bivariate analysis are presented in Table 2. It can be seen that the percentage of those aged 15 years and older who experienced crime and reported to the police was higher among those who were male, aged 55 years and older, married, had no education, or had not completed primary school or had completed primary school, lived in rural areas, lived on the islands of Bali and Nusa Tenggara, and did not work.

**Table 1. Percentage Distribution of Victims of Crime by Background Characteristics**

| Background Characteristics                                               | Number of Observation | Percentage   |
|--------------------------------------------------------------------------|-----------------------|--------------|
| <b>Reported Crime to the Police</b>                                      |                       |              |
| Yes                                                                      | 1,857,525             | 90.4         |
| No                                                                       | 197,707               | 9.6          |
| <b>Gender</b>                                                            |                       |              |
| Male                                                                     | 1,333,615             | 64.9         |
| Female                                                                   | 721,617               | 35.1         |
| <b>Age (years)</b>                                                       |                       |              |
| 15-29                                                                    | 210,799               | 10.0         |
| 30-54                                                                    | 943,463               | 44.6         |
| 55+                                                                      | 757,832               | 35.9         |
| <b>Marital Status</b>                                                    |                       |              |
| Not yet married                                                          | 362,331               | 17.6         |
| Married                                                                  | 1,692,901             | 82.4         |
| <b>Education</b>                                                         |                       |              |
| No education/not completing primary school/<br>completing primary school | 701,219               | 34.1         |
| Completing junior secondary school                                       | 410,197               | 20.0         |
| Completing senior secondary school                                       | 702,198               | 34.2         |
| Completing university                                                    | 241,618               | 11.8         |
| <b>Place of Residence</b>                                                |                       |              |
| Urban                                                                    | 1,390,536             | 67.7         |
| Rural                                                                    | 664,696               | 32.3         |
| <b>Island of Residence</b>                                               |                       |              |
| Sumatra                                                                  | 532,031               | 25.9         |
| Java                                                                     | 1,074,364             | 52.3         |
| Bali and Nusa Tenggara                                                   | 125,482               | 6.1          |
| Kalimantan                                                               | 105,260               | 5.1          |
| Sulawesi                                                                 | 152,743               | 7.4          |
| Maluku and Papua                                                         | 65,352                | 3.2          |
| <b>Work Status</b>                                                       |                       |              |
| Working                                                                  | 1,520,948             | 74.0         |
| Not working                                                              | 534,284               | 26.0         |
| <b>Total</b>                                                             | <b>2,055,232</b>      | <b>100.0</b> |

Source: 2021 National Socioeconomic Survey (author's compilation)

The results of the multivariate analysis are presented in Table 3. It can be seen that statistically significant demographic and socioeconomic causes of crime reporting in Indonesia were gender, age, education, place of residence, island of residence, and work status. The results of the diagnostic test of the multicollinearity showed that no correlation coefficient was more significant than 0.70, and therefore, there was no multicollinearity between independent variables in the model. In addition, the overall goodness-of-fit test results showed that the model fit at the significance level of  $< 0.001$ . Further, the Nagelkerke coefficient of determination ( $R^2$ ) was 0.049, which means that the model can explain 4.9% of the variation in the probability.

**Table 2. Percentage Distribution of People Who Experienced and Reported Crime by Background Characteristics**

| Background Characteristics |                                                                                 | Experienced and Reported Crime to the Police |         | Total (%) |
|----------------------------|---------------------------------------------------------------------------------|----------------------------------------------|---------|-----------|
|                            |                                                                                 | No (%)                                       | Yes (%) |           |
| <b>Gender</b>              |                                                                                 |                                              |         |           |
|                            | Male                                                                            | 8.4                                          | 91.6    | 100.0     |
|                            | Female                                                                          | 11.9                                         | 88.1    | 100.0     |
| <b>Age (years)</b>         |                                                                                 |                                              |         |           |
|                            | 15-29                                                                           | 10.4                                         | 89.6    | 100.0     |
|                            | 30-54                                                                           | 9.7                                          | 90.3    | 100.0     |
|                            | 55+                                                                             | 8.4                                          | 91.6    | 100.0     |
| <b>Marital Status</b>      |                                                                                 |                                              |         |           |
|                            | Not yet married                                                                 | 9.8                                          | 90.2    | 100.0     |
|                            | Married                                                                         | 9.6                                          | 90.4    | 100.0     |
| <b>Education</b>           |                                                                                 |                                              |         |           |
|                            | No education/not having completed primary school/having complete primary school | 7.2                                          | 92.8    | 100.0     |
|                            | Having completed junior secondary school                                        | 9.6                                          | 90.4    | 100.0     |
|                            | Having completed senior secondary school                                        | 11.0                                         | 89.0    | 100.0     |
|                            | Having completed university                                                     | 12.6                                         | 87.4    | 100.0     |
| <b>Place of Residence</b>  |                                                                                 |                                              |         |           |
|                            | Urban                                                                           | 10.5                                         | 89.5    | 100.0     |
|                            | Rural                                                                           | 7.8                                          | 92.2    | 100.0     |
| <b>Island of Residence</b> |                                                                                 |                                              |         |           |
|                            | Sumatra                                                                         | 5.7                                          | 94.3    | 100.0     |
|                            | Java                                                                            | 12.6                                         | 87.4    | 100.0     |
|                            | Bali and Nusa Tenggara                                                          | 6.0                                          | 94.4    | 100.0     |
|                            | Kalimantan                                                                      | 10.7                                         | 89.3    | 100.0     |
|                            | Sulawesi                                                                        | 6.0                                          | 94.0    | 100.0     |
|                            | Maluku and Papua                                                                | 5.9                                          | 94.1    | 100.0     |
| <b>Work Status</b>         |                                                                                 |                                              |         |           |
|                            | Working                                                                         | 9.9                                          | 90.1    | 100.0     |
|                            | Not working                                                                     | 8.7                                          | 91.3    | 100.0     |
| <b>Total</b>               |                                                                                 | 9.6                                          | 90.4    | 100.0     |

Source: 2021 National Socioeconomic Survey (Author's compilation)

The results of the multivariate analysis showed that a higher probability of reporting crime to the police was associated with being male, being aged 30-54 years, having no education or not having completed primary school or having completed primary school, living in rural areas, living on Sumatra Island, and not working. The result shows that males were 1.7 times more likely to report the crime to the police than females. Second, those who were aged 30-54 years were 1.06 times more likely to report the crime to the police than those who were aged 15-29 years. Third, those who completed university education were 0.6 times less likely to report the crime to the police than those who had no education, had not completed primary school, or had completed primary school. Fourth, those who lived in urban areas were 0.98 times less likely to report the crime to the police than those who lived in rural areas. Fifth, those who lived on Java Island were 0.41 times less likely to report the crime to the police than those who lived on Sumatra Island, and (vi) those who were working were 0.7 times less likely to report the crime to the police than those who were not working.

