Comprehensive Wealth

Comprehensive Wealth in Indonesia

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Universitas Indonesia Veritas, Probitas, Iustitia
LPEM FEB UI Institute for Economic and Social Research
Universitas Indonesia SDGs Hub UI Sustainable Development Goals Hub University of Indonesia
BAPPENAS Kementerian Perencanaan Pembangunan Nasional/ Badan Perencanaan Pembangunan Nasional

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Executive Summary

Ensuring national prosperity requires a shift in thinking from the short term to the long term. This shift must be supported by the right tools to allow policy-makers to make decisions that benefit future generations as much as the current ones. For decades, policymaking has focused on growth in gross domestic product (GDP). A growing GDP has been the main standard for deciding how well countries are doing. If GDP is growing, policy is deemed effective, and governments are applauded. If GDP is declining or sluggish, calls will be made for government strategies to be revisited. Yet GDP is a short-term indicator that captures only what is happening in the market economy, ignoring the costs of economic activities on nature, society, and the well-being of future generations. Measuring progress with tools that go beyond short-term indicators such as GDP is therefore essential for assessing the nation's future well-being and sustainability. Here, we discuss how a measure known as comprehensive wealth can serve as an important counterpoint to GDP. We show that it is possible to measure comprehensive wealth for Indonesia and illustrate how it reveals aspects of Indonesia's development that are invisible through the lens of GDP.

Comprehensive wealth comprises five types of assets: produced capital, human capital, natural capital, financial capital, and social capital. Measuring the size of this portfolio provides a fuller understanding of Indonesia's development achievements and prospects, reflecting the diverse assets that contribute to its economic and social well-being.

Our study reveals that over the past 25 years, Indonesia's Comprehensive Wealth Index (CWI)—the inflation-adjusted (real) per capita value[1]of its comprehensive wealth portfolio[2] — nearly tripled, increasing from IDR 404.3 million (USD PPP 86,100) in 1995 to IDR 1.13 billion (USD PPP 240,750) in 2020 (Figure ES1). This corresponds to an average annual growth rate of 4.3%. Most of this growth came from increases in the value of Indonesia's human and produced capital, which grew at average annual rates of 4.4% and 5.0%, respectively. Market natural capital,[3] in contrast, hardly grew over the period. Financial capital, for its part, was also flat over the period and (since Indonesia is a net debtor country) was a drag on overall wealth.

In contrast to the CWI's 4.3% annual average growth over the period, Indonesia's GDP grew considerably more slowly. In real per capita terms, Indonesia's GDP grew from IDR 27.5 million (USD PPP 5,860) to IDR 54.1 million (USD PPP 11,500), for an average annual growth rate of just 2.8%. The relatively slow growth of Indonesia's real per capita GDP compared with its CWI suggests that the country is not benefiting as much from its increased wealth as it should. Indeed, in 1995, Indonesia created IDR 68,000 of real GDP for every IDR 1 million in real wealth (a rate of return on wealth of 6.8%), but this figure had fallen to IDR 47,800 by 2020 (a rate of return of 4.8%).

Assessing the reasons for Indonesia not fully realising the benefits of the growth in its wealth is beyond the scope of this study. The main benefit of our results is to make this finding apparent, which is possible only when comprehensive wealth accounts are compiled for the country. By showing that Indonesia is not fully benefiting from the growth in its wealth, we provide a window

[1] All figures in 2017 prices.
[2] Note that CWI includes only those assets we could place a monetary value on. This model excludes social capital and those forms of natural capital that provide unpriced benefits, such as the climate system. These other forms of capital were also evaluated in the study but in non-monetary terms.
[3] Market natural capital comprises agricultural land, fossil fuels, minerals, timber, and fisheries (including aquaculture)

into the possibilities for the country if it were to better manage its assets. Had Indonesia managed to maintain the rate of return on the wealth it enjoyed in 1995, it would have earned 42% more income in 2020 than it did. That additional income would have been sufficient to push Indonesia solidly into the World Bank's class of upper-middle-income nations, placing the country closer to achieving its goal of high-income status by 2045.

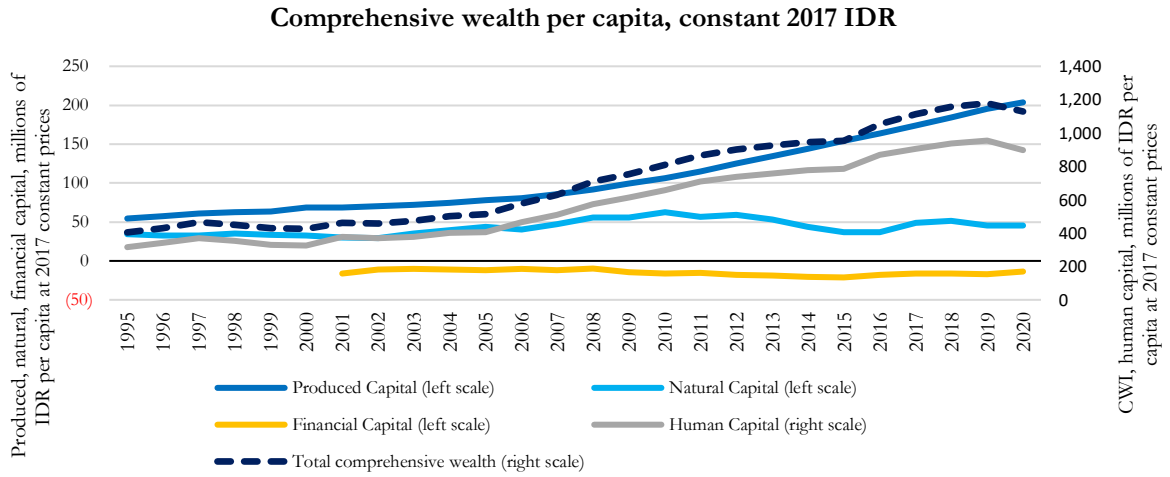

Figure ES1. Comprehensive Wealth per Capita, Indonesia, 1995-2020

Source: Authors' calculations based on data from BPS-Statistics Indonesia, Bank Indonesia, Ministry of Agriculture, Ministry of Environment and Forestry, Food and Agriculture Organization of the United Nations (FAO), World Bank Data Bank, and U.S. Geological Survey.

Although we were not able to fully investigate the reasons for Indonesia's income shortfall, evidence suggests that one concern is the failure of the country to realize the full potential of its natural resource wealth. Based on data from the World Bank and the Food and Agriculture Organization of the United Nations, we find that Indonesia is less successful, for example, in creating wealth from its timber harvesting than other countries. Though Indonesia ranks among the top producers of timber, fish, coal, natural gas, oil, nickel, gold, tin, and copper, it ranked only 14th in terms of aggregate natural resource wealth and 79th in per capita terms in 2018. Brazilians enjoyed almost twice as much natural capital per capita as Indonesians in that year. Chinese citizens enjoyed nearly six times as much. Malaysia generated six times more wealth for every tree harvested.

These results suggest that Indonesia is "leaving money on the table" by not managing its natural resources as effectively as it might. The extra income it could earn by doing better could help it escape the middle-income trap. Development can be seen as a process of wealth management. Some countries do better at this than others. Those that do enjoy higher standards of living off the same wealth base. Indonesia could be one of those countries, but currently, it is not. Regularly compiling and using comprehensive wealth accounts to guide policymaking would be a wise step in that direction.

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Abbreviations

AFLN	*Aset finansial luar negeri*/Foreign financial assets
AKSI	*Asesmen Kompetensi Siswa Indonesia Indonesia*/National Assessment Program
BAPI	Biodiversity Action Plan for Indonesia
BMKG	*Badan Meteorologi, Klimatologi, dan Geofisika*/Meteorological, Climatological, and Geophysical Agency
BOE	Barrels of oil equivalent
BPM	Balance of Payments and International Investment Position Manual
BPS	*Badan Pusat Statistik*/Statisctics Indonesia
CBD	Convention on Biological Diversity
CPI	Consumer Price Index
CPO	Crude palm oil
CWI	Comprehensive Wealth Index
DAU	*Dana Alokasi Desa*/District Allocation Fund
FCI	Financial Capital Index
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GHG	Greenhouse gas
GOS	Gross operating surplus
HCI	Human Capital Index
IBSAP	Indonesian Biodiversity Strategy and Action Plan
ICT	Information and Communications Technology
IDRC	International Development Research Centre
IEA	International Energy Agency
IFLS	Indonesian Family Life Survey
IFPRI	International Food Policy Research Institute
IISD	International Institute for Sustainable Development
IIP	International Investment Position
IPCC	Intergovernmental Panel on Climate Change
IRSA	Indonesian Regional Science Association
KFLN	*Kewajiban finansial luar negeri*/Foreign financial liabilities

KRL	*Kereta Rel Listrik*/ Electric Commuter Train
LPEM FEB UI	Lembaga Penyelidikan Ekonomi dan Masyarakat – Fakultas Ekonomi dan Bisnis Universitas Indonesia
LPI	Logistic Performance Index
MNCI	Market Natural Capital Index
MPA	Marine Protected Area
MRT	Mass Rapid Transit
MSME	Micro, Small, and Medium-sized Enterprise
NER	Net Enrollment Rate
OECD	Organisation for Economic Co-operation and Development
PCI	Produced Capital Index
PISA	Programme for International Student Assessment
REDD	Reducing Emissions from Deforestation and Forest Degradation
Tersus	*Terminal Khusus*/Dedicated Port
TPD	Teacher professional development
TUKS	*Terminal Untuk Kepentingan Sendiri*/Port for Private Use
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WVS	World Values Survey
WVSA	World Values Survey Association

Comprehensive Wealth

Chapter 1: Introduction

1.1 The Need for New Measures of Progress

Indonesia is striving to balance economic growth with environmental protection and social development. The primary focus of government policies at all levels remains on improving the immediate quality of life. The key indicators commonly used to assess national progress in Indonesia, much like in other nations, tend to concentrate on short-term objectives. Measures such as the unemployment rate, inflation rate, and Gross Domestic Product (GDP) primarily gauge the current state of the economy and society. They show how many people are employed today, how quickly prices are rising, and how much income is available to spend at present. However, these indicators fail to account for critical issues such as resource depletion, environmental degradation, and social inequalities. They are inadequate for assessing the well-being of future generations or the well-being of those alive today in the coming years. It is important to consider the welfare of future generations and question whether current actions are sustainable or will suffice for the generations that follow.

Assessing Indonesia's future well-being and its sustainability requires more than simply relying on short-term indicators. The key to long-term progress lies in the concept of wealth, specifically comprehensive wealth. Comprehensive wealth encompasses five types of assets:

- *Produced capital*, which includes buildings, roads, railways, airports, houses, machinery, and other manufactured assets;
- *Human capital*, which encompasses the wealth embedded in the skills and knowledge of the workforce, is a crucial element for the nation's development;
- *Natural capital*, which includes the wealth derived from natural resources, such as forests, minerals, land, and the overall natural environment;
- *Financial capital*, which includes direct investment, bank deposits, stocks, bonds, and other forms of financial assets and liabilities; and
- *Social capital*, which is derived from civic engagement, trust, and cooperation among the population.

These five components together form the comprehensive wealth "portfolio." They serve as the foundation for producing most of the goods and services that contribute to individual and national well-being. This includes essentials like food, energy, and healthcare, as well as intangibles like clean air, thriving forests, and safe communities. Consumption of these goods and services significantly contributes to individual and national well-being, underscoring the critical importance of comprehensive wealth.

Genuine progress for a nation relies on the sustainability of consumption levels. A nation cannot claim to be developing or progressing if it consumes more today at the expense of future generations. To truly understand a nation's development, it is imperative to track how its comprehensive wealth is evolving.

While comprehensive wealth measurement has yet to be fully embraced by nations worldwide, there is growing recognition. The United Nations, as well as esteemed economist Joseph Stiglitz, recognises the importance of comprehensive wealth to surpass GDP as a measure of progress. Some organisations have initiated efforts to measure it. The World Bank, for instance, began reporting comprehensive wealth figures in the 1990s and introduced a related indicator in its global development metrics (World Bank, 2021a). Furthermore, a collaboration of the United Nations Environment Programme (UNEP), Kyushu University, and others have released comprehensive wealth reports with estimates for most countries in recent years, emphasising the relevance of this comprehensive approach (UNU–IHDP & UNEP, 2012, 2014, 2023; Managi & Kumar, 2018). We

believe integrating comprehensive wealth measurement into Indonesia's progress assessment is a critical step towards securing long-term prosperity and well-being for the country (and, indeed, for all countries).

1.2 About This Report and Its Findings

1.2.1 The Findings in Brief

The report reveals nuanced trends in Indonesia's progress that extend beyond GDP measurements. Viewed through the lens of GDP, Indonesia has progressed quite well since the Asian Financial Crisis in 1998. This report examines the trends in real per capita comprehensive wealth in Indonesia, focusing on the period following the financial crisis in 1998. The analysis looks into the growth patterns of produced capital, natural capital, human capital, social capital, and financial capital, aiming to provide insights into the country's economic trajectory.

Real per capita wealth in comprehensive terms in Indonesia has displayed remarkable growth, essentially doubling since the Asian Financial Crisis in 1998. The data indicates substantial investment in both produced capital and human capital during this period, showcasing robust development in these crucial asset categories. However, a concerning trend emerges regarding natural capital. Despite the overall positive trend, natural capital did not experience any growth, especially in the last decade of the study period. By 2020, the average Indonesian had access to less natural capital than in 2010. This degradation in natural capital is particularly concerning for a country like Indonesia, which is heavily reliant on its environment for economic growth and well-being. While comprehensive wealth is increasing overall, the report highlights the risk to future wealth and income due to this concerning natural capital trend.

Despite impressive growth, Indonesia's per capita level of wealth lags behind peer countries, emphasizing the need for better natural capital management. Addressing this issue is crucial to prevent falling into the middle-income trap and sustain long-term economic prosperity.

1.2.2 What This Report Does Not Do

While striving to provide the most comprehensive assessment of wealth in Indonesia currently available, this report faces several limitations. Since social capital cannot be quantified in monetary terms, its incorporation into the comprehensive wealth measures discussed here is limited. Consequently, the analysis is constrained to focus on produced, natural, human, and financial capital, falling short of true comprehensiveness. Additionally, due to resource constraints, a thorough examination of wealth distribution across sectors and regions within the Indonesian economy was not possible, despite its significance given the increasing focus on wealth inequality and its potential impacts. This report looks forward to future analysis to address this crucial aspect. Lastly, although data on certain types of capital, notably produced and financial capital, extends beyond 2020, the analysis concludes in that year due to the lack of recent BPS-Statistics Indonesia data on natural capital.

1.2.3 Reading This Report

This report is structured into five chapters to comprehensively explore the assessment of wealth in Indonesia. Following this introduction, Chapter 2 provides a detailed definition of comprehensive wealth, presenting compelling arguments supporting its use as a metric for national progress. Chapter 3 encapsulates our findings on the evolution of comprehensive wealth in Indonesia from 1990 to 2020, exploring their implications for well-being. The chapter not only recommends actions to enhance the resilience of Indonesia's wealth portfolio but also discusses how comprehensive wealth can serve as a lens for informed decision-making.

For those seeking deeper insights into the concepts, methodologies, and data sources utilised, Chapter 4 offers technical details on individual comprehensive wealth indicators. These indicators, spanning overall comprehensive wealth, produced capital, natural capital, human capital, financial capital, and social capital, are presented in six sections. Each section includes information on the geographic scope, time series, frequency of compilation, indicator description, relevance to comprehensive wealth, compilation methods and data sources (along with limitations), statistical reliability, and trend analysis. Chapter 5 provides the conclusion and recommendations of the report.

While the primary focus of this report revolves around evaluating the status of asset stocks constituting comprehensive wealth, it acknowledges that stocks are only one facet of the broader wealth context. Recognising that changes in stocks result from flows, such as the extraction of timber from forests and the labour market compensation over the years, the report emphasises the importance of measuring both stocks and flows for a holistic understanding.

Although a complete assessment of all flow-related aspects is beyond the report's manageable size and scope, a case study on "green growth" indicators within the natural capital section provides a glimpse into what such an assessment might entail. Supplementary information essential for comprehending comprehensive wealth, its measurement, and the findings presented here is included in various annexes.

Chapter 2:What is Comprehensive Wealth, and Why Measure It?

2.1 Measuring What Matters in the Long Run

Comprehensive wealth assessment encompasses an evaluation of a nation's available assets, ranging from the familiar to less commonly acknowledged categories. It starts with assets that most people readily recognise, like produced capital and financial capital, to include natural, human, and social capital. Produced and financial capital, often the first to come to mind, encompasses tangible assets such as infrastructure, buildings, machinery, stocks, and bonds. Investments by various entities, including governments, businesses, and households, primarily target the accumulation of these types of capital.

Natural capital extends beyond market resources like timber, minerals, oil, and gas to encompass entire ecosystems. For instance, wetlands contribute to clean drinking water, while forests act as carbon storage reservoirs. These ecosystems not only support life but also hold economic value, often unaccounted for in conventional markets.

Human capital comprises the collective knowledge, skills, and abilities within the workforce acquired through education, informal learning, and on-the-job experiences. Education plays a significant role in enhancing productivity and individual contributions to society, particularly in developed countries.

Social capital encapsulates the norms and behaviours governing interactions within society, encompassing legal systems, cultural norms, and social networks. It facilitates cooperation, mutual support, and community well-being, ultimately influencing the utilisation and value of other forms of capital. While some view social capital as an enabling factor enhancing the value of other capital types, it remains a crucial component of the comprehensive wealth portfolio.

Together, these five categories of capital—produced, financial, natural, human, and social—constitute the comprehensive wealth portfolio essential for future well-being. Understanding comprehensive wealth is crucial alongside GDP, as it provides insights into long-term sustainability and well-being trends. Despite the valuable insight that comprehensive wealth provides into future well-being, Indonesia has not yet fully embraced its measurement, and this holds true for most countries.

Luckily, Indonesia has had experience in measuring some aspects of wealth. BPS-Statistics Indonesia has long maintained a national balance sheet that reports the value of the nation's produced and financial capital and, more recently, a portion of its natural capital. However, assessments of natural, human, and social capital are lacking. This gap underscores the need for comprehensive wealth measurement to guide sustainable policy-making.

Assessing comprehensive wealth alongside GDP offers a perspective on national progress through the lens of sustainability. Integrating estimates of comprehensive wealth into policy assessments will allow Indonesia to design and evaluate policies that focus on sustainable growth, addressing challenges such as climate change, workforce competitiveness, and social cohesion more effectively. Understanding Indonesia's evolving comprehensive wealth and analysing its implications for future well-being is now more crucial than ever.

2.2 What Is Well-Being and What Makes It Sustainable?

In this report, well-being refers to the benefits derived from consuming goods and services, including purchases in both marketplace and non-marketplace. While market consumption—purchasing goods like food, cars, and entertainment—significantly contributes to well-being, our

definition extends to non-market consumption, such as enjoying natural landscapes or the security felt when children are in school. These non-market experiences also play a crucial role in enhancing well-being.

Well-being involves both present and future dimensions. The immediate benefits of consumption contribute to current well-being, while the sustainability of future well-being involves the ability to maintain or improve these benefits over time. Measuring future well-being can be uncertain due to the constantly changing world. However, understanding the sustainability of a nation's progress requires an evaluation of whether the resources essential for future well-being are being conserved from one period to the next. To effectively discuss future well-being, it is essential to define "the future" practically. For national well-being evaluations, this typically means considering changes in "essential resources" over a reasonable timeframe, such as a quarter or a year. Sustainable development means that the same or greater resources, collectively known as the comprehensive wealth portfolio—are maintained or grown to the next period.

Well-being is defined as the flow of benefits derived from the consumption of both market and non-market goods and services. The "essential resources" necessary for well-being refer to the production of goods and services. Mapping these resources can be simplified by conceptualising them as the combinations of capital within the comprehensive wealth portfolio.

Measuring the comprehensive wealth portfolio through the CWI offers a robust framework for assessing sustainable development. Numerous studies and experts have supported this idea (see Arrow et al., 2012; Hamilton & Clemens, 1999; Dasgupta, 2001 and 2014; Dasgupta & Mäler, 2000; Stiglitz et al., 2009; World Bank, 2011 and 2021; Managi et al., 2023). The index aggregates the monetary values of diverse assets adjusted for inflation and population growth. It is expressed in real per capital value to provide a comparative measure of sustainability over time. An increasing CWI suggests sustainable development, indicating that the foundation for well-being is growing faster than demographic and economic pressures. Conversely, a declining CWI indicates unsustainable development, where future well-being may be compromised.

2.3 How Comprehensive Wealth Is Measured

Comprehensive wealth assessment uses two main methods. First, tangible assets will be quantified in physical units, such as measuring a forest's area or volume. However, the approach is different when it comes to intangible assets. Human and financial capital are hard to express in physical terms, and even produced capital, like quantifying housing stock, proves to be complex. For instance, not all houses are equal—a modern, well-maintained house offers more well-being than an old, poorly maintained-one of the same size.

The second approach to comprehensive wealth measurements is the assessment of assets based on their monetary value, which applies to both tangible and intangible assets. This method allows for the aggregation of various asset values and highlighting their contributions to well-being. For instance, it can combine the monetary value of a forest and a pulp mill to estimate the overall value of natural and produced capital owned by a forest company.

Despite its advantages, not all assets should be monetarily valued. Some assets are crucial to well-being, and any deterioration results in irreplaceable costs. These assets are essentially priceless and should be measured physically, excluding them from aggregate measures of comprehensive wealth in the CWI.

Identifying critical assets to well-being is complex. For this report, indicators for climate and ecosystem are presented in physical units, as they provide irreplaceable goods and services. In the case of ecosystems, the extent to which their goods and services are irreplaceable may vary, as some can be partially substituted by other assets within certain limits. For instance, the water purification service offered by lakes and rivers could be replaced by drinking-water treatment plants. However, practical limitations related to data and methods currently limit the ability to conduct monetary valuations for these assets.

For assets that are not irreplaceable and can be appropriately valued, it is crucial to estimate their full social value. Assessing the social value of an asset considers the costs and benefits associated with its use, accounting for its impact not only on the owner but on society as a whole. As an illustration, education delivers individual benefits in the form of higher earnings and personal satisfaction from learning. Simultaneously, it provides society with benefits as educated individuals are more likely to actively contribute to the well-being of society. Although they may not reflect the full social value, market prices are the closest measure of the social value of assets. For instance, education prices might not capture the full benefits of engaged citizens, and fossil fuel assets might be overpriced if climate impacts and costs are excluded from their pricing. Despite these issues, market prices are used in this study due to the lack of practical alternatives. The sources of data used in this study are covered in detail in Chapter 4 and Appendix.

Chapter 3:Comprehensive Wealth in Indonesia—Findings and Recommendations

3.1 Main Findings and Recommendations

The real per capita wealth of comprehensive wealth experienced a significant increase, 2.8 times higher in 2020 compared to 1995. Notably, the growth was primarily driven by investments in two critical asset categories: produced capital and human capital. Unfortunately, this upward trend did not extend to natural capital, which remained stagnant over the assessed period. Indonesia showed the same level of natural capital endowment in 2020 as it did in 2010, raising concerns given Indonesia's reliance on the environment for growth and well-being.

While the overall comprehensive wealth is on an upward trajectory, a concerning issue arises regarding future wealth and income. This concern is primarily attributed to the persistently flat growth in natural capital. The findings in this report align with those of reputable institutions like the World Bank and UNEP, assuring the reliability of its methods and data. Despite the considerable growth in produced and human capital, it is crucial to highlight that Indonesia's per capita wealth levels remain significantly lower than those of peer countries.

The conclusion of this report emphasises the urgent need for Indonesia to enhance the management of its natural capital within the comprehensive wealth portfolio to evade the middle-income trap. The lack of growth in natural capital since 1995 indicates a depletion that supports the growth of other assets. While leveraging natural assets for broader development is a common global practice, this report underscores the necessity for Indonesia to enhance the management of its natural capital for sustained success.

A striking revelation from the findings is the relatively minimal contribution of timber from Indonesia's forests to the country's overall wealth. This unexpected outcome prompts an exploration of how Indonesia compares the production of major natural capital assets and commodities on a global scale. The country emerges as a substantial producer in the top 10 for timber, fish, coal, natural gas, oil, nickel, gold, tin, and copper. However, the World Bank's data on comprehensive wealth positions Indonesia as 14th in terms of aggregate natural resource wealth globally. Furthermore, the country ranks 79th in per capita wealth, highlighting a discrepancy between possessing abundant natural resource wealth and effectively generating income from it.

Comparative analysis with countries like Brazil and Malaysia, both heavily reliant on natural capital, exposes Indonesia's underperformance. Malaysia, with forests similar to Indonesia's, manages to generate six times more wealth for every tree harvested. This glaring difference suggests that Indonesia has untapped potential for increased income if conditions are optimized for extracting maximum wealth from its natural resources. Effectively generating and capturing this wealth could unlock substantial additional income, potentially propelling Indonesia beyond the confines of the middle-income trap.

The vulnerability in Indonesia's development, indicative of its well-being, becomes apparent with deeper examination of the comprehensive wealth portfolio. Long-term shifts in the nature and distribution of Indonesia's assets are observed, diminishing the resilience of wealth and, consequently, overall well-being in the face of external shocks:

- Indonesia's most vital asset, human capital, experienced a nearly tripled increase during the study period. However, a significant concentration of human capital remains in less productive sectors such as agriculture.
- While investments in produced capital in real per capita terms have seen substantial growth, there is a growing concentration on building projects.

- The market natural assets of Indonesia, encompassing minerals, fossil fuels, timber, and agricultural land—traditional pillars of the country's wealth—experienced a 27% decline in real per capita terms from 2010 to 2020 due to the physical depletion of key natural resource assets.
- In terms of non-market assets of natural capital, Indonesia is grappling with climate change, evident in a rising average temperature and increased precipitation. These climatic shifts may have adverse effects on various capital stocks, potentially leading to floods, and diminishing the value of physical capital. Simultaneously, elevated sea temperatures might induce coral bleaching, negatively impacting Indonesia's biodiversity.
- Indonesia's financial capital, reflected in the consistently negative International Investment Position from 2001 to 2020, signifies that the value of foreign liabilities exceeded foreign assets in real per capita terms.
- Social capital indicators reveal a decrease in formal political engagement and a slight decline in trust in others.

3.2 Detailed Trends in Overall Comprehensive Wealth

3.2.1 Indonesia's Comprehensive Wealth Index

The Comprehensive Wealth Index (CWI) measures the real (inflation-adjusted) per capita value of Indonesia's aggregate produced, human, natural and financial capital[4]. The result shows that CWI grew 2.8 times over 25 years, covering the period 1995 to 2020[5]. As presented in Figure 1, in 1995, the CWI amounted to IDR 404,298,741 (USD PPP 86,100 per Indonesian. By 2020, this figure had surged to IDR 1,130,480,139 (USD PPP 240,750 per Indonesian), indicating an average annual growth rate of 4.3%.

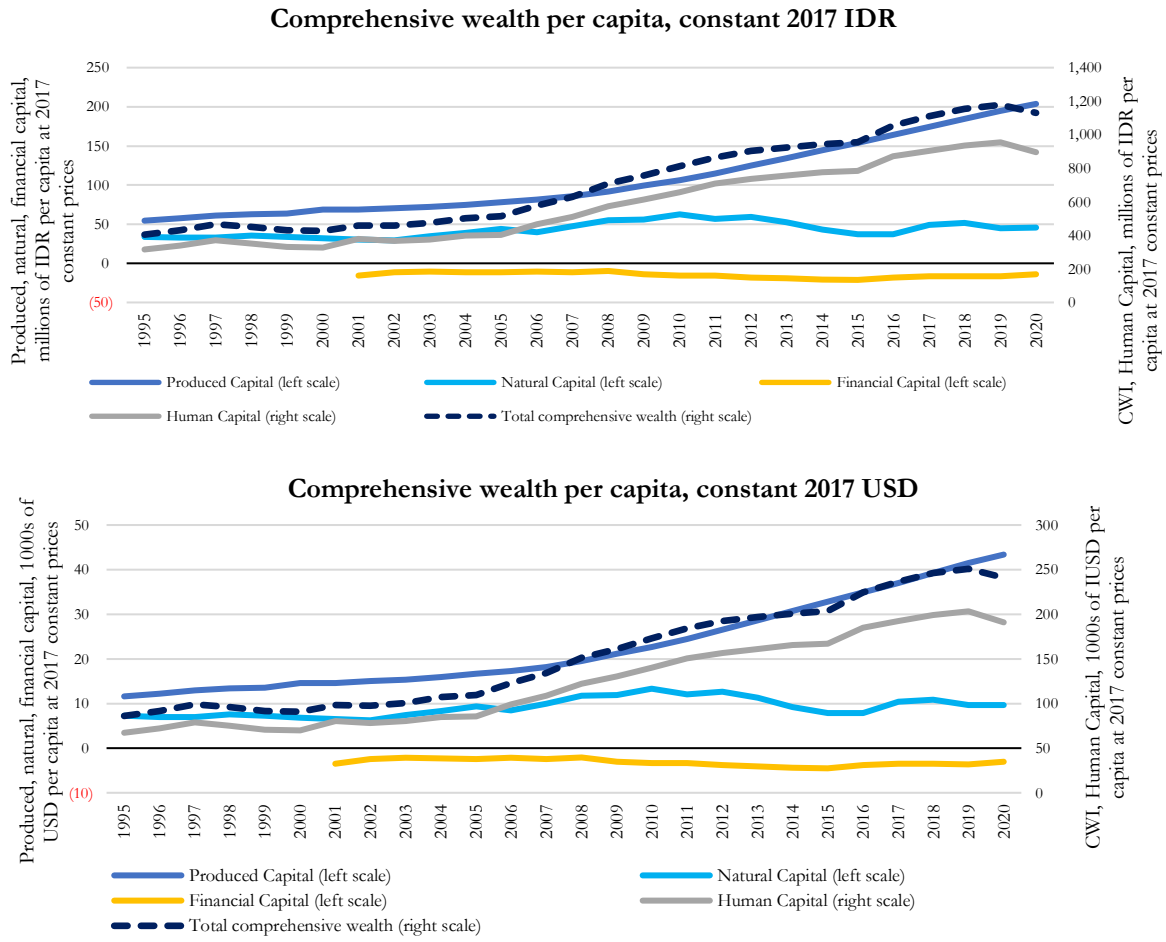


Figure 1. Comprehensive wealth per capita, Indonesia, 1995-2020

Source: Authors' calculations based on data from BPS-Statistics Indonesia, Bank Indonesia, Ministry of Agriculture, Ministry of Environment and Forestry, Food and Agriculture Organization of the United Nations (FAO), World Bank Data Bank, and U.S. Geological Survey.

[4] For the CWI methodology see World Bank (2021a) and International Institute for Sustainable Development (2016, 2018).

[5] The period used for the estimation of the CWI was limited to 19952020 since human capital, the largest asset which contributes to more than 50% of CWI, could not be estimated prior to 1995 due to lack of data. Produced capital and natural capital, on the other hand, covered the period 1990–2020, while financial capital was estimated for 2001–2020. Thus, financial capital was omitted in the CWI estimate for the period 1995–2000. This exclusion does not significantly skew the overall results, given that financial capital contributes about 2% to total wealth.

Breaking down the components of the CWI, **Produced Capital Index (PCI)**[6] showed a steady annual growth of 5.3%, increasing from IDR 43.5 million (USD PPP 9,260) in 1990 to IDR 203.7 million (USD PPP 43,379) in 2020, indicating a total increase of 369%. While growing substantially over the period, Indonesia's investments in produced capital became increasingly concentrated in buildings, which accounted for approximately 75% of the total produced capital in 2020. Machinery and equipment contributed 10% and vehicles 6% of produced capital. Since buildings mostly do not contribute to the production of other economic outputs, this growing dominance causes reason for concern as it may limit Indonesia's capacity to produce other goods and services. Aside from that, four sectors of the economy dominate the produced capital in Indonesia. By 2018, the manufacturing, real estate activities, agriculture, and mining sectors accounted for 58% of the PCI.

The **Human Capital Index (HCI),** representing the most substantial portion of Indonesia's assets, grew substantially over the period.[7] The average Indonesian experienced an increase in real human capital, rising from IDR 315.8 million (USD PPP 67,261) in 1995 to IDR 895.4 million (USD PPP 190,689) in 2020. The trend in the HCI has generally been on an upward trajectory, except for a notable dip in 1998. This exception is largely attributed to the economic crisis of 1998, which had a profound impact on the value and distribution of labour across various sectors of the economy (Nasution, 1999). During the crisis period, there was a significant shift of labour from more value-added sectors, such as manufacturing, to those that were less so, like agriculture. The decline of the HCI between 2019 and 2020 was likely due to the global COVID-19 pandemic.

The **Market Natural Capital Index (MNCI)** demonstrated a slight increase in real per capita terms during the 1990-2020 period, despite experiencing fluctuations over the thirty-year period.[8] The real per capita value of Indonesia's market natural capital increased from IDR 29.94 million (USD PPP 6,376) in 1990 to IDR 45.36 million (USD PPP 9,651) in 2020, a total increase in IDR per capita of 51.4% and an average annual increase of 2.2%. The composition of renewable and non-renewable resources in the natural capital shifted over time. Renewable resources dominated in 1990 but declined with the rise of non-renewables during commodity booms. The decline in fossil fuel value after 2010 led to a drop in non-renewables' share, which rebounded in 2016 as fossil fuel value recovered and agriculture value declined.

Our analysis also considers **non-market natural capital**, which was evaluated in non-monetary terms. During the study period, Indonesia has experienced erosion in biodiversity and the associated ecosystems. However, there has been some progress in slowing the degradation rate over the past decade. Like many parts of the world, Indonesia is witnessing climate change, evident in the rising average temperature. Precipitation in Indonesia has also increased, albeit at a more moderate level. The adverse effects of these climate changes could impact other capital stocks; for instance, increased precipitation may lead to floods, diminishing the value of physical capital, while rising sea temperatures could result in coral bleaching, adversely affecting Indonesia's biodiversity.

The **Financial Capital Index (FCI)**, which is measured by Indonesia's International Investment Position (IIP), has consistently been in negative territory, indicating that the value of financial assets owned by foreigners in Indonesia is higher than the foreign financial assets owned by

[6] See Appendix 1 for the PCI methodology.

[7] See Appendix 2 for the HCI methodology and data sources.

[8] See Appendix 3 for the MNCI methodology.

Indonesians.[9] The changes in the IIP during 2001-2020 remained relatively marginal, fluctuating from a negative IDR 16 million (or USD PPP 3,423) to a negative IDR 14 million (or USD PPP 2,969). On average, total assets represent around 30-40% of liabilities. A higher value of liabilities is not necessarily detrimental; with most liabilities being investments from abroad, effective management could lead to positive economic spillovers and help Indonesia escape the middle-income trap.

Social capital appears to be high in Indonesia based on indices related to participation, trust, and tolerance. Over the past two decades, there have been mixed results in these indicators. [10] While formal political engagement, like party membership or voting, has decreased, there is an increasing trend in participation in group and communal activities. Trust in others has slightly declined but remains high, as evidenced by people's willingness to seek help from their neighbours. In terms of tolerance, data from various sources suggest that Indonesians are becoming more accepting of coexisting with individuals from diverse ethnic and religious backgrounds.

3.2.2 Comprehensive Wealth Compared to GDP

In contrast to the CWI's 4.3% annual average growth over the period, Indonesia's GDP grew considerably more slowly. In real per capita terms, Indonesian GDP grew from IDR 27.5 million (USD PPP 5,860) to IDR 54.1 million (USD PPP 11,500), for an average annual growth rate of just 2.8% over the period.

The relatively slow growth of Indonesia's real per capita GDP compared with its CWI suggests that the country is not benefiting as much from its increased wealth as it should. GDP can be thought of as the return on a country's investment in its comprehensive wealth portfolio. As wealth increases, GDP should increase along with it at the same rate, or possibly even faster.[11] This is not what we observe in Indonesia, however. In 1995, Indonesia created IDR 68,000 of real GDP for every IDR 1 million in real wealth (a rate of return on wealth of 6.8%). By 2020, this figure had fallen to IDR 47,800 by 2020 (a rate of return of 4.8%). For some reason, Indonesia has become less effective at turning wealth into income as time has gone by.

Assessing why Indonesia has not fully realized the benefits of the growth in its wealth is beyond the scope of this study. The main benefit of our results is in making this finding apparent, which is possible only when comprehensive wealth accounts are compiled for the country. Until now, no estimates of human capital have been compiled for Indonesia. BPS-Statistics Indonesia (2019a) has only recently begun compiling produced capital and natural capital figures. Its figures are not complete and do not extend back as far in time as those in this study. Still, they represent an excellent step in the right direction for BPS-Statistics Indonesia, and it should pursue and expand this work.

By showing here that Indonesia is not fully benefiting from the growth in its wealth, we provide a window into the possibilities for the country if it were to better manage its assets. Had Indonesia

[9] See Appendix 4 for the FCI methodology.

[10] See Appendix 5 for the SCI methodology.

[11] Income can increase faster than wealth because increasing wealth can have spillover effects known as productivity gains. The more comprehensively wealth is measured, the less such spillover effects should emerge since productivity gains are measured as the increase in GDP, which is not explained by increases in wealth. When wealth is incompletely measured, productivity can emerge simply because the input of some unmeasured component of wealth has increased.

managed to maintain the rate of return on its wealth that it enjoyed in 1995, it would have earned 42% more income in 2020 than it did. That additional income would have been sufficient to push the country out of its lower-middle-income status and into the group of countries considered to be upper-middle-income by the World Bank, placing the country closer to achieving its goal of high-income status by 2045 (Ministry of National Development Planning Republic of Indonesia, 2019).[12] Realizing this extra income in the future is still possible, but it will require, among others, a new approach to natural resource management. It requires an approach that ensures Indonesia's resources are preserved for future generations and, at the same time, better capitalizes on the economic benefits of using those resources today. Other countries already do this. Based on data from the World Bank (2021a) and FAO (2024), we find that Malaysia creates about six times as much wealth for every tree harvested as Indonesia. As the world's fourth-biggest hardwood timber producer and steward of much of the world's tropical forests, Indonesia cannot afford to "leave money on the table" like this.

Though Indonesia ranks among the top producers of timber, fish, coal, natural gas, oil, nickel, gold, tin, and copper, it ranked only 14th in terms of aggregate natural resource wealth and 79th in per capita terms in 2018, according to the World Bank (2021a). Brazilians enjoyed almost twice as much natural capital per capita as Indonesians in that year. Chinese citizens enjoyed nearly six times as much.

There is too much at stake for Indonesia not to do a better job managing its natural wealth. For Indonesians, it is a question of escaping, or not, from the middle-income trap. For the rest of the world, it is a question of whether future generations will only know about the wondrous diversity of Indonesia's natural environment through pictures of the past (Brodjonegoro & Smith, 2023).

Development can be seen as a process of wealth management. Some countries are better at this than others. Those that do, enjoy higher standards of living off the same wealth base. Indonesia could be one of those countries, but currently, it is not. Regularly compiling and using comprehensive wealth accounts to guide policymaking would be a wise step in that direction. The extra income it could earn by doing better could help it escape the middle-income trap[13], an outcome that would be more than worth the investment in additional statistical effort.

[12] The World Bank judges countries' income status on the basis of gross national income (GNI) per capita measured in nominal U.S. dollars converted at market exchange rates (GNI is a measure similar to GDP but accounting for Indonesian income earned abroad). In 2020, Indonesia's GNI per capita by this measure was $3,900, which placed it just below the World Bank's threshold of upper-middle-income status for that year ($4,096). Had Indonesia maintained its 1995 return on wealth in 2020, its GNI per capita in that year would have been closer to $5,500. The World Bank's threshold for consideration as a high-income country in 2020 was $12,695, so Indonesia would have been closer to its goal but still a good distance from reaching it.

[13] The middle-income trap is a development scenario where countries that have reached middle-income status due to rapid economic growth fail to take the further steps necessary to achieve high-income status.

3.3 Detailed Trends in Produced Capital

Produced capital is one of the main elements in the country's economy. Produced capital can be defined as physical assets created with the purpose of providing goods or services in various sectors, such as businesses, households, communities, governments, and non-profit organisations. Produced capital includes infrastructure such as roads, railways, power plants, industrial equipment, and other man-made capital. Out of all the capital, produced capital is considered the most exhaustive and reliable data. Investments by governments, businesses, and households are often aimed at building up stocks of this reproducible capital. Produced capital is a key part of the productive base that enables the creation of market output. It is distinct from other forms of capital in that it is intentionally manufactured and created to be used for the production processes and activities of the economy, making produced capital a central component of a nation's economic development and growth.

Adopting the OECD Measuring Capital methodology (OECD, 2009b), estimating produced capital in Indonesia involves calculating the aggregate value of real (inflation-adjusted) fixed capital and per capita fixed capital owned by households, businesses, and governments. It captures physical assets such as buildings, machines, equipment, and other physical capital. The measurement of produced capital is conducted in monetary terms, allowing for the quantification of nearly all assets and their aggregation based on different types, as well as measurement on a per capita basis.

Measuring the accumulation of produced capital stock provides valuable insights into a country's development pathways. Infrastructure capital, which is an important part of produced capital, holds a crucial role in giving insights into government policies as it embodies essential public assets for the functioning of both the economy and society. The infrastructure capital includes energy supply, water and drainage systems, agriculture production, and transportation sectors. Good infrastructure capital enables reliable access to services and plays a facilitating role in economic production and consumption, for instance, in the case of electricity generation by power plants (Collins et al., 2014). Analysing the composition of produced capital also becomes essential for guiding investment reallocation. For instance, in the case of Canada's capital investments, although showing significant improvement in real per capita terms, were primarily concentrated on housing and energy infrastructure, particularly in oil and gas extraction (IISD, 2018), which is why Canada must start diversifying its produced capital away from its concentration in oil and gas extraction.

Assessing the level and trends of the produced capital index is crucial as it is a key factor in generating goods and services in a country. As a vast archipelago with a middle-income status, produced capital is also particularly crucial for supporting interconnectivity and providing adequate housing across Indonesia. It is essential that we understand the breakdown of produced capital by sectors and asset types to analyse the development pathways of each component of the capital. This information can serve as valuable input for policymakers when formulating sector-specific investment policies. The remainder of this section will discuss the national trends of produced capital, complementary analysis of produced capital development across sectors, policy recommendations, and summaries. Technical details, including the concepts, methods, and data of the calculation of produced capital, will be further detailed in **Appendix A1 and A2**.

3.3.1 The Trend of Produced Capital Index (PCI) in Indonesia

The PCI is assessed by calculating the aggregate value of real fixed capital and per capita fixed capital owned by households, businesses, and governments. It includes residential and non-residential buildings, machinery, equipment, vehicles, and others. The development of produced capital can also be assessed by its trend across the sectors of the economy. The evolution of the PCI was assessed by type of asset and across sectors of the economy. The index was obtained by accumulating the nominal value of investments in these assets as measured by Gross Fixed Capital Formation (GFCF) from the national accounts and accounting for their depreciation over time. Deflation to real terms was accomplished by applying the Consumer Price Index (CPI) to the nominal values. The real values were converted to per capita terms by dividing by population. Estimated on an annual basis for 1990–-2020, the PCI is measured in 2017 local currency units (IDR) and 2017 USD.