**Table 3. Odds Ratio from the Binary Logistic Regression of the Determinants of Crime Reporting**

| Covariates                                                                                               | Odds Ratio [95% CI] | p-value |
|----------------------------------------------------------------------------------------------------------|---------------------|---------|
| <b>Gender (ref: Female)</b>                                                                              |                     |         |
| Male                                                                                                     | 1.659 [1.642-1.676] | < 0.001 |
| <b>Age (years) (ref: 15-29)</b>                                                                          |                     |         |
| 30-54                                                                                                    | 1.059 [1.045-1.074] | < 0.001 |
| 55+                                                                                                      | 1.032 [1.014-1.050] | <0.001  |
| <b>Marital Status (ref: Not yet Married)</b>                                                             |                     |         |
| Married                                                                                                  | 1.002 [0.986-1.018] | 0.802   |
| <b>Education (ref: No Education/Not Having Completed Primary School/Having Completed Primary School)</b> |                     |         |
| Having completed junior secondary school                                                                 | 0.718 [0.708-0.729] | < 0.001 |
| Having completed senior secondary school                                                                 | 0.599 [0.591-0.607] | < 0.001 |
| Having completed university                                                                              | 0.537 [0.528-0.545] | < 0.001 |
| <b>Place of Residence (ref: Rural Area)</b>                                                              |                     |         |
| Urban                                                                                                    | 0.976 [0.965-0.987] | < 0.001 |
| <b>Island of Residence (ref: Sumatra Island)</b>                                                         |                     |         |
| Java                                                                                                     | 0.411 [0.406-0.417] | < 0.001 |
| Bali and Nusa Tenggara                                                                                   | 0.922 [0.898-0.946] | < 0.001 |
| Kalimantan                                                                                               | 0.487 [0.476-0.498] | < 0.001 |
| Sulawesi                                                                                                 | 0.952 [0.929-0.975] | < 0.001 |
| Maluku and Papua                                                                                         | 0.978 [0.944-1.013] | 0.208   |
| <b>Work Status (ref: Not working)</b>                                                                    |                     |         |
| Working                                                                                                  | 0.701 [0.692-0.709] | < 0.001 |
| <b>Constant</b>                                                                                          | 21.984              | < 0.001 |

Source: 2021 National Socioeconomic Survey (author's compilation)

The results of this study support the results of previous studies on the importance of demographic and socioeconomic factors on the likelihood of reporting crime to the police (e.g., Tarling & Morris, 2010; Ranapurwala et al., 2016; Boateng, 2018; Zaykowski

et al., 2019; Holliday et al., 2020; Mahasse, 2020). The higher likelihood of reporting crime to the police for male victims may be because male victims were more brave than female victims. Meanwhile, female victims were less likely to report crimes because it felt inconvenient to report crimes experienced.

The greater likelihood of reporting crime among older victims may have been because older victims had more experience and maturity in handling problems they experienced, including crime, than younger victims. In addition, older victims might think that all crimes should be reported or that it is the right thing to do. Meanwhile, a lower probability of crime reporting among younger victims might be caused by fear of reprisal.

In addition, a lower likelihood of reporting crime among higher-educated victims may be because they could cope with and justify the crime more than lower-educated victims. In addition, higher-educated victims might think that police could do nothing or would not be interested. Meanwhile, a lower probability of reporting crime among lower-educated victims might cause them to hope that the offenders would be caught or punished.

Further, the greater likelihood of reporting crime experienced in rural areas and on Sumatra Island might be because rural residents and Sumatrans had higher courage than their rural counterparts and those who lived on other islands, respectively. In addition, rural and Sumatran victims might think the crimes were serious, significant, or upsetting. Meanwhile, a lower probability of reporting crime among victims in urban areas and Java might be because they think the crime was too trivial or a common occurrence and also because they have no loss.

Furthermore, there is a higher likelihood of reporting crimes experienced by those not working because they needed more financial security and more time to report than their working counterparts. In addition, non-working victims might hope to prevent the recurrence of the crime or hope that the property would be recovered. Meanwhile, a lower probability of crime reporting among working victims could be caused by the fact that they reported the crime to other authorities.

## CONCLUSION

The results of this study show that 90.4% of the population aged 15 years and above who experienced crime reported the crime to the police. The percentage of those who reported the crime to the police was higher among those who were male, aged 55 years and above, married, had no education, had not completed primary school, or had completed primary school, lived in rural areas, lived on the islands of Bali and Nusa Tenggara, and did not work. After controlling for other factors, the likelihood of reporting the crime was higher among those who were male, aged 30-54 years, had no education, had not completed primary school and had completed primary school, lived in rural areas, lived on Sumatra Island, and did not work.

This study found that the probability of crime reporting was lower among females and younger adults who have higher education, live in urban areas, live on Java Island,

and work. These findings imply the need to improve the information, education, and communication about crime reporting, particularly among these groups, in the policy formulation to improve the security of the people of Indonesia. A limitation of this study is that the analysis of the socioeconomic and demographic causes of crime reporting did not include crime-related factors, such as the type of crime and offender characteristics. However, this limitation should not profoundly influence the results, and this study still contributes to the study of crime reporting.

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## Does Indonesia's High Level of Corruption Affect Its Trade Volume?

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### Abstract

*This article aims to examine the connection between corruption and the amount of trade in several commodities, including raw materials, capital goods, intermediate products, and consumer goods, with a specific emphasis on the Indonesian situation. Indicators of corruption utilized in this article include the Corruption Perception Index (CPI) and the Control of Corruption (COC). Meanwhile, the sum of Indonesia's exports and imports indicated the country's trade volume. For this issue, this article employs the gravity model and regresses it with either a fixed effect or a random effect model. The empirical findings show that both the CPI and COC levels of corruption in Indonesia have a negative impact on the amount of trade in capital goods. However, only the CPI shows a negative correlation with the prevalence of corruption in Indonesia, whereas consumer products, intermediate goods, and raw materials all show a positive correlation. The impact of COC on Indonesia's trade partners is complicated for the commodities this article looked at. The insights generated from this study hold significant value in shaping a more informed and accurate representation of how corruption permeates and impacts international trade dynamics, thus contributing to a more nuanced understanding of this critical issue.*

### Keywords:

corruption; trade volume; gravity model

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## INTRODUCTION

The economic impacts of corruption are difficult to pin down. Mauro (1995) suggests this might harm economic development, foreign direct investment (FDI), public investment, and trade. It is common knowledge that these investigations will bear fruit in the future (Huntington, 1968; Leff, 1964). Therefore, the quality of institutions may be inferred from levels of corruption, and economic development is influenced by corruption. Corruption has a variety of negative effects on international business. Numerous studies point to corruption as a factor that makes international trade more difficult. Most of their research indicates that corruption hinders international trade (Gil-Pareja et al., 2019; Saputra, 2019; Xiao et al., 2018). Corruption might undermine import limitations in countries with weaker currencies than others.

The literature on corruption and trade that is now available brings up three issues. To begin, a sampling of countries. The subject matter of archival writing is often a collection of states. De Jong & Bogmans (2011) took a sample from 190 countries. Misleading trade flow proxies have the potential to induce misunderstanding. Because market share does not imply trade flow at an "absolute level." It concluded that corruption does not boost export volume. The last problem is with the corrupted proxy. Others believe public opinion corruption indices such as the CPI, ICRG, and WBES are pointless. The number of countries represented by each indicator varies. As a result, judgments drawn from actual evidence are constrained. Since it is impossible to judge levels of corruption directly, many scholars use indices of corruption instead. The second constraint, on the time available for observation, leads to the third limitation. Many types of study use cross-country analysis since there are so few indications of corruption. Because of this, it is challenging to quantify corruption's long-term consequences on businesses and the causes they support (de Jong & Bogmans, 2011).

In light of these challenges, this essay investigates how corruption affects trade in Indonesia. In contrast to other studies, this paper investigates just the transaction volume involving four different commodities. The purpose of this technique is to get an understanding of how corruption impacts various things. We choose goods for the benefit of consumers, producers, and shareholders. The Corruption Perception Index (CPI) from Transparency International and the Control of Corruption (COC) from the Worldwide Governance Indicator will be used in this study. Indonesia's potential to export goods and attract foreign investment may suffer due to the country's widespread corruption. According to Henderson & Kuncoro (2004), local businesses view corruption as costly since bribing officials involves a more significant investment of time and capital. Using data from 2001, they discovered that businesses bribe 8% of public officials and pay 1% to local police. Investors from other countries believe that corruption is a significant problem in Indonesia.

Corruption is said to hurt business. Actual results by Ades & di Tella (1997), Musila & Sigué (2010), and Treisman (2007) supported this approach. Ades & di Tella (1997) used the Business International Corruption Index (BI Index) and the World

Competitiveness Report to study corruption reasons in different countries. They found that higher GDP imports hurt corruption. Ades & di Tella (1997) and Treisman (2007) employed a GDP proxy for imports to investigate corruption sources across nations. They measured trade openness using import value and imports as a % of 1980 GDP. He utilized the CPI and BI as independent variables. The variables are insignificant for every regression, as evidenced by his WLS and OLS estimates. Unlike the preceding two kinds of literature, Musila & Sigué (2010) examined corruption and business differently. As a dependent variable, corruption determined trade volume. Export/import volume signified trade, but CPI and BI indices denoted corruption. The gravity model was used to construct a corruption problem in international trade encompassing 47 African states and 180 trading partners. OLS, Tobit, and WLS estimated the relationship between African trading partner corruption and exports and imports.

Corruption has varying effects on international trade. Through an institutional analysis, it is found that foreign aid, such as official development assistance and aid for trade, can moderate the negative impact of corruption on international trade (Bahoo et al., 2022). The World Trade Organization (WTO) has increasingly addressed the issue of corruption in international trade. It has taken a clear-cut approach to incorporate anticorruption measures and values within its framework. Studies have shown that corruption acts as a barrier to international trade, mainly through bureaucratic mechanisms of trade and investment licensing (Atsir & Sunaryati, 2018; Gil-Pareja et al., 2019). While perception-based indexes show a negative effect of corruption on trade, the "grease the wheels" view is supported by a structural index, especially in low and middle-income countries (Jayachandran, 2020). Additionally, corruption has been found to affect bilateral exports of goods from Vietnam to its trading partners (Cooray, 2009).

De Jong & Bogmans (2011) empirical study confirms this strategy, which predicts exporters' premiums or bribes. The logarithm of 2002 bilateral exports was their trade-dependent variable. Corruption was a priority variable assessed using broad corruption indices, its direct relationship to trade, and its intrinsic unpredictability. Dutt and Traca (2010) argued the conflict between corruption and trade protection. Manufacturing exports and imports from 122 countries are the dependent variables, the ICRG Index is a proxy for corruption, and tariffs quantify trade protection. A corruption-augmented gravity model, panel data, and OLS estimate showed that import tariffs by the importing country relate to corruption's impact on international trade. Their investigations showed a negative correlation between corruption and business, particularly with low tariffs. Paradoxically, pleasant connotations with corruption raise tariffs. Corruption aids business here.

In their investigation of international trade corruption, de Jong & Bogmans (2011) found similar outcomes. They investigated whether corruption hampers or benefits global trade. They averaged bilateral export data from 1999 to 2002 and constructed nine corruption indices from the Corruption Perceptions Index and the World Bank's Economic Survey to represent worldwide business. Based on corruption, they categorized the world's countries into four groups. Thus, 73 countries are in Group 1, 83 in Group 2,

26 in Group 3, and 8 in Group 4. They estimated using Baier Bergstrand OLS regression with a gravity model. They usually find that corruption hurts international trade using WBES corruption levels. However, corruption and institution quality indicators show the opposite. Corruption increases imports, according to one study.

Finally, Thede & Gustafson (2012) found comparable results. They analyzed corruption variables' effects on import flow compared to numerous representation approaches. Corruption is further distinguished by its severity, frequency, geographic concentration, practical impact, and predictability. This corruption indicator was created in 1999 using data from 32 post-communist Eastern European and sub-Saharan African countries and the World Business Environment Survey (WBES). They employed the Generalized Method of Moments (GMM) to investigate Anderson and Marcouiller's (2002) modified gravity approach and discovered that corruption's features hurt economic trade. Their results, like De Jong & Bogmans (2011), support the premise that corruption hurts a country's import flow. Their study also showed a positive coefficient variable of a constrained corruption function, proving corruption's benefits. This result showed them that corrupt activities pay off, particularly when it comes to opening new markets to foreign product importers.

Corruption's impact on economic trade was analyzed using a gravity approach. The results varied depending on the measures of corruption used. Perception-based indexes showed a negative effect of corruption on trade, but this effect was not widespread. However, a structural corruption index revealed evidence of a "grease the wheels" view, particularly in low and middle-income countries—differences in corruption levels also negatively impacted trade. Membership in regional trade agreements did not significantly alter these results (Men, 2022). A study specifically focused on the relationship between corruption and agricultural trade found that corruption can be trade-taxing when the protection level is low. However, with a higher degree of protection, corruption becomes trade-enhancing. These results were consistent across different measures of corruption (Pastpipatkul et al., 2017; Abidin et al., 2016).