The average annual growth of PCI stood at 5.3% from 1990 to 2020, as shown in **Figure 2.** The number has tripled, from IDR 43.6 million (USD PPP 9,260) in 1990 to IDR 203.7 million (USD PPP 43,380) in 2020.

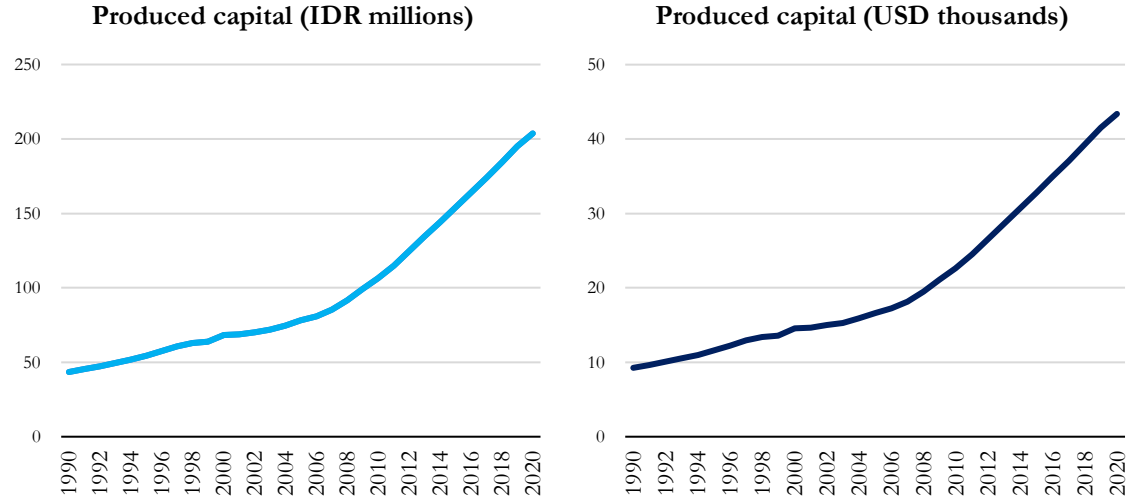


Figure 2. Produced capital index, Indonesia, 1990-2020

Source: Authors' calculation based on data from BPS-Statistics Indonesia and the World Bank Data Bank.

In aggregate value, produced capital increased by IDR 47,249,200 billion (USD PPP 10,060 billion from IDR 7,789,950 billion (USD PPP 1,660 billion) in 1990 to IDR 55,039,150 billion (USD PPP 11,720 billion) in 2020, as shown in **Figure 3**.

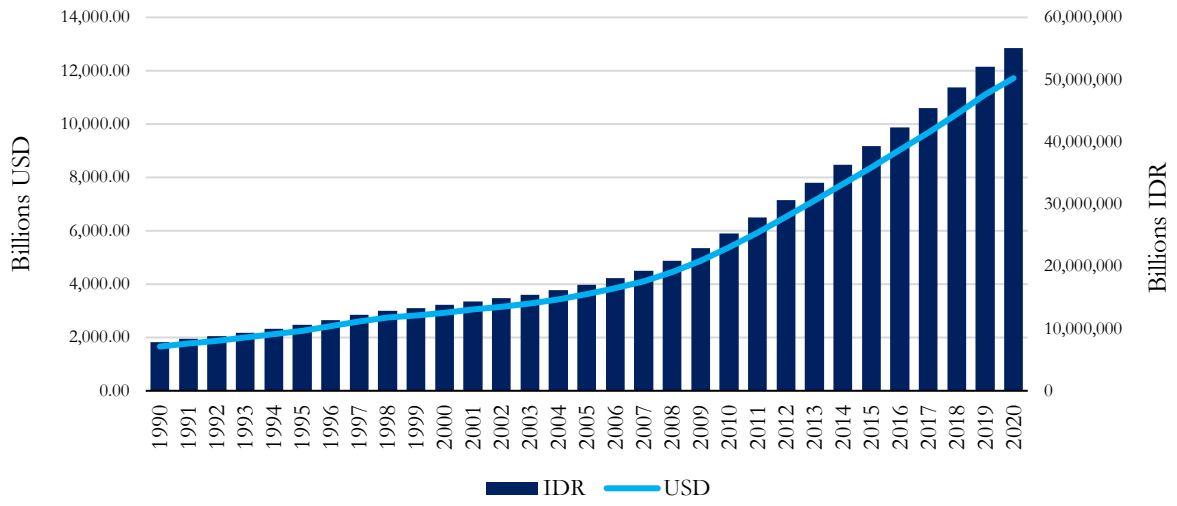


Figure 3. Aggregate produced capital, Indonesia, 1995-2020

Source: Authors' calculation based on data from BPS-Statistics Indonesia and the the World Bank Data Bank.

Several major events affected the accumulation of produced capital. Indonesia's rate of investment in produced capital rose rapidly in the early 1990s, followed by a sharp decline caused by the Asian Financial Crisis in 1997-1998. This crisis had a significant impact on the accumulation of produced capital, leading to a decrease in growth from 8% in 1997 to 2% in 1999. The decline in accumulation was primarily attributed to a sharp decrease in GFCF. In 2020, the produced capital accumulation was also affected by the COVID-19 pandemic, where GFCF declined by 6%, dropping from IDR 4,817 trillion (USD PPP 1,026 billion) in 2019 to IDR 4,520 trillion (USD PPP 962 billion) in 2020 (see **Appendix A2**).

The growth of PCI was sustained by an average GFCF contribution of 31% to the GDP, as seen in **Figure 4**. Comparing this with other developing countries (Brazil, India, South Africa, and Thailand), Indonesia's average GFCF as a percentage of GDP has been consistently higher in all countries except China since the 1998 Asian crisis. Indonesia's GFCF contribution to the GDP reached an all-time high at 37% in March 1997 but hit a record low of 23% in 1999 after the Asian Financial Crisis. It was not until the end of the study period that it recovered to the levels seen before the financial crisis.

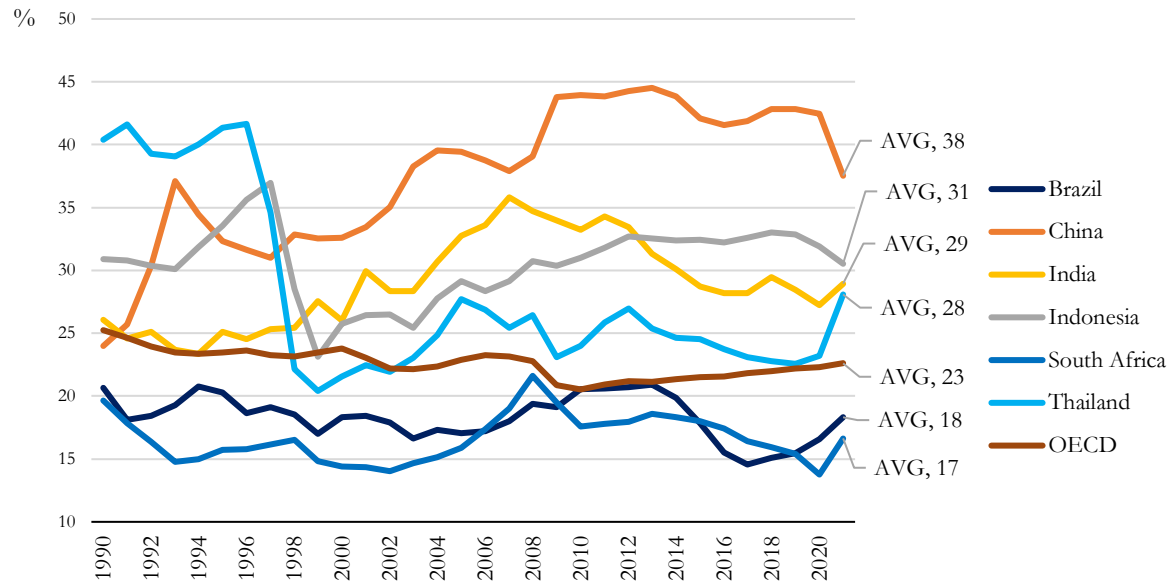


Figure 4. GFCF as percentage of GDP (%), Indonesia, 1990-2022

Source: Authors' calculations based on data from the World Bank Data Bank.

Over time, there has been a decline in the proportion of imports used as intermediate inputs in Indonesia's GFCF. This trend can be seen in **Figure 5**, where the share of imports has experienced a significant decrease of 16.2% from 1995 to 2016. This shift might show that, over time, Indonesia has been relying less on imports as the country develops its own produced capital.

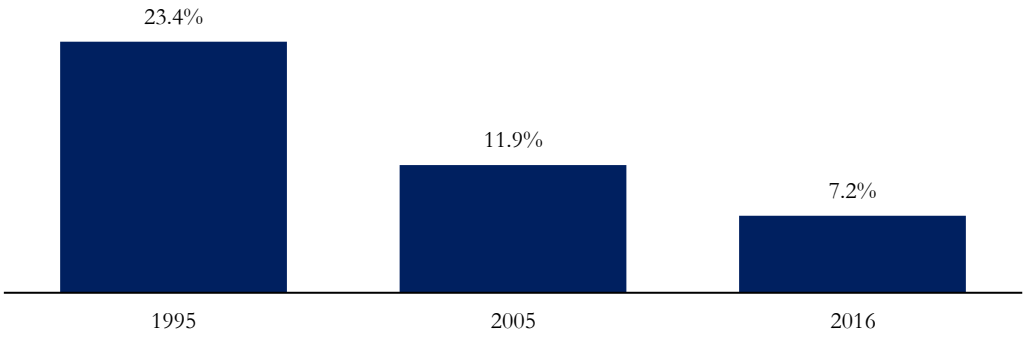


Figure 5. Import share of intermediate inputs in GFCF, Indonesia, 1995-2016

Source: Authors' calculation based on Statistics Indonesia's input-output (IO) tables (BPS-Statistics Indonesia, n.d.-a).

Produced capital consists of buildings, machinery and equipment, vehicles, and other assets. According to BPS-Statistics Indonesia (2019b) categorisation, buildings include housing, non-housing buildings, roads, bridges, utility networks, irrigation, and other buildings. Machinery and equipment include power plants, machines, computers, electronic devices, and information communications technology, while vehicles refer to cars, motorcycles, aeroplanes, vessels, and trains (BPS-Statistics Indonesia, 2019b).

As **Figure 6** shows, buildings account for the largest share of Indonesia's produced capital during the study period. In 2000[14], buildings accounted for 75% of the total produced capital in Indonesia, while machinery and equipment contributed 9%, and vehicles contributed 6%. As Indonesia's investments in produced capital grew substantially over time, there was a growing concentration for investments towards buildings. These shares had not changed substantially by 2020, with buildings, machinery and equipment, and vehicles remaining at 74%, 10%, and 6%, respectively. The continuing high share of buildings in the PCI was driven by the country's economic growth in recent years, which created demand for infrastructure development to improve connectivity, increase electrification, and meet the need for housing.

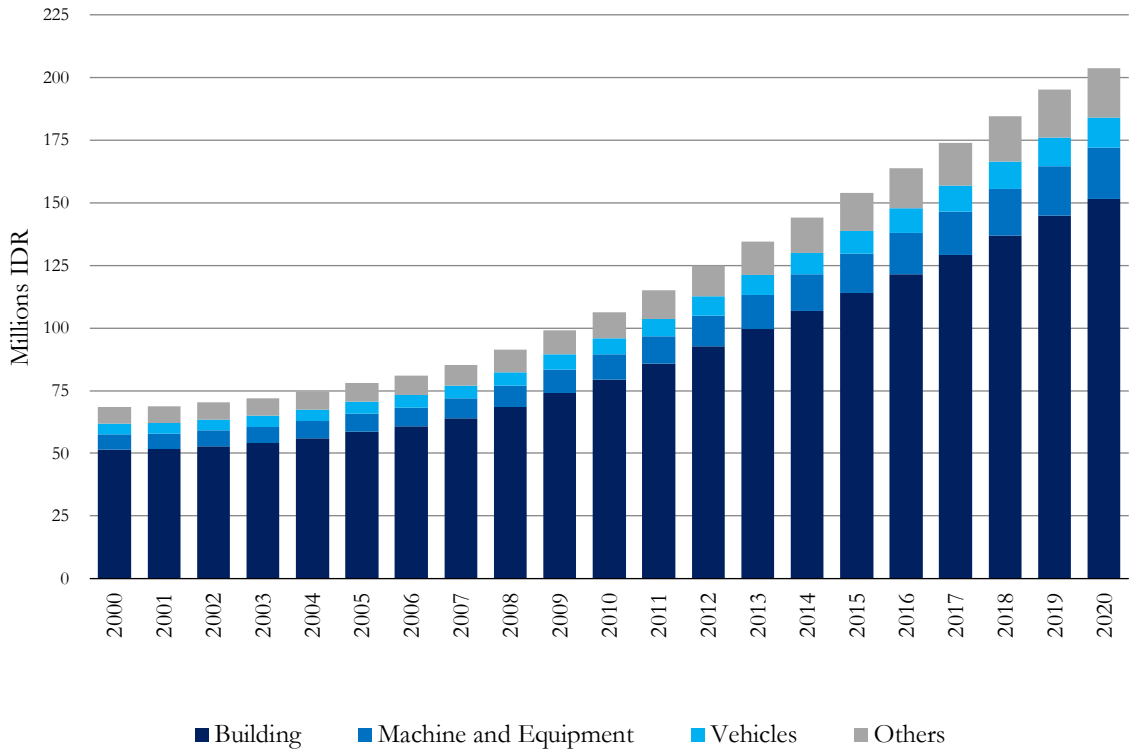


Figure 6. PCI breakdown by asset types, Indonesia, 2000-2020
Source: Authors' calculations based on data from BPS-Statistics Indonesia (see Appendix A).

As illustrated in **Figure 7**, produced capital in Indonesia is concentrated in four sectors of the economy: manufacturing, real estate activities, agriculture, and mining. In 2010[15], the PCI of these four sectors amounted to IDR 64 million (USD PPP 13,730), representing 61% of the country's overall PCI. By 2018, their combined value had increased to IDR 89 million (USD PPP 19,000), but their overall share had dropped to 48%.

[14] 2000 is the first year for which a breakdown of the PCI by asset type is available.

[15] The breakdown of the PCI by sector is available only for the period 2010-2018.

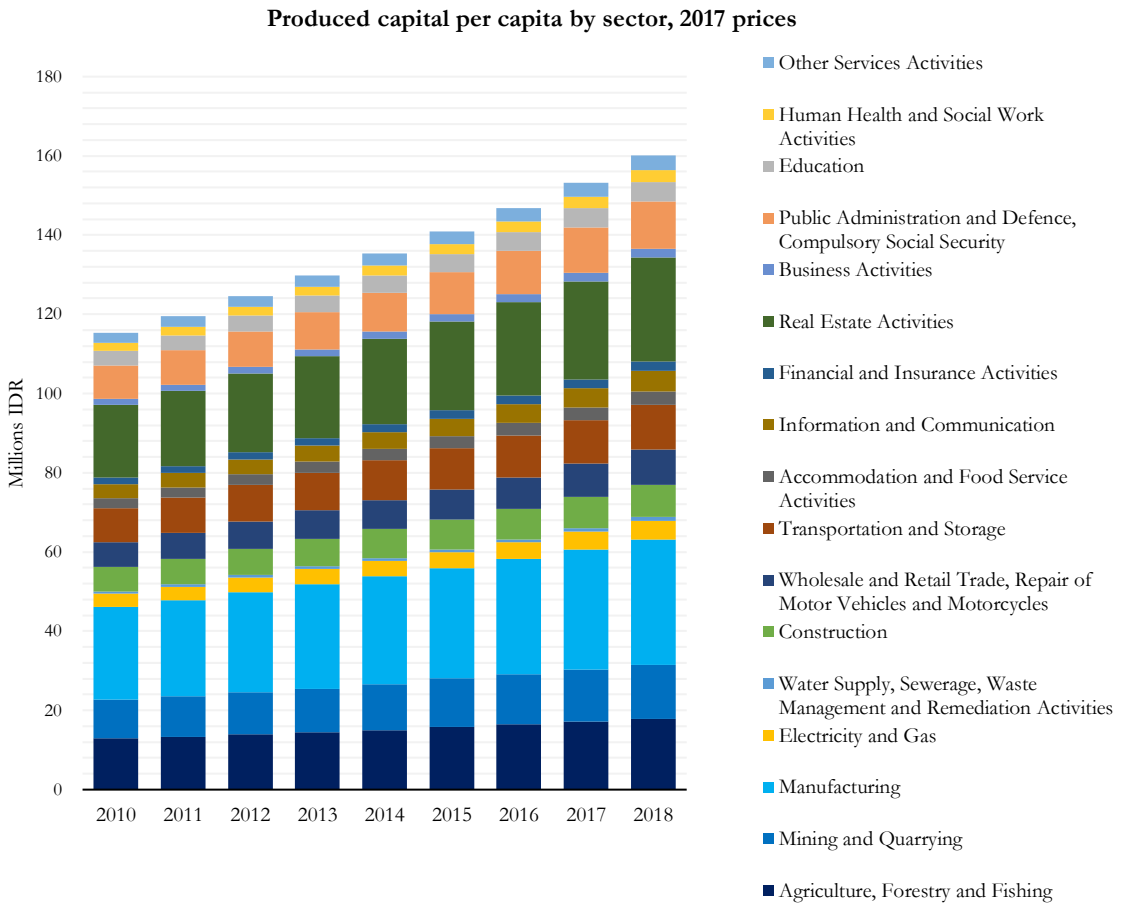


Figure 7. PCI breakdown by sector, Indonesia, 2010-2018

Source: Authors' calculations based on data from BPS-Statistics Indonesia (see Appendix A)

Although the manufacturing sector accounted for the highest share in the PCI (17%) in 2018, the sector's contribution to the overall national economy has been declining since 2010. In 2010, the sector contributed 22% to the index. The main traits of the manufacturing sector in Indonesia have remained relatively consistent, even when compared to the pre-crisis period. First, the sector lacks diversification, producing only a few products with a comparative advantage for export. Second, it mostly manufactures products of low complexity that are also produced by many other countries. Third, the manufacturing sector also makes a relatively modest contribution to job creation. The value-added in the sector tends to be dominated by a small number of low-tech manufacturers.

The second-largest contributor to produced capital was concentrated in the real estate sector. In this sector, the PCI increased by IDR 7.8 million (USD PPP 1,660 billion) from 2010 to 2018. This growth can be attributed to the increasing demand for housing and other infrastructure driven by the expansion of middle-class households, which grew from 9% in 1993 to over 20% in 2019 (Pratomo et al., 2020). Given the demographic composition with millions of potential first-time home buyers, Indonesia's residential property sector has plenty of room for growth in the decades to come.

3.3.2 Complementary Analysis: Produced Capital Development across Sectors in Indonesia

3.3.2.1 Transportation Sector

Having more than 17,000 islands, Indonesia is considered the world's largest archipelago country. Populated with more than 275 million people, logistics and transportation development become crucial to supporting Indonesia's development. Transportation infrastructure, such as roads, railways, and inter-island connectivity like ports, will also stimulate regional economic growth.

Roads

In 2021, the total length of roads in Indonesia reached 546,116 kilometres. Based on the administrative authority, district or city roads accounted for the largest proportion, measuring 444,548 kilometres or 81.4 per cent. Meanwhile, state roads covered 47,017 kilometres (8.61%), and provincial roads spanned 54,551 kilometres (9.99%). From 1989 to 2021, Indonesia has managed to construct an additional 287,629 kilometres of roads of all types. However, the data shows that the roads increased by 3% from 2015 to 2019, while the number of vehicles went up by 27% (BPS, 2021a), leading to traffic congestion within Indonesia's urban regions.

In recent years, there have been growing infrastructure initiatives, and the government has been committed to moving development projects outside of Java Islands to improve connectivity within the country. Toll road construction increased significantly compared to the first construction in 1978, with the total length of operational toll roads in Indonesia reaching 2,623.51 kilometres by March 2023 (Toll Road Regulatory Body/BPJT, 2023). The President Jokowi administration has built a total of 1,848.1 kilometres of toll roads, averaging about 264.01 kilometres annually. This describes a significant development from the 789.82 kilometres of operational toll roads that existed by the end of 2014.

While progress has been made in improving infrastructure, challenges and disparities continue to persist in certain areas. When we look at the road condition, most of the roads (60%) in the Java–Bali region are in good condition in 2021 (**Figure 8**). In other regions, the percentage of roads in good condition is around 30 to 40% of the total length of existing roads. In the Java–Bali region, only 16% of roads are categorised as damaged or heavily damaged, while this number rises to 35% to 40% for other regions.

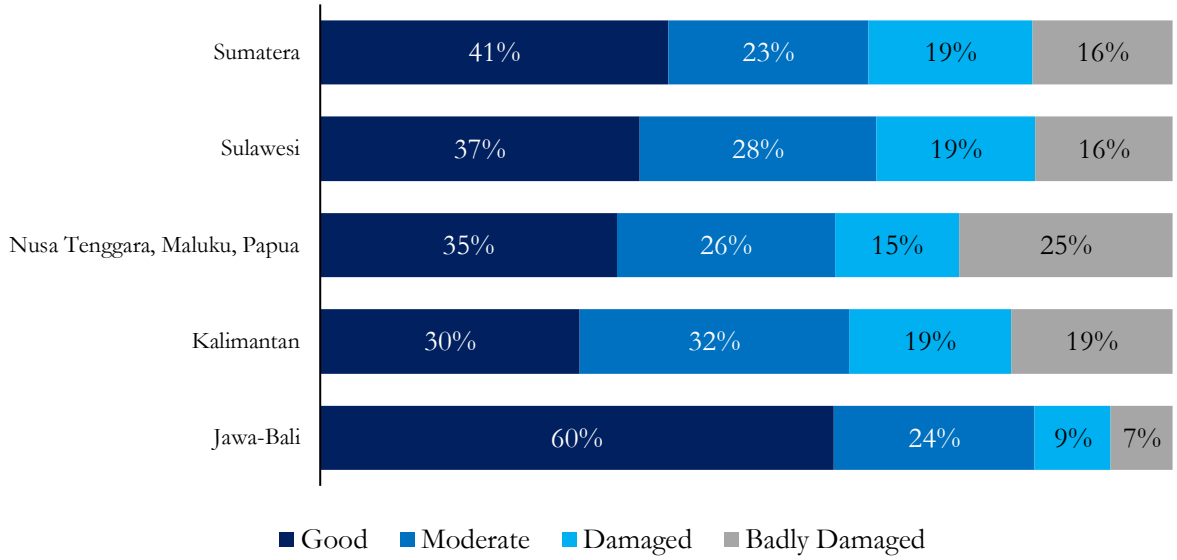


Figure 8. Distribution of total roads by condition in each region, Indonesia, 2021
Source: Authors' calculations based on data from BPS-Statistics Indonesia (2022a)

Looking at the surface type of the roads, the proportion of paved roads (asphalt surface) in 2021 accounted for 67.07% of the total road length, whereas unpaved roads (gravel and/or soil surfaces) constituted 32.93% of the overall length (BPS, 2022a). In every region, more than 40% of the roads are paved with asphalt (**Figure 9**). The Java-Bali region is the largest region with the most paved roads (80%), while more than 40% of roads are still unpaved in the other regions.

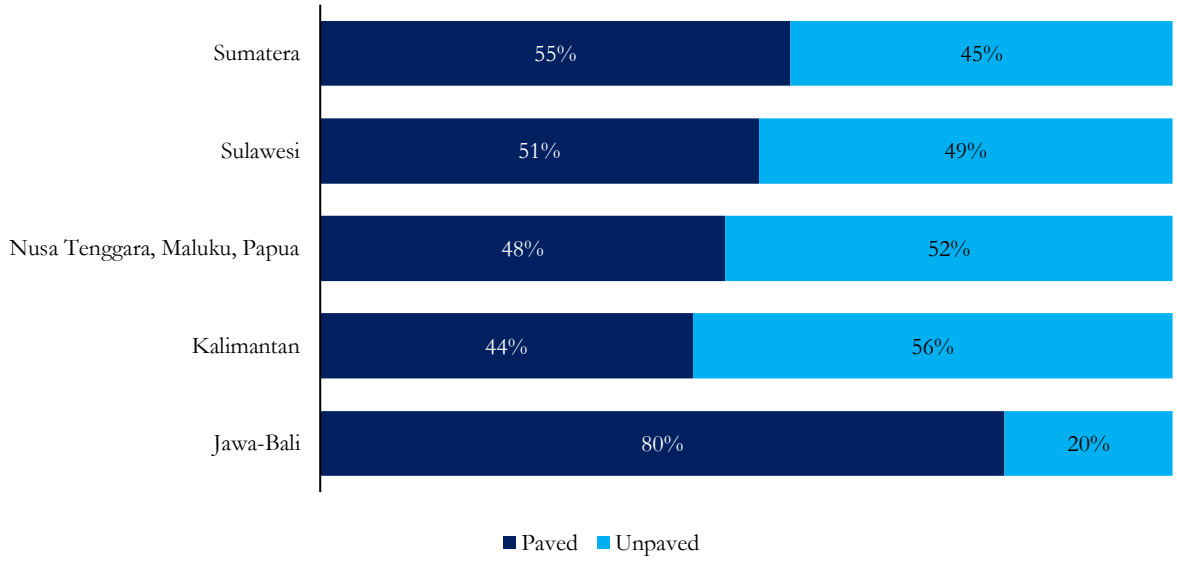


Figure 9. Distribution of total roads by surface type in each region, Indonesia, 2021
Source: Authors' calculations based on data from BPS-Statistics Indonesia (2022a)

Railways

Indonesia had 6,642 kilometres of active railway tracks in 2022, a 38% increase from the active railway tracks in 2010 (Ministry of Transportation, 2023). Around 70% of railways have been concentrated in Java islands, followed by 28% in Sumatra and the remaining 2% in Sulawesi and Papua. Between 2018 and 2022, the average annual growth of passenger and passenger kilometres for railway transportation reached 8% and 22%, respectively.

The growth of secondary cities surrounding Jakarta as the capital city, as well as soaring property prices in city centres, have spurred improvements in passenger railway services. In 2019, Jakarta saw the introduction of rail-based mass transportation modes, including Mass Rapid Transit (MRT) and Light Rapid Transit (LRT), complementing the existing Electric Commuter Train (*Kereta Rel Listrik*/KRL), which already carry an average of 1.2 million passengers daily (Harish, 2023). In 2022, the passengers of railways in Jabotabek (Jakarta-Bogor-Depok-Tangerang-Bekasi) accounted for 78% of the total railways passengers in Indonesia (Ministry of Transportation, 2023). This number includes passengers of the KRL, MRT Jakarta, LRT Jakarta, and Soekarno Hatta Airport Railways.

To improve economic development and connectivity, the government is accelerating the development of railway infrastructure throughout the country. The government is targeting the construction of 10,524 km of railway networks in the country by 2030 (VOI.id, 2022). According to the 2020-2024 National Medium-Term Development Plan), the key railway project targets include finishing the construction of the Makassar-Parepare Railway, Jakarta-Bandung High-speed Railway, Jakarta-Surabaya Railway speed increase, and developing the urban mass transportation system for six metropolitan areas (Jakarta, Surabaya, Bandung, Medan, Semarang, and Makassar).

Ports

Maritime infrastructure plays an important role in Indonesia's domestic and international trade. According to the Ministry of Transportation's SIGITA Port Dashboard, there are 602 total ports in Indonesia as of 2021, consisting of 28 major ports and 574 feeder/branch ports (Ministry of Transportation, n.d.). Aside from this, there were 2219 private ports, known as Dedicated Ports (*Terminal Khusus*/Tersus) and Ports for Private Use (*Terminal Untuk Kepentingan Sendiri*/TUKS), throughout Indonesia (Ministry of Transportation, n.d.). The majority of port activities happened at Indonesia's 25 strategic ports, with the largest ones including the Port of Belawan, Tanjung Priok, Tanjung Perak, and Makassar. These strategic ports accounted for 49 and 25 per cent of the unloading and loading of domestic cargo in Indonesia and reached 69 and 40 per cent of the unloading and loading of international cargo (BPS-Statistics Indonesia, 2022).

Over the years, Indonesia has continuously tried to improve the high logistic costs and low productivity of its maritime infrastructure. As major maritime infrastructure developments have been concentrated in western Indonesia, Indonesia introduced and implemented the Sea Toll program in 2015 to facilitate more balanced development in the Eastern Indonesia Region, especially in disadvantaged, remote, outermost, and border areas. This initiative aims to reduce the cost of logistics in eastern Indonesia and enhance connectivity across the country by providing efficient marine transport services, along with marine transport subsidies, revitalising civil

shipping, and fostering local industries. To support the Sea Toll initiative, the Ministry of Transportation has established 177 sea transportation routes by 2023, which comprised 39 sea toll freighter routes, 116 pioneer ship routes, six special livestock transport routes, and 16 feeder ship routes (Ministry of Transportation, n.d.).

Although the Sea Toll program has led to more affordable shipping between islands at rates that are 30%–50% cheaper than commercial vessels, its broader impact on improving the public welfare in the Eastern Indonesia Region remains limited (ERIA, 2021). Logistic costs in Indonesia continue to be high compared to its neighbouring regions. Indonesia's logistic cost accounted for 23.5 per cent of the GDP, in contrast to 8 per cent for Singapore and 13 per cent for Malaysia (PWC, 2022). Furthermore, Indonesia ranks 61st out of 139 countries in The World Bank's 2023 Logistics Performance Index (LPI), falling behind other ASEAN countries such as Singapore (1st) and Malaysia (31st), Thailand (37th), Philippines (47th), and Vietnam (50th) (World Bank, 2023). This underscores the challenge Indonesia faces in strengthening and accelerating its maritime infrastructure to improve overall economic competitiveness and connectivity.

3.3.2.2 Energy Sector

In 2020, Indonesia's total primary energy supply reached 1.493 billion barrels of oil equivalent (BOE). As seen in **Figure 10,** fossil fuels continue to be the main source of energy in Indonesia, with the share of fossil fuels in the total primary energy supply averaging around 94% between 2008 and 2020. The primary energy mix for 2020 was mainly made up of coal at 39%, followed by oil at 33%, gas at 17%, and renewable sources including hydropower, geothermal, and biofuels at 11%. In terms of energy consumption, 43.1% went to transportation, 34.1% to industry, 16.8% to households, and 4.8% to commercial places (MEMR, 2021a).

Indonesia had a total installed electric generation capacity of 70.1 gigawatts connected to the grid by the end of 2020 (MEMR, 2021a). Around 65% of this amount was produced by state-owned electricity company PT Perusahaan Listrik Negara, while the remaining shares came from private power utilities and independent power producers (IRENA, 2022). The total installed off-grid system capacity reached 2.7 GW, raising the total installed capacity in Indonesia to 72.8 GW by the end of 2020.

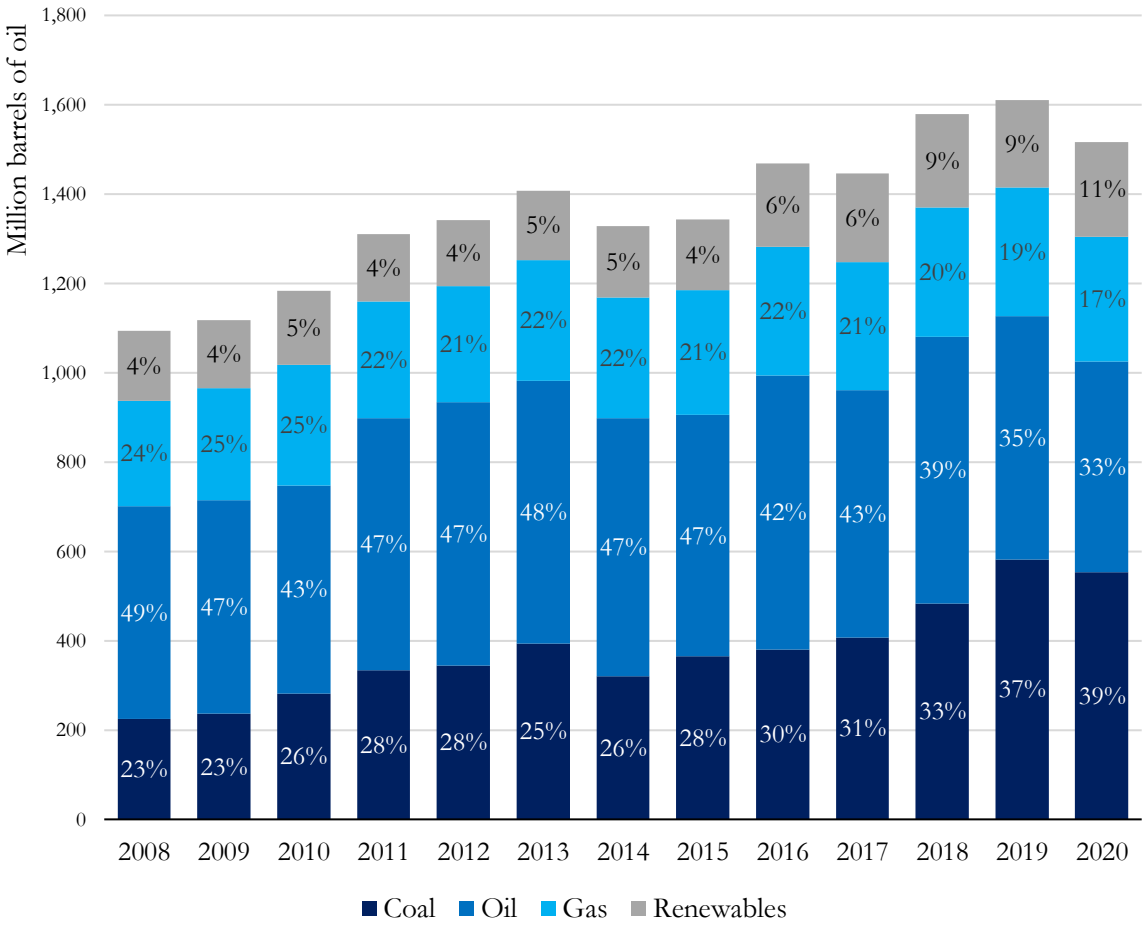


Figure 10. Primary energy mix, Indonesia, 2008 - 2021
Source: Handbook of Energy and Statistics 2008 and 2021

In recent years, Indonesia has been trying to shift towards renewable energy. Although coal still makes up the biggest energy source for electric power plants, accounting for half of the total installed capacity, the government has been focusing more on adopting clean coal technology to reduce emissions from fossil-fuel-powered plants (ADB, 2020). As the country moves towards renewable energy, it is crucial for the government to address the Energy Trilemma and design policies that can strike a better balance between energy reliability, affordability, and sustainability, along with its impact on everyday lives (World Energy Council, 2023).

In the energy sector, the electrification ratio has shown significant improvement, from 66.3% in 2009 to 99,20% in 2020, generating more than 30 million new customers across the country (Ministry of National Development Planning Republic of Indonesia, 2020; MEMR, 2021b). However, a decrease in demand due to the COVID-19 pandemic and an overly optimistic demand forecast resulted in the overcapacity of electricity in the Java-Bali system. This creates a dilemma as less developed regions beyond Java-Bali continue to experience regular electricity outages, and around 0.8% of the country's population still lacks access to electricity.

The level of investment in transmission and distribution grids has been impressive in recent years (ADB, 2020). By 2020, electricity had reached 99.2% of Indonesian households, industries, and businesses, a significant increase from about 67% in 2010 (IRENA, 2022). However, there are still

challenges that remain to ensure the reliable operation of Indonesia's electricity grids, as recurrent power outages persist outside Java due to an unstable supply of electricity (Setyowati, 2021). Shifting the focus from investing in generation capacity to infrastructure will be crucial, given the oversupply conditions. Further investments will be required to interconnect the Indonesian archipelago to ensure grid reliability and bridge the remaining gap of electrification in the less-developed regions of the country.

3.3.2.3 Manufacturing and ICT Sector

Manufacturing

The manufacturing sector plays a crucial role in driving Indonesia's structural transformation. The sector is dominated by micro and small firms, accounting for 99.3% of all manufacturing firms (BPS-Statistics Indonesia, 2023). Medium- and large-sized firms, in contrast, account for less than 1% of the total. Micro and small firms account for 61.8% of total manufacturing employment, with large firms accounting for 33% and medium-sized firms just 5.2% of total manufacturing employment (ADB-Bappenas, 2019).

Generally, manufacturing contributes relatively little to employment generation, 11.8% in 2000 and changed very little over time, such that by 2014 it was only 11.6% (ADB-Bappenas, 2019). These employments are dominated by the food manufacturing sector (6%), textile manufacture (4%), and wood (3%). Aside from that, value added in manufacturing tends to be dominated by a small number of low-tech manufacturing subsectors, including food manufacturing and petroleum. Overall, the food manufacturing, textiles, and wearing apparel sectors dominate the manufacturing sector in Indonesia. The food manufacturing sector stands out the most, as it is the largest manufacturing segment in terms of firms (24.5% of the total), employment (16.4% of the total), and value-added (18.4% of the total).

Manufacturing significantly shapes the country's gross exports, contributing 65.9% in 2020 (ADB-Bappenas, 2019). Exports in sectors like mining, food manufacturing, textile manufacturing, and petroleum largely contribute to this export share, with a strong focus on intermediate goods. This specialisation in intermediate goods exports has implications for downstream processing activities, potentially impacting the value-added contributions of these sectors.

Over time, the shares of manufacturing sectors to value-added have been declining in Indonesia. According to World Bank datasets (World-Bank, 2021), Indonesia had more than 30% of value-added from the manufacturing sector in 2002, then it decreased to less than 20% in 2020. Countries that have been successful in their developments have succeeded by moving resources, both in terms of share of employment and value-added, into manufacturing. However, Indonesia has not been able to achieve this to the same extent as more successful Asian countries, as its focus has been on products and sectors characterised by low productivity and limited growth in labour productivity. To grow further, Indonesia needs to diversify its economy and improve its economic activities, with the goal of producing higher-value products and adopting more effective patterns of production.

Information and Communications Technology

Digital infrastructure projects are required to improve Indonesia's Information and Communications Technology (ICT) sector as the country prioritises the digital economy as a national area of growth. Indonesia seeks to diversify the economy away from a reliance on natural resources by developing higher-tech exports. It is targeted to increase the industrial sector's gross domestic product share from 20% to 30% by 2030 and create more than 7 million new jobs (Oxford Business Group, 2019). The rise of Indonesia's middle class and the recognition of ICT's role in boosting economic growth have increased ICT spending in recent years. The government's spending on ICT infrastructure has increased around fivefold between 2016 and 2020 (Hanadian Nurhayati-Wolff, 2021). In 2020, the expenditure on ICT infrastructure in the country amounted to just over one billion U.S. dollars.

Indonesia is ranked as the third-largest cellular market globally, with around 355 million mobile cellular subscriptions in 2020 (International Trade Administration, 2022). While the telecommunications industry faces competitive challenges, data and value-added services remain lucrative areas for growth. Internet adoption stood at 69.8% in 2020, with the expansion of broadband infrastructure, particularly wireless solutions, to connect remote regions and islands to urban centres. This connectivity not only aids economic activities but also offers opportunities for providing IT devices and services to local communities. As investments in ICT infrastructure accelerate, Indonesia is positioning itself to utilise technology for sustainable economic growth and development.

3.4 Detailed Trends in Human Capital

Human capital plays an important role in countries' well-being (World Bank, 2021a), and Indonesia is no exception. Measuring and monitoring human capital will support policymakers in better understanding how much is being invested in human capital and what the returns of those investments are for national prosperity.

Human capital in this study is assessed by using four indicators:

- Human Capital Index (HCI)
- Educational Attainment
- Education Spending
- Learning Outcome

Among these indicators, the HCI is the one that is included in the sub-indexes of the overall comprehensive wealth. It encompasses not just the sheer number of workers but, crucially, their qualities. It measures the aggregate value of real (inflation-adjusted) per capita labour compensation over time, representing the skills, experiences and competencies embodied in the population. These aspects can be conceptualised as stocks of human capital that can increase a person's productivity, which in turn yields higher incomes.

3.4.1 The Trend of Human Capital Index in Indonesia

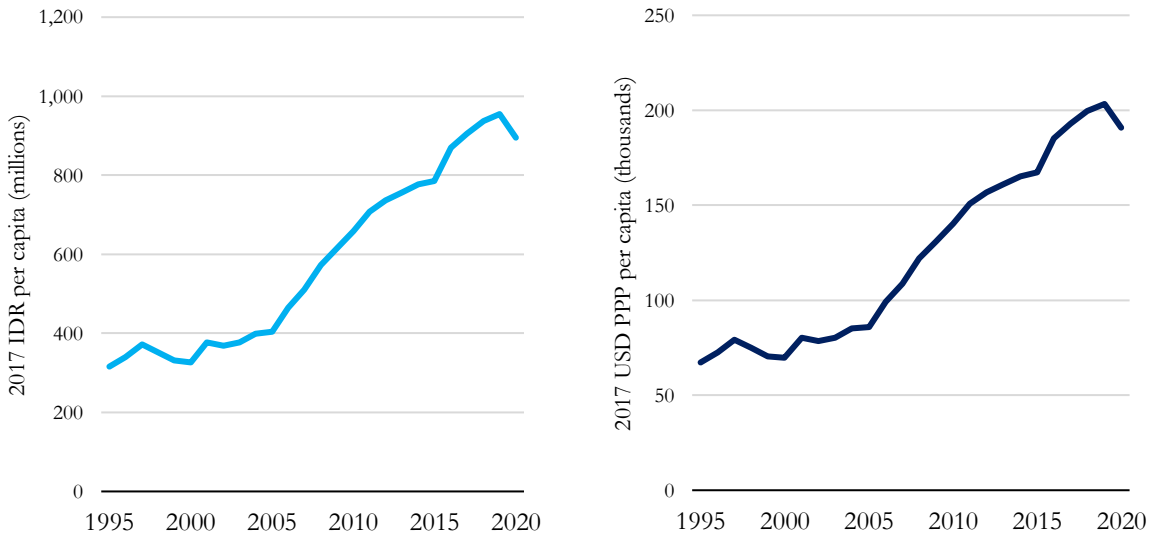


Figure 11. HCI, Indonesia, 1995-2020

Source: Authors' calculations based on data from BPS-Statistics Indonesia and the World Bank DataBank

The average Indonesian experienced important increases in human capital over the study period. The HCI increased from IDR 315.8 million (USD PPP 67,260) in 1995 to IDR 895.4 million (USD PPP 190,690) in 2020. Except for a notable dip from 1997 to 2000 due to the Asian financial crisis, the index grew consistently until 2019. The downturn witnessed after 2019 was likely related to the global COVID-19 pandemic. Further analysis would be required to determine whether the decline was reversed as the world recovered from the pandemic.

Examining the sectoral breakdown of the HCI, the proportion of human capital in the agriculture sector, which contributes relatively little to Indonesia's GDP, unfortunately, remains significant.