Corruption affects Indonesia's business in many ways. Use laws and regulations first. The latter includes trade protection and low government pay (Setiyono & McLeod, 2010; Mc Leod, 2008). Both theoretical and empirical studies point to these criteria as essential in influencing the incidence of corrupt activities, including bribery, illegal logging, smuggling, and trade favoritism. According to Men (2022), specific policies that cause economic inefficiency foster corruption. In practice, customs officials are typically blamed for corruption's harmful effects on international trade. According to Dutt (2009) and Dutta & Kar (2018), corrupt officials may facilitate export and import operations to avoid high tariffs. When trade restrictions are high, smuggling is one of the various ways to move goods. Another example is beef import quotas. Second, products and services are acquired.

Men (2022) analyzes the impact of corruption on trade flows in Indonesia using the gravity model. The study introduces the Corruption Perceptions Index (CPI) and its secondary items as explanatory variables and constructs balanced panel data. The findings

show that corruption in Indonesia has an inverted U-shaped relationship with its imports. Additionally, corruption in Indonesia and its trading partners leads to short-term growth in bilateral trade flows but fails to achieve sustained and healthy trade development. The study suggests that reforms in the legal system and anticorruption measures should be implemented to promote the prosperity and development of Indonesia's external trade.

The research gap in this paper is due to a need for a clear and complete knowledge of how corruption affects trade in Indonesia. While various studies are included, they must comprehensively study this connection in the Indonesian context. Furthermore, the specific commodities chosen for investigation and their relation to Indonesia's more significant trade dynamics are not fully described. The ambiguity in corruption's effect on trade volume, with some research finding positive impacts in specific circumstances, needs to be adequately addressed, and there is a need to investigate the implications of corruption on trade and economic growth in the country.

This study provides a substantial contribution to comprehending the influence of corruption on international trade, focusing specifically on the context of Indonesia. By adopting a more specialized contextual lens, the research offers a comprehensive and customized examination of the impact of corruption on domestic trade. Including several perspectives adds complexity to the existing literature on corruption and trade, enhancing our comprehensive understanding of the various mechanisms at play.

## METHODS

The gravity model is commonly used to investigate bilateral trade between two countries. This model utilized Newton's theory concerning gravitational force. The fundamental gravity model for the trade problem is as follows:

$$\ln \text{TRD}_{ij} = \alpha_1 \ln \text{GDP}_i + \alpha_2 \ln \text{GDP}_j - \alpha_3 \ln D_{ij} + \varepsilon_{ij}, i \neq j \quad (1)$$

The equation explains that bilateral trade between country  $i$  and  $j$ ,  $\text{trade}_{ij}$ , is determined positively by  $\text{GDP}_i$  is national income of country  $i$ ,  $\text{GDP}_j$  is national income of country  $j$ , and negatively by physical distance between country  $i$  and  $j$ ,  $D_{ij}$ .

The gravity model is modified to handle economic difficulties. GDP and distance in this model explain bilateral trade. Distance measures transportation costs, whereas GDP measures trade volume. Linnemann (1966) and Prais (1967) improved this model by adding population as a second measure of country size. The "augmented gravity model" describes this hypothesis. Proxy, or "gravity dummies," such as a common language, colonial past, or border, are used to explain trade movements between states. Gravity sandbags will be used to improve long-term memory. When studying governance's impact on trade, several studies consider corruption. Researchers use corruption indices to measure a nation's corruption. TI's CPI and WGI's COC are indices. This study will incorporate these indicators into the modified gravity model to quantify corruption's impact on international business.

This paper builds on De Jong & Bogmans (2011) and Akbarian & Shirazi (2012) to simulate corruption and trade volume in an economic environment. We will not

use common colonizer, colonial connections, or corruption squared like their models. Indonesia had just three conquerors, whereas our analysis included over 35 countries. Thus, the first two variables cannot affect it. The third variable shows an inverted U-shaped non-linear relationship between corruption and export and import countries (Dutt & Traca, 2010). However, this variable is confirmed to be substantially associated with other model components. Thus, their updated gravity model after removing these elements is as follows:

$$\ln \text{TRD}_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln \text{GDP}_{it} + \alpha_2 \ln \text{GDP}_{jt} + \alpha_3 \ln \text{POP}_{it} + \alpha_4 \ln \text{POP}_{jt} + \alpha_5 \ln \text{DST}_{ij} + \alpha_6 \text{CBR}_{ij} + \alpha_7 \text{LNG}_{ij} + \alpha_8 \text{COR}_{it} + \alpha_9 \text{COR}_{jt} + \varepsilon_{ijt} \quad (2)$$

In the equation (2), *i*, *j*, and *t* indicate country *i*, country *j*, and time *t* respectively. Trade stands for export or import volume. GDP, DST, and POP comes from basic gravity model representing national income, distance measured from one capital city to another capital city, and population in a country respectively. Other variables which are widely used in gravity model are CBR and LNG. Where CBR denotes for common border and LNG is common language. Additional variable used to proxy corruption level is COR. Finally,  $\varepsilon_{ijt}$  is an error term assumed as well-behaved.

Instead of focusing on two countries like in equation (2), this research will examine the effect of corruption on trade in Indonesia using two proxies for corruption. The Corruption Perception Index (CPI) and the Control of Corruption Index (CC) will be surrogates for corruption. Both are used to gauge how well governments combat corruption. Both measures rely on the interpretation and summarization of survey data. Nonetheless, these two metrics have a high degree of consistency (about 98 percent). According to de Jong & Bogmans (2011), this high agreement between the two indicators may signify a "great consensus" among academics who advocated for both developments. While the Corruption Perceptions Index (CPI) focuses on this issue, CC is only one of several indicators of institution quality in the World Governance Index (WGI). Therefore, the equation (2) can be written into two different equations as follows:

$$\ln \text{TRD}_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln \text{GDP}_{it} + \alpha_2 \ln \text{GDP}_{jt} + \alpha_3 \ln \text{POP}_{it} + \alpha_4 \ln \text{POP}_{jt} + \alpha_5 \ln \text{DST}_{ij} + \alpha_6 \text{CBR}_{ij} + \alpha_7 \text{LNG}_{ij} + \alpha_8 \text{CPI}_{it} + \alpha_9 \text{CPI}_{jt} + \varepsilon_{ijt} \quad (3)$$

$$\ln \text{TRD}_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln \text{GDP}_{it} + \alpha_2 \ln \text{GDP}_{jt} + \alpha_3 \ln \text{POP}_{it} + \alpha_4 \ln \text{POP}_{jt} + \alpha_5 \ln \text{DST}_{ij} + \alpha_6 \text{CBR}_{ij} + \alpha_7 \text{LNG}_{ij} + \alpha_8 \text{COC}_{it} + \alpha_9 \text{COC}_{jt} + \varepsilon_{ijt} \quad (4)$$