In 1995, this sector's share of the HCI was 22%, about equal to that of manufacturing. Although decreasing over time, it was still notably high (15%) in 2020. According to the World Bank (n.d.), the real value added per worker in the agricultural sector was only USD 3,601 in 2019, or roughly half of that of the services sector (USD 7,287) and about a quarter of that in manufacturing (USD 13,791). According to McMillan and Rodrik (2011), the labour productivity of a nation can be enhanced in two ways, either through growth within economic sectors via capital accumulation and technological advancements or by labour transitioning from low-productivity to high-productivity sectors. In the context of Indonesia, it is essential to pursue both strategies. This will require enhancing productivity within the agricultural sector to reduce labour requirements, accompanied by policies designed to expedite the transfer of human capital from agriculture to higher value-added sectors.

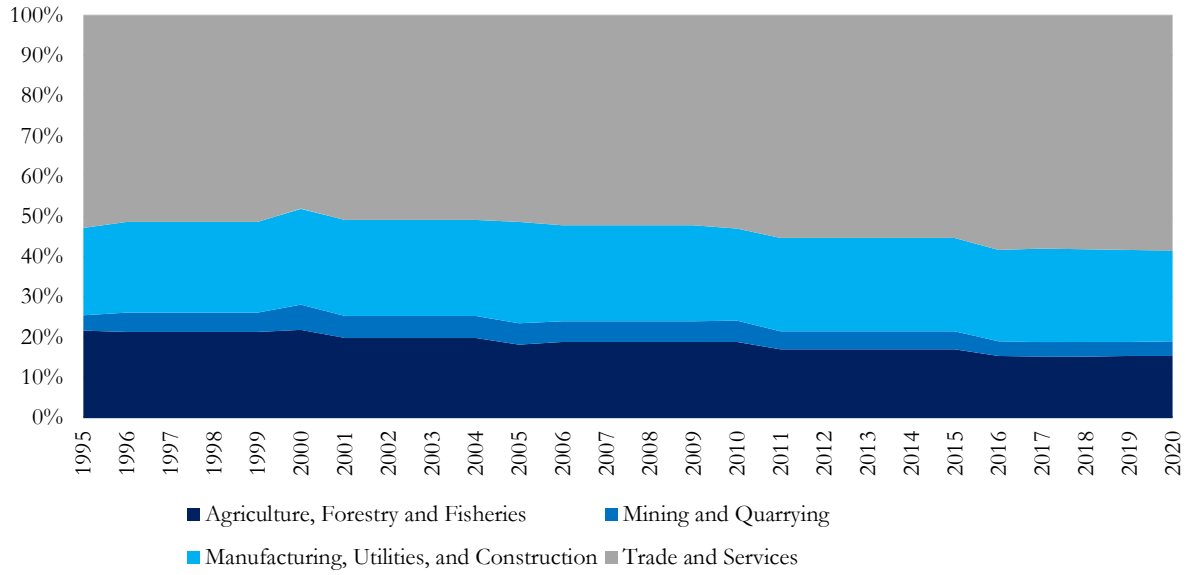


Figure 12. Share of HCI by sector, Indonesia, 1995-2020
Source: Authors' calculations based on data from BPS-Statistics Indonesia

3.4.2 The Improvement of Educational Attainment

While an increasing trend of HCI can be influenced by various factors, educational levels stand as one of the most significant. From 2003 to 2020, there has been an upward trend in net enrolment rates (NERs) for students at each level of education. Primary education, already high at the outset, grew from 93% to nearly 98%. Meanwhile, lower- and upper-secondary enrolments saw more rapid growth, with increases from 63% to 80% and from 41% to 61%, respectively.

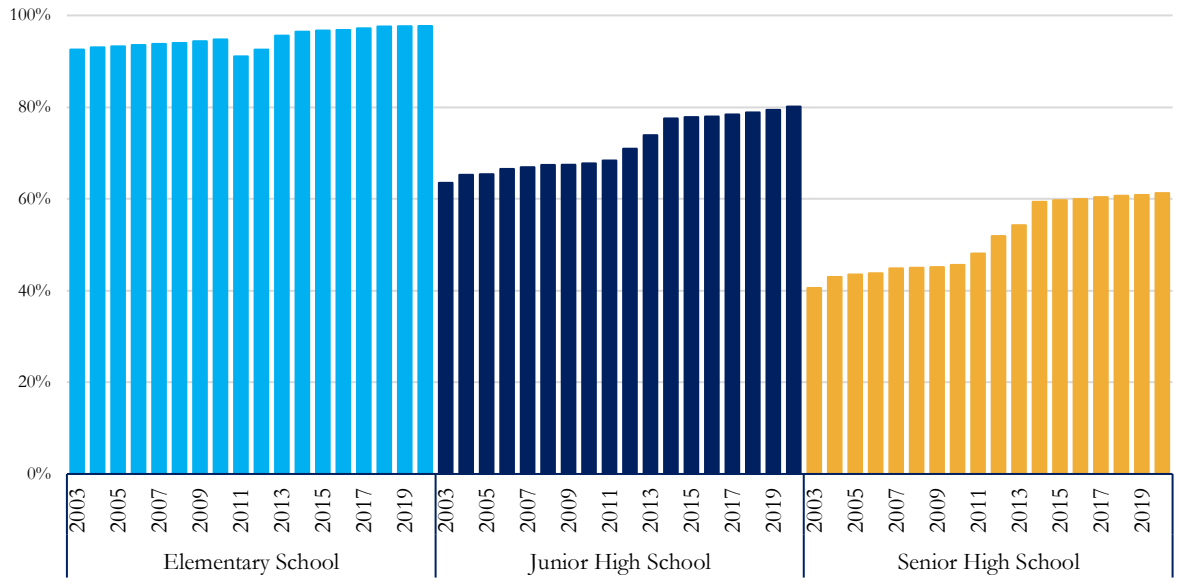


Figure 13. NER, Indonesia, 2003-2020
Source: BPS-Statistics Indonesia

This trend translates into an improvement in the highest level of educational attainment among the population. Between 2009 and 2018, there was a decrease in the percentage of the population without educational diplomas and, concurrently, a shift in the proportion of attainment towards higher educational levels. Observing the rapid growth of HCI suggests that Indonesian workers are successfully translating their increased investments in education into returns in the workforce.

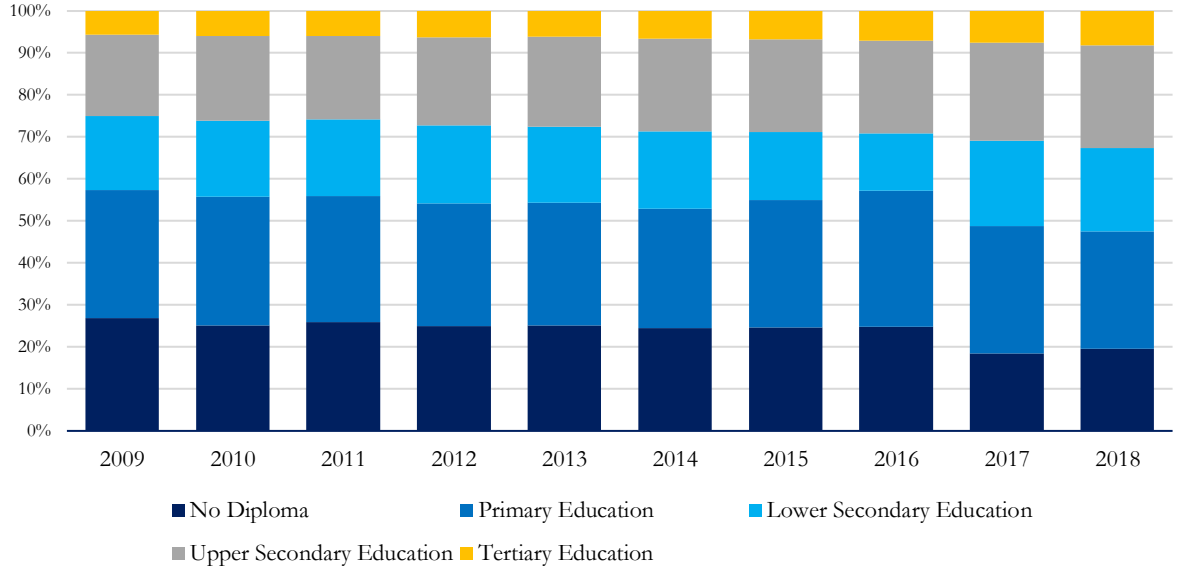


Figure 14. Highest Educational Attainment, Indonesia, 2009-2018
Source: BPS-Statistics Indonesia

3.4.3 The Government's Budget on Education

Following the 2002 constitutional amendment, Indonesia has consistently fulfilled its obligation to allocate 20% of the national budget to the education sector. This percentage surpasses Japan (9.3%) and the Republic of Korea (12.8%) and is comparable to Malaysia (21%) and Singapore (17.7%). It is noteworthy, however, that while these percentages are similar, the governments of Malaysia and Singapore allocate a significantly larger portion of their GDP for government expenditure (World Bank & Ministry of Finance Republic of Indonesia, 2020). As a result, the financial resources allocated to Indonesia's education sector have experienced a real-term surge of over 200% between 2002 and 2018. While the implementation was finalised in 2009, the education budget for 2019 is set at IDR 492.5 trillion (approximately USD 34 billion), marking a more-than-threefold increase in real terms since 2001. Anticipated future expansions in the budget and overall economic growth indicate a continuous increase of resources dedicated to the education sector.

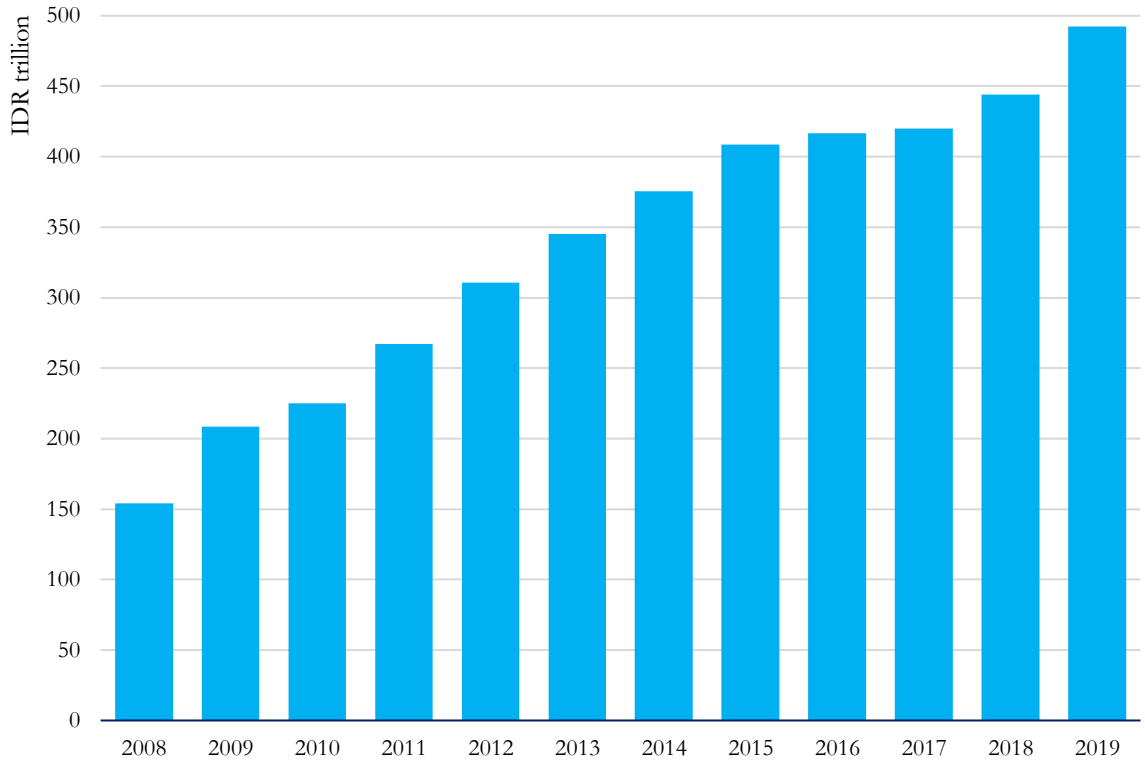


Figure 15. Government budget on education, 2008 - 2019

Source: Directorate General of Budget, Ministry of Finance Republic of Indonesia

Student Learning Outcomes

Despite notable increases in enrolment and access to education, advancements in student learning outcomes have struggled to meet expectations. The Programme for International Student Assessment (PISA) test conducted in 2022 revealed that only a quarter of Indonesian students attained the minimum proficiency level in mathematics, reading, and science, specifically for level 2 or above (18% in mathematics, 25% in reading, and 34% in science) (OECD, 2023a).

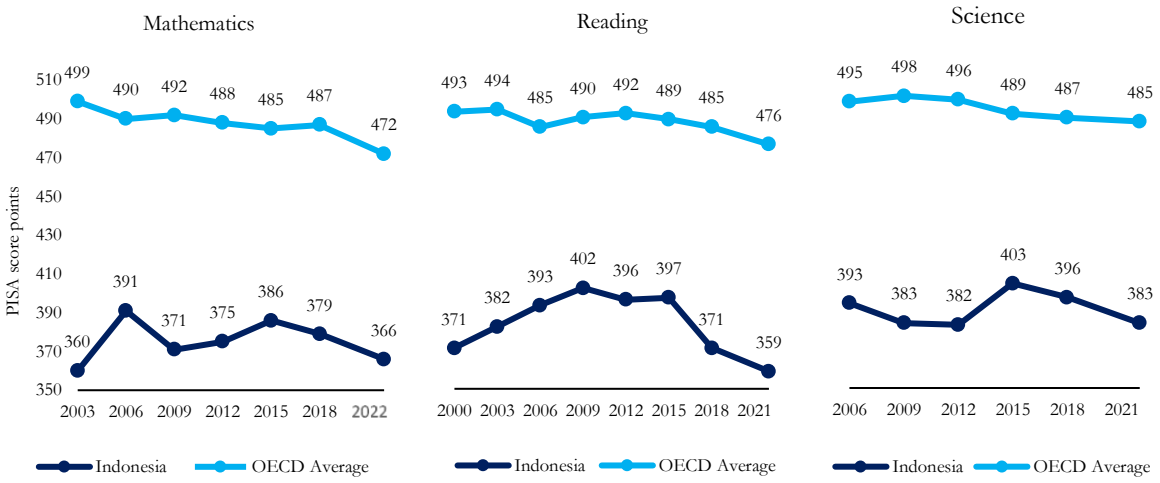


Figure 16. PISA score trends, Indonesia, 2003-2022
Source: PISA OECD Dashboard

In general, the PISA 2022 assessment witnessed an unprecedented decline in performance across OECD nations, attributed to the impact of the COVID-19 pandemic and the trends of declining scores in reading, science, and math evident even before 2018 (OECD, 2023b). Nevertheless, Indonesian students, on average, still scored below the OECD average in mathematics (OECD 69%), reading (OECD 74%), and science (OECD 76%). Indonesia's PISA 2022 results rank among the lowest ever recorded in all three subjects, particularly for reading (359) which was previously lowest in 2000 and 2018 (371). The same holds true for mathematics (366), which reached its lowest point in 2022 (360). Meanwhile, the science score (383) remains relatively stable. Increased access to education in Indonesia amidst persistently low learning outcomes poses a threat to Indonesia's potential for human capital development.

The results in the Indonesian Report Card in 2022 similarly showed subpar performance, with an average of around 56% of students across various school types demonstrating literacy proficiency above the minimum and around 42% of students across different school types demonstrating numeracy proficiency above the minimum (Ministry of Education, Culture, Research, and Techonology Republic of Indonesia, 2023). Moreover, there are notable disparities in learning outcomes across regions. Findings from the Indonesia National Assessment Program (*Asesmen Kompetensi Siswa Indonesia*/AKSI) reveal that provinces with a higher prevalence of low-performing students are predominantly situated in eastern Indonesia (World Bank & Ministry of Finance Republic of Indonesia, 2020).

3.4.4 The Gap Between Educational Attainment and Learning Outcomes

Despite increased spending on education, many schools in Indonesia still lack essential resources to support student learning. Even with the government's efforts to reform teacher professional development (TPD) over the past four decades, the quality of Indonesian teachers remains lacking (Revina et al., 2020). PISA test report in 2022 also shows that 18% of students in Indonesia attended schools where the principal indicated that the school's ability to deliver instruction was hindered due to insufficient teaching staff, while 13% faced challenges related to inadequate or poorly qualified teaching staff (OECD, 2023b).

One factor contributing to the above issue is the unequal distribution of transfers from the central government to regional governments, influencing their capacity to manage education spending. District Allocation Fund (*Dana Alokasi Desa*/DAU) transfers are not allocated on a per capita basis, and some DAU components are provided as block grants of the same amount to all districts regardless of their population size (World Bank & Ministry of Finance Republic of Indonesia, 2020). As student numbers across districts and provinces vary, this creates significant disparities in resource allocation per student, affecting efficient resource distribution. The notion that more funding does not automatically equate to better outcomes holds true in education finance. Transfers from the central government to the regional government are not consistently aligned with infrastructure needs, and there is a notable lack of capacity at the school level to effectively manage the resources.

3.5 Detailed Trends in Natural Capital

The role of natural resources, the environment, and ecosystems in supporting sustainable development cannot be neglected. These include renewable and non-renewable resources sold on the market, such as timber, fisheries, or minerals. However, ecosystems also provide valuable services not on the market, such as fertile soil, biodiversity, or a favourable climate. These are reflected in the concept of natural capital, defined by the Natural Capital Coalition as "the stock of renewable and non-renewable resources — such as plants, animals, air, water, soils, minerals — that combine to yield a flow of benefits to people" (SEEA, n.d.). These can be found in the rainforests and the peatlands, the rivers and the seas, the pastures and fields, the minerals and fuels extracted, and other elements of the natural environment.

Natural capital generates value through the flow of benefits often linked to other capital. Some assets serve as inputs to producing goods and services, while others are directly consumed for well-being. Since stocks of natural assets provide inputs to production processes, they also become a source of wealth. The state of natural capital, therefore, affects other capital as well. For example, a country's iron ore reserves contribute to steel production. The resulting steel could be used to produce consumer goods (increasing consumption), construct infrastructure (increasing produced capital), or export (increasing financial capital). Consequently, managing natural capital for sustainable development is unavoidable.

The nature of natural capital is distinct from other forms of capital, as it operates by its own complex laws and systems. It can also collapse with no advanced notice in a non-linear manner that deserves special attention (Managi & Kumar, 2018). Excessive consumption of natural capital can cause the country to be unable to maintain its inclusive wealth.

Becoming a source of well-being, a comprehensive measure of natural capital is required in the ongoing degradation of the planet's ecosystems. Estimating natural capital provides indicators that combine environmental and economic information, including biophysical and monetary information (European Commission et al., 2014). Doing so, this estimation can serve ecosystems' contributions to the economy, inform various natural resource management decisions, and enhance natural capital's transparency and fairness (Hein et al., 2020). Natural capital accounting can also be utilised to monitor the indicators for the 2030 Agenda for Sustainable Development (Alpízar et al., 2020). Therefore, it can provide significant input for planning and legislation with comprehensive, evidence-based development strategies.

This section focuses on the role and importance of natural capital in the context of measuring inclusive wealth in Indonesia. This study considers **market natural capital**, which can be classified into non-renewable resources and renewable resources. Non-renewable resources can be broken down into fossil fuels (oil, natural gas, and coal) and (e) minerals (gold, copper, iron sand, nickel, and tin). Renewable resources can be categorised into agricultural resources, plantation resources, forestry, fisheries, and livestock. There is also **non-market natural capital,** the ones that should not, cannot, or are yet to be evaluated in monetary terms. One reason for this is the limitation of data and valuation concepts methods, but another reason is that some forms of natural capital are essential to well-being, so they should be measured separately from other natural capital. This study considers **land use** in Indonesia, especially as it relates to the availability and preservation of natural ecosystems. Lastly, there is also a review of Indonesia's changing climate, as reflected by precipitation and temperatures. Consequently, natural capital was assessed using both monetary and non-monetary indicators. The table below shows a list of evaluated natural capital, as well as their components.

Table 1. A list of evaluated natural capital

Category	Natural Capital	Component
Market Natural Capital	Agriculture	Palm oil, rubber, coffee, tea, cocoa, coconut, coconut, pepper, nutmeg, paddy, maize, soybeans, mung beans, cassava, sweet potato, ground nuts, bananas, mangoes, oranges, cabbage, shallots and chilies
	Forestry	Industrial plantation forest and forest concession rights
	Fisheries	
	Aquaculture	Marine aquaculture and freshwater aquaculture
	Livestock	Buffalos, pigs, milk, eggs, cows, chicken
	Fossil fuels	Oil, natural gas and coal
	Minerals	Nickel, gold, copper and tin
Biodiversity and Land Cover	Biodiversity	
	Land cover	
Climate	Precipitation	
	Temperatures	

Market natural capital

Market natural capital refers to the natural assets that can be measured in monetary terms. These are presented as the overall value-weighted quantities of natural assets that yield goods and services sold in the market economy, following IISD (2018). Our market natural capital encompasses agriculture, fisheries, livestock, forestry, fossil, and mineral resources. Other market natural assets include wildlife stocks used for hunting and fishing and water in reservoirs, dams, and irrigations. However, these are not included in the index as the data on their physical extents and values are unavailable.

Agriculture

Indonesia is a significant producer of various agricultural commodities, rice and palm oil being two major commodities. Indonesia produced 54 million tons of rice in 2022 and 46 million tons of palm crops in 2021, the latter of which compose 82% of Indonesia's plantation production. The domination of one crop is a result of a monoculture food policy, which has developed an unbalanced food system that relies heavily on specific commodities, especially rice (Rondhi et al., 2019). Indonesia's horticulture output is more diversified, with shallot, potato, and cabbage being the three top-produced commodities by weight.

The agricultural sector is the third-largest sector in the economy after manufacturing and trade, contributing 12.4% of total GDP in 2021. It showed resilience during the pandemic in 2020, as even though it contracted by more than 5% in the peak of COVID-19 during the year's second quarter, it managed to grow by 2.19% annually (BPS-Statistics Indonesia , 2020). The sector remains a crucial source of livelihood, providing around a third of employment in the country (Moeis et al., 2020). This statistic is even more remarkable because a significant majority of these agricultural employees, a staggering 61%, are part of the Micro, Small, and Medium-sized Enterprises (MSMEs). This strong link between agriculture and MSMEs underscores the pivotal role of small-scale farming and related businesses in Indonesia's economy. They contribute to rural development and enhance local communities' resilience (Suryahadi & Hadiwidjaja, 2011).

Moreover, integrating agriculture and MSMEs promotes economic diversification, reduces poverty, and fosters inclusive growth by providing employment opportunities, particularly in rural areas where alternative job prospects are often limited.

Historically, the agriculture sector has undergone significant transformations, with one pivotal moment being the Green Revolution in the 1960s. During this period, Indonesia adopted modern agricultural practices, introducing high-yielding crop varieties, modern farming techniques, and an increased use of fertilisers and pesticides. These changes led to substantial increases in agricultural productivity, notably in rice production, helping Indonesia achieve rice self-sufficiency and significantly reducing hunger and poverty (Fuglie, 2004). However, the Green Revolution's focus on specific crops raised food sovereignty and security concerns. While Indonesia achieved self-sufficiency in rice, it became more dependent on imports for other essential staples, leaving the country vulnerable to global market fluctuations. This situation has renewed Indonesia's commitment to achieving food sovereignty, emphasising control over its food systems to ensure a stable supply of diverse and nutritious food. Indonesia has grappled with navigating a changing global landscape in recent years, particularly amidst commodity booms in the palm oil and rubber sectors. Balancing the economic gains from these commodities with environmental sustainability and social equity concerns has become a central challenge. Managing this delicate equilibrium is crucial to secure the nation's future food security, maintain ecological integrity, and safeguard the well-being of its people.

Indonesia's agriculture sector faces a range of threats that challenge its long-term sustainability and food security. One significant threat is the ongoing conversion of agricultural land for non-agricultural purposes. From 2015 to 2019, Indonesia lost 628,959 hectares of paddy fields and 1,720 hectares of shifting cultivation land. Uniquely, it gained 531,416 hectares of dry-field agricultural land. Those lands are dominated by the new expansion of palm oil plantations (Ministry of Agriculture, 2020). This poses a substantial risk to the country's ability to meet its domestic food needs. To address this issue, the government has introduced initiatives like the "food estate" program, with a prominent case being the development in Kalimantan. The program aims to convert vast areas of land into agricultural estates, primarily for rice and other staple crops. However, the program has faced criticism due to its high costs and potential social and environmental impacts (Napitupulu *et al.*, 2021; Neilson, 2017; McDonald & Meylinah, 2021).

A more significant threat to Indonesia's agricultural sector comes from climate change, as highlighted by various agencies like the United States Agency for International Development (USAID) and the International Food Policy Research Institute (IFPRI). Instances of extreme weather events have proven detrimental to local production. For instance, Dhamira & Ilham (2020) estimated that the occurrence of El Nino would reduce rice production by 6.2% (Dhamira & Ilham, 2020). These events underscore the urgency of adopting climate-resilient practices, such as drought-resistant crops and improved irrigation systems. On the other hand, improved mitigation measures would be necessary to reduce greenhouse gas emissions from the agricultural sector. The target for Indonesia's enhanced Nationally Determined Contribution (NDC) in 2022 would reduce greenhouse gas (GHG) emissions from the agricultural sector from 110.5 to 108 metric tons of CO_2 equivalent. That figure suggests a GHG emissions reduction of 0.4% per annum from 2010 to 2030 (UNFCCC, 2022). There are measures in place to achieve this, such as paddy field management, the use of organic fertiliser and biogas to absorb GHG emissions, and the improvement of animal feed through green feed and concentrates (Bappenas, 2019). Such measures are vital for both adaptation and mitigation as Indonesia confronts the evolving climate challenges in its agricultural sector (Tacconi & Muttaqin, 2019).

Forestry

Indonesia has a proportion of forest areas that reach 62.97% of its land area (Ministry of Environment and Forestry Republic of Indonesia, 2020). It covers 10% of the global tropical forest with 50% of the world's biodiversity, including flora, mammals, amphibians, reptiles, primates, and birds, and provides 25% of the medicinal plants for human health (Ministry of Environment and Forestry Republic of Indonesia, 2018). Therefore, Indonesia is the third-largest country in terms of rainforest coverage in the world (Turubanova et al., 2018). Furthermore, Indonesia also possesses forests with high biodiversity due to its geographical location along the equator (Kusmana, 2011). The extensive forests in Indonesia contribute significantly to society. From both a global and national perspective, these forests provide crucial ecological, climatic, and socio-economic benefits (Harrison et al., 2020).

Figure 16. Map of forest, Indonesia, 2019
Source: Andreas et al. (2019)

Decisions and forest management in Indonesia are laid out in government agencies and institutions. At the central government level, the Ministry of Environment and Forestry oversees the management of forests and natural resources in Indonesia. However, Indonesia's governance system is transitioning toward a more decentralised system, which presents both challenges and opportunities simultaneously (Triyanti, et al., 2023). In addition to decentralisation, the management of different types of forests in Indonesia is regulated by different directorates. Production forests, both permanent and limited, are managed by the Directorate General of Sustainable Forest Management, while conservation forests are managed by Forest Management Units. Indonesia also uses diverse forest initiatives and policies to manage and protect forest areas. These range from non-state market-driven governance systems such as forest and palm oil certification (Giessen et al., 2016; Wibowo et al., 2019) to state-led governance mechanisms like the Forest Moratorium (Sloan, 2014), Community Forest Management (Wulandari & Inoue, 2018), and global strategies like the REDD+ initiative (Korhonen Kurki et al., 2017; Boer, 2020).

Despite efforts to improve forest management quality, the rate of deforestation in Indonesia remains relatively high but has tended to decline recently. In 1950, approximately 87% (159 million hectares) of the country's total land area was estimated to be covered by forests (Tsujino et al., 2016). According to specific studies, around 59.0 million hectares of forest were cleared between 1950 and 1997. Deforestation continued in the country even after the Asian financial crisis hit Indonesia. It is estimated that primary forest loss from 2000 to 2012 amounted to over 6.02 million hectares, with an increasing trend (Margono et al., 2014). The loss and degradation of forests can be attributed to factors such as oil palm and pulpwood plantations and forest conversion to grasslands associated with fires, logging, and mining (Austin et al., 2019). But in its development, the overall rate of deforestation in Indonesia has declined as a result of a shift in policy direction that prioritises sustainability and better government monitoring (Djaenudin et al., 2018). Based on the most recent data accessible, Indonesia documented a decrease in deforested land from July 2021 to June 2022, with 104,000 hectares (equivalent to 256,990 acres) compared to the previous figure of 113,500 hectares (Teresia, 2023). One of the contributing factors to the declining rate of deforestation is economic growth, which generates new employment opportunities and consequently reduces the reliance on expanding into new land (Arrow et al., 1995).

To achieve substantial transformation in Indonesia's forest governance and decrease deforestation, the government has implemented various programs and strategies, including the REDD+ initiative (Korhonen Kurki et al., 2017; Boer, 2020). Indonesia has been guided by the 2012 REDD+ National Strategy, supported by Norway, with a target of reducing greenhouse gas emissions by 41%, leading to sustained reductions in deforestation and forest fire extent for about 20 consecutive years (Ministry of Foreign Affairs Republic of Indonesia, 2021). As part of its REDD+ readiness, the government established a moratorium on logging, oil palm, and wood fibre plantations (Norway and Indonesia, 2010; Purnomo, 2012). The moratorium aims to halt permits for activities in primary forest areas to curb the rate of forest loss, and during this suspension, data integration, mapping, and regulation occur (REDD+ Task Force, 2012). One notable example is the 2011 moratorium on new permits for oil palm expansion in primary forests and peatlands. The limited effectiveness of the moratorium in 2011 in reducing deforestation could be attributed to factors such as the policy's partial forest protection, inadequate communication of the moratorium to local implementing agencies, lack of law enforcement, and the presence of local vested interests (Austin et al., 2017). The 2011 moratorium was extended in May 2013 and May 2015, with each extension spanning an additional two years (Government of Indonesia, 2013; Sapariah et al., 2015). Subsequently, in May 2017, the Indonesian government announced a third extension (Reuters, 2017). This moratorium became permanent in 2019 (Government of Indonesia, 2019).

Forestry loss generates greenhouse gas emissions and biodiversity change. It is reported that forest loss has negatively affected agricultural productivity in the country. Forestry losses caused a reduction in agricultural productivity of 45%, or USD 2.63 billion, between 2001 and 2014 (Yamamoto et al., 2019). As observed in Kalimantan, tropical forest loss due to fires significantly reduced diversity and changed soil chemical properties. It caused the ecosystem to lose its functions, such as moisture storage and carbon sinking, and it stopped providing essential nutrients in the area (Agus et al., 2019).

Fishery and Aquaculture

Indonesia's significant caught fisheries products are skipjack, tuna, cob, and shrimp. Centres for caught fisheries include Maluku, East Java, South Sulawesi, North Maluku, and North Sumatra. Considering that the average Indonesian only consumes 57.27 kilograms of fish annually (Ministry of Marine Affairs and Fisheries, n.d.), much of Indonesia’s fisheries production is directed towards

exports rather than to the domestic market. Indonesia's trade balance in fisheries and aquaculture has experienced surpluses for the last five years, with the most significant contributor being crustaceans.

However, some issues could undermine productivity in the sector. Many of Indonesia's marine species are either overexploited or depleted, with the Ministry of Marine Affairs and Fisheries estimating that 90% of Indonesian boats draw their catch from overfished areas (Merk, 2022). Conservation measures are in place to ensure enough fish population, with a policy of fishing quota as the latest measure (Antara, 2023). Other than that, Indonesia's fisheries management policy is also oriented towards increasing investment and jobs in the fisheries sector by streamlining regulations, lowering production costs, and increasing the value addition of its products. However, some of these policies might be counterproductive. For instance, subsidies and tax deductions have driven overfishing in Indonesia since 1980, causing stock depletion and a decline in productivity (Merk, 2022).

Aquaculture can be a solution to these issues. According to data from the Ministry of Marine Affairs and Fisheries (n.d.), aquaculture produces more than twice the amount of fish compared to captured fisheries. This sector has the potential for increased production, having grown from 2.4 million tonnes in 2010 to 6.4 million tonnes in 2019. Looking forward, the Ministry of Marine Affairs and Fisheries will encourage the aquaculture sector to be the prime mover in supplying fish for consumption, with main commodities, namely shrimp, tilapia, seaweed, lobster, and crab. This approach will meet the protein needs of the Indonesian population without threatening marine fish stocks.

Livestock

Chickens dominate the overview of livestock in Indonesia. Around 97% of Indonesia's livestock are chickens. Cows comprise about 1% of the total livestock, while other meats such as pigs, buffalos, ducks, and others combined only comprise 2% of Indonesia's livestock population. From the consumption side, 79% of Indonesians' meat intake came from chickens. Despite this, the annual consumption as of 2022 reaches 0.15 kilograms per capita each week, translating into 2.1 million tons of consumption each year at the national level, meaning that chickens experience 1.7 million tons of surplus (Annur, 2022). The most considerable import need came from cow meat, with an annual production of only 499 thousand tons in 2022, whereas we consume much more. For the last five years, Indonesia has suffered from a deficit of 250-300 thousand tons of cow meat yearly (Pransuamitra, 2023). It would only be possible to fulfil Indonesia's domestic market needs with imports.

Indonesia's livestock depends on one species (chicken), and its bovine population comes from foreign sources. That fact will likely endure with Indonesia's rise in per capita income, making meat more affordable for many families. Despite tlhe policy trend of Indonesia's government towards food production sovereignty (*kedaulatan pangan*) by making deregulation efforts to boost private investment in food production, the industry trend is not catching up due to a lack of an efficient market system, low protein intake, and lack of production standardisation (Soetirto, 2013).

Fossil fuel

The abundance of oil reserves and low domestic demand made Indonesia an oil-exporting country before the 21st century, with production reaching 1.2 million barrels per day in 1981. However, increased demand and reduced production transformed Indonesia into a net oil importer by 2004; by 2008, Indonesia left the Organization of Petroleum Exporting Countries. Oil production fell

from 917 thousand barrels a day in 2012 to 692 thousand barrels a day in 2021 (BP, 2022), and crude oil imports increased in response, from around 225 thousand barrels a day in 2000 to about 311 thousand barrels a day in 2022. Indonesia's oil production decreased gradually at an average of 2.8% annually between 2010-2018 (Rahman et al., 2021). This declining trend is related to the natural maturation of producing oil fields, a slower reserve replacement rate, and decreased exploration and investment (PWC, 2019). The country still relies on mature oil fields due to limited significant oil discoveries in the last decade, especially in Java, Sumatra, and Kalimantan. Indeed, oil reserves have been depleted since the 1990s, as shown by the decline in proven oil reserves, from 5.1 billion barrels in 2000 to 2.4 billion in 2020 (BP, 2022). With its estimation of proven reserves of oil, the Ministry of Energy and Mineral Resources estimated that at the current production rates of 700 thousand barrels per day, and assuming no additional new sources, Indonesian proven reserves for crude oil (2.44 billion barrels), are estimated to last for less than ten years (Ministry of Energy and Mineral Resources Republic of Indonesia, 2021a).

Figure 17. Oil and gas resource distribution, Indonesia, 2022
Source: Ministry of Energy and Mineral Resources (2022)

Natural gas plays a more predominant role in Indonesia's oil and gas production, representing 60% of total oil and gas lifting in the country as measured by barrels of oil equivalent per day (PWC, 2019). In 2020, the Ministry of Energy and Mineral Resources Republic of Indonesia reported a production rate of 6 billion standard cubic feet per day with proven reserves of 43,6 trillion cubic feet, the 13th largest in the world (Ministry of Energy and Mineral Resources Republic of Indonesia, 2021a). Indonesia's proven reserves are estimated to last less than 20 years at the current production rate, given that there are no additional new sources.

Indonesia has a pivotal role in the global coal market. The country ranked as the 5th largest coal producer in 2018, although it is considered as the 2nd largest coal exporter since it exports around 80% of its production (Baskoro et al., 2021). However, most of Indonesia's produced coal has low to medium calorific value (Ministry of Energy and Mineral Resources Republic of Indonesia, 2023), which also fetches a lower price. Coal extraction in Indonesia is mainly located in Sumatra and Kalimantan, where there are large sedimentary basins with low mining costs (Friederich & van Leeuwen, 2017).

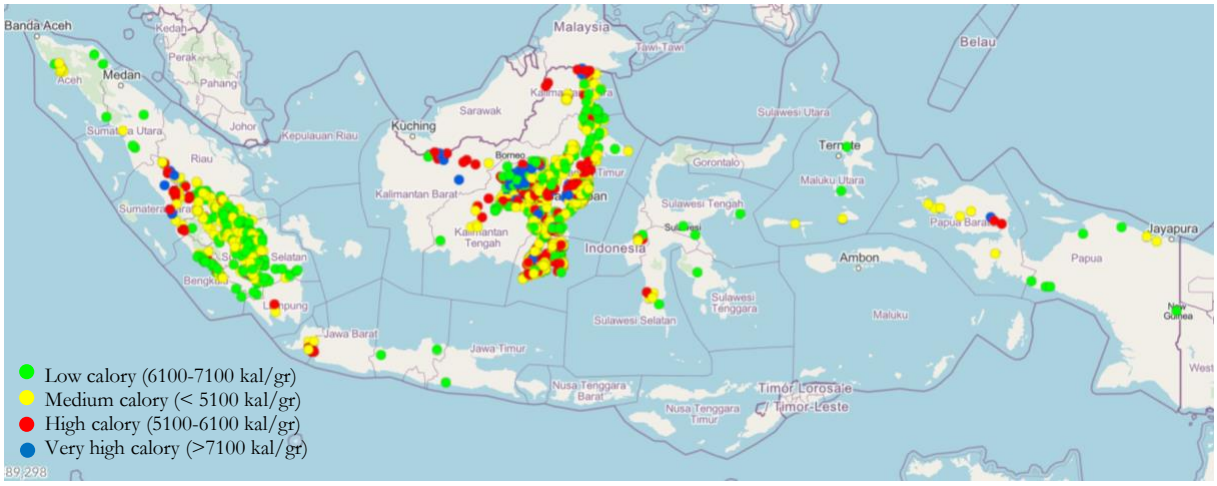


Figure 18. Coal resource distribution, Indonesia, 2022
Source: Ministry of Energy and Mineral Resources Republic of Indonesia (2022)

Fossil fuels have been important for Indonesia's economy, specifically for transportation and industrial sectors. In 2022, Indonesia's industrial sector utilises almost 85% of fossil fuels for its energy and more than 99% in the transportation sector (Ministry of Energy and Mineral Resources, 2020). Considering the continuity of Indonesia's economic growth over the coming years, the International Energy Agency (IEA) projected that oil and gas demand will continue to grow until 2050 under the stated policies scenario, yet oil demand will decrease under the announced pledged scenario (IEA, 2022). The demand for oil comes the most from the transportation sector and is projected to increase until 2030, given the continued growth of passenger transport demand, and the demand for natural gas comes the most from the industrial sector, specifically the chemical industry (Bagaskara et al., 2023).

Fossil fuels trade will also be affected by government policies and commitment. In 2021, Indonesia exported almost USD 7 billion worth of natural gas in 2021, a steep decline from USD 20.5 billion in 2012. Inversely, it is importing oil with a value of USD 40.42 billion in 2022, which was slightly lower than the 2012 level of USD 45.27 billion. IEA (2022) projected that if Indonesia continues with its stated policies, its oil and gas production will decrease over the coming years, which will cause growth in oil and gas imports. Nevertheless, coal export will be an option for the country to preserve jobs and revenues in the medium run, given the surging price of coal in recent years, yet it is notable to note that coal export's continuity will depend highly on policies impacting coal demand in the importing markets, especially in India and China (IEA, 2022).

Minerals

Positioned among three large continental plates and enveloped by 20 microplates, Indonesia has rich deposits of minerals (Geological Agency, 2018), especially coal, copper, gold, nickel, and tin (Kuo, 2012). In 2023, Indonesia's nickel output was 1.71 million tonnes, covering 51 per cent of global supply (Lakhsmi, 2024). This large amount of mineral production makes Indonesia's economy heavily reliant on its mining industry, so any policies related to the mining sector must consider how they might affect the country's economy (Resosudarmo et al., 2009).

The Indonesian mining sector has a polarised ownership structure, with almost all major companies in the mining sector owned by foreign companies (Warburton, 2017). However, the governance of the mining sector, regulated by the Ministry of Energy and Mineral Resources, has

issued a series of regulations to prioritise domestic ownership in the mining and energy sectors (PWC, 2019). The government introduced the mining laws to secure the industry's resources' rent, including ownership, trade, and subsidies (Winanti & Diprose, 2020). One of these mining laws is Law Number 3/2020, which emphasises resource nationalism, state ownership, control over trade, and subsidies (Sutrisno. A., 2021). On the other hand, the government has also created regulations to streamline investment bureaucracy in the mining sector to maintain economic competitiveness in Indonesia (PWC, 2019). The mining law shows government intervention over the ownership structure, production, and price control. Simultaneously, the government enhances incentives for companies that establish downstream industries. This demonstrated the government's determination to achieve self-sufficiency across the entire value chain and attain energy security (Sutrisno. A., 2021).

Minerals are crucial elements in the rapidly growing clean technology sector. Many clean energy technologies, such as solar photovoltaic (PV), wind, and electric vehicles (EV), require more minerals compared to traditional fuel-based technologies (IEA, 2021). As a result, the demand for minerals will increase as clean energy transitions gather pace. One mineral of particular interest in the transition to renewable energy is nickel. The quality of nickel makes it applicable in various renewable energy technologies, including geothermal, electric vehicles, energy storage batteries, hydrogen, hydropower, wind, and concentrated solar power. This has led to a significant increase in nickel usage in the clean energy production process in various countries (Zheng et al., 2014; Wang et al., 2021). Rich in nickel, Indonesia has benefited from increased investment in nickel mining and export promotion of this commodity (Widiatedja, 2021). Besides nickel, Indonesia also produces a considerable amount of copper and other minerals, making import countries accelerate the supply of important Indonesian minerals in the international market (Islam et al., 2023).

To add value to mineral export products, the government has implemented Law Number 3/2020, which prohibits the export of raw materials. To increase value added, the government has implemented a mining industry downstream programme since 2014 to achieve higher sales value and competitiveness in the international market. To promote downstream activities, the government has enforced a ban on mineral exports, i.e. nickel. This forces Indonesia's domestic mining sector to contend with issues related to local nickel selling prices and the assessment system for metal quality. The export ban has forced mining companies to sell their nickel ore to domestic smelters at lower prices amid the current high world nickel price. Additionally, there is a perceived bias in assessing nickel metal quality levels. This issue is burdensome to Indonesia's domestic mining industry, while this can potentially increase the added value of Indonesian mineral products (Winona, 2022).