The disparities among equation (2), (3), and (4) are at index *i* and the addition of variable COC. Equation (2) use index *i* for many countries while equation (3) and (4) use the index to stand for Indonesia and *j* is for Indonesia's trading partner. In addition, equation (2) and (3) utilize corruption indicators (CPI) from TI whereas equation (4) derive corruption indicator (COC) from WGI. To understand how corruption impacts commodities, they are divided into four groups. Products comprise intermediate, final, raw, and capital products. To properly classify imported and exported commodities, equations (5), (6), (7), and (8) will have the trade symbol rearranged into four equations. *X* indicates export. This paper will abbreviate the export of raw materials (XRAW), produced capital

(XCAP), intermediates (XIMD), and completed consumer items (XCNS). When X is replaced by M indicates imports.

$$\ln XTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 CPI_{it} + \alpha_9 CPI_{jt} + \varepsilon_{ijt} \quad (5)$$

$$\ln XTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 COC_{it} + \alpha_9 COC_{jt} + \varepsilon_{ijt} \quad (6)$$

$$\ln MTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 CPI_{it} + \alpha_9 CPI_{jt} + \varepsilon_{ijt} \quad (7)$$

$$\ln MTRD_{ijt} = \alpha_0 + \alpha_{ij} + \alpha_1 \ln GDP_{it} + \alpha_2 \ln GDP_{jt} + \alpha_3 \ln POP_{it} + \alpha_4 \ln POP_{jt} + \alpha_5 \ln DST_{ij} + \alpha_6 CBR_{ij} + \alpha_7 LNG_{ij} + \alpha_8 COC_{it} + \alpha_9 COC_{jt} + \varepsilon_{ijt} \quad (8)$$

This paper consists of 122 countries covering 10-year period, from 2013 to 2022. Trade volume and GDP information are available elsewhere. Bilateral trade volume figures use World Bank WITS. Akbarian & Shirazi (2012) advocate measuring bilateral trade in US dollars per thousand. In this article, raw material goods, capital goods, intermediate goods, and consumer products are treated as different commodities rather than a single trading volume. This categorization aims to gather additional data about corruptible goods. This article estimated GDP (US \$ constant 2005) and population using the World Bank's WDI database.

In this paper, distance, population, and language determine gravity. CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) provides all statistics except population, which comes from the World Development Indicators. Distance represents transportation costs when exporting or importing products. The unit is kilometers. There may be several meanings for "population". Exporting nations' populations represent their workforces. Meanwhile, the importing nation's population indicates market size. This article uses LNG and CBR as dummies. They are 1 if Indonesia and its trading partners share a border or ethnic language, 0 otherwise.

## RESULTS AND DISCUSSION

Panel data may be estimated using three methods: Pooled Regression Model (PRM), Fixed Effect Model (FEM), and Random Effect Model (REM), each employing a unique dataset. FEM and REM are the primary focus of this study. Which strategy works best will be determined by the Hausman test. The first dataset's Hausman test shows many export/import models. In the export model, REM works for raw materials and FEM for others.

In contrast, import models should employ FEM for intermediate products and REM for raw materials, capital goods, and consumer goods. The Hausman test is done on the second dataset using three methods depending on whether the corruption index is included. The model is tested using just the CPI as a fraud indicator. The model is tested with and without CPI in the equations. Finally, the model is evaluated using the

CPI and COC as corruption indicators. Only the capital goods export model implies a strategy change, while the others trend in the same direction. REM should be used if our intermediate product export model utilizes one corruption indicator and FEM if it employs both. Raw resources and consumer items are better exported through REM, whereas FEM best exports capital goods. No matter the corruption indicator, the Hausman test for import models gives consistent recommendations. The best approach for each model is REM.

The models using the initial dataset (see Table 1 and Table 2) estimate Indonesia's GDP (GDP(i)) with an unexpected sign, but not its trading partner's GDP (GDP(j)). The export of capital goods model has an unexpected sign, although the export and import models demonstrate statistical significance for GDP(i). Exports and imports of raw materials positively correlate with GDP(i), adjusting for other factors. This finding aligns with several studies analyzing the relationship between exports, imports, and GDP in different countries and periods (Choi & Lee, 2019; Ria et al., 2023; Uslu, 2016). These studies have shown that exports and imports are crucial to economic growth. While some studies have found a positive correlation between exports and GDP, indicating that an increase in exports can lead to higher GDP, other studies have also highlighted the importance of imports in driving economic growth. Overall, the evidence suggests that exports and imports of raw materials can positively impact GDP. The variable differs dramatically between exclusion and corruption index inclusion in the import model. The GDP(i) significance level linked to export volume is 1.8% in the first treatment and 3.7% in the second. First-treatment raw material exports and purchases grew by 4.9%, and the second-import model by 7.7%.

In the export and import model of intermediate products and consumer goods, GDP(i) predicts higher Indonesian income increases trade in both categories of commodities. GDP(j), Indonesia's trading partners' GDP, exhibits expected but minor signals for exporting intermediate goods and buying raw materials. Indonesia's GDP(i) and trading partner's GDP(j) estimates from the second dataset match those from the first. The second set of models shows that Indonesia's GDP(i) does not influence intermediate product exports or imports but does on capital goods (negative) and other commodities. GDP(i) has a statistically significant negative effect on capital and consumer goods imports in the export model. In the import model, this variable boosts trade volume for raw materials and final consumer goods across all treatments. Except for raw material imports, Indonesia's trading partners' GDP(j) has a substantial coefficient with the correct sign in practically all export and import models.

Indonesia's population shows that POP(i) negatively affects exports and imports, except for capital goods, where GDP(i) exports are shockingly positive. The negative POP(i) values for capital, intermediate, and consumer products indicate a fall in Indonesia's exports as the population expands. Indonesia's rising domestic demand will reduce imports of raw materials, capital goods, intermediate products, and consumer goods. Some studies done by Bojnec & Fertő (2017) and Chi & Kilduff (2010) have also revealed that population size, economic development, and geographic distance

influence exports and imports, with factors such as trade orientation, manufacturing importance, and high-technology goods also playing a role. Since the unexpected result is only in one model, export of capital goods, and because it is likely to be related to the crisis phenomena causing a significant drop in Indonesian trade volume, it may be reasonable to allow multicollinearity among POP(i), GDP(i), and CPI(i) for the export model. Negative POP(i) signals may be inappropriate for import models for many reasons.