While mining creates market natural capital, it can also destroy non-market capital since it carries significant risks of environmental damage and social changes (Aung et al., 2020). These environmental risks such as deforestation, public health risks, and pollution. Industrial mining expansion has been responsible for 1,901 km^2 of direct forest loss and an estimated 194-215 km^2 of indirect forest loss (Giljum et al.,2022). Another issue is the use of mercury, especially by artisanal mines, which could lead to public health issues (Usher, 2013). Despite requiring environmental impact analysis (EIA) for mining operations, many illegal miners still operate in Indonesia without environmental or social risk mitigation instruments (Resosudarmo et al., 2009; Ministry of Energy and Mineral Resources Republic of Indonesia, 2020). Most conflicts arise due to the failure to fulfil EIA requirements, resulting in clashes between NGOs and miners (Ministry of Energy and Mineral Resources Republic of Indonesia, 2020).

3.5.2 Market Natural Capital Index

The MNCI, which is the natural capital sub-index of the overall NCWI, slightly increased between 1990 and 2020, although it experienced fluctuations in the thirty-year period. The real (2017 prices) per capita value of Indonesia's market natural capital increased from IDR 29.94 million (or USD PPP 6,376) in 1990 to IDR 45.36 million (or USD PPP 9,651) in 2020, a total increase in IDR per capita of 51.37% and an average annual increase of 2.16%. While the market natural capital value increased by 3.58% annually from IDR 5,366,305 billion to IDR 12,244,616 billion, Indonesia's population grew 1.38% per annum.

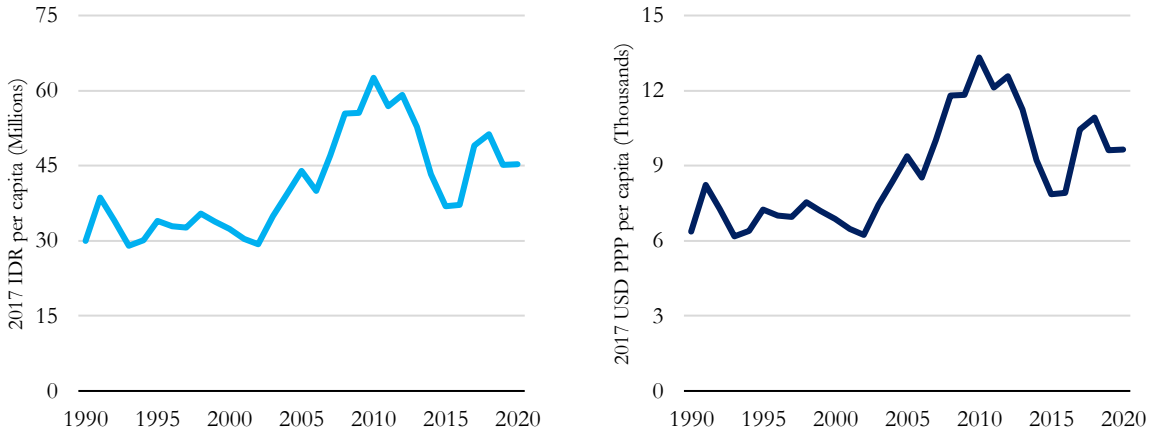


Figure 19. MNCI, Indonesia, 1990-2020
Source: Authors' calculations based on data from BPS-Statistics Indonesia

Our calculations are less suitable for cross-country wealth comparisons due to their reliance on locally sourced, country-level data. However, the World Bank (2021) offers such insights. A striking revelation from the World Bank's findings is the relatively minimal contribution of timber from Indonesia's forests to the country's overall wealth. This unexpected outcome prompts an exploration of how Indonesia compares the production of major natural capital assets and commodities on a global scale. The country emerges as a substantial producer in the top 10 for timber, fish, coal, natural gas, oil, nickel, gold, tin, and copper. However, the World Bank's data positions Indonesia as 14th in terms of aggregate natural resource wealth globally. Furthermore, the country ranks 79th in per capita wealth, highlighting a discrepancy between possessing abundant natural resource wealth and effectively generating income from it.

Comparative analysis with countries like Brazil and Malaysia, both heavily reliant on natural capital, exposes Indonesia's underperformance. Malaysia, with forests similar to Indonesia's, manages to generate six times more wealth for every tree harvested. This glaring difference suggests that Indonesia has untapped potential for increased income if conditions are optimized for extracting maximum wealth from its natural resources. Effectively generating and capturing this wealth could unlock substantial additional income, potentially propelling Indonesia beyond the confines of the middle-income trap.

Decomposition

The MNCI includes renewable resources and non-renewable resources, with varying shares between the two. In 1990, renewable resources composed 76.16% of the MNCI, largely dominated

by agriculture and livestock. However, the share of minerals and fossil fuels increased during the commodity boom in the mid-2000s to mid-2010s. At the peak of the commodity boom in 2010, non-renewables collectively formed 54.81% of Indonesia's MNCI. With the decline in the value of fossil fuels, the share of non-renewables in the MNCI also fell to a low of 27.61% in 2016. However, the increased value of fossil fuels coupled with the decline of agriculture lifted the share of non-renewable resources to 44.40% in 2020.

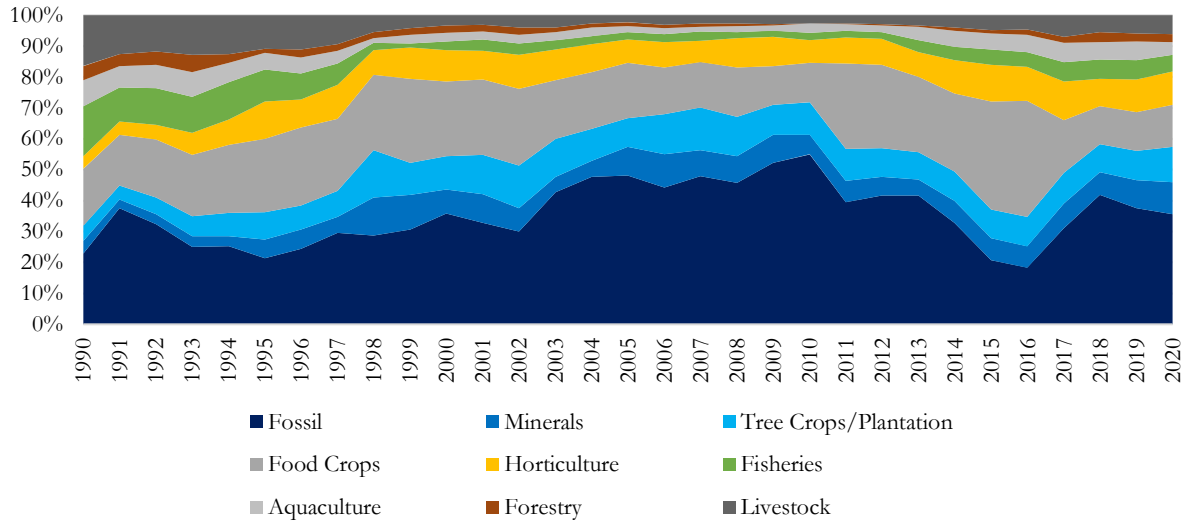


Figure 20. MNCI by Sector, Indonesia, 1990-2020

Source: Authors' calculations based on data from BPS-Statistics Indonesia

Between 1990 and 2020, the MNCI increased by IDR 15.38 million. This was primarily influenced by the per-capita value increase in fossil fuels by IDR 9.51 million, followed by horticulture, plantation, and minerals, with a value of approximately IDR 3 million. Meanwhile, other sectors experienced declines, led by fisheries and livestock, with IDR 1.96 million and IDR 1.67 million, respectively. The rest, including food crops, aquaculture, and forestry, followed with decreases below IDR 1 million.

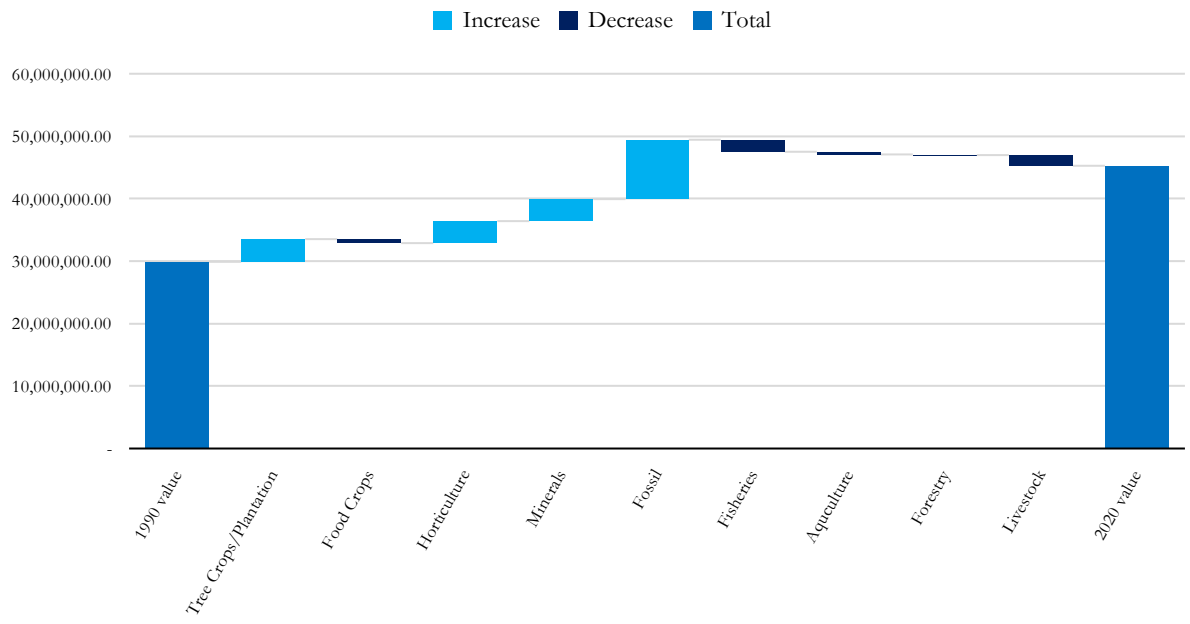


Figure 21. Decomposing changes in 1990 and 2020 MNCI
Source: Authors' calculations based on data from BPS-Statistics Indonesia

The decline in the contribution of some renewable resources could be due to one of two things. The first is when the total value of said category declines, which is the case for livestock, aquaculture, fisheries, and forestry. The second is the total value of said category still increases, albeit at a pace lower than population growth. This is the case for food crops, of which the total sum still increased by an average of 0.25% per annum.

Non-renewable resources have been dominated largely by fossil fuels rather than by minerals. While there had been some fluctuations, the share of fossil fuels over non-renewable resources reached a high of 92.79% in 1991 and had never been below 69.91% (in 1998). On average, oil and gas compose 36.86% and 41.12% of Indonesia's fossil fuels market natural capital. However, the share of coal has increased over time. In 1991-1995, the average share of coal over fossil fuels was 5.80%. The percentage increased by around nine-fold to 51.70% in 2016-2020.

Meanwhile, the share of minerals over non-renewable resources has never exceeded 30%, averaging at 16.99%. Copper formed the bulk of Indonesia's mineral MNCI, with an average share of 46.87%. The value of gold had been increasing over time. Between 1991 and 1995, the average share of gold over minerals was 18.87%; this increased to 45.82% between 2016 and 2020. Consequently, the share of nickel and tin declined from 1990 to 2020, from 29.71% and 25.12% to 10.41% and 4.18%.

Physical Quantities

At its crux, the MNCI was determined by two forces: the physical quantities of the commercial natural assets and their price. This is especially the case for fossil fuels and minerals since their values are calculated based on the availability of existing reserves. The table below demonstrates the changes in the physical reserves of fossil fuels and minerals.

Table 2. Index of per capita physical quantities of market natural assets, Indonesia, 2020 (1990 = 100)

Asset	Index
Nickel	420.52
Gold	95.82
Copper	123.88
Tin	69.16
Coal	154.16
Oil	25.89
Gas	73.20

On a per-capita basis, the reserves for gold, tin, oil, and gas have declined since 1990. These declines do not necessarily indicate a depletion of their physical reserves. Physical reserves decline means that existing reserves are not replaced as fast as they have been depleted. It is possible that there are still unexplored deposits that could be unearthed through future exploration and development. Additionally, there might be known deposits that are currently impractical to extract due to economic or technical constraints. While these undiscovered or economically unviable deposits can contribute to wealth if they are developed into usable reserves in the future, they currently do not provide any immediate wealth. Consequently, they are not taken into consideration in the MNCI.

Meanwhile, nickel, copper, and coal reserves have increased within the last thirty years. This indicates that deposit explorations are occurring at a faster pace compared to reserve extraction. It could be that technological and economic factors are enabling access to previously inaccessible deposits. It could also be a sign that there is a strong incentive to explore new deposits.

Price Effects

Inversely, the price of market natural assets tends to be more dynamic. The rise and fall of the value tend to follow the global commodity prices—it was elevated during the commodity boom in the mid-2000s to the mid-2010s. The Market Natural Capital Index reached its peak in 2010 at IDR62.6 million, largely driven by an increase in oil values. The index reached its trough in 1993 at IDR29 million.

The figure below presents the Market Natural Capital Index, including and excluding fossil fuels, and compares them against the World Bank Commodity Price Index (all in real 2017 prices). The overall market natural capital index followed the elevated commodity prices during the 2000s to the mid-2010s, as well as its dip in 2015-2016. The growth of the Market Natural Capital Index was less pronounced when fossil fuels were not considered. Despite a general parallel trend between the index with and without fossil fuels, there was a discrepancy between the two fluctuates over time, notably widening during periods of commodity booms. This suggests that the valuation of Indonesia's fossil fuel reserves plays a significant role in the overall trends and levels of Indonesia's market natural wealth.

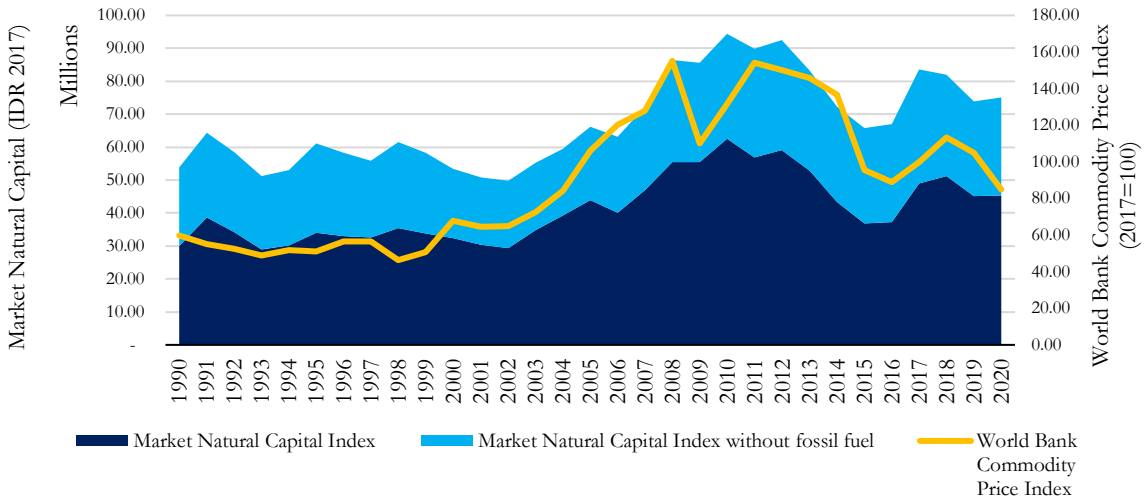


Figure 22. MNCI with and without fossil fuels, Indonesia, 1990-2020
Source: Authors' calculations based on data from BPS-Statistics Indonesia

Commodity Boom and Indonesia

A commodity boom is the increased price of commodities. In Indonesia, it has happened several times, including in the 2000s. Back then, coal and crude palm oil (CPO) led to an increase in commodity prices, with almost twice as much increase between 2001 and 2005. In early 2009, commodity prices were valued five times as much as in 2001 (Shrestha & Coxhead, 2018). This boom supposedly occurred between 2001 to 2012. It peaked in 2011 when the extractive sector reached the highest export share. Through this commodity boom, two commodities stood out: coal and palm oil. Both commodities contributed about 20% of exports in 2014. Apart from those commodities, Indonesia also exported crude oil and forest products (Wihardja, 2016).

The commodity boom was intensified by the drastic changes in the global economy in 1999 due to China's exponential growth as it opened its economy to the world. China's growth triggered a spike in commodity demand. Moreover, Indonesia experienced a regulation change, further pushing the activities surrounding palm oil and coal (Wihardja, 2016).

After around a decade of enjoying the blessings of the commodity boom, Indonesia experienced a trade deficit in 2012. Indonesia's exports sunk at the end of 2011 due to the economy's dependence on commodities (Wihardja, 2016). Indonesia faced a balance of payment deficit in 2013, followed by a continuous weakening of the rupiah. Commodity prices continued to dwindle in mid-2014, with CPO showing the most drastic decline. The fall in commodity prices was mostly caused by high supply levels, uncertainty surrounding growth prospects, and the appreciation of the US dollar (World Bank, 2015).

Increased commodity prices evoked numerous effects, especially in Indonesia's coal and palm oil industries, the most dominant industries. The palm oil industry experienced mass job creation, but it did not affect real wages and household expenditures. These findings may have happened due to decreased formal employment in the industry (Shrestha & Coxhead, 2018). On the other hand, in the coal industry, real wages increased, but there was no significant effect on employment (Pasaribu, 2020).

When the commodity boom occurred, the manufacturing sector lived in the shadows of the extractive sectors. Despite this, the manufacturing sector still grew. A few manufacturing products, such as chemical products and machinery, exhibited rapid growth. In contrast, a few products exhibited slow growth, including textiles, wood, and paper products (Adler, 2012).

Rising commodity prices also had negative effects on non-extractive sectors. For example, the increase in wages in the extractive sectors, especially in the mining sectors, largely exceeded the manufacturing sector. In fact, between 2003—2008, wages in the manufacturing sector decreased by as much as 15 per cent. The service sector also suffered a decrease in wages, although not as drastic as the manufacturing sector (Adler, 2012).

For the development of economic structure, the commodity boom resulted in a few concerns. For instance, the boom only brought significant development to the coal and palm oil industry. This led to a gap between extractive sectors. Sectors like fishery did not reap the benefits of the boom. Moreover, the windfall of the commodity truly brought benefits to a few and caused damage to the industrialisation process in Indonesia (Wihardja, 2016).

Indonesia's dependence on extractive sector activities is reflected in how dominant these sectors are in tax revenues. Hence, as the effects of the boom weakened, specifically in 2014, Indonesia faced a decrease in tax receipts due to the slump in tax revenues from the oil and gas sectors (Ministry of National Development Planning Republic of Indonesia, 2019). Previously, the revenues from the commodity boom were largely used for short-term policies, such as subsidies. For instance, in 2013, there was a spike in expenditures for energy subsidies, which even exceeded the national budget (Setiawan, 2014). When coupled with the incompetence of local governments to invest, the resources needed for long-term policies, such as infrastructure and human development, became very limited (Wihardja, 2016).

3.5.3 Non-market natural capital

For non-market natural capital, we consider land cover and biodiversity, as well as climate conditions, represented by precipitation and temperature. Ecosystem conditions provide analytical input for policymaking as they describe the characteristics of ecosystems and how they change over time. The types of conditions measured include biotic and abiotic components of ecosystems such as water, soil, biomass, vegetation, habitat and species. In evaluating ecosystem conditions, we first define and select suitable ecosystem characteristics and the corresponding variables. Once these are established, we compile the indicators that reflect the condition of the ecosystems. Finally, we derive aggregate measures that capture the overall state of conditions across various types of ecosystems.

Biodiversity and Land Cover

Biodiversity is the variety and interaction of all life on Earth (UNFCCC, 2021). It is vital in maintaining the integrity of ecosystems as well as providing various ecosystem services, such as soil protection and hydrological cycle regulation. Despite this importance, biodiversity has been under threat due to overuse of natural resources, climate change, and environmental degradation. WWF (2022) estimated that, on average, the population of wildlife mammals, birds, fish, reptiles, and amphibians had decreased by 69% since 1970, with greater biodiversity losses in the global south.

Indonesia is endowed with a relatively rich biodiversity. Consisting of approximately 17 thousand islands, Indonesia has seven major biogeographic regions revolving around its major islands and the surrounding seas (CBD, n.d.). Indonesia has 2 out of Conservation International's 25 diversity hotspots, 18 out of WWF's "Global 200" ecoregions, and 24 of Bird Life International's "Endemic Bird Areas". According to Indonesia's biodiversity profile in its latest report to the Convention on Biological Diversity (CBD), the country hosts 31,750 plant species, 732 mammal species (14% of the total species in the world), 1,711 bird species (17% of the total species in the world), 750 reptile species (8% of the total species), 403 amphibian species (6% of the total species), and 1,236 freshwater fish species (9% of the total species) (Interactive Country Ficches, 2022). Biogeographic, geological, climatic, and ecological factors lead to a high level of endemism (von Rintelen, Arida, Hauser, 2017), with species such as the giant padma (*Rafflesia arnoldii*), the Komodo dragon (*Varanus komodoensis*), orangutan (*Pongo spp.*), and the Javan rhinoceros (*Rhinoceros sondaicus*).

Similar to what occurs globally, Indonesia's biodiversity is also threatened. In 2019, 135 plants and 124 animals in Indonesia were classified as critically endangered on the International Union for Conservation of Nature Red List of Threatened Species (Interactive Country Ficches, 2022).

In response to existing threats to biodiversity, the Government of Indonesia prepared its first Biodiversity Action Plan for Indonesia (BAPI) in 1993, which was renewed and became the Indonesian Biodiversity Strategy and Action Plan (IBSAP) 2003-2020. The IBSAP connects worldwide and local pledges on biodiversity and offers direction for establishing national preferences and allocations in biodiversity preservation. The most recent IBSAP, the Indonesia Biodiversity Strategy and Action Plan 2015-2020, was published in 2016. In addition, Indonesia has several local regulations to resolve the threat to biodiversity. Key legislation concerning biodiversity in Indonesia includes Law No.5/1990, which focuses on safeguarding the variety of plant and wildlife species and their habitats and ensuring the sustainable utilization of biodiversity. Government Regulation No.7/1999 strives to prevent the extinction of plant and wildlife species, maintain their genetic purity and diversity, and uphold ecosystem equilibrium and stability. There are also the 1999 Forestry Law, the 2009 Environmental Protection and Management Law, the Fisheries Law, and the Coastal and Small Islands Management Law that regulate specific sectors of natural resources.

The biodiversity in Indonesia's forests is abundant, yet it is threatened by deforestation and habitat degradation. The total forest area in Indonesia was 125.76 million hectares (ha) in 2022, equivalent to 62.97% of Indonesia's land area (Ministry of Environment and Forestry Republic of Indonesia, 2022). Out of that total area, 46.9 million hectares (25%) are primary forests that form naturally without human interference, 43.1 million hectares (23%) are secondary forests are regions of primary forest that have been transformed due to deforestation, and 5.4 million hectares (2.9%) are planted forests. Indonesia's forests have been degraded by deforestation in the last thirty years, although the rate has slowed in the last five years. The rate of deforestation experienced a 75 per cent reduction in 2019-2020, reaching 115 thousand hectares. This marked the lowest deforestation rate recorded since 1990 (Ministry of Environment and Forestry Republic of Indonesia, 2022). This is corroborated by annual tree cover loss data from Global Forest Watch, which have slowed significantly in recent years (2016-2021), largely due to reductions in commodity-driven expansion (Global Forest Watch, n.d.). Apart from programs to solve the problem of deforestation (as reviewed in the Forestry section), some programs are directly created to protect biodiversity. There are 560 units of conservation areas, covering 22.1 million hectares for land-based and 5.3 million hectares for marine-based.

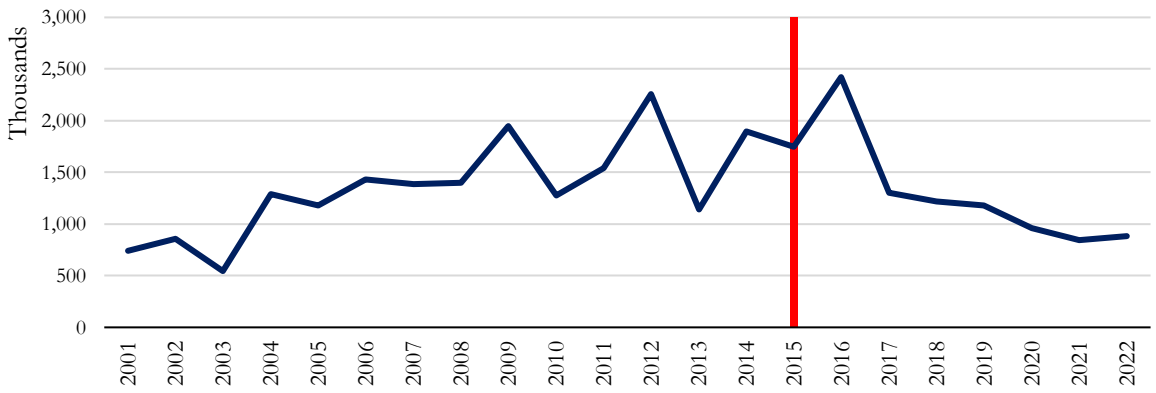


Figure 23. Annual tree cover loss, Indonesia, 2001-2022

Source: Global Forest Watch (n.d.)
Note: There is a methodological difference for calculations prior to and after 2015, marked by the red line.

Indonesia is also rich in coastal natural resources and underwater diversity, which are also threatened. Indonesia is part of the coral triangle. The coral triangle is home to approximately 76% of the world's coral reefs. A total of 605 out of 798 coral species in the world are discovered in this region. According to the Ministry of Environment and Forestry, in 2021, Indonesia's mangrove ecosystems totalled 3.3 million hectares or 20.37% of the world's total area. However, there are threats that disrupt the sustainability of natural resources, such as coral bleaching due to warming seawater temperatures. Meanwhile, mangrove forests also experience deforestation as a result of the direct use of wood and mangrove leaf products, the utilization of the wetland environment, or the entire stockpiling and conversion for coastal construction (ELAW, n.d.). Indonesia established a Marine Protected Area (MPA) plan to address this. Indonesia currently has 284,000 square kilometres (110,000 square miles) of the marine area under protection. However, less than 20% of Indonesia's MPAs cover significant marine ecosystems (Gokkon, 2022a). Considering the inadequate coverage and quality of protection, an expansion of MPAs is needed to tackle this issue. By the end of this decade, Indonesia aims to extend its MPAs coverage to 10% of its total territorial waters in 2030 and to 30% by 2045. However, experts have stressed the importance of improving management so that the MPAs are effective and just for local stakeholders (Gokkon, 2022b). It is crucial to improve the management effectiveness to achieve the marine protection target (Amkieltiela et al., 2022).

Precipitation and Temperature

Precipitation and temperature in Indonesia are influenced by its position in the Inter-Tropical Convergence Zone, where the northeast and southeast trade winds penetrate the doldrums. Located in the zone, Indonesia has several climate characteristics, such as strong ascending motion, overcast skies, strong squalls, heavy rainfall and severe local thunderstorms with variable intensities (World Bank, 2022). Furthermore, the country also has hot and humid conditions. In the capital of Indonesia, humidity varies between 61% and 95%, while precipitation is around 218 mm per month. In terms of climate risk, the country is ranked in the top third of countries due to its high exposure to all types of flooding and extreme heat (World Bank & ADB, 2021).

Climate change, as indicated by the increasing temperature trend, is also indicated in Indonesia, as shown in the following figure. The figure presents a temperature anomaly in 2021, which compares the average temperature in 2021 to the normal period (in this case, average 1981-2010). Based on 89 observation stations of the Meteorological, Climatological, and Geophysical Agency in

Indonesia (*Badan Meteorologi, Klimatologi, dan Geofisika*/BMKG), the normal temperature from 1981 to 2010 was 26.6 ºC, while the average temperature from 2010-2020 was 27.1 ºC. As presented in the figure, although there is a high degree of variability year to year, there has been a clear upward trend of annual temperature on average at the Indonesia level. It is also shown that 2016 was the hottest year, with a 0.8 °C anomaly, followed by 2020 and 2019 (0.7 °C and 0.6 °C anomaly, respectively).

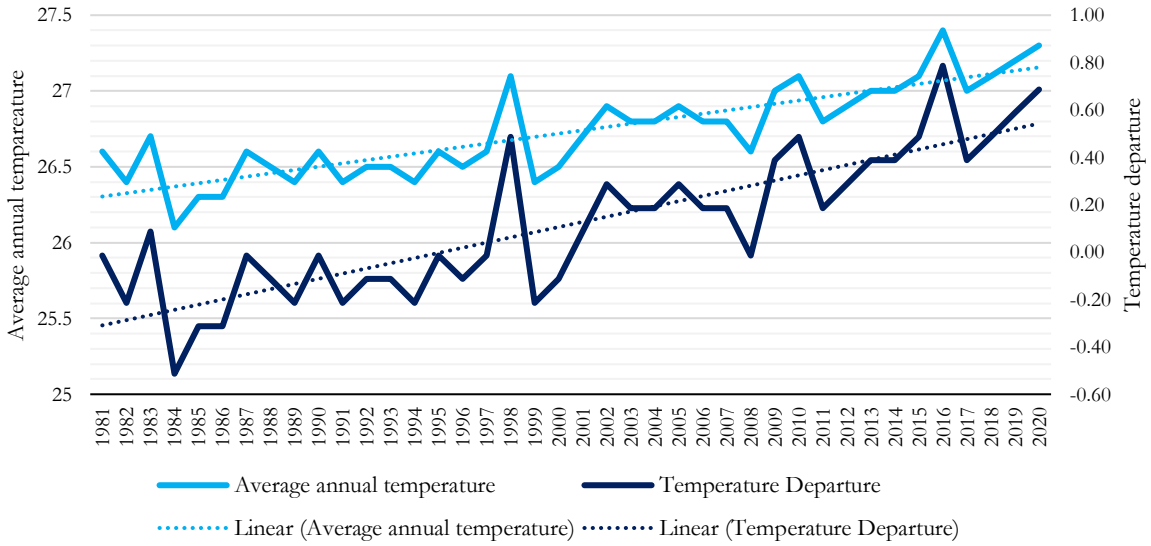


Figure 24. Average annual temperature and anomaly, Indonesia, 1981-2020
Source: Authors' calculations based on data from BMKG (n.d.)

BMKG (2022) observation also shows the spatial distribution of increased temperatures. As observed in 89 stations distributed throughout the country, the anomaly temperature of 2021 showed an increase of different magnitudes compared to the normal period. It was found that the maximum anomaly was 1.4 ºC as recorded in Sentani – Jayapura, the eastern part of Indonesia.

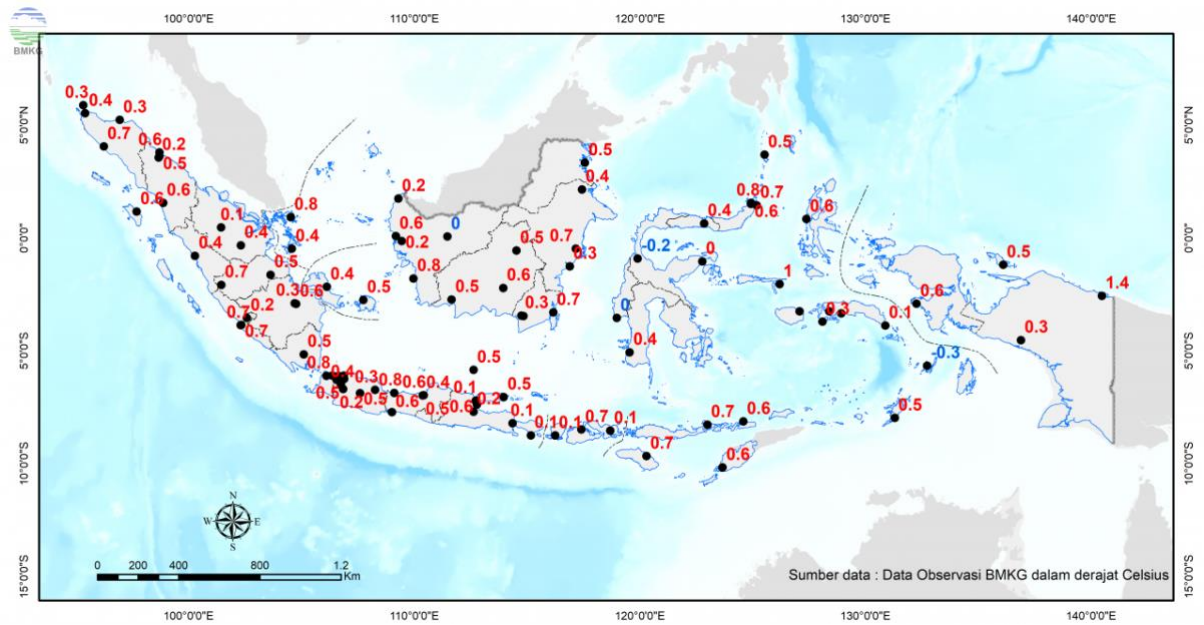


Figure 25. Average Annual Temperature and Anomaly, Indonesia, 2022
Source: BMKG (2022)

There has been an upward trend with a high degree of variability year to year in precipitation at the Indonesia level. The wettest year took place in 2010, at 3.289 mm, while the driest year was 1997, at 2.275 mm. Having high precipitation levels, Indonesia has a high potential exposure to all types of flooding. It is predicted that the intensity of these hazards is expected to grow as the climate changes. It is estimated that the population exposed to an extreme river flood could grow by 1.4 million by 2035–2044 (World Bank & ADB, 2021).

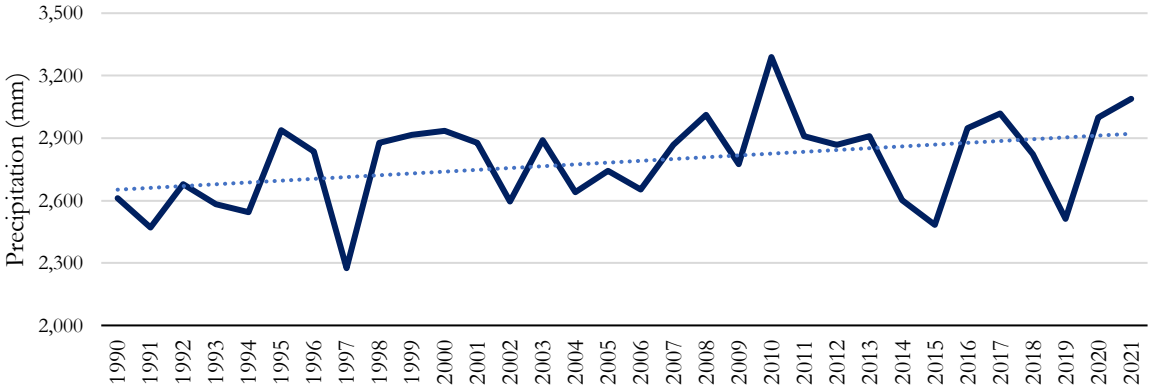


Figure 26. Level of precipitation, Indonesia, 1990-2021

Source: Authors' Calculations based on data from the World Bank (2022)

As an archipelagic country with a high population density, Indonesia is highly vulnerable to climate change impacts. Extreme events such as shifts in precipitation patterns followed by floods and droughts, long-term changes from sea level rise, and increasing temperature have a significant impact on Indonesia's development. It is reported that climate change could cost between 2.5–7% of Indonesia's GDP (World Bank, 2022). Climate change can also affect many of Indonesia's sectors. For instance, high precipitation caused flooded power plants in the capital city of Indonesia. On another occasion, drought caused reduced power output of hydro near Jakarta that caused 51.5 million USD in losses (Handayani et al., 2019).

3.6 Detailed Trends in Financial Capital

Financial capital represents the aggregation of assets and liabilities. With a different nature from the other types of capital (where the concept of liabilities does not apply), the calculation of financial capital within the scope of comprehensive wealth is slightly different.

Each financial asset, whether held by households, corporations, or governments, is accompanied by a corresponding liability of an equivalent amount. For instance, in the case of an individual savings account, the funds deposited in the bank serve as a positive asset for the account holder but a negative liability for the bank. This dual nature of financial assets and liabilities holds true across other forms of financial capital. As a result, when a customer is a citizen of Indonesia, and the bank in which they hold their savings is an Indonesian bank, the deposited funds do not contribute to the computation of Indonesia's comprehensive wealth as they effectively cancel each other out.

However, financial capital becomes a part of the comprehensive wealth calculation when one of the parties involved (for this instance, the customer or the bank) is non-Indonesian. For instance, when an Indonesian resident holds an account in a non-Indonesian bank, the funds placed in the bank are deemed a positive asset value in Indonesia's financial capital calculation, while a negative liability is registered in the financial capital calculation of the bank's home country. Conversely, if a non-resident deposits their money in an Indonesian bank, there will be a negative liability value for Indonesia and a positive asset value in the account holder's home country. A similar concept also applies to share ownership in foreign companies or ownership of foreign government bonds. Consequently, the only financial capital contributing to the comprehensive wealth at the national level is the net foreign financial assets owned by Indonesian citizens. This net figure represents the difference between the value of foreign financial assets held by Indonesians and the domestic financial assets owned by foreigners.

In Indonesia, this net value is referred to as the International Investment Position (IIP). IIP shows the value and composition of foreign financial assets (*aset finansial luar negeri*/AFLN) and foreign financial liabilities (*kewajiban finansial luar negeri*/KFLN) of the Indonesian population at a certain time. A positive IIP indicates that the amount of foreign financial assets held by Indonesians is more than that of Indonesian financial assets held by foreigners, while a negative IIP illustrates the opposite.

While the IIP is the sole index within financial capital included in the comprehensive wealth calculation, it is imperative to consider other types of Indonesia's financial capital, especially because Indonesian IIP has not yet recorded the international investment activity of households. Particular attention is given to household and government financial capital, as they directly impact Indonesia's net foreign financial assets.

3.6.1 Sources of Financial Statistics and Approach to Their Deflation

Indonesian financial capital data has been gathered from Bank Indonesia, Statistics Indonesia, the Financial Services Authority, and the International Monetary Fund. Notably, all financial data is sourced in nominal terms, devoid of inflation adjustments. Therefore, it becomes imperative to deflate the data adequately. The implicit GDP growth rate is used as a price deflator, as it is more suitable for reflecting price changes for financial data than the CPI.

Text Box 3.1 Financial Capital Data Sources

- International Investment Position: Bank Indonesia. *Statistik Ekonomi dan Keuangan Indonesia.*
- Central Bank Rate: Statistics Indonesia. *BI Rate.*
- Household Income: Statistics Indonesia. *Neraca Rumah Tangga Indonesia.*
- Final Consumption Expenditure: Statistics Indonesia. *Neraca Rumah Tangga Indonesia.*
- Bond Ownership: Financial Services Authority. *Laporan Statistik Pasar Modal.*
- Stock Ownership: Financial Services Authority. *Laporan Statistik Pasar Modal.*
- Household Debt, Loans and Debt Securities: International Monetary Fund. *Global Debt Database.*

3.6.2 Overall Financial Wealth: International Investment Position

In Indonesia, the measurement of IIP statistics has evolved over time, utilising two distinct methodologies. From 2001 to 2009, IIP was calculated per the guidelines outlined in the Balance of Payments and International Investment Position Manual, 5th Edition (BPM 5), while since 2010, it has adhered to the BPM6. This transition brought about changes in the recording of reverse investment within foreign direct investment[16], resulting in substantial increases in both IIP assets and IIP liabilities. It is noteworthy, however, that this shift does not impact the net IIP, thus ensuring that the variance between the two measurement methods does not affect the calculation of comprehensive wealth.

These statistics cover all AFLN and KFLN in Indonesia. Nevertheless, it is imperative to note that Indonesia's IIP does not yet include the international investment activity of households. Additionally, noteworthy points include that the direct investment position is based solely on data from companies participating in the direct investment survey and the Foreign Exchange Transactions ITRS reporting, and contractors in the oil and gas sector. In terms of financial derivatives, it exclusively encompasses the banking sector. Finally, the international investment activities of the general government may not be fully accounted for using existing sources and methodologies. These nuances should be considered when utilizing Indonesia's IIP data for analysis and decision-making.

From 2001 to 2020, Indonesia's IIP consistently remained negative, indicating that the value of Indonesia's foreign liabilities exceeded the value of its foreign assets in real per capita terms. On

[16] In *BPM5*, FDI was presented in the standard components on a directional basis. In *BPM6*, FDI is presented in the standard components on a gross assets and liabilities basis, with detail that separately identifies the relationship between the investor and the entity receiving the investment.

average, total assets represent around 30-40% of liabilities. However, two distinct positive trends were observed: one from 2001 to 2008 and another from 2015 to 2020.

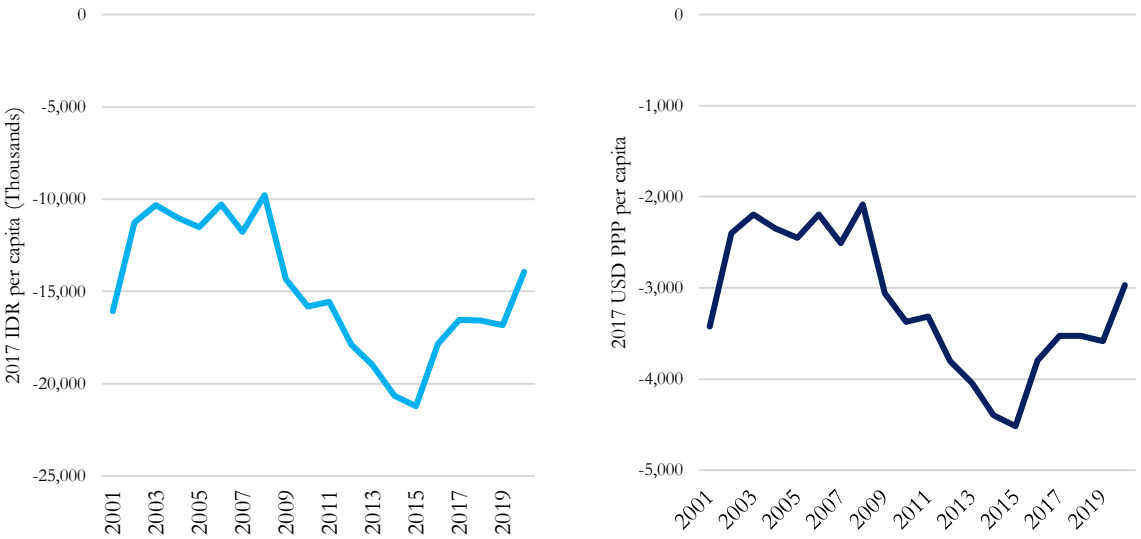


Figure 27. IIP, Indonesia, 2001-2020

Source: Bank Indonesia

The first phase of the positive trend was attributed to reduced liabilities. This fall in liabilities was mostly reflected in net other investment —which was split down into trade credits, loans, and other assets/liabilities— as a result of Indonesia's recovery from the 1997 Asian financial crisis. Among the two upward trends, there was a continuous decrease in IIP from 2009 to 2015. This was mostly owing to the low interest rate regime in the aftermath of the 2008 global financial crisis, which caused capital to flow from advanced to emerging countries. This trend was also supported by the enactment of Law No. 25 of 2007 on Domestic investment, which increased the ease of investment for foreigners. Meanwhile, the upward trajectory in the recent period (starting from 2016) was driven by asset expansion that outpaced liability growth. The first spike in assets is inextricably linked to Indonesia's successful Tax Amnesty program, which encouraged taxpayers to declare their unreported assets, especially those held offshore. An increase in asset placements abroad, as well as a constant increase in direct and other investments, are other influential elements during the period. Meanwhile, foreign liabilities were also increasing at a slower pace in the same period, which was mainly influenced by a surge in direct investment and portfolio investment due to investor optimism regarding Indonesia's promising economic growth, improved investment climate, and a stronger domestic stock market.