The second dataset has more observations than the first. Therefore, regressions on Indonesia's population, POP(i), and other nations' populations perform better. The coefficient for POP(i) in the first dataset negatively influenced exports and imports for consumer items alone in the second dataset's model. Capital goods imports are positive. Hence, a 1% population growth might raise imports by 25% and 22%. Other items appear unaffected by POP(i). In Indonesia, a 1% increase in POP(j) decreases capital goods imports by 0.3%, raw material exports by 0.5%, and imports by 1.3% to 1.4%.

The export model for the first dataset demonstrates that changing distance travel time (DST) affects only raw commodities. Because this variable is not affected by the passage of time, FEM cannot be utilized to analyze consumer, intermediate, or capital products. When corruption is eradicated, an increase of one percent in distance is detrimental to exporting raw materials. The relevance of corruption was not affected in any way by its inclusion in the model (Olney, 2016). The gap is still considerable and unfavorable. No matter what treatment or model is used, the variable is always found to have a negative value in the import model that is based on the first dataset. This aspect is essential to the capital and consumer product market models. When routes are excessively lengthy, exporters and importers become less eager to travel (Fitzgerald & Haller, 2014; Larch et al., 2016). The regression analysis findings support the hypothesis performed on the second dataset, although DST is not statistically significant for some commodities (Jun, 2022). The increase in distance will make it more difficult for Indonesia to export and import raw materials, consumer products, capital goods, and intermediate goods. This one is moot since the model for exporting capital goods employs FEM, eliminating time-dependent variables like this one. The DST coefficient in the model for importing intermediate products is significantly on the negative side.

The first data set demonstrates that a shared border has little influence on the exports and imports of some different commodities. In contrast, LNG significantly affects the trade of just one product. The CBR and LNG coefficients in the export model are insignificant. A one percent increase in language may result in a 1.9 percent decrease in imports of capital goods (where CPI is not included in the model) and a 1.8 percent decrease, respectively. Despite this, some exports are unaffected by shared borders. The outcomes of the regression models that were run using the second dataset show that LNG does not have a statistically significant effect, but CBR does. If the CBR went up by 1%, raw material exports from Indonesia would increase by 2.1%, while imports of capital goods would increase by 3%.

CPI(i) has a positive and sizable effect on export and import models for particular commodities, whereas CPI(j) has an effect that is both large and negative on these models. Increasing CPIs are beneficial to the export of intermediate products, the import of consumer goods, and the import of raw materials. It demonstrates that an increase of one percentage point in corrupt practices leads to an increase in the export of raw materials. This condition lends credence to the FAO's claim that bribery, illegal logging, and illicit wood trafficking that help timber corporations utilize forestry resources and export timber to their nation or outside (Hansen et al., 2012; Lescuyer et al., 2014; Torres-Rojo, 2021).

The unethical practices of Indonesia's trade partners have a negative impact on the country's exports and imports of raw materials, as well as capital goods and consumer products. If the Corruption Perception Index (CPI) of Indonesia's trading partners continues to rise, the country will ship out fewer raw materials and import fewer finished, capital, and intermediate products. This condition is logical given that there are rules in place by governments and international organizations to prevent excessive mining and logging of natural resources.

There is no association between CPI, COC, and export model corruption, as shown by the second dataset. The Corruption Perception Index in Indonesia drives up imports of raw materials but brings both exports and imports of capital goods to a standstill. If other nations view Indonesia as corrupt, it will increase the amount of raw materials it imports while decreasing the amount of capital products it sells. This condition is because a negative perception of Indonesia's level of corruption can have a detrimental impact on the country's capacity to compete economically and attract investment from other nations (Alfada, 2019; Pujiati et al., 2023; Syukri et al., 2022). As a consequence, Indonesia may come to rely more heavily on the importation of raw materials for its industries, which are essential for production, while simultaneously experiencing difficulties in exporting its capital products to other nations. The dynamics of Indonesia's commerce are also impacted by the stability of the country's currency rate as well as the country's current account balance.

A negative COC is predicted for Indonesia using a model for importing capital goods that does not consider CPI. As a result, a one percentage point reduction in corruption in Indonesia as the result of enhanced control would reduce the country's dependency on capital from outside the country by the same amount. When the estimated model is applied to the first dataset, the Corruption Perception Index (CPI(j)) negatively influences Indonesia's exports and imports of raw materials, capital goods, and consumer items. The second data group has adverse effects on imports, positive effects on exports of capital goods, and neutral effects on imports of raw materials. The effects of the second group of data on imports of raw materials are neutral. Despite the neutral impact on raw material imports, controlling corruption enhances Indonesia's trade in consumer products, capital goods, and raw commodities, ultimately improving the country's trade balance and economic stability. Indonesia's consumer product exports and imports, as well as its imports and exports of capital goods and raw commodities, are all enhanced by the country's corruption control coefficient.

Table 1. Estimation results of four commodities (Export Model)