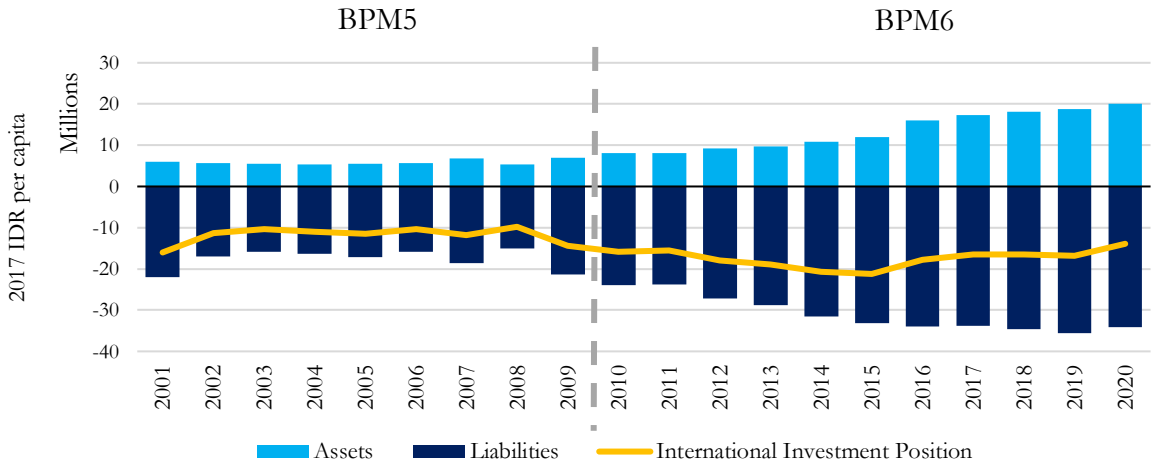


Figure 28. **IIP by asset and liability, Indonesia, 2001-2020**
Source: Bank Indonesia

Indonesia's IIP can also be analyzed by examining the breakdown of its assets and liabilities. On the asset side, foreign reserves and other investments are the main contributors. Unlike other financial assets, foreign reserves, which are funds held by a central bank in foreign currencies, do not have a corresponding liability. A significant portion of Indonesia's large foreign reserve holdings stems from the vital contributions of the petroleum and mining industries to exports. However, the proportion of these resources in the reserve has been gradually declining due to the depletion of subsoil resources. On the other hand, other investments are majorly contributed by currencies and deposits held by Indonesian residents, such as individuals and businesses, in foreign countries. The low share of direct and portfolio investments compared to other types of assets shows that Indonesian citizens do not invest enough abroad. On the liability side, the primary contributors in recent years have been direct and portfolio investments. The share of these types of liability has steadily increased since 2001, stabilizing at around 70% since 2010. This shift in liability composition reflects an increase in foreign investment in Indonesia.

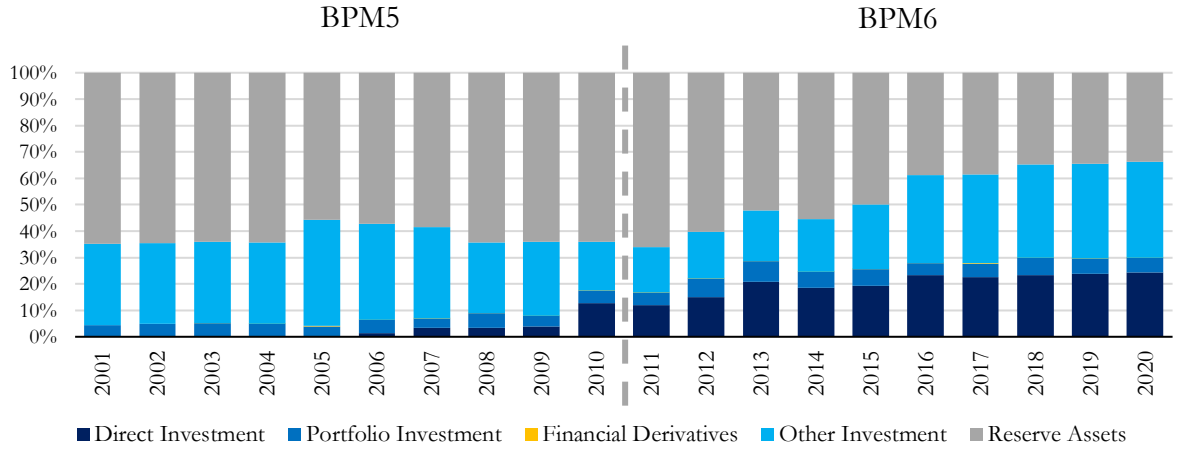


Figure 29. **Indonesia's international investment position, by type of asset, 2001-2020**
Source: Bank Indonesia

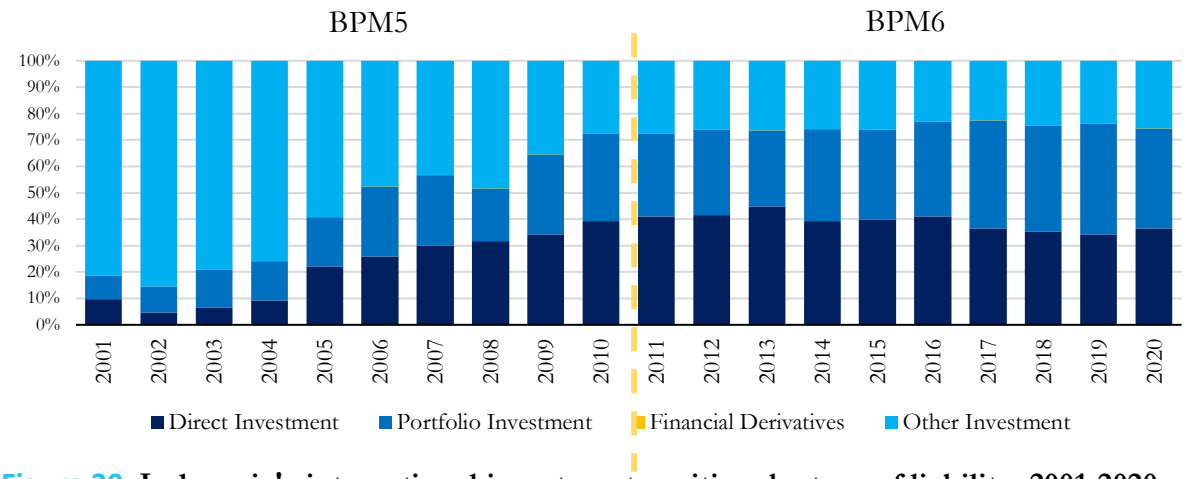


Figure 30. Indonesia's international investment position, by type of liability, 2001-2020
Source: Bank Indonesia

Since at least 2001, Indonesia has consistently recorded a negative IIP, contributing to a negative value in the calculation of comprehensive wealth. However, the nature of the majority of liabilities, which are investments from abroad, indicates that the negative figures are not inherently detrimental. Whether higher liability is a good or bad thing depends on several factors, such as the conditions optimizing the financial returns of these investments, including the regulatory framework, accountability measures, and efforts to combat corruption. It also depends on how effectively the returns from these capital inflows are utilized to expand the economy and whether these inflows are directed toward sustainable, productive, and high-impact sectors. Effective liability management can lead to positive spillover effects from capital inflows, such as job creation, increased exports (thereby boosting foreign reserves), environmental sustainability, and overall economic and wealth improvement. Successfully managing these aspects can support Indonesia's ambition to transcend its current middle-income country status.

3.6.3 Complementing Analysis: Trends in Household Financial Capital

When discussing financial capital in Indonesia, it's crucial to incorporate an analysis of the household sector, which has not been captured in the current calculations of Indonesia's IIP. A closer examination of several trends in this sector, as discussed below, can help illustrate its contribution and impact on the broader financial landscape of the country.

3.6.3.1 Trends in household consumption and saving

The household consumption trend in Indonesia has remained stable over the years. Since at least 2009, Indonesian households have generally been able to meet their consumption needs for goods and services by relying on their disposable income, implying a consistent positive saving rate.

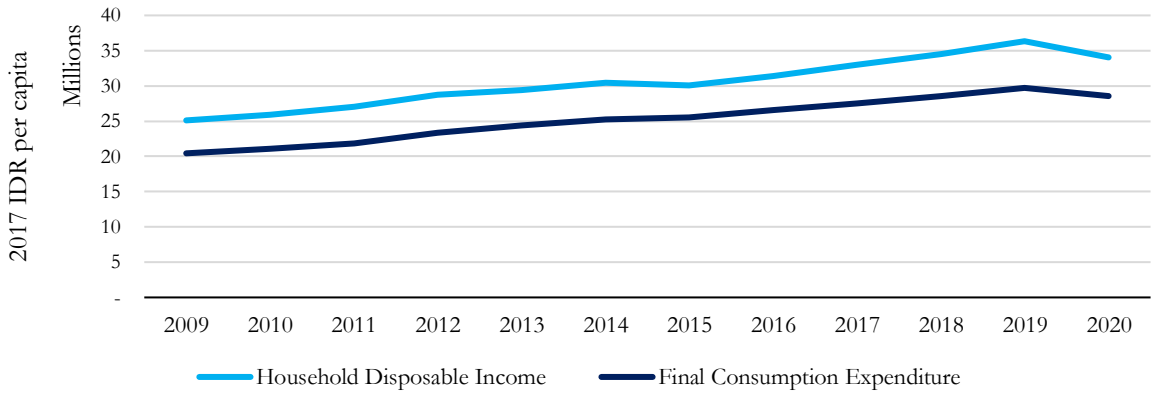


Figure 31. Household disposable income and final consumption expenditure, 2009-2020
Source: Financial Services Authority

However, in relative terms, household savings in Indonesia contributed only 4.1% to the GDP value in 2020. This contributes to the overall national savings ratio (gross savings)[17] of 29% of the GDP in the same period. This figure is relatively low, especially when compared to neighbouring countries like Singapore, where gross savings constitute 41% of GDP. Furthermore, there is a high probability of disparities in savings contributions among different income classes, yet there is a notable lack of data in this area. The availability of such data, potentially categorized by income deciles, would facilitate a more in-depth analysis of household saving and consumption patterns. This low savings ratio is insufficient to finance the country's developmental needs, particularly in bridging the gap between savings and investments. Consequently, Indonesia finds itself in a position where it needs to rely on foreign financing, thereby increasing the liabilities of its financial capital.

On the other hand, the level of bank account ownership in Indonesia is still relatively low. According to the 2020 Susenas (National Socio-Economic Survey), only 40.3% of the adult population in Indonesia has a bank account. This explains the inelastic effect of Bank Indonesia's benchmark interest rate on the savings rate of the household.

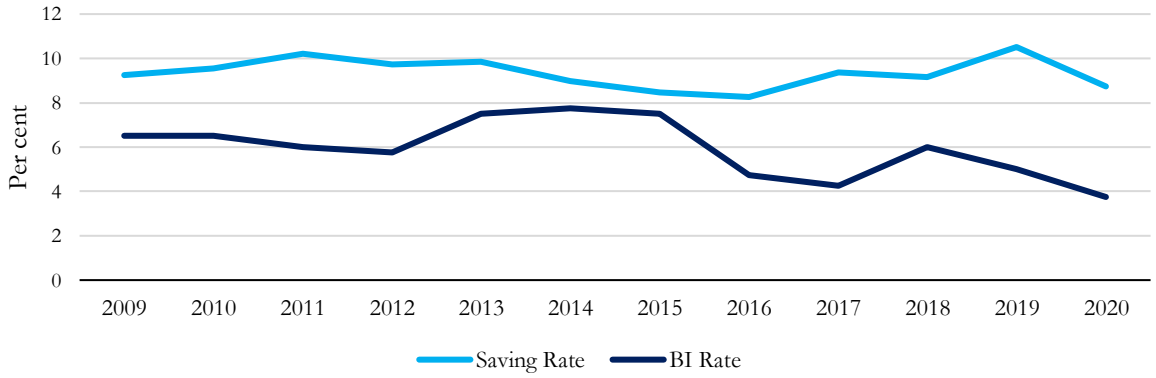


Figure 32. Bank Indonesia rate and household saving rate, 2009-2020
Source: Bank Indonesia; Statistics Indonesia

[17] Overall national savings ratio is calculated as gross national income less total consumption, plus net transfers.

3.6.3.2 Trends in household financial assets

With a relatively shallow financial market, the movement of household financial assets in Indonesia is heavily driven by the rise of public participation in the stock market. This growth has been substantial over the years. In 2008, there were just 317,000 investors in the Indonesian capital market; by 2020, this figure had risen to 3.8 million (and even reached almost 15 million by 2022).

Zooming in on the bond market, individual holdings have been steadily increasing, with the striking exception of government bonds from 2009 to 2012. This temporary dip was attributed to the reduction in government bond coupon rates, which followed a 350-basis point cut in Bank Indonesia's interest rates from December 2008 to March 2012. Following this period, ownership of both government and corporate bonds saw an uptick as more people began investing in bonds.

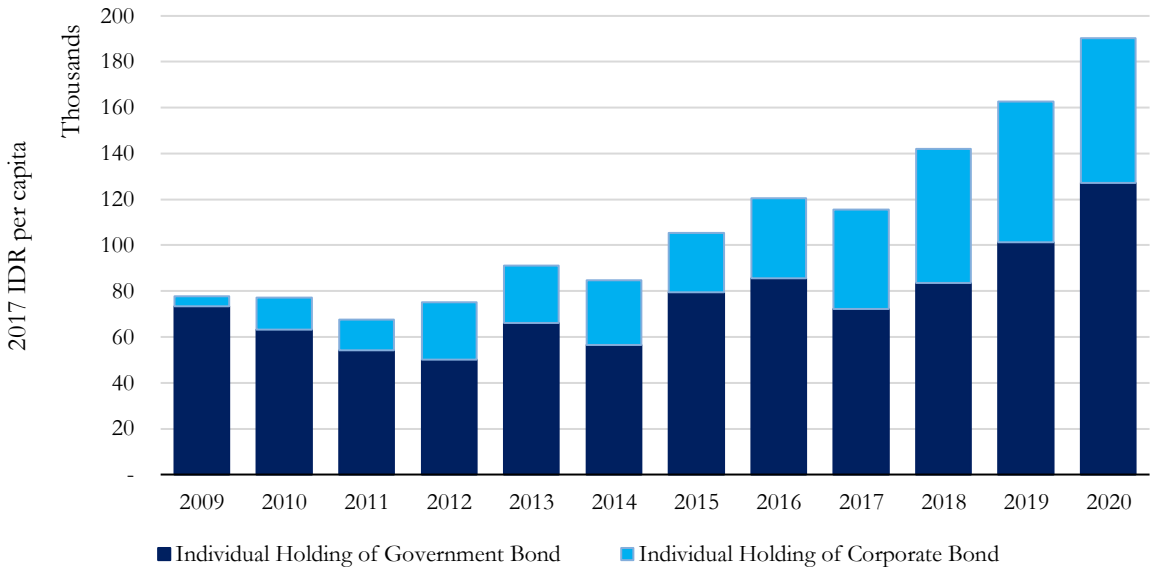


Figure 33. Individual holdings of government bonds and corporate bonds, 2009-2020
Source: Financial Services Authority

A similar trend to the one observed in bond ownership is evident in equity holdings in Indonesia. There has been a general increase in equity investments since 2009, with the exception of the period between 2012 and 2015, which experienced a stagnation. This is believed to be due to the high inflation period of 2013-2015, where inflation rates hovered around 5-8%. Such high inflation rates could have eroded the value of savings, making individuals more cautious and less inclined to invest in relatively riskier assets like equities. Following this period of stagnation, there was a notable increase in individual equity ownership, which coincided with the stabilization of inflation rates and a growing number of investors entering the market.

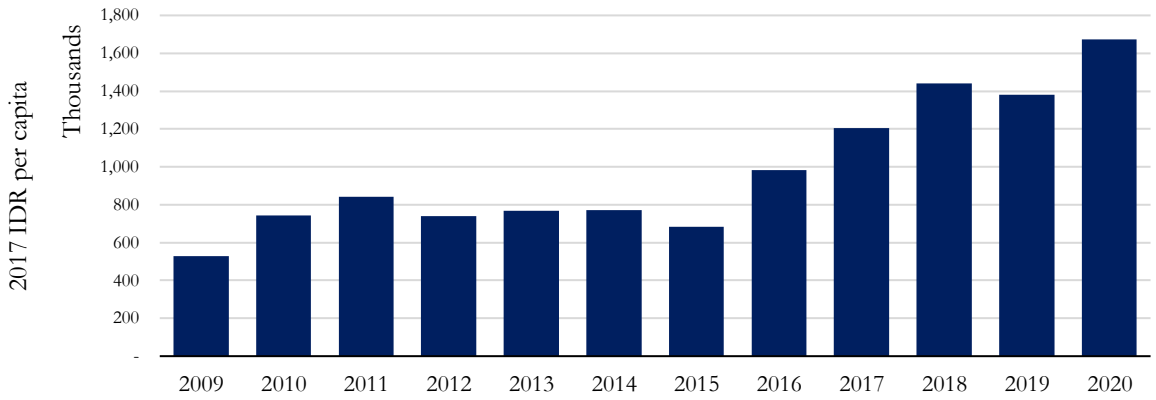


Figure 34. Individual holdings of equity, 2009-2020
Source: Financial Services Authority

3.6.3.3 Trends in household financial liabilities

Another essential aspect of the household financial capital was demonstrated on the liability side. Between 2009 and 2013, there was a significant increase in the proportion of household debt, loans, and debt securities to disposable income, from around 17% to 26%. Notably, these levels remained relatively stable until 2020, indicating a period of consistent debt behaviour among households. When viewed as a percentage of the Gross Domestic Product (GDP), the total financial liabilities of households in 2020 amounted to 17.8%. This figure is considerably lower than that of neighbouring countries such as Singapore, which stood at 60.91%, Malaysia at 76.33%, and Thailand at 89.58%.

This relatively lower level of household debt in Indonesia aligns with the data in the previous section, which reveals that household consumption levels have not exceeded disposable income since at least 2009. This situation puts Indonesian households in a relatively safe position in the event of changing economic conditions that might impact the ability to service debt.

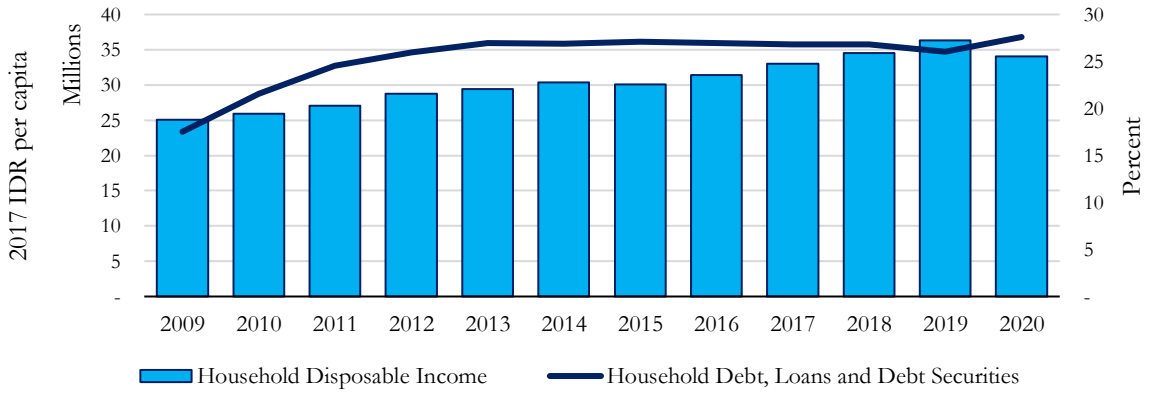


Figure 35. Household debt and household disposable income, 2009-2020
Source: Financial Services Authority

3.6.4 Complementing Analysis: Trends in Government Financial Capital

The government sector is another vital element to discuss in the context of Indonesia's financial capital. In the early 2000s, the central government had a relatively high level of debt, reaching up

to 77% of the GDP. This was a consequence of the Asian financial crisis in 1998, which forced the Indonesian government to sharply increase its borrowing to issue bank restructuring bonds.

However, through effective debt management, this high debt level was significantly reduced to about 23% by 2012. This level of debt was continuously to be prudently managed thereafter. Even though the nominal value of the debt increased, the proportion to GDP was maintained below 30% until 2019, before the COVID-19 pandemic. This level of government debt in Indonesia is considerably below the safe limit set by Law No. 17 of 2003, which establishes a maximum government debt threshold of 60% of GDP. Indonesia's government debt-to-GDP ratio was also substantially lower when compared to neighbouring countries such as Malaysia and Singapore which recorded 52.42% and 127.85% respectively in 2019.

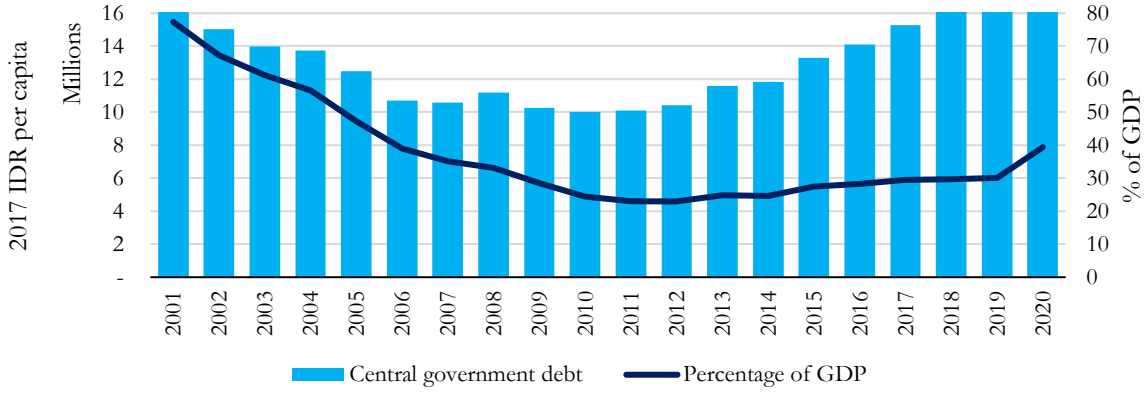


Figure 36. Indonesia's central government debt, 2001-2020

Source: Ministry of Finance

3.7 Detailed Trends in Social Capital

3.7.1 Introduction

Most economists define social capital as the amount of goodwill available among individuals and groups, coming from the structure and content of each social relation (Institute for Social Capital, 2019). The main components of social capital are those that base social interaction, namely trust, norms, and networks between individuals in a society.

Social capital generates value as productive activities would not happen without three things: Formal norms called the rule of law, Informal interactions between individuals and companies called networks, and the trust between contracting parties that each would hold onto their commitments. In other words, our whole economy depends on trust, credibility, and culture as beliefs that underlie interpersonal trust as the core of social capital (Dasgupta, 2005). Furthermore, the effect of social capital comes from the network of information, influence, and solidarity (Institute for Social Capital, 2019).

There are several local idiosyncrasies regarding social capital in Indonesia. One is the localized form of mutual assistance known as *gotong royong*, where individuals help one another to achieve a common goal. Here, the legitimacy of local authorities and trust between the authorities and local communities play an essential role in ensuring development projects (Bowen, 1986). Furthermore, certain local mores (*kearifan lokal*) hold a firm grip on regulating society's members on various issues, from cutting nails to preserving particular ecosystems. In terms of tolerance, Indonesia touts its national motto of *Bhinneka Tunggal Ika*, meaning unity in diversity. Despite many ethnicities, all share the common identity and values of the national family of Indonesia, where diversity is viewed as a strength, not a weakness. That perspective becomes the foundation of Indonesia's solid social capital. Even more than that, the national ideology of *Pancasila* (five principles) is also incorporated into the regional cultures of Indonesia. Consequently, it creates a unifying effect for national development (Juhro *et al.*, 2022).

The concepts, methods, and data necessary to value social capital are still in their infancy; consequently, social capital is not monetized. Instead, we assess social capital based on non-monetary indicators grouped into civic engagement and trust (IISD, 2018):

- **Civic engagement**—trends in key variables reflecting the actions and behaviours that can be seen as contributing positively to the collective life of a community or society
- **Trust and cooperative norms**—trends in key variables reflecting how people behave and expect others to behave.

We rely on several measures constructed from several datasets. The main source is the World Values Survey (WVS), conducted in Indonesia in 2001 (Wave 4, n= 1,000), 2006 (Wave 5, n = 2,015), and 2018 (Wave 7, n= 3,200). The WVS contains questions related to group membership, political actions, trust, confidence in institutions, as well as tolerance. It also covers the widest time length compared to other possible data sources, with many questions comparable across waves. However, its sample size is relatively small, and its regional sampling is not as thorough as other samples (despite being designed to represent Indonesia). We also utilized the individual-level sections of the Indonesian Family Life Survey (IFLS), conducted in 2007 and 2014. Results from the IFLS can be seen as representative of the Indonesian population living in the 13 IFLS provinces in 2007 and 2014. Lastly, we also utilized BPS (2014), which reports the results of the Social Resilience modules in the 2012 and 2014 Socio-Economic Survey (n=75,000 in 2014). While

the BPS data enjoys a larger sample size drawn from all provinces of Indonesia, it lacks the time span to cover the period of interest. The table below compares the three data sources:

Table 3. Comparison of the main data sources

	World Values Survey	Indonesian Family Life Survey	Socio-Economic Survey (Social Resilience)
Temporal coverage	2001, 2006, 2018	2007, 2014	2012, 2014
Sample size	2001: n =1,000 2006: n = 2,015 2018: n = 3,200	2007: 29,000 2014: 31,000	2014: 75,000
Regional coverage	2001: 5/34 provinces 2006: 10/34 provinces 2018: 20/34 provinces	13/34 provinces	34/34 provinces with sampling in all cities/regencies
Intended represented population	Adult population of Indonesia	Adult population of the 13 provinces sampled	Adult population of Indonesia
Covered items	Group membership, political actions, trust, confidence in institutions, as well as tolerance	Trust, tolerance	Community participation, trust, tolerance
Advantage	Extensive list of questions and objects, extensive temporal coverage, key items are consistent over waves, open access	Adequate list of questions, possibility to conduct cross section and longitudinal analysis	Large sample size, large population size, several key items are covered
Disadvantage	Sample size and regional coverage is relatively small, different surveying standards between waves	Regional coverage is relatively small, temporal coverage is relatively small (only 7 years)	Questions differ over waves, consistency between waves are not as robust as IFLS or WVS, limited temporal coverage, limited access

3.7.2 Civic Engagement

The WVS data below suggests that group membership has slightly improved in the last twenty years. The number of adults being an active member in at least one organization has increased from 58.46% in 2006 to 68.67% in 2018, although this is largely explained by the relative reduction of inactive members (which declined around 6%) rather than people not being a member of any organization. Religious groups enjoy a higher rate of participation, with 69% of people claiming membership.

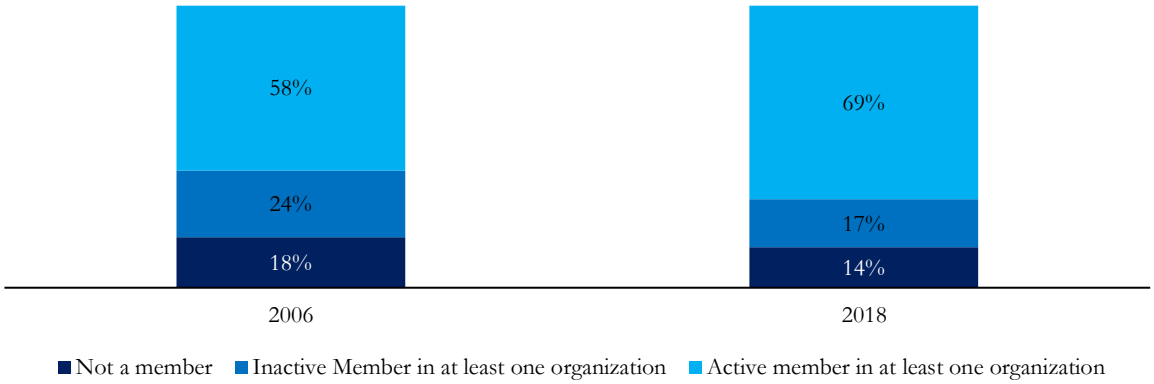


Figure 37. Public participation in an organization, Indonesia, 2006 & 2018
Source: Authors' calculations based on data from Inglehart et al., 2022.

People could also be active in collective actions (gotong royong) around their neighborhood, which the 2012 and 2014 BPS surveys (**Error! Reference source not found.**) suggest is the case. Participation is notably higher for helping those afflicted by disasters as well as for religious activities. Considering that the two surveys were executed within two years of each other, the emphasis should be on the range of levels and ranks demonstrated by both surveys. While the percentage points differed between the two waves, the rank remained consistent.

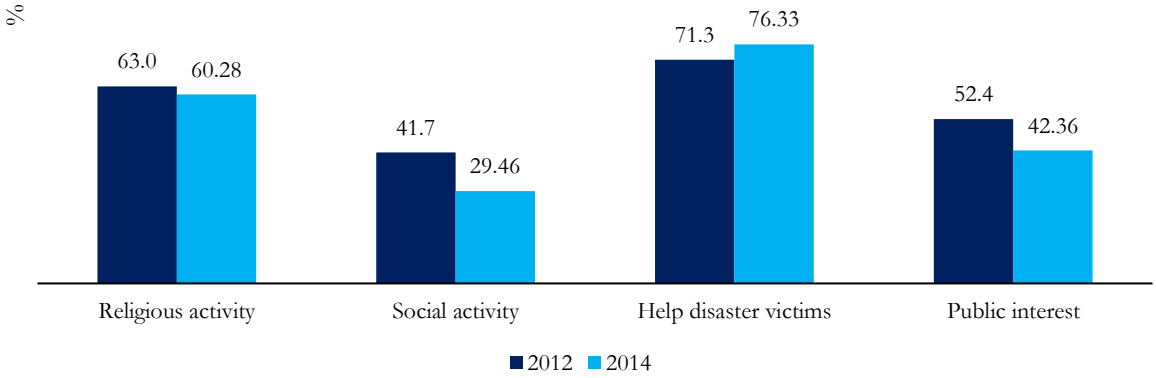


Figure 38. Household participation in activities around their neighbourhoods (in percent), Indonesia, 2012 & 2014
Source: Authors' calculations based on data from BPS-Statistics Indonesia, 2012, 2014.

Trends for political participation are more mixed, although they tend to be flat. Based on the WVS, people claiming membership in political parties fell from 15.93% in 2006 to 9.61% in 2018 (Figure 39.). However, the percentage of respondents who have done or are willing to strike, sign

petitions, and attend peaceful demonstrations increased between 2001 and 2018. Inversely, the percentage of people willing to join in boycotts had slightly declined.

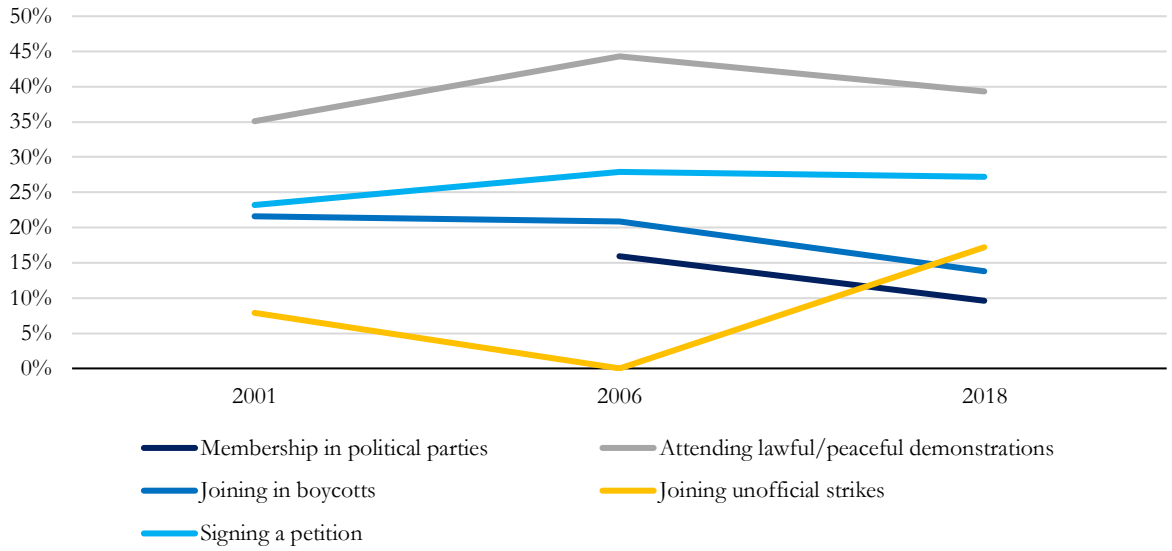


Figure 39. Willingness to engage in certain political actions, Indonesia, 2001, 2006, & 2018
Source: Authors' calculations based on data from Inglehart et al., 2022.

Figure 39. **Error! Reference source not found.**Figure 40. demonstrates voter turnout since the first parliamentary election of the New Order era in 1971 up to 2019. During the New Order era (prior to 1998), there were high voter turnouts for parliamentary elections. After the first post-Reformasi parliamentary election in 1999, voter turnout for parliamentary elections fell. Since 2004, presidents have been directly elected rather than elected by the members of the House of Representatives and the Regional Representative Council. However, both parliamentary and presidential elections had relatively low turnout, although at around 70%, they were relatively high by international standards. In the most recent election in 2019, parliamentary election turnout remained at around 70%, while the turnout for presidential elections reached a record high of 81.93%.

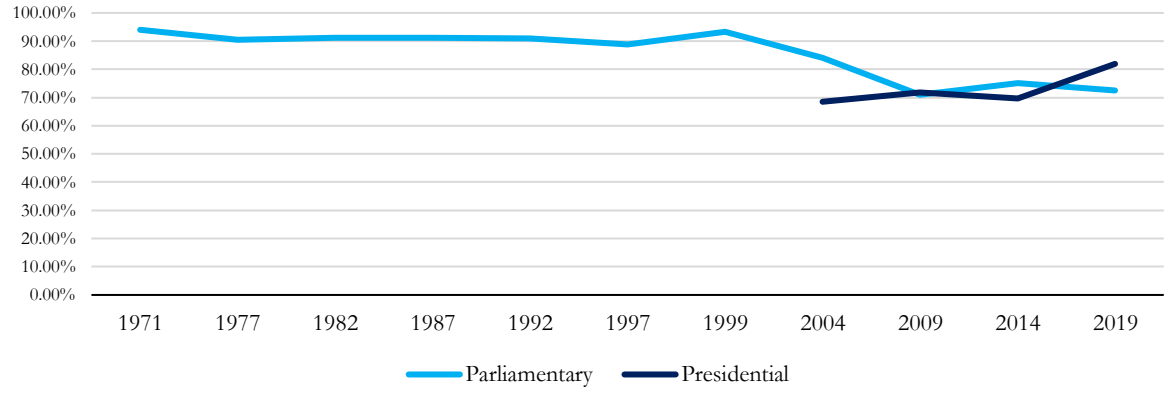


Figure 40. Voter turnout in presidential and parliamentary elections, Indonesia, 1971-2019
Source: Authors' calculations based on data from International IDEA, n.d.

3.7.3 Trust and cooperative norms (trust and tolerance)

Trust

Referring to results from the WVS survey, 95.30% of people in 2018 would say that one needs to be very careful with most people compared to 50.60% in 2006 (Figure 40.). However, the IFLS survey suggests the opposite trend; 86.69% of people in 2014 agreed that someone is likely to take advantage of them, compared to 92.59% in 2007.

The WVS survey suggests that trust in people had declined across the board, with people trusting less of their neighbours, people they know personally, and people they met for the first time. However, the IFLS survey suggests that people were largely willing to ask their neighbours for favours, such as leaving their children (76.01% agreeing in 2014) or asking them to watch over their house (59.01%). Similarly, high figures were also reported by the BPS for 2012 & 2014.

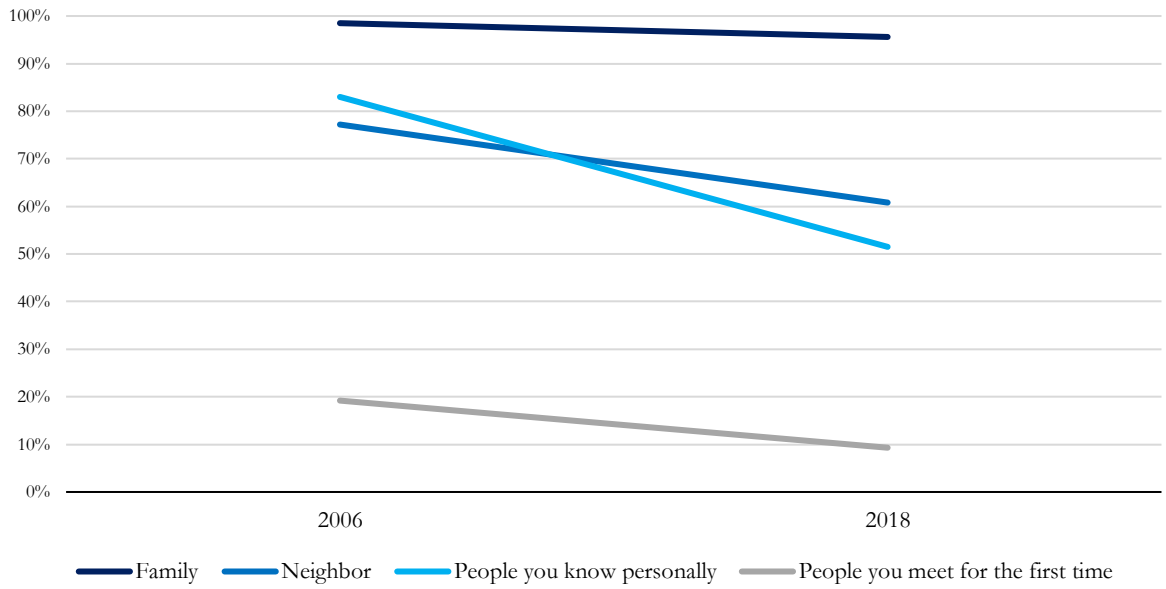


Figure 41. Trust toward other people, Indonesia, 2006 & 2018

Source: Authors' calculations based on data from Inglehart et al., 2022.

Inversely, confidence in institutions has increased and is relatively high. The 2014 BPS social capital report suggested that the majority places great confidence in community leaders, religious figures, and village apparatus. Referring to the WVS, the percentage of people placing a lot or a great deal of confidence in the government and parliament had noticeably increased between 2001 and 2018, reaching a high of 78.80% and 50.80% in 2018 respectively. Confidence in political parties was at 36.8% in 2018, although it was not a significant decline compared to 2001. In line with high participation in religious organizations, confidence in religious institutions also remained high at 98.3%. Confidence in the media, namely the press and television, slightly declined from 2001 levels to 50.5% for the press and 48.10% for television.

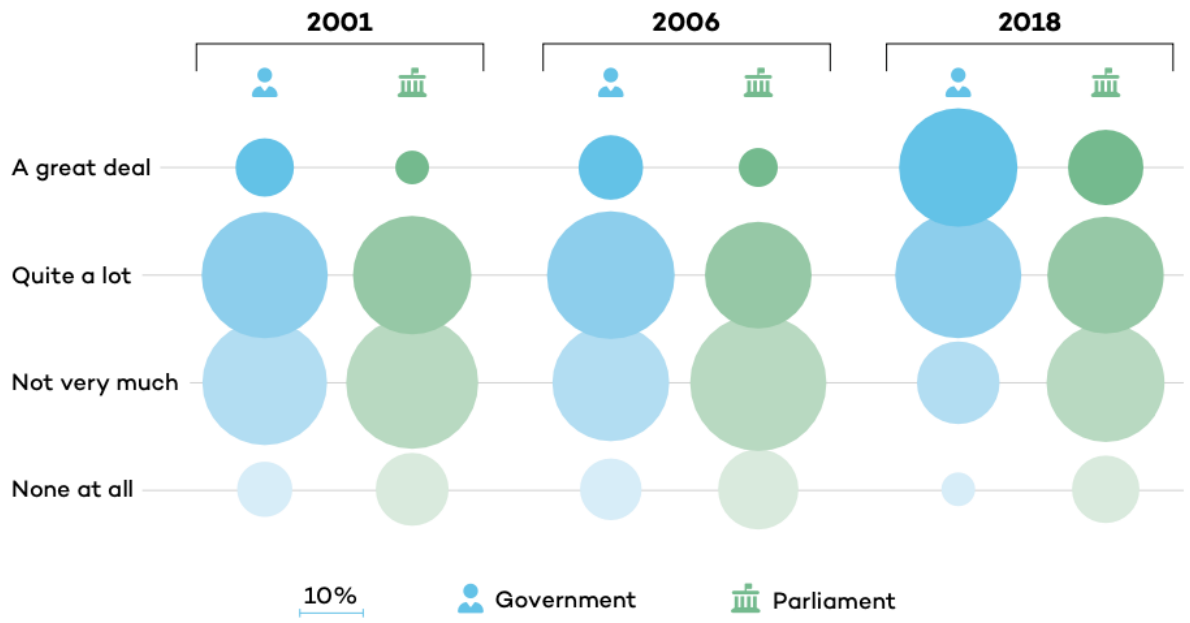


Figure 42. Confidence in government and parliament, Indonesia, 2001, 2006, & 2018
Source: Authors' calculations based on data from Inglehart et al., 2022.

Tolerance

Coexistence with differing ethnicities and religions seems to be high, with some indices suggesting improvements in the last twenty years. Referring to the WVS, only 30.1% of the sampled population in 2018 would say that they would be uncomfortable with neighbors from different race, nationalities, ethnicities, or religions, down from 49.8% in 2001 and 54.5% in 2006. While IFLS shows that 69.45% of the sampled population in 2014 generally trust those with the same ethnicities more (with a slight decline over the two waves), this is not the case for those with the same religion, with only 17.49% not objecting to the statement that they trust people with the same religion more. Indeed, IFLS also indicates that 76.54% of the population sampled in 2014 would not object to people of different faiths in the same neighborhood.