| Variables          | REM                  |                      |                      | FEM                 |                     |                     | REM                 |                     |                     | REM                  |                      |                      |
|--------------------|----------------------|----------------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|----------------------|
|                    | Raw Materials (XRAW) |                      |                      | Capital (XCAP)      |                     |                     | Intermediate (XIMD) |                     |                     | Consumer (XCNS)      |                      |                      |
| GDP <sub>(t)</sub> | 4.227<br>(3.873)     | 1.337<br>(3.260)     | 5.736<br>(5.005)     | -8.877*<br>(4.791)  | -1.479<br>(3.212)   | -6.622<br>(5.204)   | 3.551<br>(4.487)    | -0.421<br>(3.11)    | 1.878<br>(4.773)    | 10.18**<br>(4.723)   | 10.89***<br>(3.443)  | 8.312<br>(5.332)     |
| GDP <sub>(t)</sub> | 1.342***<br>(0.445)  | 1.413***<br>(0.323)  | 1.981***<br>(0.366)  | 4.332***<br>(0.508) | 4.469***<br>(0.963) | 4.401***<br>(0.882) | 1.224***<br>(0.044) | 1.229***<br>(0.185) | 1.322***<br>(0.187) | 1.223***<br>(0.117)  | 1.072***<br>(0.189)  | 1.884***<br>(0.332)  |
| POP <sub>(t)</sub> | 0.289<br>(15.33)     | 1.815<br>(14.23)     | -1.535<br>(16.46)    | 17.721<br>(15.25)   | 11.522<br>(15.77)   | 15.502<br>(16.23)   | 7.417<br>(14.15)    | 11.884<br>(13.22)   | 8.882<br>(14.27)    | -30.341*<br>(16.11)  | -33.125**<br>(15.44) | -28.223*<br>(16.25)  |
| POP <sub>(t)</sub> | 0.334*<br>(0.554)    | 0.376<br>(0.377)     | 0.648*<br>(0.521)    | -0.208<br>(1.383)   | -0.220<br>(1.847)   | -0.212<br>(1.717)   | 0.050<br>(0.231)    | 0.221<br>(0.231)    | 0.188<br>(0.211)    | 0.188<br>(0.332)     | 0.267<br>(0.283)     | 0.334<br>(0.443)     |
| CPI <sub>(t)</sub> | 0.817<br>(0.889)     |                      | 1.063<br>(1.071)     | -2.259**<br>(0.531) | -1.793*<br>(1.023)  |                     | 1.172<br>(0.814)    |                     | 0.576<br>(0.932)    | -0.222<br>(0.915)    |                      | -0.443<br>(1.443)    |
| CPI <sub>(t)</sub> | -0.255<br>(0.167)    |                      | -0.877<br>(0.702)    | 0.387*<br>(0.223)   | 0.412*<br>(0.092)   |                     | -0.038<br>(0.115)   |                     | -0.026<br>(0.145)   | -0.221<br>(0.243)    |                      | -0.018<br>(0.554)    |
| COC <sub>(t)</sub> |                      | -0.101<br>(0.533)    | -0.151<br>(0.490)    |                     | -1.635<br>(0.793)   | -0.445<br>(0.537)   |                     | 0.712<br>(0.514)    | 0.334<br>(0.241)    |                      | 0.369<br>(0.445)     | 0.556<br>(0.745)     |
| COC <sub>(t)</sub> |                      | 0.271<br>(0.245)     | -0.032<br>(0.454)    |                     | -0.059<br>(0.741)   | 0.033<br>(0.129)    |                     | 0.062<br>(0.263)    | 0.055<br>(0.322)    |                      | 0.885*<br>(0.854)    | 0.573<br>(0.483)     |
| DST                | -1.421***<br>(0.224) | -1.362***<br>(0.489) | -1.234***<br>(0.532) |                     |                     |                     | -1.312**<br>(0.264) | -1.218**<br>(0.411) | -1.433**<br>(0.856) | -1.217***<br>(0.223) | -1.443***<br>(0.774) | -1.845***<br>(0.475) |
| CBR                | 2.321*<br>(1.262)    | 2.652*<br>(1.372)    | 2.217*<br>(1.366)    |                     |                     |                     | 1.187<br>(1.422)    | 1.312<br>(1.237)    | 1.855<br>(1.554)    | 0.544<br>(1.211)     | 0.775<br>(1.885)     | 0.375<br>(1.274)     |
| LNG                | 0.061<br>(2.469)     | 0.015<br>(2.244)     | 0.617<br>(2.855)     |                     |                     |                     | 0.534<br>(2.485)    | 0.544<br>(2.499)    | 0.665<br>(2.654)    | 0.442<br>(2.311)     | 0.954<br>(2.443)     | 0.564<br>(2.335)     |
| Constant           | -122.6<br>(204.8)    | -106.9<br>(213.5)    | -133.0<br>(215.1)    | -264.2<br>(222.7)   | -189.1<br>(192.0)   | -227.7<br>(201.8)   | -252.3<br>(182.8)   | -215.4<br>(181.3)   | -234.7<br>(165.7)   | 389.0<br>(222.3)     | 338.7<br>(245.2)     | 344.0<br>(211.6)     |
| Obs                | 1,220                | 1,220                | 1,220                | 1,220               | 1,220               | 1,220               | 1,220               | 1,220               | 1,220               | 1,220                | 1,220                | 1,220                |
| R-Squared          | 0.063                | 0.055                | 0.071                | 0.332               | 0.120               | 0.118               | 0.128               | 0.148               | 0.208               | 0.155                | 0.126                | 0.116                |
| Country            | 122                  | 122                  | 122                  | 122                 | 122                 | 122                 | 122                 | 122                 | 122                 | 122                  | 122                  | 122                  |

Note: \*, \*\*, \*\*\* represent significance levels at 10%, 5%, and 1%, respectively.

Table 2. Estimation results of four commodities (Import Model)