However, there might be limits to how close people are accepting of different religions. Interfaith marriage seems to be one of those limits, as 81.86% of the sampled population in the 2014 IFLS would object to someone with a different faith from them marrying one of their close relatives or children. This was up by 36 percentage points from the previous wave in 2007. Similarly, BPS also reported that only 7.90% of households in 2014 would agree to their child marrying someone of a different faith, compared to 70.2% of households who would agree to their child having friends of a different faith.

Furthermore, IFLS also suggests that 58.72% of the sampled population in 2014 would object to groups of different faiths building a place of worship in their community; while this was a steep decline from 2007 where 78.45% would object, this was still high. Similarly, BPS reported that only 42.81% of the sampled population in 2014 would agree if other religions have activities in their neighborhood, a decrease from 61.72% in 2012. Meanwhile, more of the sampled population would state that they are more likely to choose candidates with the same religion in elections, with the share of those answering "very likely" reaching 51.12% in 2014.

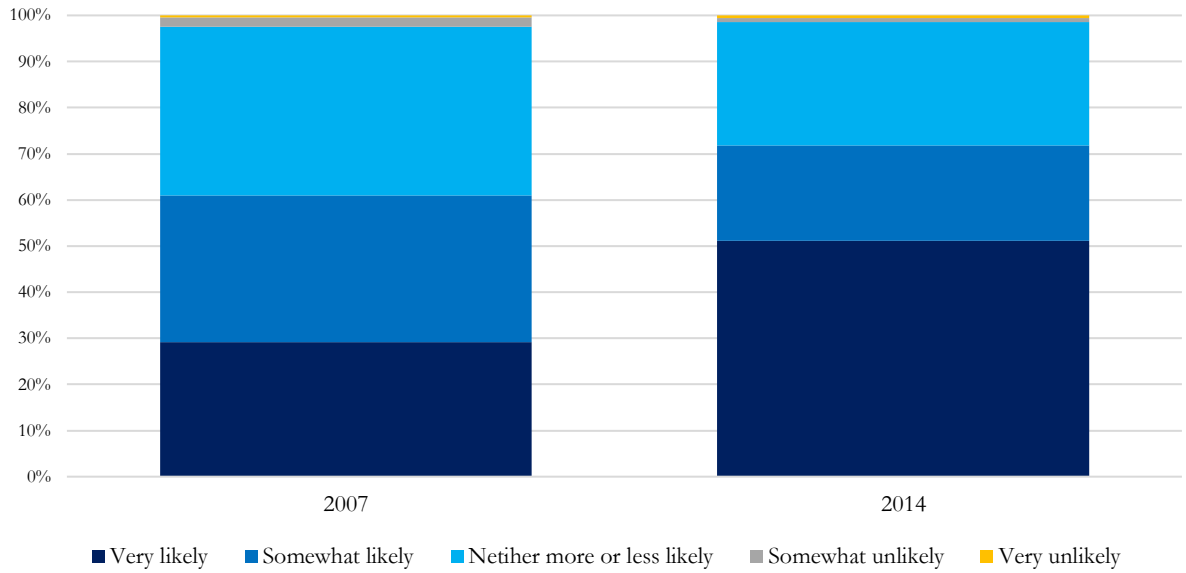


Figure 43. Likelihood to vote for a candidate with the same religion, Indonesia, 2007 & 2014

Source: Authors' calculations based on data from IFLS-5

Text Box 3.7 Recent Findings on Urbanization and Social Capital in Indonesia

Urbanization is moving forward at an astounding rate in many emerging nations. About 151 million Indonesians (56 percent of the population) now reside in urban areas, a more than twofold increase from 1970 to 2010 (Roberts et al., 2019). Around 220 million people (or 70% of the population) are anticipated to live in cities by 2045.

This fast urban growth could have an impact on social capital. According to critics of urban spread, dense, compact communities are more likely to promote social interaction, and when travel times increase due to sprawl, less time is available for community involvement and neighborly engagement. This indicates that fast urban sprawl and a rise in urban density will have a favorable effect on social capital, including neighborly relationships, trust-building, and civic involvement. However, this conclusion is mainly based on situations in rich nations, yet social capital and urban form may differ in certain ways between advanced and emerging economies such as Indonesia. Here, we review two findings linking urbanization with social capital in the context of Indonesia.

Using the 2014 National Socio-Economic Survey (same data as reported here) and geospatial characteristics of 15 Indonesian metropolises, Muzayanah et al. (2020) found that numerous social capital indicators are positively impacted by high residential density and high street connectivity in Indonesian urban areas. People who lived in areas with higher density were less likely to know their neighbors, had lower levels of trust among neighbors, and participated in fewer community activities. They were regularly exposed to many incidental interactions with strangers; as a result, they tended to avoid social situations to reduce this type of engagement.

Using the 2012 National Socio-Economic Survey and some geospatial data, Civelli et al. (2022) arrived at a similiar finding. Their results suggested that higher density is associated with lower levels of neighborly trust and community involvement in Indonesian cities. In places with greater crime rates, the correlation between density and social capital is more apparent. Because crime is more prevalent in densely populated regions, trust, and community involvement are undermined, supporting the view that density lowers social capital. Furthermore, lower density is associated with lower interethnic tolerance, but this is due to sorting.

With both papers suggesting that higher density could lead to a deterioration of social capital, this highlights a pressing need for administrators to understand and address how social capital is built and depreciated in the urban context.

Chapter 4:Comprehensive Wealth Indicators in Detail

4.1 Overall Comprehensive Wealth Indicator

Theme: Overall Comprehensive Wealth

Geographic scope: Indonesia

Time series: 1990–2020

Frequency: Annual

Description: The Comprehensive Wealth Index elucidates the composite worth of authentic (inflation-adjusted) per capita produced, natural capital, human capital, and financial assets, with financial capital quantified by Indonesia's net foreign financial asset holdings. The current constraints preclude the incorporation of social capital into the iteration of the index, as delineated in the subsequent Limitations section. The index is denominated in chained 2017 local currency units (Rupiah) and US$ PPP.

Relevance to comprehensive wealth: The Comprehensive Wealth Index (CWI) stands as the most encompassing gauge of comprehensive wealth currently available. By amalgamating the appraised values of produced, natural, human, and financial capital into a unified index, it facilitates the facile monitoring and articulation of the overarching trajectory in comprehensive wealth, akin to GDP's function in delineating the overall trend in income.

In theoretical terms, the CWI emerges as a nearly ideal barometer of the sustainability of well-being, as posited by seminal works (Dasgupta, 2001 and 2014; Dasgupta & Mäler, 2000; Hamilton & Clemens, 1999; Managi & Kumar, 2018; Stiglitz et al., 2009; UNU–IHDP & UNEP, 2023; World Bank, 2011, 2018 and 2021). This arises from the fact that the productive base by the index constitute the foundation for the production of all "goods and services" consumed by individual Indonesians. Notably, the terms "goods and services" and "consumption" are employed here with nuanced meanings distinct from their colloquial interpretations.

The "goods and services" derived from the assets comprising comprehensive wealth extend beyond conventional market goods. They encompass a diverse spectrum, including tangible goods such as subsistence food derived from the environment, akin to market goods, as well as non-market services like precipitation and temperature.

The extensive scope of the CWI in encompassing assets that enhance well-being underscores its pivotal role as an indicator of sustainability. A rising real per capita value of comprehensive wealth over time suggests sustainable development pathway, synonymous with increasing well-being. Conversely, a decline over time unequivocally signals unsustainable development, foreshadowing a future decline in well-being.

Method of calculation and data sources: The calculation of the CWI involves the application of quantity indexes pertaining to per capita produced, natural, and human capital. In the case of the national index, the incorporation of financial capital stocks further contributes to the calculation. The requisite data for this process were acquired from diverse sources, including Statistics Indonesia, and were meticulously compiled by the authors of this report.

Limitations: A primary constraint inherent in CWI lies in the omission of social capital. This omission is rooted in the unavailability of the requisite concepts, methodologies, and data sources essential for its valuation. Furthermore, a notable limitation arises from the deliberate exclusion of certain natural assets, owing to either the inherent impracticality or ethical considerations

surrounding their valuation. This category encompasses commercial fish stocks, surface and groundwater resources, non-commercial forests, wetlands, and other ecosystems, reflecting a nuanced acknowledgment of the complexities involved in assigning monetary values to these ecological components.

Reliability: The reliability of human capital may be affected by the high level of informality and the substantial presence of unincorporated enterprises in Indonesia, introducing complexities in accurately capturing the dynamics of the labor market.

Analysis: The most extensive measure of wealth applicable to Indonesia today, the CWI, exhibited a total growth of 2.8 times over the 25-year period spanning from 1995 (when human capital data became available) to 2020. In 1995, the CWI was IDR 404.3 million (equivalent to USD PPP 86.101 per Indonesian). By 2020, this figure had increased to IDR 1,130 millions (USD PPP 240,750 per Indonesian), indicating an average annual growth rate of 4.3%. Analyzing the individual components of the CWI, human capital, which constitutes the most substantial portion of Indonesia's assets, experienced consistent growth throughout the period. The average Indonesian experienced an increase in real human capital from USD PPP 67,260 in 1995 to USD PPP 190,690 in 2020. Market natural capital also demonstrated an increasing pattern in real per capita terms during the 1995-2020 period. The real per capita value of Indonesia's market natural capital increased from USD PPP 6,380 in 1990 to USD PPP 9,650 in 2020, a total increase of 51.4% and an average annual increase of 2.2%. Produced capital demonstrated a steady annual increase of 5.3%, progressing from USD PPP 9,260 per capita in 1990 to USD PPP 43.380 per capital in 2020. Financial capital witnessed a modest improvement over the same period, shifting from negative USD PPP 3,420 to negative USD PPP 2,970 in real per capita terms.

4.2 Produced Capital Indicator

Indicator PC1: Produced Capital Index

Theme: Produced Capital

Geographic scope: Indonesia

Time-series: 1990-2020

Frequency: Annual

Description: The Produced Capital Index (PCI) measures the aggregate value of Indonesia's stock of fixed capital in real (inflation-adjusted) IDR per capita. The stock of the fixed capital includes produced capital (residential and non-residential buildings, roads, dams, machinery and equipment, and other fixed assets) owned by private and government.

Relevance to comprehensive wealth: Produced capital is a key part of the productive base upon which market output is created and distributed and therefore plays a key role in the provision of welfare-enhancing market goods and services. As an archipelagic country with middle-income status, assessing the level and trends of the produced capital index is crucial. It is necessary to assess the level and changes in the productive bases of the country for the fact that produced capital is one of the key factors of production in businesses and the public sector, such as for supporting interconnectivity and producing goods and services.

Method of calculation and data sources: Produced capital index is developed by calculating fixed capital stock based on data on gross fixed capital formation. Then, it is converted to a per capita basis by dividing the stock of fixed capital by population data. Estimated on an annual basis for 1990-2020, it is measured in 2010 local currency units (Rupiah).

Limitations: The produced capital index only measures the fixed capital index and does not include changes in inventories because of data constraints on changes in inventories. Due to the limited sectoral depreciation rate, the aggregate depreciation rate was utilized.

Reliability: The produced capital Index is considered very reliable.

Analysis:

The average annual growth of the PCI stood at 5.3% from 1990 to 2020, as shown inFigure 72. . Its value tripled, rising from IDR 43.6 million (USD 9,260) in 1990 to IDR 203.7 million (USD 43,380) in 2020. Several major events affected the accumulation of produced capital. The rate of investment in fixed assets rose rapidly in the early 1990s, followed by a decline caused by the Asian financial crisis in 1997–-1998. The crisis had a significant impact on the accumulation of produced capital, leading to a decrease in annual growth from 6% in 1997 to 1% in 1999. In 2020, the produced capital accumulation was also affected by the COVID-19 pandemic, with GFCF declining by 6%

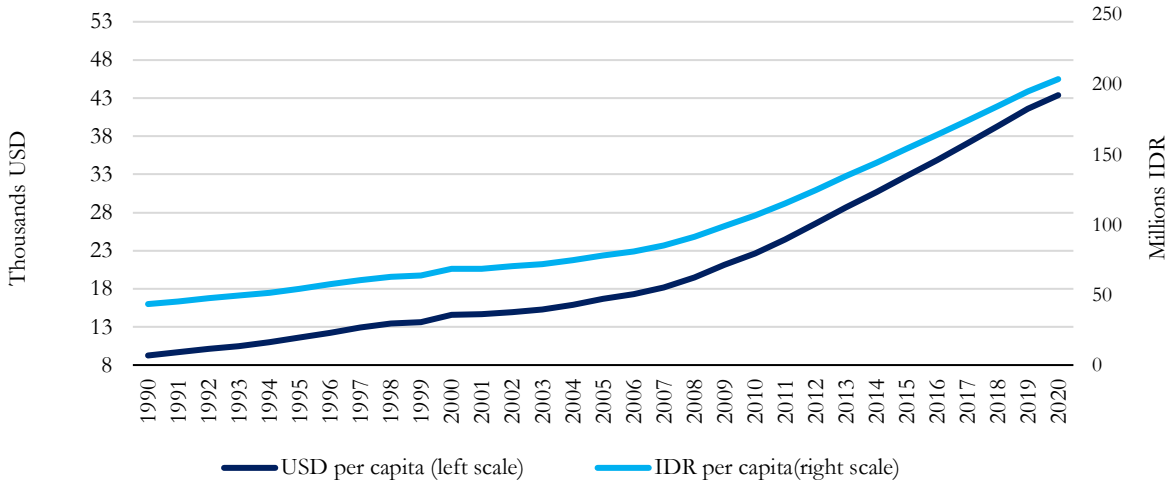


Figure 44. Produced capital per capita, Indonesia, 1990–2020

Produced capital consists of buildings, machinery and equipment, vehicles, and other assets. In 2000, buildings accounted for 75% of the total produced capital, machinery and equipment contributed 9%, and vehicles contributed 6%. These shares had not changed substantially by 2020, remaining at 74%, 10%, and 6%, respectively. The continuing high share of buildings in the PCI was driven by the country's economic growth in recent years, which created demand for infrastructure development to improve connectivity, increase electrification, and meet the need for housing.

By sector, manufacturing, real estate activities, agriculture, and mining accounted for the majority share of the PCI. In 2010, the PCI of these sectors amounted to IDR 64 million (USD 13,730), representing 61% of the overall index. By 2018, their combined value had increased to IDR 89 million (USD 19,000), but their overall share had dropped to 48%.

4.3 Human Capital Indicator

Indicator HC1: Human Capital Index

Theme: Human Capital

Geographic scope: Indonesia

Time-series: 1995-2020

Frequency: Annual

Description: The HCI measures the aggregate value of real (inflation-adjusted) per capita human capital, representing the skills, experiences and competencies embodied in the population. These can be conceptualized as stocks of human capital that can increase a person's productivity, which in turn yields higher incomes.

Relevance to comprehensive wealth: Investing in human capital generates both economic and non-economic benefits. As people develop their skills, experience, and competencies, they become more employable and attract higher wages. Industries can increase productivity by tapping into a more skilled and productive labour force. Additionally, individuals and communities receive non-economic benefits from human capital, such as improved subjective well-being and higher levels of civic engagement (United Nations University International Human Dimensions Programme on Global Environmental Change & UN Environment Programme, 2014).

Method of calculation and data sources: The HCI presented here is based on the discounted flow of total market labour compensation. First, the total market labour compensation was calculated for each year. This was obtained from the IO tables prepared by BPS-Statistics Indonesia for 1995, 2000, 2005, 2010, and 2016 (BPS-Statistics Indonesia, n.d.-a). For other years, labour compensation was interpolated based on the average share of labour income to GDP. Labour compensation is composed of two elements: formal wages paid to employed workers and earnings of the self-employed. Data on formal wages were taken directly from the national accounts prepared by BPS-Statistics Indonesia, while earnings of the self-employed were estimated to be a varying share of mixed-income, also from the national accounts. Mixed income is the surplus or deficit accruing from production by unincorporated enterprises owned by households. It implicitly contains an element of remuneration for work done by the owner or other members of the household (UN Statistics Division, n.d.). Depending on the industry in question, it is assumed that the remuneration of owners represented between 0% and 95% of mixed-income. Properly estimating the share of mixed-income that represents the remuneration of owners is especially relevant in countries where informal enterprises make up a high proportion of the economy, such as Indonesia.

Limitations: The main drawback of the market labour compensation is its underlying assumption that income disparities accurately represent differences in productivity and, by extension, variations in human capital value among individuals. However, incomes fluctuate for numerous reasons, not all related to productivity differences. As a result, using wages to estimate human capital might lead to somewhat skewed results (Le et al., 2003).

Reliability: The HCI is considered to be reliable as it uses the data from BPS-Statistics Indonesia and the World Bank DataBank.

Analysis: The average Indonesian experienced important increases in human capital over the study period. The HCI increased from IDR 315.8 million (USD PPP 67,260) in 1995 to IDR 895.4 million (USD PPP 190,690) in 2020. Except for a notable dip from 1997 to 2000 due to the Asian financial crisis, the index grew consistently until 2019. The downturn witnessed after 2019 was likely related to the global COVID-19 pandemic. Further analysis would be required to determine whether the decline was reversed as the world recovered from the pandemic.

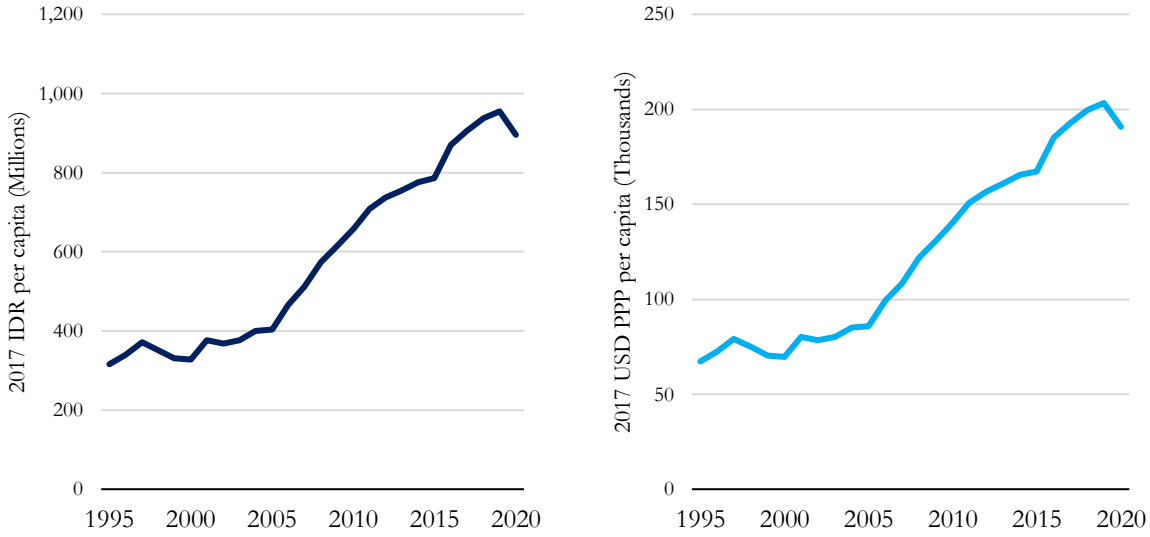


Figure 45. HCI, Indonesia, 1995-2020

Source: Authors' calculations based on data from BPS-Statistics Indonesia and the World Bank DataBank

4.4 Natural Capital Indicators

Indicator NC1: Market Natural Capital Index

Theme: Natural Capital – Market natural capital

Geographic scope: Indonesia

Time-series: 1990-2020

Frequency: Annual

Description: The MNCI measures the aggregate value of real (inflation-adjusted) per capita market natural capital. It is measured in chained 2017 rupiahs per capita.

Relevance to comprehensive wealth:

Natural capital is a key part of the productive base upon which market output is created and, therefore, plays a key role in the provision of well-being-enhancing market goods and services. The compilation of tables and accounts proposed in the inclusive wealth framework allows stakeholders to better comprehend the interaction between the environment and the economy, specifically the extraction of these assets from the environment and their use within the economy.

Natural assets tend to be measured in physical units with different units used for different assets. For example, nickel is measured in tonnes, whereas crude oil is measured in cubic metres. Consequently, their quantities cannot simply be summed, unlike produced and human capital, for which quantities are measured in rupiahs. Overall sustainability is, therefore, difficult to assess in physical terms. For example, is the country more or less sustainable if the quantity of nickel declines while the quantity of wood increases?

As an aggregate index, the MNCI overcomes this problem. It allows for the total natural asset base to be assessed and integrated with similar measures of produced and human capital to assess comprehensive wealth.

Method of calculation and data sources: The MNCI is created by combining the data of values and volumes of production for the agriculture, aquaculture, fisheries, forestry, livestock, fossil, and minerals sectors into an annual quantity index from 1990 to 2020. Meanwhile, non-market natural capital measures data on precipitation and temperature.

Table 4. Natural capital components datasources

	Component	Variables	Data sources	Notes
Market Assets	Agriculture	Cost	BPS-Statistics Indonesia	Survey of Farmer Business (1990 - 2018), Interpolated for Other Years and Several Commodities
		Production	Ministry of Agriculture	
		Price	FAO and Ministry of Agriculture	Producer Price Data, Interpolated for Missing Data
	Aquaculture	Cost	BPS-Statistics Indonesia	Survey of Aquaculture Business (1993 & 2014), Others Interpolated
		Production	BPS-Statistics Indonesia	Statistics of Aquaculture (1990 - 2020)
		Revenue	BPS-Statistics Indonesia	Statistics of Aquaculture (2000 - 2020), 1990 - 1999 Interpolated
	Fisheries	Cost	BPS-Statistics Indonesia	Survey of Fisheries Business (1993 & 2014), Others Interpolated
		Production	BPS-Statistics Indonesia	Statistics of Fisheries (1990 - 2020)
		Revenue	BPS-Statistics Indonesia	Statistics of Fisheries (2000 - 2020), 1990 - 1999 Interpolated
	Forestry	Cost	BPS-Statistics Indonesia	Statistics of Forest Concession Establishment 1990 - 2020, Statistics of Timber Culture Estate 1993 - 2020 (Timber Culture is Interpolated from 1990 - 1992)

		Production	BPS-Statistics Indonesia	Statistics of Forest Concession Establishment 1990 - 2020, Statistics of Timber Culture Estate 1993 - 2020 (Timber Culture is Interpolated from 1990 - 1992)
		Revenue	BPS-Statistics Indonesia	Statistics of Forest Concession Establishment 1990 - 2020, Statistics of Timber Culture Estate 1993 - 2020 (Timber Culture is Interpolated from 1990 - 1992)
	Livestock	Cost	BPS-Statistics Indonesia	Livestock Business Cost Structure 2014 & 2017 (Cost is interpolated for other data points)
		Production	BPS-Statistics Indonesia	Statistics of Livestock 2000-2020 (Production is Interpolated from 1990 - 1999)
		Price	BPS-Statistics Indonesia	Consumer and producer price statistics 2009-2020 (Price is insterpolated based on export/import prices for 1990-2009)
	Fossil	Cost	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990-2020)
		Depreciation	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990-2020)
		Production	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990-2020)
		Rate of return	Financial Services Authority of Indonesia (2019)	
		Reserve	U.S. Energy Information Administration (2022)	
		Revenue	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990-2020)
	Minerals	Cost	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990-2020)
		Depreciation	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990-2020)
		Production	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990-2020)
		Rate of return	Financial Services Authority of Indonesia (2019)	
		Reserve	BPS-Statistics Indonesia and USGS	
		Revenue	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990-2020)
Non-market	Precipitation		World Bank	
	Temperature		BMKG	

Limitations: A few important market natural resources (primarily commercial fish stocks and water resources such as hydroelectric, drinking and irrigation reservoirs) are not included in the MNCI due to gaps in data and methods. As a result, the value of market natural capital is somewhat underestimated by the index. There are also non-market natural assets that contribute indirectly to market production (such as forest-based insects that provide pollination services freely to farmers and aquatic ecosystems that regulate water quality and prevent floods) that could be valued and combined into a separate index of non-market natural capital. A difficulty in estimating resource rents with this method is that one is rarely able, from using the source information, particularly national accounts data, to isolate only the extraction or harvesting activity; and in certain circumstances, multiple resources may be extracted at the same time, particularly in mining. Generally, data on gross operating surplus (GOS) for industries that extract and harvest environmental assets will capture some down stream processing, refinement or other value-added activity also undertaken by the extractor before sale. Since all of these additional activities require inputs of labour and capital, partitioning a firm's GOS into pure extraction activity relating to a single resource is not always straightforward. Nonetheless, every effort should be made to isolate the specific GOS for the extraction activity of individual resources in the underlying data.

Reliability: The MNCI is considered very reliable, with the exception of the extended estimates of commercial timber volumes and built-up land areas compiled by the authors of this study, which can be considered only acceptable. Overall, the MNCI is considered reliable.

Analysis: The MNCI increased slightly between 1990 and 2020, with considerable fluctuations over the period. The value of the index increased from IDR 29.9 million (USD 6,380) per capita in 1990 to IDR 45.4 million (or USD 9,650) per capita in 2020, for a total increase of 51.4% and an average annual growth of 2.2%.

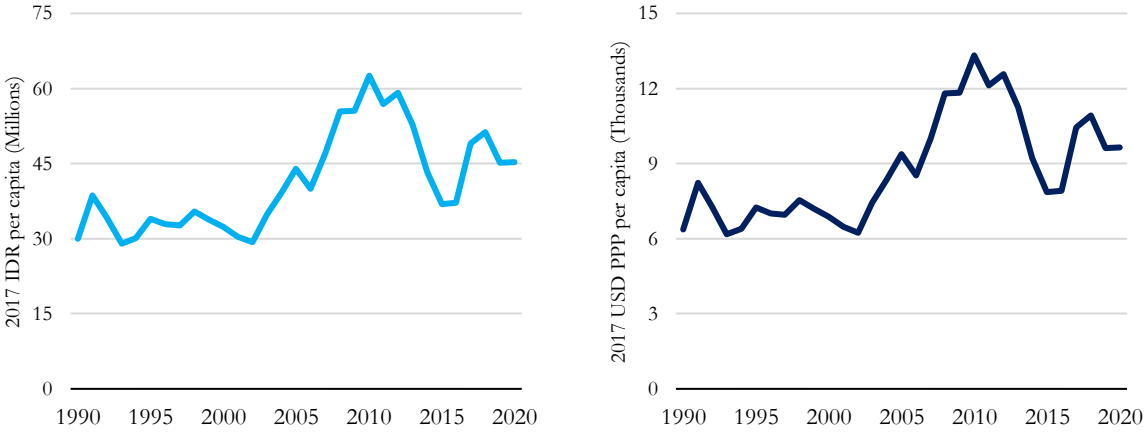


Figure 46. MNCI, Indonesia, 1990-2020

Source: Authors' calculations based on data from BPS-Statistics Indonesia

Indicator NC2: Temperature

Theme: Natural Capital – Climate

Geographic scope: National

Frequency: Annual and seasonal data, 1981-2020

Description: Temperature indicator indicates an annual time series of temperature departures from normal over the period 1981 to 2020 at the national level.

Relevance to comprehensive wealth: Changes in temperature have a long-term impact on stocks of natural capital. It will reduce the value and productivity of agricultural land, the extent of forest and timber stocks, the functioning of ecosystems and it services. Air temperature is of primary importance as an indicator of global climate change. The United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) utilize surface air temperature in their work. It is also an important indicator of climatic conditions and is considered an essential climate variable by the World Meteorological Organization Climate Observing System.

Method of calculation and data sources: The indicator is based on data that are taken from the Meteorological, Climatological, and Geophysical Agency of Indonesia.

Reliability: Temperature is considered very reliable.

Analysis: At national level, though there was a high degree of variability year to year, a clear upward trend in temperature can be seen at the national level from 1981 to 2020. The temperature departure was 0,69 degrees Celsius above average in 2020. The warmest year was 2016 (0,79 degrees Celsius above the avarage) and the coldest year was 1984 (-0,51 degrees Celsius below the average).

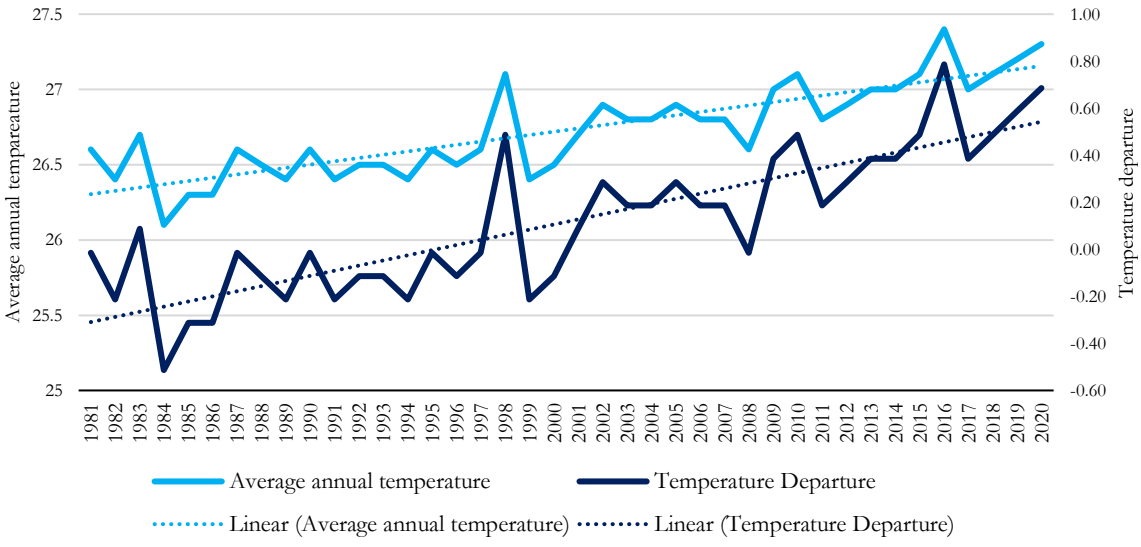


Figure 47. Average annual mean temperature, Indonesia, 1981-2020
Authors' calculations based on data from BMKG (n.d.)

Indicator NC3: Precipitation

Theme: Natural Capital – Climate

Geographic scope: National

Time series: 1991 to 2020

Frequency: Annual and seasonal data

Description: The indicator presents the annual departure from the normal level of precipitation for the period 1991 to 1990.

Relevance to comprehensive wealth: Changing precipitation patterns affect the productivity of some natural capital, such as agriculture and crop losses. They also affect water levels and can change the timing of peak stream flows. Increased precipitation can result in increased flooding and soil loss. Decreased precipitation can threaten the drinking water supply and result in droughts.

Method of calculation and data sources: Precipitation departures are calculated by subtracting the normal value for 1961 to 1990 from the annual value. Observed data is produced by the Climatic Research Unit of the University of East Anglia. Data is presented at a 0.5° x 0.5° (50km x 50km) resolution.

Limitations: As the data are presented as percentage departures from normal, they must be interpreted carefully.

Reliability: Temperature is considered very reliable.

Analysis: As presented in the figure below, precipitation has been on the upward trend at the national level, although there is a high degree of variability year to year. The wettest year was 2010, at 3.289 mm, while the driest year was 1997, at 2.275 mm. With a 3.000 mm precipitation level in 2020, the precipitation departure was 9.7% below normal departure (the precipitation average from 1961 to 1990 was 2.735 mm).

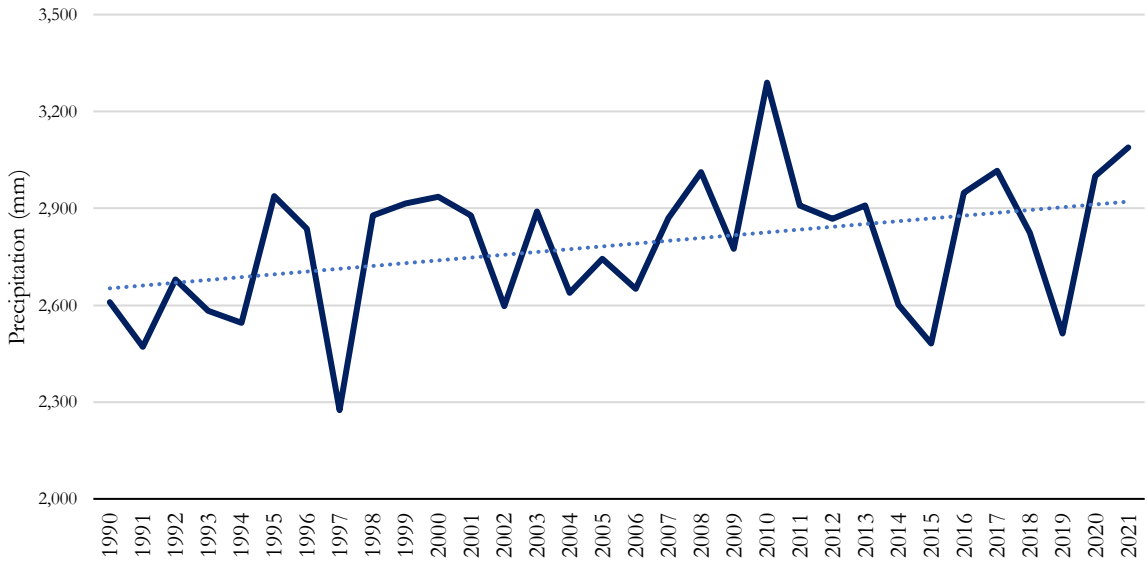


Figure 48. Annual precipitation, Indonesia 1991-2020

Source: Authors' Calculations based on data from the World Bank (2022)

4.5 Financial Capital Indicator

Indicator FC1 - International Investment Position Index

Theme: Financial Capital

Geographic scope: National

Time series: 2001-2020

Frequency: Annual

Description: The IIP shows the real per capita value of Indonesia's net foreign financial assets, calculated from the difference between the real per capita value of foreign financial assets (*aset finansial luar negeri*/AFLN) and foreign financial liabilities (*kewajiban finansial luar negeri*/KFLN).

Relevance to comprehensive wealth: The IIP is the only financial capital that contributes directly to the calculation of comprehensive wealth. A positive IIP indicates that the amount of foreign financial assets held by Indonesians exceeds that of Indonesian financial assets held by foreigners, thus increasing comprehensive wealth. Conversely, a negative IIP shows that the amount of Indonesian financial assets held by foreigners is greater than that of foreign financial assets held by Indonesians, thereby reducing comprehensive wealth. This index is the sole element of comprehensive wealth that can contribute to either an increase or a decrease in Indonesians' wealth, depending on the circumstances. It is also inherently the smallest component of wealth as it only accounts for monetary flows and records only those Indonesians who own foreign assets.

Method of calculation: The index is calculated by deflating Bank Indonesia's IIP in nominal terms by using the implicit price index for Indonesian GDP and dividing it by population.

Limitations: The index calculation in this study utilized both BPM 5 (for the period before 2010) and BPM 6 (since 2010). This shift leads to changes in the recording of reverse investment within foreign direct investment, resulting in a substantial increase in both assets and liabilities. However, this shift does not impact the net IIP, and thus does not alter the calculation of comprehensive wealth.

Reliability: The IIP is considered reliable as it sourced directly from Bank Indonesia.

Analysis: Indonesia's IIP has been consistently negative since at least 2001, indicating that non-residents hold more Indonesian financial assets than Indonesian residents hold foreign financial assets in real per capita terms.

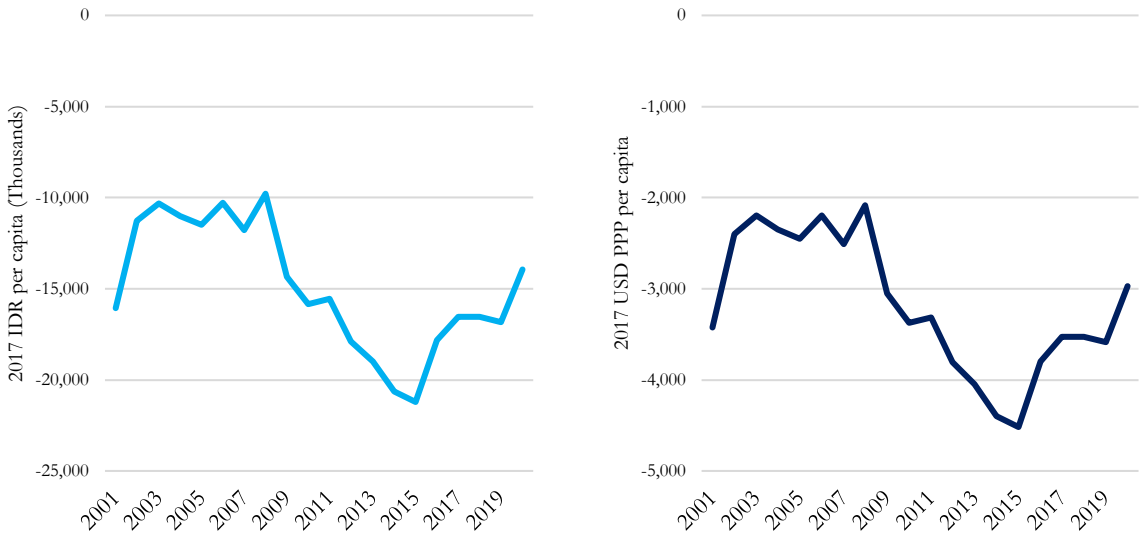


Figure 49. IIP, Indonesia, 2001-2020

Source: Authors' Calculations based on data from the World Bank (2022)

The 2007 Law No. 25 regarding capital investment could be a factor in the noticeable decrease in FCI post-2008. This legislation marked a significant turning point in the country's business landscape by introducing incentives for foreign investment (Hafiluddin & Patunru, 2022; U.S. Department of State, 2021). Provisions under this law encompassed a range of measures, including granting foreign and domestic investors equal legal rights; safeguarding foreign investments from nationalization; allowing investments in all sectors, excluding those detrimental to national safety, health, environment, and morality; enhancing the property rights of foreign investors; offering flexibility in terms of entry and exit of foreign investors; and providing tax incentives for sectors that contribute significantly to the economy.

4.6 Social Capital Indicator

Indicator SC1: Group Membership

Theme: Social capital – civic engagement

Geographic scope: Indonesia

Time-series: 2006, 2018

Frequency: Intermittent, following the WVS execution in Indonesia.

The WVS is maintained by the World Values Survey Association (WVSA), which is a global network of social scientists studying values, with the WVS association and secretariat headquartered in Stockholm, Sweden (World Values Survey, n.d.).

Globally, the WVS has been conducted since 1981, with seven completed waves. The WVS has an international master questionnaire for each survey wave. However, the members of the WVSA conduct nationally representative surveys by themselves, with the collected data shared among members of the network and later released publicly. While funding from the WVSA had been obtained in some cases, most surveys were financed by local scientific foundations. Consequently, there might be data gaps for certain countries for certain waves.

In Indonesia, three waves had been conducted: Wave 4 in 2001 (n=1,000), Wave 5 in 2006 (n=2,015), and Wave 7 in 2018 (n=3,200). Compared with other countries, Wave 4 would reflect 1999-2004, Wave 5 would reflect 2005-2009, and Wave 7 would reflect 2017-2022. The Institute of Quranic Studies conducted waves 4 and 5, while Wave 7 was conducted by the University of Melbourne and SurveyMETER, following WVSA standards.

Description: Group Membership tracks the proportion of the population who were active or inactive members of a group, organization, or association in the previous year.

Relevance to comprehensive wealth: Participation in group activities and interpersonal trust correlate positively. People learn to trust others more when they get more involved in their communities and other group activities. Similarly, increased interpersonal trust increases a person's propensity to engage in group activities. As a result, there is a positive feedback loop where cooperation fosters trust, and trust fosters cooperation.

Being a part of a group unites people from different backgrounds, fostering the growth of social capital among them. Even when these behaviours are not the group's main goals, belonging to groups, associations, or organizations can help people acquire democratic values and behaviours, including cooperation, trust, and interpersonal cooperation.

Method of calculation: The data for organization membership was obtained from the fifth and seventh waves of WVS for Indonesia. The survey asks whether the respondents were members of religious, sports, arts, music, labour, professional, charitable/humanitarian, environmental organization, or political parties. Membership was also divided into passive or active membership. The data was aggregated into broader categories of organizations (such as hobby organizations, work-related organizations, and social movement organizations) and tabulated using appropriate population weights.

Limitations: Compared to the IFLS or SUSENAS, the WVS has a relatively small sample size as well as more limited regional and temporal coverage. This is especially the case for Wave 4 and Wave 5 surveys, consisting of samples drawn from 5 and 10 provinces (out of 34).

Reliability: Due to its sampling constraints, the WVS might not be suitable for determining precise national levels compared to a BPS survey. However, it might still be suitable to compare rough levels and change over time.

Analysis: The WVS suggests high rates of organization memberships in Indonesia (Figure 49). Among the sampled population, 69% were active in at least one organization as of 2018. This number increased 11 percentage points from 58% in 2006. As active membership rose, inactive members declined from 23% in 2006 to 17% in 2018.

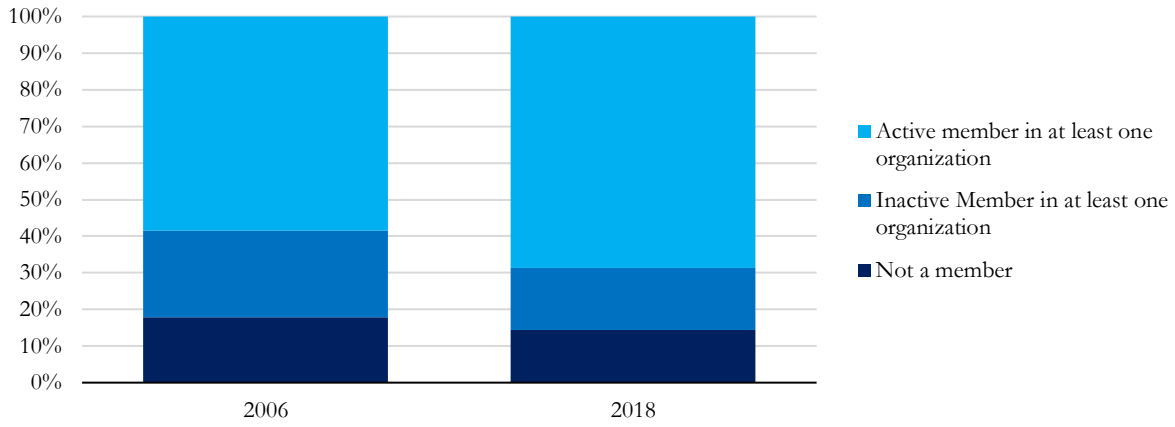
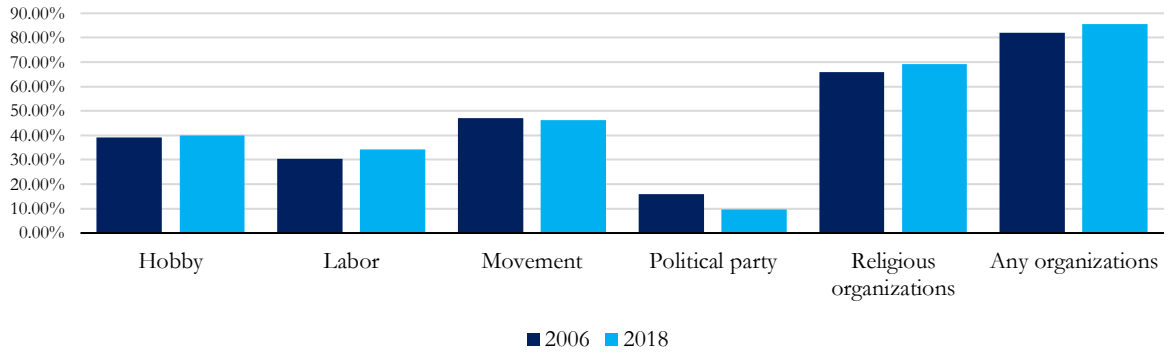


Figure 50. Public participation in an organization, Indonesia, 2006 & 2018

Source: Authors' calculations based on data from Inglehart et al., 2022.

The figure below demonstrates rate of membership by types of organization. The highest rate of organization membership, including inactive and active memberships, was observed for religious organizations at 66.05% in 2006 and 69.14% in 2018. Inversely, the lowest rate of organization membership was observed for political parties. Political parties also became the only type of group with a decline in participation rates, from 15.93% in 2006 to 9.60% in 2018.



Note: Hobby groups were composed of sports, arts, and music groups; Labour organizations were composed of labour and professional groups; Movement organizations were composed of charitable/humanitarian and environmental organizations.

Figure 51. Household participation in activities around their neighbourhoods, Indonesia, 2012 & 2014

Source: Authors' calculations based on data from BPS-Statistics Indonesia, 2012, 2014.

Indicator SC2: Collective Action

Theme: Social capital – civic engagement

Geographic scope: Indonesia

Time-series: 2012, 2014

Frequency: Intermittent

BPS had several approaches to measuring social capital in Indonesia (BPS, 2021). Their efforts started with several small-scale surveys in 2005 and 2009, which refined the instruments used to measure social capital in larger-scale surveys. These included SUSENAS (*Survei Sosial-Ekonomi Nasional*/ National Socio-Economic Survey) in the Socio-cultural & Education module or Social Resilience module. Social capital is also measured in the Happiness Level Measurement Survey (*Survei Pengukuran Tingkat Kebahagiaan*/SPTK).

However, it did not mean that their results could be used for our analysis. Firstly, the data or reports from these studies were not always released publicly. Secondly, even when the results were published, they could be done in a form that disabled intertemporal analysis. For example, BPS released a report on Social Capital Statistics in 2022 based on 2021 SPTK. While it contained detailed cross-section tabulations between groups, it did not have a temporal comparison. Furthermore, the use of the index as the main unit in the report prohibited comparison with other surveys that might have comparable questions, such as SUSENAS, IFLS, or WVS.

The other option would be to use data from SUSENAS. A previous attempt by Suryahadi, Rishanty, and Sparrow (2020) constructed several social capital variables from the 2006, 2009, 2012, 2014, and 2018 SUSENAS. However, their efforts suggested that the availability of questions and options was inconsistent over waves. Furthermore, while the data might be fit for their purpose (panel data regression), their summary statistics revealed jumps that would not be expected for short time periods. Thus, we deem it to be a poor fit for time-series comparison.

Consequently, we utilized *Social Capital Statistics in the 2014* report released by BPS. The report was based on the 2014 SUSENAS, which took households as the observation unit. The survey had a sample size of 75,000 households in every city/regency in Indonesia, making it useful to establish levels that could be compared with WVS and IFLS that demonstrated changes. Furthermore, the report also contained comparisons with the *Social Capital Statistics in 2012*, which was also based on SUSENAS and contained many similar questions.

Description: Collective action tracks the share of households who often or always participate in certain activities around their neighbourhood, such as religious activities, social activities, helping disaster victims, and public interest.

Relevance to comprehensive wealth: Indicator SC1 - Participation in Group Activities is complemented by rates of collective action, which show how active households were in local communities. Some of these collective actions were associated with the provision of public goods or with helping vulnerable people, which could enhance local welfare.

Method of calculation: The data was obtained from the *Social Capital Statistics in 2014* report released by BPS. The report contained by-group tabulations of the responses of the 2014 SUSENAS Social Resilience survey. The report also contained comparisons with the 2012 SUSENAS Socio-Cultural & Education survey. For this indicator, the report presented the

percentage of households answering either "often" or "always" to whether they participate in activities around the neighbourhood.

Limitations: Questions and options were inconsistent over waves, with this question only available in 2012 and 2014. The temporal coverage was also more limited compared to WVS, with only 2012-2014 figures available. Furthermore, the data itself was not publicly released, unlike IFLS or WVS. This includes a more detailed tabulation (such as the precise percentage of who answers "often") and the survey dataset.

Reliability: Due to its sampling constraints, the WVS might not be suitable for determining precise national levels compared to a BPS survey. However, it might still be suitable to compare rough levels and change over time. Meanwhile, the results from BPS might be considered reliable due to its representative sampling and its large sample size.

Analysis:

The BPS results suggest that participation in local community events was contingent on the type of events. The percentage of households often or always participating in helping disaster victims (at 71-76%) and religious activities (at 60-62%) was higher than for public interest (42-52%) or social activities (29-41%).

The rank within the sampled population remained relatively consistent between the two waves. This was expected, as the surveys were conducted only two years apart. However, the proportion for participation in local organizations or participation in public-interest and social activities was varied.

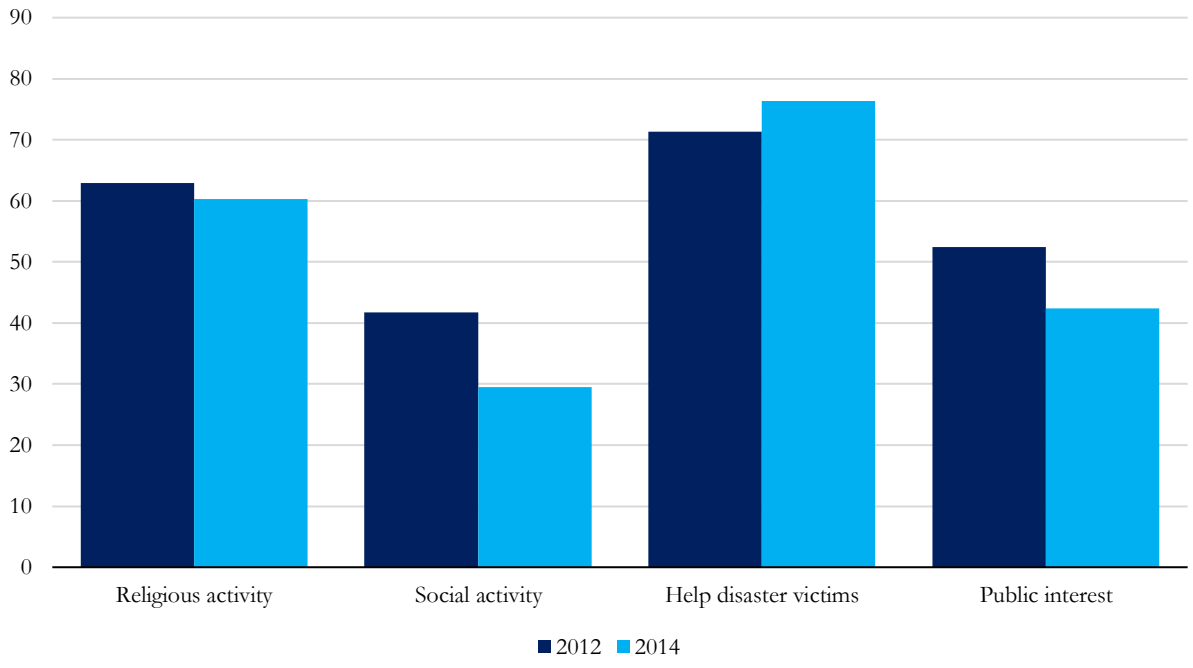


Figure 52. Household participation in activities around their neighbourhoods, Indonesia, 2012 & 2014

Source: Authors' calculations based on data from BPS-Statistics Indonesia, 2012, 2014.

Indicator SC3: Political Participation

Theme: Social capital – civic engagement

Geographic scope: Indonesia

Time-series: 2001, 2006, 2018

Frequency: Intermittent, following the World Values Survey (WVS) execution in Indonesia. In Indonesia, three waves had been conducted: Wave 4 in 2001 (n=1,000), Wave 5 in 2006 (n=2,015), and Wave 7 in 2018 (n=3,200). Compared with other countries, Wave 4 would reflect 1999-2004, Wave 5 would reflect 2005-2009, and Wave 7 would reflect 2017-2022.

Description: Political participation tracks the share of people who participated in political actions, especially as subjects of democracy. The actions specified are signing petitions, joining boycotts, joining unofficial strikes (unavailable in Wave 5), and participating in peaceful demonstrations. Meanwhile, the level of participation was classified into: "have done," "might do," "would never do," and "don't know."

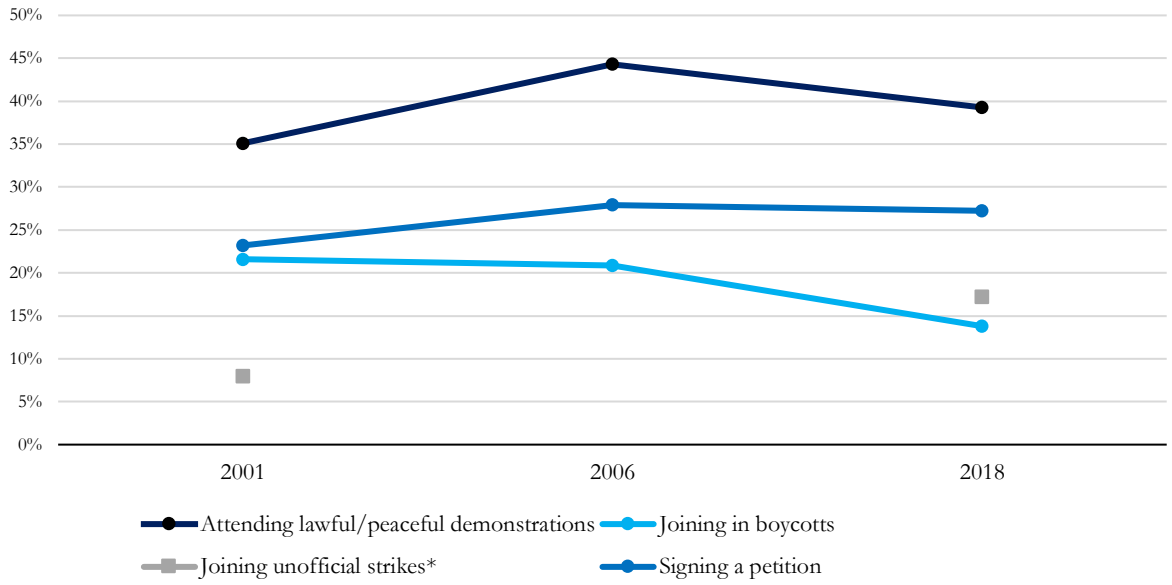
Relevance to comprehensive wealth: Engagement in political actions builds trust and reciprocity among community members and empowers individuals and communities. It reflects social cohesion and collective action capabilities, creating a more resilient society.

Method of calculation: The data for political participation was obtained from the fourth, fifth, and seventh waves of WVS for Indonesia. The survey asks whether the respondents were willing to participate in the following political actions: petition signing, lawful demonstrations, participating in boycotts, and joining unofficial strikes (with this being unavailable in 2006). The available options were "have done", "might do", "would never do", and "don't know". The data was aggregated and tabulated using appropriate population weights.

Limitations: Compared to the IFLS or SUSENAS, the WVS has a relatively small sample size as well as more limited regional and temporal coverage. This is especially the case for Wave 4 and Wave 5 surveys, consisting of samples drawn from 5 and 10 provinces (out of 34).

Reliability: Due to its sampling constraints, the WVS might not be suitable for determining precise national levels compared to a BPS survey. However, it might still be suitable to compare rough levels and change over time.

Analysis: The WVS suggested Indonesians were more willing to participate in political actions between 2001 and 2018. The sampled population showed more interest in participating directly in politics through petition signings and lawful demonstrations. It increased from 35% to 39% for lawful demonstrations and 23% to 27% for petition signing. However, willingness to participate in boycotts experienced a decline from 22% to 14%.



Note: Participants were considered willing to conduct certain political actions if they answered "have done" or "might do." The question for joining unofficial strikes was unavailable for 2006.

Figure 53. Willingness to engage in certain political actions, Indonesia, 2001, 2006, & 2018
Source: Authors' calculations based on data from Inglehart et al., 2022.

Indicator SC4: Voter Turnout

Theme: Social capital – civic engagement

Geographic scope: Indonesia

Time-series: 1971, 1977, 1982, 1987, 1992, 1997, 1999, 2004, 2009, 2014, 2019

Frequency: Parliamentary elections were held once every five years since 1971. After the fall of Suharto in 1998, the election cycle was broken, with an election held early in 1999. The following elections then followed every five years.

Prior to 2004, there were no presidential elections as the president was chosen by the legislative body, the People's Consultative Assembly (*Majelis Permusyawaratan Rakyat*). Since 2004, the president has been directly chosen by voters once every five years.

Description: Voter turnout tracks the share of registered voters who go to the polls and vote in the election.

Relevance to comprehensive wealth: A gauge of civic engagement and the degree to which citizens participate in governmental decision-making is voter turnout. The essential democratic participation mechanisms are elections, and high turnouts are typically seen favourably. One recurrent worry is that low voter turnout casts doubt on the idea that election results, and thus, governmental policies, represent the will of the broader public.

Method of calculation: For voter turnout, the data was aggregated by International IDEA, which tracks elections worldwide. The data is collected through desk research from national electoral bodies, which in the case of Indonesia is Indonesia's Commission on Elections (KPU).

Limitations: International IDEA depends on the data collected by the national election authority.

The denominator of voter turnout, "registered voters," may be changing over time, since not all eligible voters necessarily register to vote. The rate of this change is unknown. Other factors may limit the comparability of results across jurisdictions; for instance, it may be more convenient to vote in some jurisdictions (easier registration, more numerous polling stations).

As with all non-monetary indicators, Voter Turnout is not directly comparable with other Comprehensive Wealth indicators in this report.

Reliability: The Voter Turnout indicator is considered very reliable.

Analysis: The voter turnout for parliamentary elections was high during the New Order period at around 90%. For the 1999 election, voter turnout remained at 93.30%. However, voter turnout declined afterwards, reaching a low of 71.91% in 2009.

Meanwhile, voter turnout for presidential elections started at 68.51% in 2004 and remained at around 60-70% for the next three election cycles. In 2019, the voter turnout jumped to 81.93%.

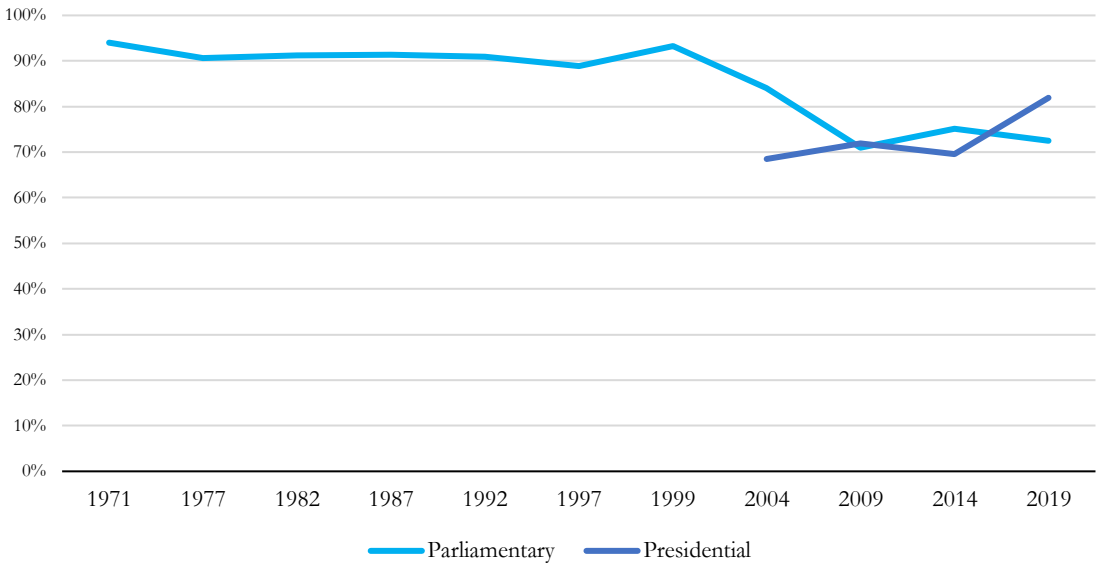


Figure 54. Voter turnout in presidential and parliamentary elections, Indonesia, 1971-2019
Source: Authors' calculations based on data from International IDEA, n.d.

Indicator SC5: General Trust

Theme: Social capital – trust

Geographic scope: Indonesia

Time-series: 2001, 2006, 2007, 2014, 2018

Frequency:

WVS: Intermittent, following the WVS execution in Indonesia. In Indonesia, three waves had been conducted: Wave 4 in 2001 (n=1,000), Wave 5 in 2006 (n=2,015), and Wave 7 in 2018 (n=3,200). Compared with other countries, Wave 4 would reflect 1999-2004, Wave 5 would reflect 2005-2009, and Wave 7 would reflect 2017-2022.

IFLS: Intermittent. To date, there had been five waves of IFLS: 1993, 1997, 2000, 2007, and 2014. The questions related to trust and tolerance was available in the Trust module for adult respondents. This was only available in the last two waves: 2007 and 2014.

Description: General trust tracks the proportion of people who think that people are generally trustworthy. There are further distinctions for family members, neighbours, acquaintances, and strangers.

Relevance to comprehensive wealth: Generalized trust is the belief in other people, especially in strangers and individuals who are different from oneself. The establishment and upkeep of positive social norms depend on a certain level of confidence in strangers. "Higher levels of trust mean lower transaction costs and improved likelihood of productive interactions," according to generalized trust, which is frequently seen as a component supporting social contracts. One crucial component of collective social capital is trust in others. The existence of community networks and institutions depends on people having faith in strangers (Turcotte et al., 2015).

Method of calculation: The data for general trust was obtained from the fourth, fifth, and seventh waves of WVS for Indonesia. The survey asked whether most people can be trusted or whether respondents need to be careful, with "don't know" and "no response" being possible answers. Furthermore, the WVS also asked how much respondents could trust their family, neighbourhood, people they knew personally, and people they met for the first time. The available options were: "trust completely", "trust somewhat", "do not trust very much", "do not trust at all." The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

The data for general trust was obtained from the fourth and fifth wave of IFLS, asked to respondents over 15. The survey asked whether the respondent has to be alert in their village or whether someone is likely to take advantage of them. The available options were: "strongly agree", "agree", "disagree", and "strongly disagree". The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

Limitations: Compared to the IFLS or SUSENAS, the WVS has a relatively small sample size as well as more limited regional and temporal coverage. This is especially the case for Wave 4 and Wave 5 surveys, consisting of samples drawn from 5 and 10 provinces (out of 34).

The IFLS drew its sample from 13 provinces in Indonesia, with no provinces in Eastern Indonesia. This made its regional coverage relatively small when compared to SUSENAS. Furthermore, it only had a seven-year interval with unclear dates for future waves.

Reliability: Due to its sampling constraints, the WVS might not be suitable for determining precise national levels compared to a BPS survey. However, it might still be suitable to compare rough levels and change over time. The IFLS has a larger sample size, although its sample was not drawn from all regions of Indonesia. Notably, Eastern Indonesia was underrepresented in the sample.

Analysis: The WVS and SUSENAS surveys suggested that Indonesians had become less trusting over time.

The WVS survey suggests that, over time, Indonesians were becoming increasingly distrustful of people. Among the sampled population, 5% were likely to trust most people as of 2018. This number was reduced by 41 percentage points from 46% in 2001. As the number of people trusting most people declined, the number of people who feel like they need to be careful to trust most people rose from 43% in 2001 to 95,3% in 2018.

The IFLS survey corroborates this high level of distrust. The survey suggests that 87% of the sampled population agree or strongly agree that someone is likely to take advantage of them as of 2014, an slight decrease of 92% in 2007.

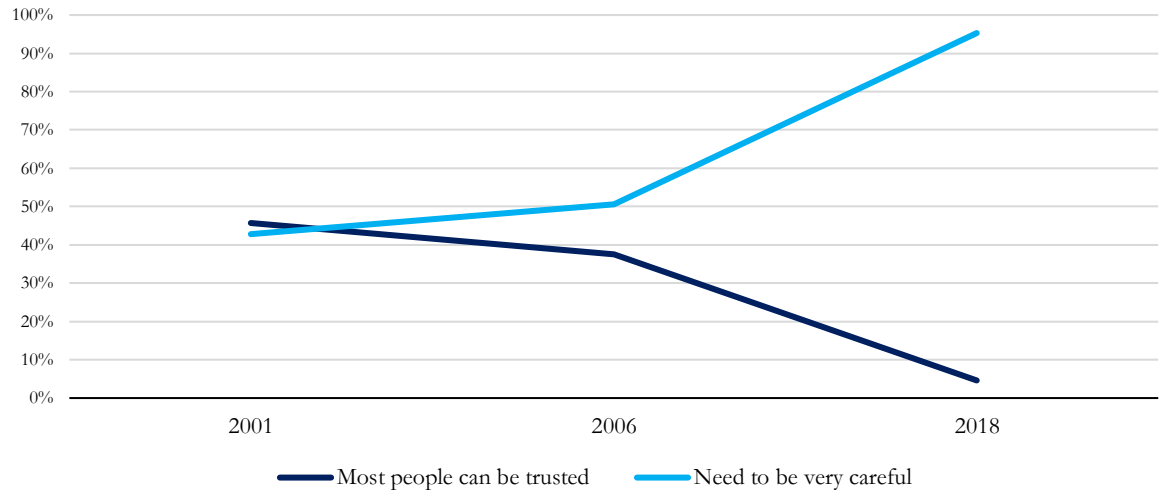


Figure 55. Sampled population response on "most people can be trusted", Indonesia, 2001, 2006, & 2018

Source: Authors' calculations based on data from Inglehart et al., 2022.

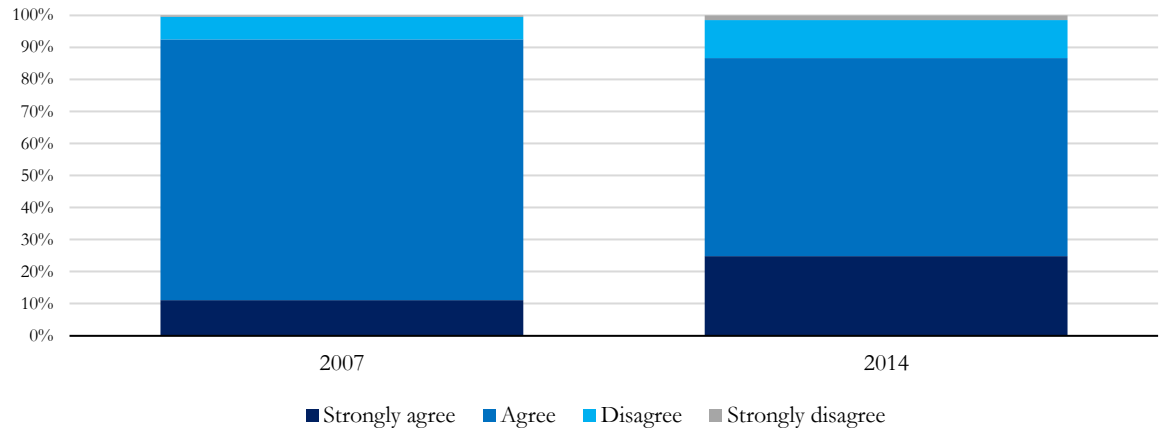


Figure 56. Sampled population response on "someone is likely to take advantage of me", Indonesia, 2007 & 2017

Source: Authors' calculations based on data from IFLS-5

Referring to the WVS in Figure 54, the sampled population had been less trusting of people, with differing degrees of trust. However, the decline of trust against family members were muted compared to neighbors, personal acquaintances, and people they met for the first time. The share of people somewhat or completely trusting of people they personally knew fell by 31.5 percentage points, nearly twice of neighbors (16.4 percentage points) and three times of people they met for the first time (9.9 percentage points).

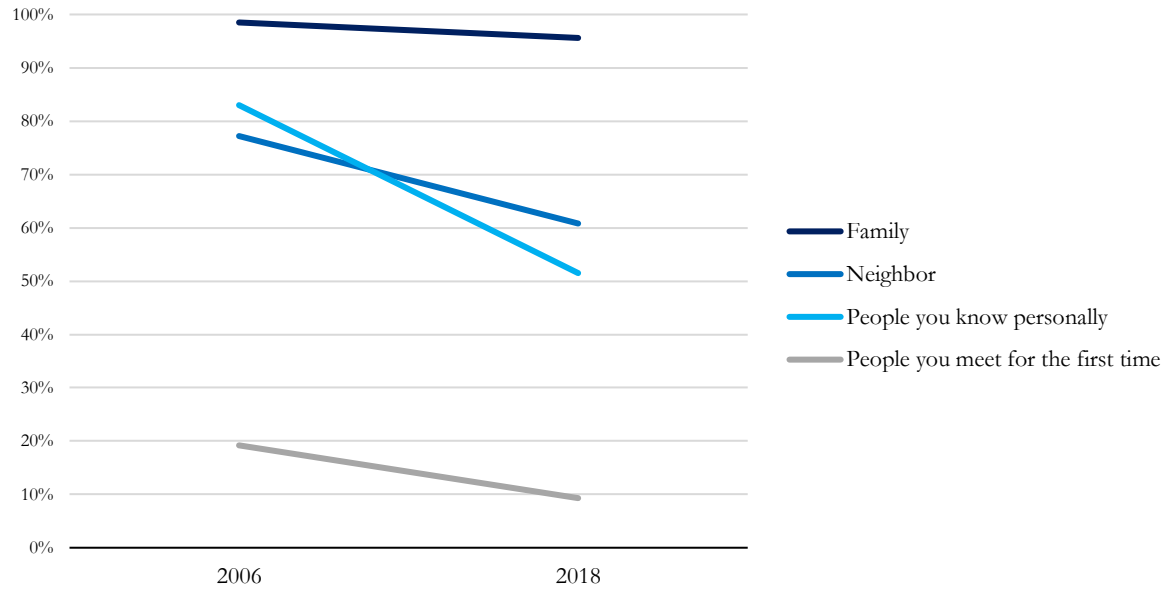


Figure 57. Trust toward other people, Indonesia, 2006 & 2018

Source: Authors' calculations based on data from Inglehart et al., 2022.

Indicator SC6. Trust in Neighbours

Theme: Social capital – trust

Geographic scope: Indonesia

Time-series: 2007, 2012, 2014

Frequency:

IFLS: Intermittent. To date, there had been five waves of IFLS: 1993, 1997, 2000, 2007, and 2014. The questions related to trust and tolerance was available in the Trust module for adult respondents. This was only available in the last two waves: 2007 and 2014.

SUSENAS: 2012, 2014

BPS had several approaches to measuring social capital in Indonesia (BPS, 2021). However, it did not mean that their results could be used for our analysis. Firstly, the data or reports from these studies were not always released publicly. Secondly, even when the results were published, they could be done in a form that disabled intertemporal analysis. For example, BPS released a report on Social Capital Statistics in 2022 based on 2021 SPTK. While it contained detailed cross-section tabulations between groups, it did not have a temporal comparison. Furthermore, the use of the index as the main unit in the report prohibited comparison with other surveys that might have comparable questions, such as SUSENAS, IFLS, or WVS.

Consequently, we utilized *Social Capital Statistics in 2014* report released by BPS. The report was based on the 2014 SUSENAS, which took households as the observation unit. The survey had a sample size of 75,000 households in every city/regency in Indonesia, making it useful to establish levels that could be compared with WVS and IFLS that demonstrated changes. Furthermore, the report also contained comparisons with the *Social Capital Statistics in 2012*, which was also based on SUSENAS and contained many similar questions.

Description: Trust in neighbours measures the share of the sampled population who trust their neighbours to watch over their house and kids.

Relevance to comprehensive wealth: Trust in neighbours fosters a sense of cooperation and mutual support, enhancing social cohesion among community members.

Method of calculation: The data for trust in neighbours was obtained from the fourth and fifth wave of IFLS, asked respondents over 15. The survey asked two questions. The first was whether the respondent would be willing to leave their children with their neighbors for a few hours if they cannot bring my children with along. The second was whether they would be willing to ask my neighbours to look after their house if they leave for a few days. The available options were: "strongly agree", "agree", "disagree", and "strongly disagree". The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

Similar data was obtained from the *Social Capital Statistics in 2014* report released by BPS. The report contained by-group tabulations of the responses to the 2014 SUSENAS Social Resilience survey. The report also contained comparisons with the 2012 SUSENAS Socio-Cultural & Education survey. For this indicator, the report presented the percentage of households answering either "trust" or "strongly trust" to whether they would be willing to leave their children with neighbours or whether they would be willing to ask neighbours to watch their house.

Limitations: The IFLS drew its sample from 13 provinces in Indonesia, with no provinces in Eastern Indonesia. This made its regional coverage relatively small when compared to SUSENAS. Furthermore, it only had a seven-year interval with unclear dates for future waves.

Questions and options were inconsistent over waves, with this question only available in 2012 and 2014. The temporal coverage was also more limited compared to WVS, with only 2012-2014 figures available. Furthermore, the data itself was not publicly released, unlike IFLS or WVS. This includes a more detailed tabulation (such as the precise percentage of who answers "often") and the survey dataset.

Reliability: The IFLS has a large sample size, although its sample was not drawn from all regions of Indonesia. Notably, Eastern Indonesia was underrepresented in the sample. Meanwhile, the results from BPS might be considered reliable due to its representative sampling and its large sample size.

Analysis: Indicator SC5 discussed that trust in one's neighbour had declined over time. This was also reflected in the sampled population's willingness to ask their neighbours to watch their house or watch their children. Both the IFLS and SUSENAS showed that people had become less willing to ask their neighbours to watch over their house and children.

The IFLS survey in Figure 57 suggests that 77% of the sampled population agree or strongly agree to leave their homes in the care of their neighbours as of 2014, a slight decrease from 83% in 2007. The BPS results suggest a similar result in Figure 59, with 82% of the sampled population agreeing or strongly agreeing to leave their homes in the care of their neighbours as of 2014.

Similarly, the IFLS survey in Figure 58. igure 58 suggests that 59% of the sampled population agreed or strongly agreed to leave their children in the care of their neighbours as of 2014, a significant decrease from 68% in 2007. The BPS survey suggests a similar result, with 85% of the sampled population agreeing or strongly agreeing to leave their children in the care of their neighbours as of 2014

It is unclear whether the level lay closer with the IFLS survey or the BPS survey. However, the IFLS survey suggests that there had been a slight decline in trust in neighbors. The survey suggests the percentage of people agreeing to leave their homes and children in the care of their neighbor decreasing by 6 and 9 percentage points respectively.

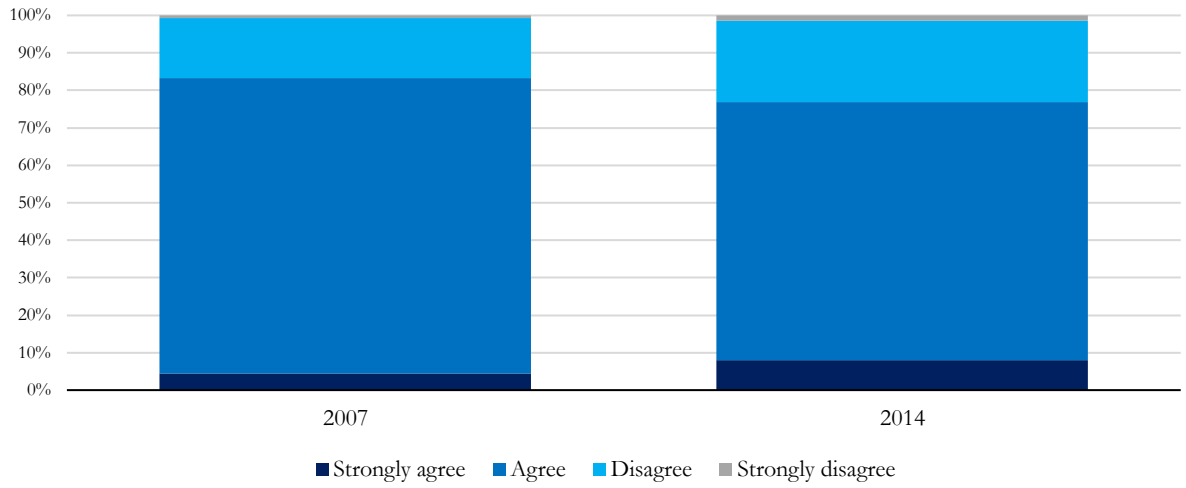


Figure 58. **IFLS: Sampled population willing to ask neighbours to watch house, Indonesia, 2007 & 2014**

Source: Authors' calculations based on data from IFLS, 2007 & 2014

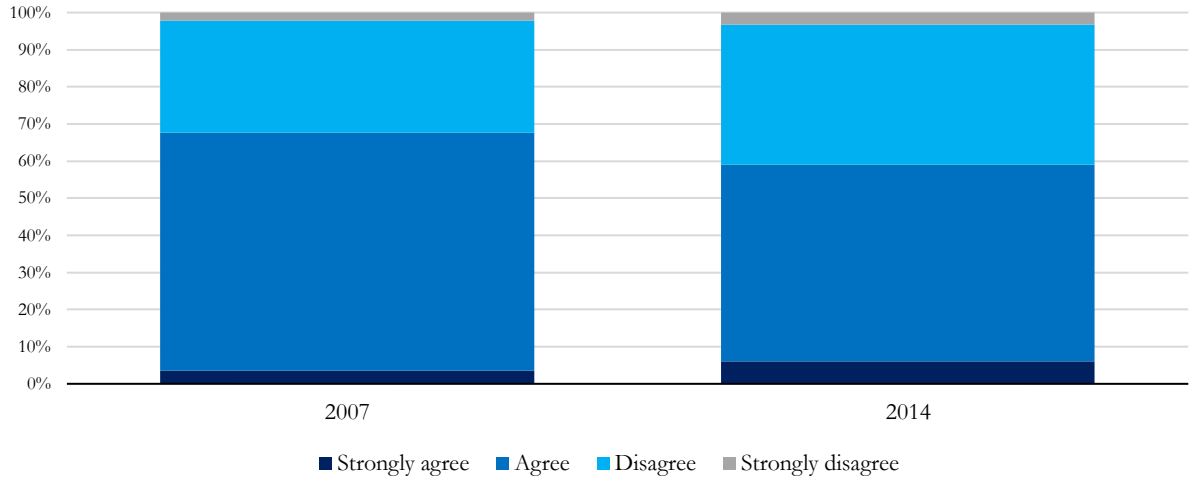


Figure 59. **IFLS: Sampled population willing to leave children with neighbours, Indonesia, 2007 & 2014**

Source: Authors' calculations based on data from IFLS, 2007 & 2014

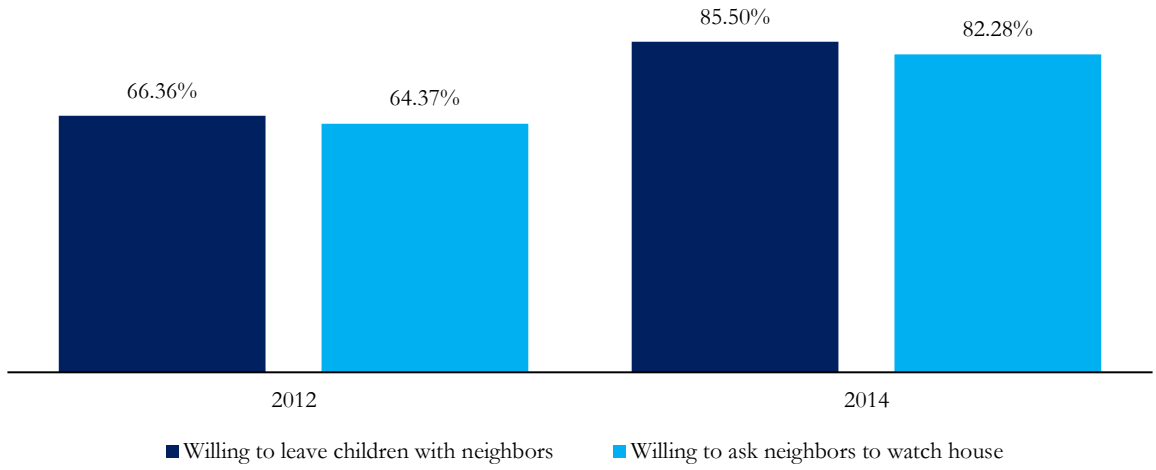


Figure 60. BPS: Sampled population willing to leave children and house with neighbours, Indonesia, 2012 & 2014

Authors' calculations based on data from BPS-Statistics Indonesia, 2012, 2014.

Indicator SC7: Confidence in institutions

Theme: Social capital – trust

Geographic scope: Indonesia

Time-series: 2001, 2006, 2012, 2014, 2018

BPS: Intermittent, Following publicly available releases of social capital survey data/analysis.

We utilized *Social Capital Statistics in 2014* report released by BPS. The report was based on the 2014 SUSENAS, which took households as the observation unit. The survey had a sample size of 75,000 households in every city/regency in Indonesia, making it useful to establish levels that could be compared with WVS and IFLS that demonstrated changes. Furthermore, the report also contained comparisons with the *Social Capital Statistics in 2012*, which was also based on SUSENAS and contained many similar questions.

WVS: Intermittent, following the World Values Survey (WVS) execution in Indonesia. In Indonesia, three waves had been conducted: Wave 4 in 2001 (n=1,000), Wave 5 in 2006 (n=2,015), and Wave 7 in 2018 (n=3,200). Compared with other countries, Wave 4 would reflect 1999-2004, Wave 5 would reflect 2005-2009, and Wave 7 would reflect 2017-2022.

Description: Confidence in institutions measures the share of the sampled population who agree that they trust local institutions, as well as how much trust they place in national institutions.

Relevance to comprehensive wealth: Confidence in institutions promotes stability, trust, and civic engagement within a society. When people have confidence in institutions, they are more likely to participate in civic activities, adhere to laws, and collaborate for the common good.

Method of calculation: The *Social Capital Statistics in 2014* report released by BPS. The report contained by-group tabulations of the responses to the 2014 SUSENAS Social Resilience survey. The report also contained comparisons with the 2012 SUSENAS Socio-Cultural & Education survey. For this indicator, the report presented the percentage of households trusting or strongly trusting village apparatus, community leaders, and religious figures.

The data for trust in national government institutions, religious institutions, and the media was obtained from the fourth, fifth, and seventh waves of WVS for Indonesia. The survey asked how much confidence the respondent placed in the government, parliament, churches/religious institutions, political parties, the press, and television (among others). The options available were "a great deal", "quite a lot", "not very much", and "none at all." The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

Limitations: Compared to the IFLS or SUSENAS, the WVS has a relatively small sample size as well as more limited regional and temporal coverage. This is especially the case for Wave 4 and Wave 5 surveys, consisting of samples drawn from 5 and 10 provinces (out of 34).

Reliability: Due to its sampling constraints, the WVS might not be suitable for determining precise national levels compared to a BPS survey. However, it might still be suitable to compare rough levels and change over time.

Analysis: The BPS survey in Figure 60. igure 60 suggest that Indonesians had a high level of trust on local leaders, with religious figures being trusted the most. Among the sampled population, 92% have trust in religious figures, 88% have trust in community leaders, and 82% have trust in village apparatus as of 2014. This trust was also reflected in 2012 at a slightly higher level.

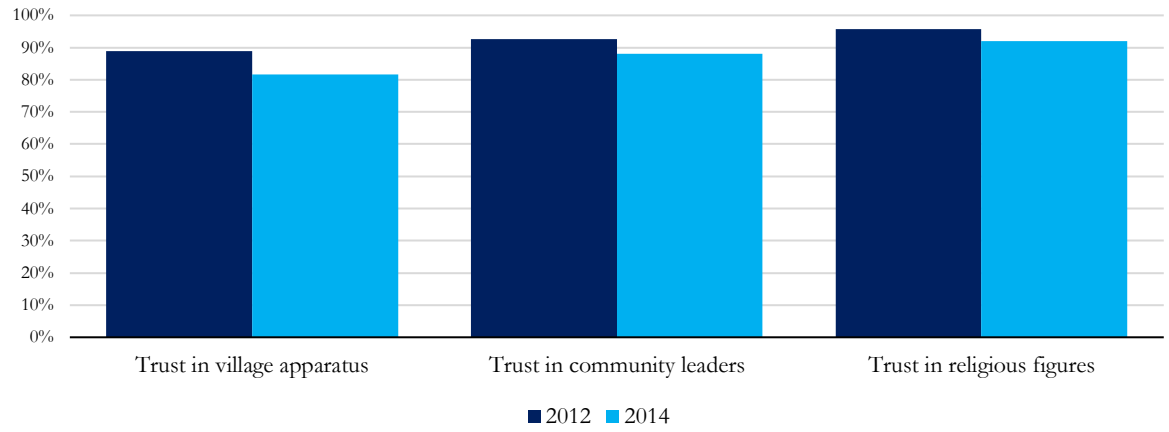


Figure 61. Trust to local institutions, Indonesia, 2012 & 2014
Authors' calculations based on data from BPS-Statistics Indonesia, 2012, 2014.

Referring to the WVS, 78% of the sampled population places a great deal or quite a lot of confidence in the government as of 2018. This was an increase of 25 percentage points from 53% in 2006. Trust in the parliament and political parties also increased, albeit reaching lower levels. In 2018, 51% had confidence in parliament, an increase of 17 percentage points from 2006. Political parties were not widely trusted in 2018, with only 36% placing a great deal or quite a lot of confidence in them. However, this was an increase of 7 percentage points from 29% in 2006.