| Variables          | REM                  |                     |                      | REM                  |                      |                     | REM                  |                      |                      | REM                   |                      |                      | REM |  |  |
|--------------------|----------------------|---------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----|--|--|
|                    | Raw Materials (MRAW) |                     |                      | Capital (MCAPI)      |                      |                     | Intermediate (MIMD)  |                      |                      | Consumer (MCNS)       |                      |                      |     |  |  |
| GDP <sub>(t)</sub> | 11.112***<br>(4.063) | 6.372**<br>(3.773)  | 14.432***<br>(4.766) | -6.443*<br>(3.337)   | 1.309<br>(2.429)     | -4.348<br>(3.738)   | 2.287<br>(3.515)     | 3.682<br>(2.562)     | 1.072<br>(3.938)     | 9.443***<br>(3.148)   | 11.334***<br>(2.285) | 10.665***<br>(3.537) |     |  |  |
| GDP <sub>(t)</sub> | 0.601<br>(0.118)     | 0.443<br>(0.443)    | 0.332<br>(0.221)     | 1.776***<br>(0.15)   | 1.663***<br>(0.142)  | 1.662***<br>(0.137) | 1.887***<br>(0.142)  | 1.721***<br>(0.133)  | 1.673***<br>(0.128)  | 1.733***<br>(0.162)   | 1.741***<br>(0.155)  | 1.722<br>(0.151)     |     |  |  |
| POP <sub>(t)</sub> | -16.91<br>(14.02)    | -11.87<br>(13.23)   | -19.88<br>(14.54)    | 23.441**<br>(11.65)  | 15.061<br>(11.2)     | 20.772*<br>(11.8)   | -0.1772<br>(12.23)   | -1.673<br>(11.76)    | 0.625<br>(12.4)      | -28.723***<br>(11.03) | -32.33***<br>(10.6)  | -30.28***<br>(11.2)  |     |  |  |
| POP <sub>(t)</sub> | 1.442***<br>(0.121)  | 1.412***<br>(0.332) | 1.223***<br>(0.322)  | -0.038<br>(0.117)    | -0.195<br>(0.108)    | -0.213<br>(0.104)   | -0.335*<br>(0.107)   | 0.163<br>(0.097)     | 0.111<br>(0.092)     | 0.025<br>(0.131)      | 0.133<br>(0.123)     | 0.138<br>(0.121)     |     |  |  |
| CPI <sub>(t)</sub> | -1.443**<br>(0.657)  |                     | -1.234**<br>(0.457)  | 1.822***<br>(0.35)   |                      | -1.448<br>(0.469)   | -0.091<br>(0.383)    |                      | -0.477<br>(0.508)    | -0.214<br>(0.316)     |                      | 0.06<br>(0.43)       |     |  |  |
| CPI <sub>(t)</sub> | 0.554<br>(1.332)     |                     | 0.533<br>(1.225)     | 0.332<br>(0.221)     |                      | 0.2812<br>(0.191)   | 0.331<br>(0.216)     |                      | 0.488<br>(0.184)     | 0.173<br>(0.273)      |                      | 0.3087<br>(0.197)    |     |  |  |
| COC <sub>(t)</sub> | -1.332**<br>(0.445)  |                     | 1.766<br>(2.644)     |                      | -0.977**<br>(0.13)   | -0.122<br>(0.21)    |                      | 0.53<br>(0.152)      | 0.802<br>(0.236)     |                       | -0.129<br>(0.107)    | -0.036<br>(0.184)    |     |  |  |
| COC <sub>(t)</sub> | 0.765<br>(1.443)     |                     | 2.546**<br>(0.556)   |                      | 0.722**<br>(0.084)   | 0.698**<br>(0.01)   |                      | 0.652<br>(0.072)     | 0.618*<br>(0.006)    |                       | 0.516**<br>(0.099)   | 0.511**<br>(0.027)   |     |  |  |
| DST                | 1.554<br>(2.554)     | 1.546<br>(2.786)    | -0.654<br>(0.567)    | -1.221***<br>(0.165) | -1.122***<br>(0.16)  | -1.118**<br>(0.161) | -1.663***<br>(0.189) | -1.773***<br>(0.187) | -1.733***<br>(0.187) | -2.773***<br>(0.127)  | -2.644***<br>(0.123) | -2.882***<br>(0.119) |     |  |  |
| CBR                | 1.456**<br>(0.825)   | 0.332<br>(0.332)    | -0.778<br>(0.624)    | 3.443***<br>(0.869)  | 3.256**<br>(0.857)   | 2.997**<br>(0.859)  | 1.525<br>(0.927)     | 1.419<br>(0.923)     | 1.434<br>(0.922)     | 1.14<br>(0.774)       | 1.06<br>(0.765)      | 1.06<br>(0.755)      |     |  |  |
| LNG                | -0.332***<br>(0.223) | 0.335***<br>(0.332) | 0.512<br>(0.522)     | 0.702<br>(2.09)      | 0.898<br>(2.067)     | 0.909<br>(2.069)    | 0.062<br>(2.209)     | 0.2724<br>(2.201)    | 0.239<br>(0.006)     | -0.245<br>(1.897)     | -0.113<br>(1.88)     | -0.11<br>(1.859)     |     |  |  |
| Constant           | -10.57<br>(178.4)    | 37.43<br>(165.0)    | -17.55<br>(144.5)    | -322.56**<br>(156.2) | -289.32**<br>(122.1) | 318.17**<br>(157.2) | -56.31<br>(148.5)    | -66.47<br>(153.4)    | -36.47<br>(151.2)    | 311.72**<br>(148.3)   | 329.33**<br>(152.1)  | 322.45**<br>(149.3)  |     |  |  |
| Obs                | 1,220                | 1,220               | 1,220                | 1,220                | 1,220                | 1,220               | 1,220                | 1,220                | 1,220                | 1,220                 | 1,220                | 1,220                |     |  |  |
| R-Squared          | 0.167                | 0.166               | 0.165                | 0.255                | 0.245                | 0.224               | 0.184                | 0.185                | 0.185                | 0.255                 | 0.225                | 0.235                |     |  |  |
| Country            | 122                  | 122                 | 122                  | 122                  | 122                  | 122                 | 122                  | 122                  | 122                  | 122                   | 122                  | 122                  |     |  |  |

Note: \*, \*\*, \*\*\* represent significance levels at 10%, 5%, and 1%, respectively.

## CONCLUSION

The gravity model's key variables - GDP(i), GDP(j), and DST - typically show significance in the first dataset. GDP(i) behaves strangely due to multicollinearity with POP(i) and CPI(i) but still aligns with Indonesian events influenced by recessions. For individual product export/import models, GDP(j) and DST are statistically significant. POP(i) has varying effects, positive for capital goods exports but negative in other models. LNG, CBR, and POP(i) behave unexpectedly, while POP(j) is negative for capital trade and positive in other models. Shared borders do not significantly impact trade except in one export/import model in the second dataset. LNG has a negative impact in the first dataset but a minor effect in the second dataset. Linguistic barriers do not affect Indonesia's foreign trade from 2003 to 2020. This paper estimates CPI and cost of living with mixed results. In the first dataset, Indonesian corruption, CPI(i), increases consumer product exports and intermediate goods imports. However, the second dataset negatively affects capital goods trade and positively affects raw material imports. CPI(j) negatively affects various imports in the first dataset, while the second dataset has mixed effects. COC(i) is only significant and negative for capital goods imports, whereas COC(j) shows positive significance in different trade categories. Higher corruption in Indonesia reduces capital goods trade.

Policymakers should prioritize anti-corruption efforts, such as implementing and enforcing anti-corruption laws and regulations. Strengthening institutional mechanisms to combat corruption is crucial. To protect Indonesia's trade interests, it is essential to monitor the corruption levels of trading partners. Trade policies and agreements should include clauses that address corruption and ensure that trading partners adhere to anti-corruption standards. This policy can help mitigate the negative effects of corruption on trade. Moreover, given that shared borders do not significantly impact trade, Indonesia should explore diversifying its trade partners beyond neighboring countries. Expanding trade relations with nations with more robust governance and lower corruption levels can be a strategic move to mitigate the adverse effects of corruption on trade.

Future research should consider additional variables like Indonesia's rule of law, democracy, and institutional qualities to understand corruption's impact on trade better. Further investigation with more variables is needed to effectively assess corruption's influence on commodities. Gathering more data and conducting comprehensive studies can provide a solid foundation for evidence-based policymaking.

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**Table 1. Quality of Life Index (Selected Countries)**

| Countries              | 2010       | 2020      |
|------------------------|------------|-----------|
| <b>ASEAN Countries</b> |            |           |
| Indonesia              | 5,814 (71) | 5,54 (71) |
| Malaysia               | 6,608 (36) | 6,62 (36) |
| Thailand               | 6,436 (42) | 5,96 (50) |
| Filipina               | 6,403(44)  | 5,71 (63) |
| Singapura              | 7,719 (11) | 8,00 (6)  |
| Vietnam                | 6,080 (61) | 5,64 (68) |

Source: Economist Intelligence Unit

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