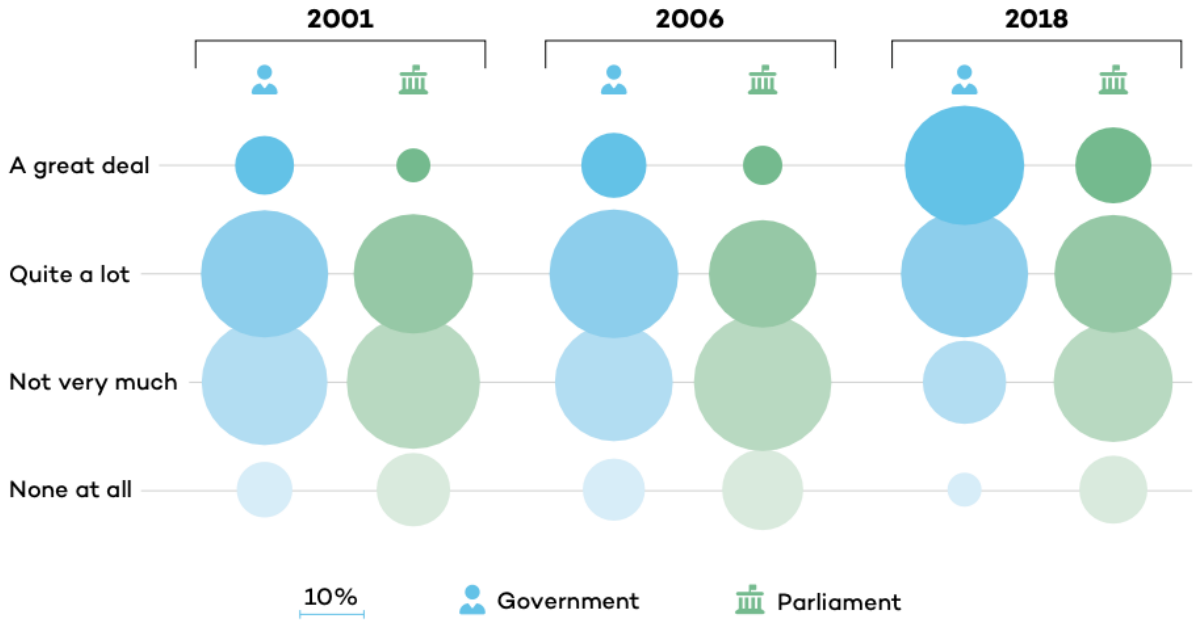


Figure 62. Confidence in government and parliament, Indonesia, 2001, 2006, & 2018
Source: Authors' calculations based on data from Inglehart et al., 2022.

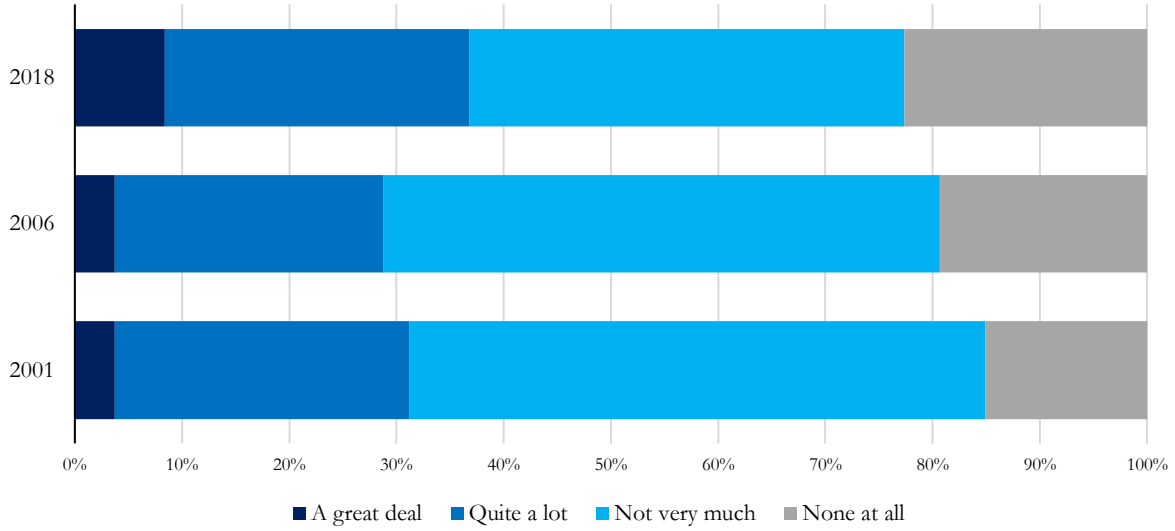


Figure 63. Confidence in political parties, Indonesia, 2001, 2006, & 2018
Source: Authors' calculations based on data from Inglehart et al., 2022.

The WVS survey suggests that the number of Indonesians who have a great deal or quite a lot of confidence in churches or religious institutions had increased to 98% in 2018. This high level was not a new trend, as the proportion in 2006 was 92%.

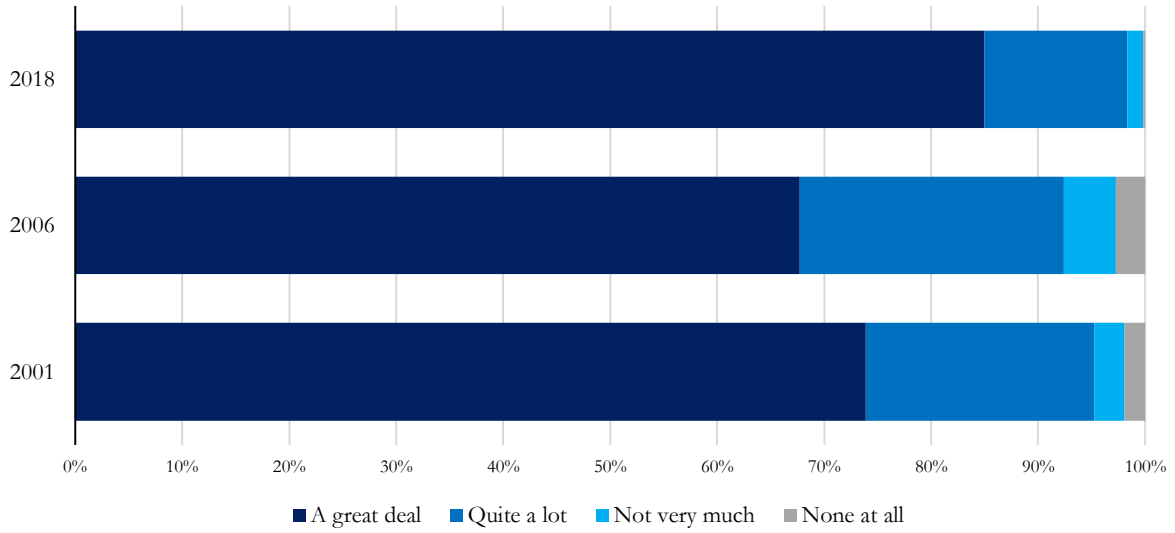


Figure 64. Confidence in churches or religious institutions, Indonesia, 2001, 2006, & 2008
Source: Authors' calculations based on data from Inglehart et al., 2022.

Confidence in the media was lower. Around 50% of the sampled population were confident of the press as of 2018 and 2006. In 2018, 48% of the sampled population have a great deal of confidence in TV, an increase of 8 percentage points from 40% in 2006.

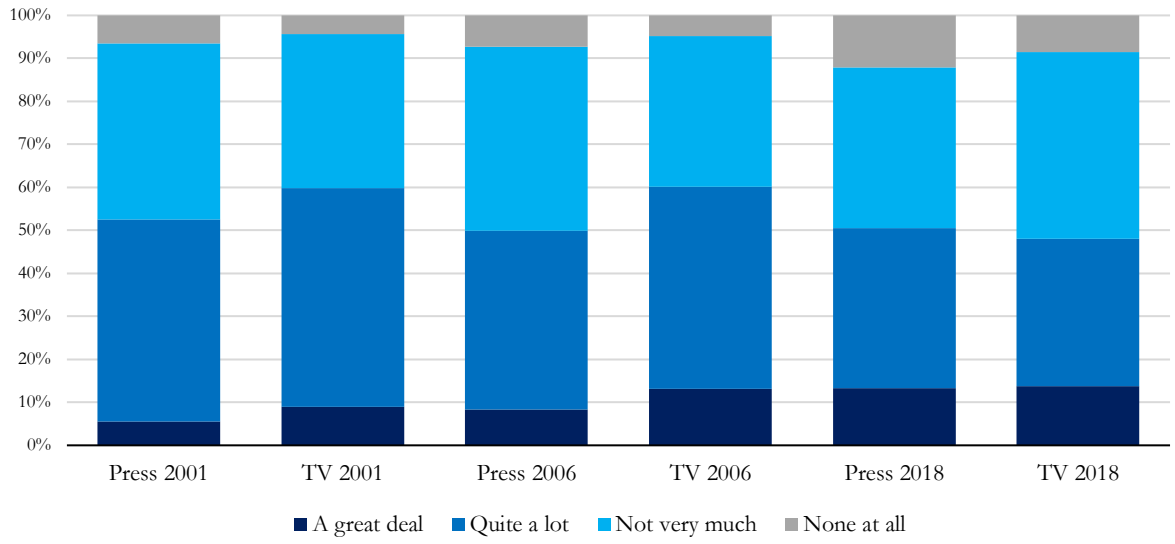


Figure 65. Confidence in the press and television, Indonesia, 2001, 2006, & 2008
Source: Authors' calculations based on data from Inglehart et al., 2022.

Indicator SC8: Tolerance as Neighbors

Theme: Social capital – tolerance

Geographic scope: Indonesia

Time-series: 2001, 2006, 2007, 2014, 2018

Frequency:

WVS: Intermittent, following the World Values Survey (WVS) execution in Indonesia. In Indonesia, three waves had been conducted: Wave 4 in 2001 (n=1,000), Wave 5 in 2006 (n=2,015), and Wave 7 in 2018 (n=3,200). Compared with other countries, Wave 4 would reflect 1999-2004, Wave 5 would reflect 2005-2009, and Wave 7 would reflect 2017-2022.

IFLS: Intermittent. To date, there had been five waves of IFLS: 1993, 1997, 2000, 2007, and 2014. The questions related to trust and tolerance was available in the Trust module for adult respondents. This was only available in the last two waves: 2007 and 2014.

Description: Tolerance as neighbours measures the estimated share of Indonesia's population who would be comfortable with neighbours of differing religions or ethnicities.

Relevance to comprehensive wealth: When neighbours are tolerant and respectful of each other's differences, it fosters an inclusive and harmonious community. This acceptance and understanding strengthen social bonds, reduce conflicts, and promote mutual trust and cooperation in the community.

Method of calculation:

The data for whether respondents would not be comfortable having people of different ethnicities/religions was obtained from the fourth, fifth and seventh waves of WVS for Indonesia. The survey asked the respondents to mention whether they would be uncomfortable with having either people of a different race, people of different religions, people who speak a different language, or immigrants/foreign workers. If the respondent answered that they would be uncomfortable with at least one of these groups, we classify them as "ethnicity/religion mentioned". We then tabulated it using appropriate population weights.

The data for general trust was obtained from the fourth and fifth wave of IFLS, asked to respondents over 15. The survey asked how the respondent would feel if someone with a different faith from them lived in their neighbourhood. The available options were: "strongly objected", "objected", "no objection", "no objection at all". The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

Limitations:

Compared to the IFLS or SUSENAS, the WVS has a relatively small sample size and more limited regional and temporal coverage. This is especially the case for Wave 4 and Wave 5 surveys, consisting of samples drawn from 5 and 10 provinces (out of 34).

The IFLS drew its sample from 13 provinces in Indonesia, with no provinces in Eastern Indonesia. This made its regional coverage relatively small when compared to SUSENAS. Furthermore, it only had a seven-year interval with unclear dates for future waves.

Reliability: Due to its sampling constraints, the WVS might not be suitable for determining precise national levels compared to a BPS survey. However, it might still be suitable to compare

rough levels and change over time. While the IFLS has a larger sample size, it is not drawn from all regions of Indonesia. Notably, Eastern Indonesia was underrepresented in the survey.

Analysis:

Referring to **Error! Reference source not found.**igure 65, the sampled population of the WVS became more tolerant of people from different races, ethnicities, and religions. The percentage of respondents who would not be comfortable having them as neighbours declined from 49.8% in 2001 to 30.1% in 2018.

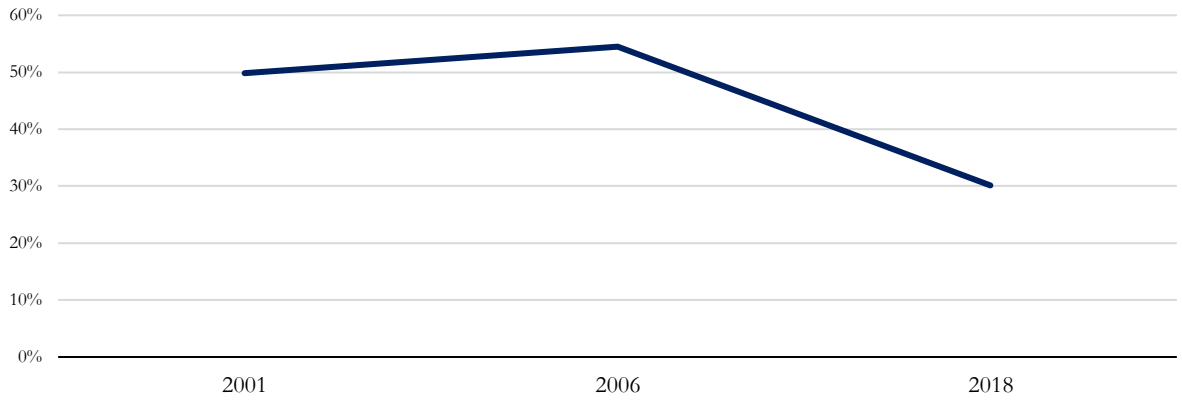


Figure 66. Respondents would not be comfortable having people from different races, ethnicities, and religions as neighbours, Indonesia, 2001, 2006, & 2018

Source: Authors' calculations based on data from Inglehart et al., 2022.

Similarly, the IFLS suggested that over three-quareters of the sampled population would not object having neighbors of different faith in their neighborhood (Figure 67). This non-objection remained steady throughout 2007 and 2014.

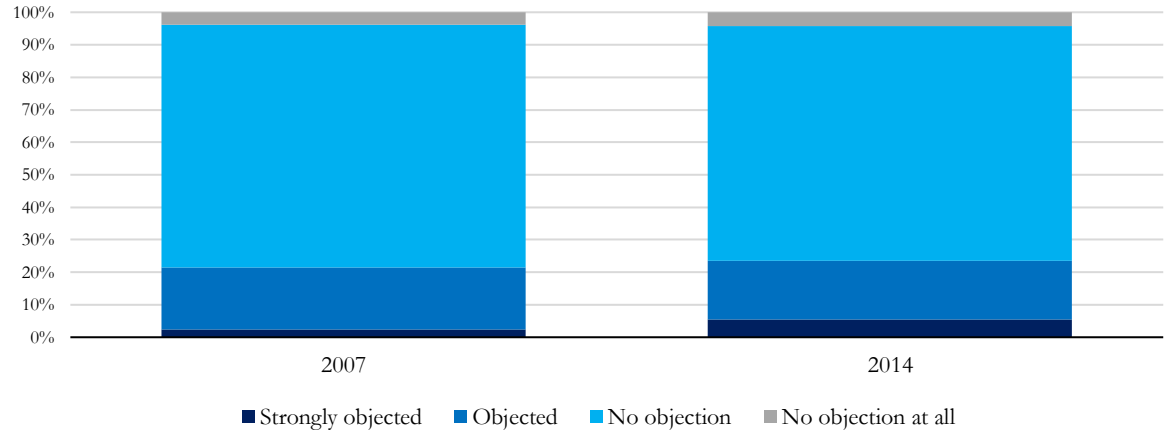


Figure 67. Feeling towards different faiths in neighborhood, Indonesia, 2007 & 2014

Source: Authors' calculations based on data from IFLS, 2007 & 2014

Indicator SC9: Tolerance in social interactions

Theme: Social capital – tolerance

Geographic scope: Indonesia

Time-series: 2007, 2012, 2014

Frequency:

BPS: Intermittent, Following publicly available releases of social capital survey data/analysis.

We utilized *Social Capital Statistics in 2014* report released by BPS. The report was based on the 2014 SUSENAS, which took households as the observation unit. The survey had a sample size of 75,000 households in every city/regency in Indonesia, making it useful to establish levels that could be compared with WVS and IFLS that demonstrated changes. Furthermore, the report also contained comparisons with the *Social Capital Statistics in 2012*, which was also based on SUSENAS and contained many similar questions.

IFLS: Intermittent. To date, there had been five waves of IFLS: 1993, 1997, 2000, 2007, and 2014. The questions related to trust and tolerance was available in the Trust module for adult respondents. This was only available in the last two waves: 2007 and 2014.

Description:

Tolerance in social interactions measures the estimated share of Indonesia's population who would be comfortable with people of differing religions or ethnicities having activities in their neighbourhood. It would also measure the estimated share of Indonesia's population who would agree to their family members having relationships with people of differing ethnicities or religions.

Relevance to comprehensive wealth: Tolerance in social interactions promotes mutual understanding, reduces prejudices, and strengthens social bonds. Such tolerance fosters an inclusive and respectful community where diversity is valued.

Method of calculation: The data was obtained from the *Social Capital Statistics in 2014* report released by BPS. The report contained by-group tabulations of the responses to the 2014 SUSENAS Social Resilience survey. The report also contained comparisons with the 2012 SUSENAS Socio-Cultural & Education survey. For this indicator, the report presented the percentage of households answering either "agree" or "strongly agree" to other ethnicities or religions having activities in their neighbourhood. The report also presented the percentage of households answering either "agree" or "strongly agree" to their family members having relationships with people from other ethnicities or religions.

The data for general trust was obtained from the fourth and fifth wave of IFLS, asked to respondents over 15. There were two questions of concern. The first was what the respondents would think if people who have a different faith from them built a house of worship in their community. The survey asked how the respondent would feel if someone with a different faith from them married one of their close relatives or children. The available options for both questions were: "strongly objected", "objected", "no objection", and "no objection at all". The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

Limitations: The IFLS drew its sample from 13 provinces in Indonesia, with no provinces in Eastern Indonesia. This made its regional coverage relatively small when compared to SUSENAS. Furthermore, it only had a seven-year interval with unclear dates for future waves.

SUSENAS questions and options were inconsistent over waves. The temporal coverage was also more limited compared to WVS, with only 2012-2014 figures available. Furthermore, the data itself was not publicly released, unlike IFLS or WVS. This includes a more detailed tabulation (such as the precise percentage of who answers "often") and the survey dataset.

Reliability: The IFLS is not drawn from all regions of Indonesia. Notably, Eastern Indonesia was underrepresented in the survey. Meanwhile, the BPS survey sampled all regions of Indonesia with a larger sample size.

Analysis: According to the BPS survey, a percentage of households was more agreeable to people from other ethnicities having activities in their neighbourhood compared to people from other religions. In both the 2012 and 2014 waves, the majority agreed or very much agreed with people of other ethnicities who had activities in the neighbourhood. However, the gap between tolerance for other ethnicities and religion slightly differed between waves—in 2012, it was around 15 percentage points, while in 2014, it was around 10 percentage points.

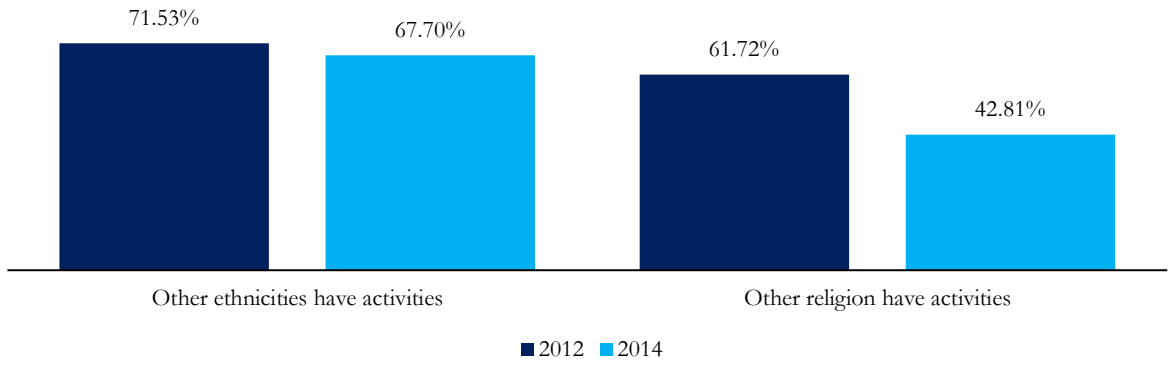


Figure 68. Households who agree/very agree to other ethnicities/religions having activities in the neighbourhood, Indonesia, 2012 & 2014

Source: Authors' calculations based on data from BPS-Statistics Indonesia, 2012, 2014.

Inversely, the IFLS survey suggested that the majority of the sampled population would object to someone from a different faith constructing a place of worship in their neighbourhood (Figure 68). Among the sampled population, 59% have objections if someone from a different faith constructs a place to worship as of 2014. This number was reduced by 19 percentage points from 78% in 2007.

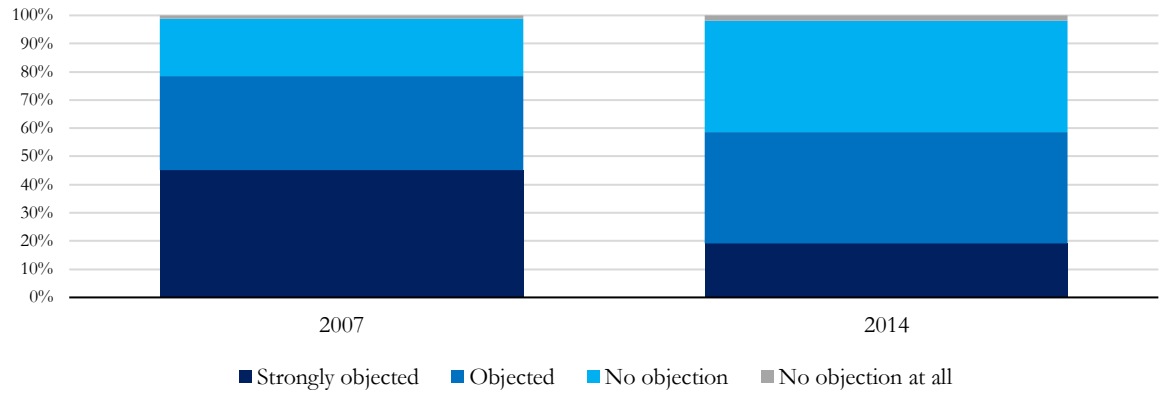


Figure 69. Feeling if different faith constructs a place of worship, Indonesia, 2007 & 2014
Source: Authors' calculations based on data from IFLS

A similar gap between the acceptance of different ethnicities and religions is also documented in terms of inter-ethnicity and inter-faith friendship and marriages. Figure 67. from the BPS survey suggests that there is a general acceptance of having children being friends with someone of a different ethnicity or faith, with a 20-percentage point lower level for someone of a different faith. However, only 7.90% of the sampled population would accept having their children be married to someone of a different faith, compared to 70.20% for someone of a different ethnicity. Figure 68. from the IFLS survey suggests that the majority of the sampled population would object to interfaith marriage, with an increasing level between 2007 and 2014.

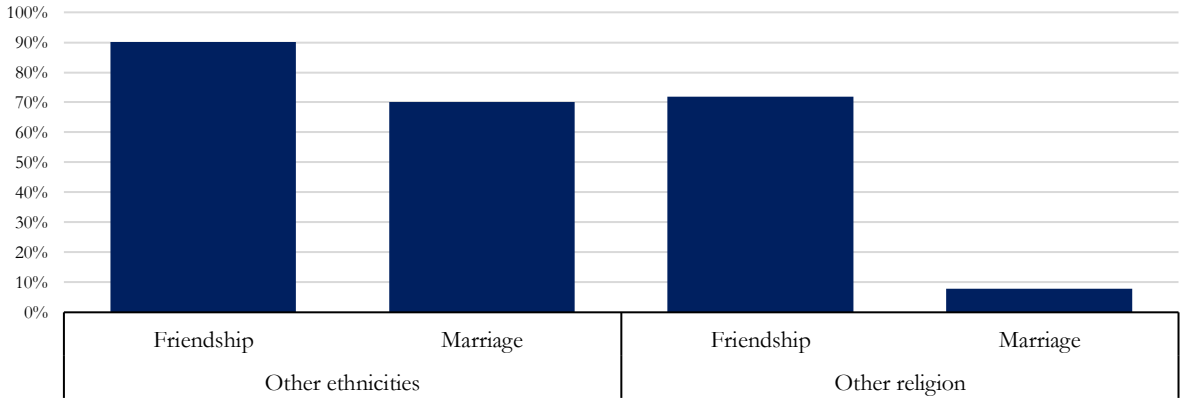


Figure 70. Households who agree or very agree children have relationships with outgroups, Indonesia, 2014
Source: Authors' calculations based on data from BPS-Statistics Indonesia, 2014

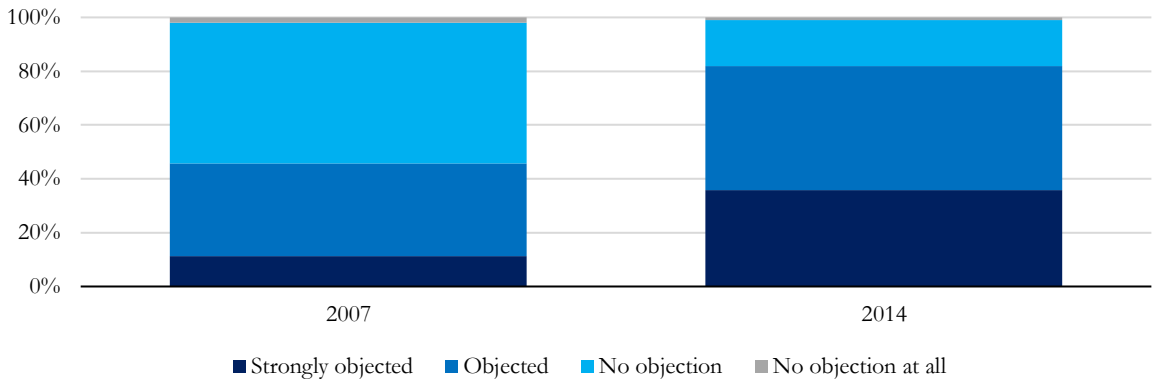


Figure 71. Objection on children marrying people of different faiths, Indonesia, 2007 & 2014

Source: Authors' calculations based on data from IFLS, 2007 & 2014

Indicator SC10: Tolerance in decision-making

Theme: Social capital – tolerance

Geographic scope: Indonesia

Time-series: 2007, 2014

Frequency: Intermittent. To date, there had been five waves of IFLS: 1993, 1997, 2000, 2007, and 2014. The questions related to trust and tolerance was available in the Trust module for adult respondents. This was only available in the last two waves: 2007 and 2014.

Description: Tolerance in decision-making measures how much people would trust others from different ethnicities and religions, as well as how religion would influence voting decisions.

Relevance to comprehensive wealth: Tolerance in decision-making may enhance a sense of community and build strong, trust-based networks within the group, which strengthens the collective social capital of a diverse community.

Method of calculation: The data for general trust was obtained from the fourth and fifth wave of IFLS, asked to respondents over 15.

There were three relevant questions. The first was asking to what extent respondents agree that they trust people with the same ethnicity as theirs more when taking into account the diversity of ethnicities in the village. The second was asking to what extent respondents agree that they trust people with the same religion as theirs more when taking into account the diversity of religions in the village. Both questions had the options "strongly agree", "agree", "disagree", and "strongly disagree". The third question was whether having a candidate with the same religion as the respondent in an election makes it more likely for the respondent to vote for him or her. The available options were: "Very likely", "somewhat likely", "neither more or less likely", "somewhat unlikely", and "very unlikely." The data was aggregated and tabulated as a percentage of the population answering certain responses using appropriate population weights.

Limitations: The IFLS drew its sample from 13 provinces in Indonesia, with no provinces in Eastern Indonesia. This made its regional coverage relatively small when compared to SUSENAS. Furthermore, it only had a seven-year interval with unclear dates for future waves

Reliability: The IFLS is not drawn from all regions of Indonesia. Notably, Eastern Indonesia was underrepresented in the survey.

Analysis: The IFLS in **Error! Reference source not found.**igure 71 and **Error! Reference source not found.**gure 72 suggested that people tended to trust those from their in-group more, with greater trust for people of the same religion (with 82.52% individuals agreeing to such statement in 2014) compared to those of the same ethnicities (with 69.44% individuals agreeing to such statement in 2014). While the level tended to be stable for greater trust with people of the same ethnicity, greater trust for those with the same religion increased between the two periods.

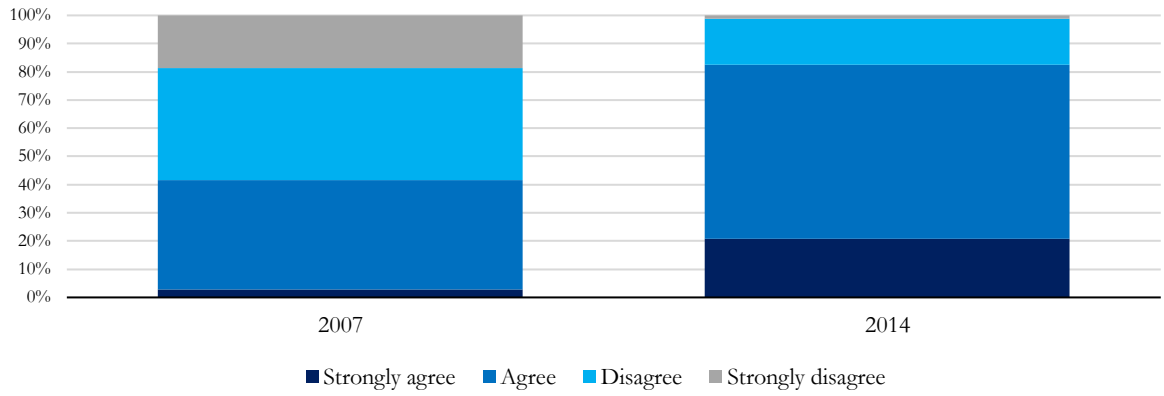


Figure 72. Trust people with the same religion as mine more, Indonesia, 2007 & 2014
Source: Authors' calculations based on data from IFLS, 2007 & 2014

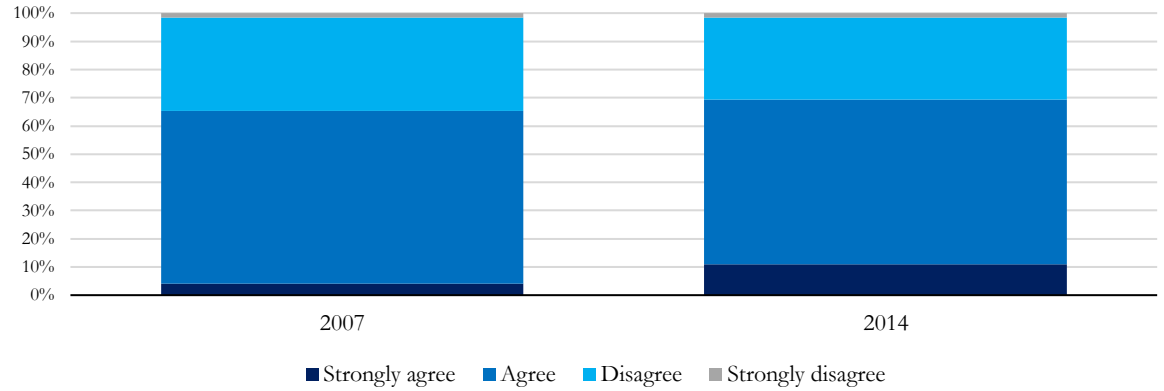


Figure 73. Trust people with the same ethnicity as mine more, Indonesia, 2007 & 2014
Source: Authors' calculations based on data from IFLS, 2007 & 2014

IFLS also reported how likely the sampled population would vote for those of the same faith, as shown in Figure 71. 73. It suggested that the majority would gravitate towards voting for candidates who share the same faith, with an increasing level between 2007 and 2014.

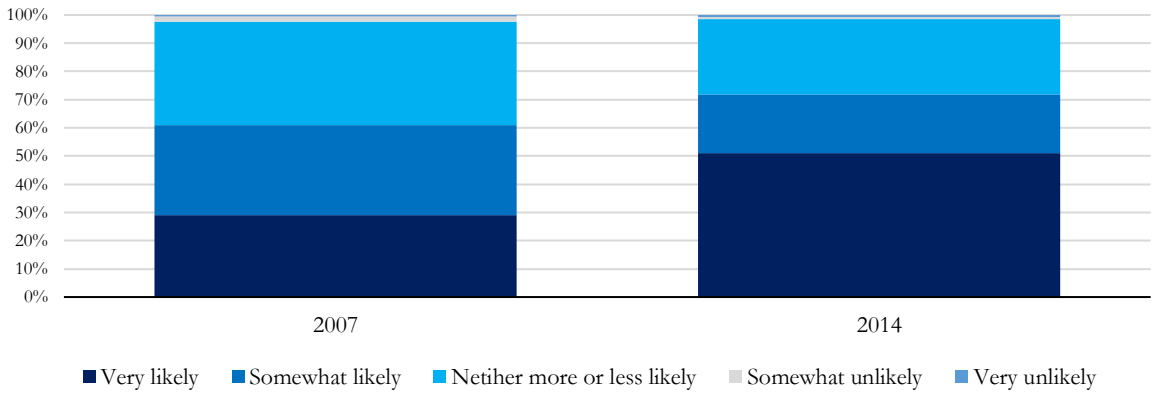


Figure 74. Likelihood to vote for candidates with the same religion, Indonesia, 2007 & 2014
Source: Authors' calculations based on data from IFLS, 2007 & 2014

Comprehensive Wealth

Chapter 5: Conclusion and Recommendations

Over the 25-year period from 1995 to 2020, Indonesia's CWI has seen a remarkable average annual growth of 4.3%. This growth, however, has been uneven across different types of capital. While produced and human capital have flourished, contributing significantly to the nation's wealth, natural capital has not kept pace, leaving room for improvement for the Indonesian government to enhance productivity and resource rent from natural resources. Although still negative, financial capital has seen modest improvement, while social capital shows a positive trend based on indices related to participation, trust, and tolerance.

Produced capital increased by an average annual growth of 5.3%. Four sectors dominate produced capital, namely manufacturing, real estate activities, agriculture, and mining, with the first two contributing the most. Investments are increasingly concentrated in buildings, with a minor contribution from machinery, equipment, and vehicles. Notably, the country has made little investment in renewable energy generation capacity, which represents a missed opportunity to engage in the transition away from fossil fuels.

Human capital, which represents the most substantial portion of Indonesia's assets, also consistently grew over time, except from 1997 to 2000, when the indicator dropped due to the economic crisis of the 1990s. The crisis impacted the value and distribution of labour across various sectors and shifted labour from high-value-added sectors, such as manufacturing, to sectors like agriculture. Trade and services are the top contributors to human capital, followed by agriculture. The share of human capital in the relatively low value-added agriculture sector remains high at 17%. Value added per worker in agriculture is just one fifth of what it is elsewhere in the economy (World Bank, 2019).

Market natural capital increased, on average, by 2.2% annually. Renewable assets (agriculture, fisheries, aquaculture, forestry, and livestock) dominated natural capital in 1990 but declined with the rise of non-renewable assets (minerals and fossil fuels) during the commodity boom from the mid-2000s to mid-2010s. At the peak of the commodity boom in 2010, non-renewables collectively formed more than half of Indonesia's market natural capital. There is considerable risk in such dependence on non-renewable resource wealth, especially since much of this wealth derives from fossil fuels the world has committed to moving away from. The country should carefully review its policies around natural resource management to ensure its vast wealth is maximized for both the current and future generations. In addition to concerns about the over-dependence on non-renewable resource wealth, Indonesia is experiencing an erosion of its biodiversity. The country is also facing the effects of climate change through the rise of precipitation and temperature. These adverse effects may lead to more frequent floods and rising sea temperatures that can result in coral bleaching and the deterioration of the country's biodiversity.

Enhancing the effectiveness of public policies requires the integration of natural capital into institutional frameworks, which entails a commitment to compiling and updating natural capital and ecosystem accounts. Institutionalizing these programs within government agencies and providing financing for personnel and technical and institutional capacities is crucial for long-term sustainability. Data quality depends on official, trustworthy, accessible, timely, and complete information sources, along with continuous dialogue and clear communication between natural capital compilers and information providers. In addition, a rigorous spatial approach and geospatial information are necessary for accounting ecosystem assets and services, enabling the registration of transactions in ecosystem services in monetary terms. This allows for the assessment of the economic significance of ecosystem services concerning users and location, which is vital to valuing "nature's contributions to people.

Financial capital has been negative throughout the period studied, indicating that the country was accumulating more foreign liabilities than foreign assets. The accumulation of liabilities is the result of investment policy choices made by the country to support its effort to escape the middle-income trap. High liabilities are not necessarily detrimental so long as they are effectively managed and lead to positive economic spillovers.

The country is generally doing well in terms of social capital despite some mixed results in some parts. While formal political engagement, like party membership or voting, has decreased, participation in group and communal activities has increased. Trust in others has slightly declined but remains high, as evidenced by people's willingness to seek help from their neighbours. In terms of tolerance, Indonesians are becoming more accepting of coexisting with individuals from diverse ethnic and religious backgrounds.

In contrast to the CWI's 4.3% annual average growth over the period, Indonesia's GDP grew considerably more slowly. In real per capita terms, Indonesian GDP grew from IDR 27.5 million (USD 5,860) to IDR 54.1 million (USD 11,500), for an average annual growth rate of just 2.8% (Figure 3). This relatively slow growth of Indonesia's real per capita GDP compared with its CWI suggests that the country is not benefiting as much from its increased wealth as it should. As reported in this study, in 1995, Indonesia created IDR 68,000 of real GDP for every IDR 1 million in real wealth (a rate of return on wealth of 6.8%). By 2020, this figure had fallen to IDR 47,800 (a rate of return of 4.8%). For some reason, Indonesia has become less effective at turning wealth into income as time has gone by.

Assessing why Indonesia is not fully realizing the benefits of the growth in its wealth is beyond the scope of this study. The main benefit of our results is making this finding apparent, which is possible only when comprehensive wealth accounts are compiled for the country. By showing that Indonesia is not fully benefiting from the growth in its wealth, we provide a window into the possibilities for the country if it were to better manage its assets. Had Indonesia simply maintained the rate of return on its wealth that it enjoyed in 1995, it would have earned 42% more income in 2020 than it did. That additional income would have been sufficient to push the country out of its chronic lower-middle-income status and into the group of countries considered to be upper-middle-income by the World Bank, placing the country closer to achieving its goal of high-income status by 2045 (Ministry of National Development Planning/Bappenas, 2019). Realizing this extra income in the future is still possible, but it will require a new approach to natural resource management. It will require an approach that ensures Indonesia's resources are preserved for future generations and, at the same time, better capitalizes on the economic benefits of using those resources today. Development can be seen as a process of wealth management, and there is too much at stake for Indonesia not to do a better job managing its natural wealth, not to mention its human and produced capital. For Indonesians, it is a question of escaping, or not, from the middle-income trap. For the rest of the world, it is a question of whether future generations will know about the wondrous diversity of Indonesia's natural environment or if it will remain a feature only of the country's past (Brodjonegoro & Smith, 2024).

Regularly compiling and using comprehensive wealth accounts to guide policy making would be a wise step for Indonesia. The extra income it could earn by better managing its wealth could help it escape the middle-income trap, an outcome that would be more than worth the investment in additional statistical effort. The enhancement of Indonesia's comprehensive wealth measurement would require concerted efforts from the government, particularly in fortifying the capabilities of the national statistics agency for more effective data collection. It is critical to address the limitations in data collection, especially in areas such as natural capital, which is still limited to

several commodities, and social capital, which mainly still uses WVS data. Encouragingly, strides are being made in this direction, with BPS-Statistics Indonesia embracing this initiative for comprehensive wealth calculation and also initiating its own work on natural and produced capital valuation (BPS-Statistics Indonesia, 2019a). Similarly, the Directorate General of State Assets Management (*Direktorat Jenderal Kekayanan Negara*/DKJN) under the Ministry of Finance is broadening its assessment of national assets, with a special focus on natural capital and is adapting regulations to support this expanded asset evaluation scope. Moreover, while the Ministry of National Development Planning may not be directly focused on comprehensive wealth, it is contributing to the effort by developing indices that extend beyond GDP, such as the Green Economy Index, the Economy Inclusive Index, and the Indonesia Blue Economy Index.

All in all, the success of improving Indonesia's comprehensive wealth calculation hinges on sustained advocacy and collaborative support from various ministries and agencies, which will not only refine the measurement of comprehensive wealth but also push its implementation and utilization into broader decision-making processes.

References

ADB & Ministry of National Development Planning Republic of Indonesia. (2019). *Policies to Support the Development of Indonesia's Manufacturing Sector during 2020–2024*. Asian Development Bank. https://doi.org/10.22617/TCS199910-2

ADB. (2020). *Indonesia Energy Sector Assessment, Strategy, and Road Map – Update.* https://www.adb.org/documents/indonesia-energy-assessment-strategy-road-map-update

Adler, G. (2012). *CHAPTER 4: Volatility in External Demand: Indonesia's Commodity Boom and Overall Competitiveness*. In Rumbaugh, T. (Ed.), Indonesia: Sustaining Growth During Global Volatility. International Monetary Fund. https://www.elibrary.imf.org/display/book/9781616352028/ch004.xml

Agus, C., Azmi, F. F., Ilfana, Z. R., Wulandari, D., Rachmanadi, D., Harun, M. K., & Yuwati, T. W. (2019). *The impact of Forest fire on the biodiversity and the soil characteristics of tropical Peatland*. In Handbook of Climate Change and Biodiversity (pp. 287–303). Springer.

AKI - Angka Konsunsi Ikan. (2024). Statistik.kkp.go.id. https://statistik.kkp.go.id/home.php?m=aki&i=209#panel-footer

Alpízar, F., Madrigal, R., Alvarado, I., Brenes, E., Camhi, A., Maldonado, J., Marco, J., Martínez-Salinas, A., Pacay, E., & Watson, G. (2020). *Mainstreaming of Natural Capital and Biodiversity into Planning and Decision-Making.*

Amkieltiela, Handayani, C. N., Andradi-Brown, D. A., Estradivari, Ford, A. K., Beger, M., Hakim, A., Muenzel, D. K., Carter, E., Agung, F., Veverka, L., Iqbal, M., Lazuardi, M. E., Fauzi, M. N., Tranter, S. N., & Ahmadia, G. N. (2022). *The rapid expansion of Indonesia's Marine Protected Area Requires Improvement in management effectiveness*. Marine Policy, 146, 105257. https://doi.org/10.1016/j.marpol.2022.105257

Andreas, H., Zainal Abidin, H., Anggreni Sarsito, D., & Pradipta, D. (2019). *Study the capabilities of RTK Multi GNSS under forest canopy in regions of Indonesia*. E3S Web of Conferences, *94*. https://doi.org/10.1051/e3sconf/20199401021

Annur, C.M. (2022). *Indonesia Surplus Produksi Daging Ayam Ras 1,7 Juta Ton pada 2021.* Accessed from https://databoks.katadata.co.id/datapublish/2022/10/25/indonesia-surplus-produksi-daging-ayam-ras-17-juta-ton-pada-2021

Antara. (2023). *KKP hitung kuota penangkapan ikan tiap zona sebagai bagian dari PIT.* Accessed from https://www.antaranews.com/berita/3594393/kkp-hitung-kuota-penangkapan-ikan-tiap-zona-sebagai-bagian-dari-pit

Arrow, K. J., Dasgupta, P., Goulder, L. H., Mumford, K. J., & Oleson, K. (2012). *Sustainability and the measurement of wealth.* Environment and development economics, 17(3), 317-353.

Arrow, K., Bolin, B., Costanza, R., Dasgupta, P., Folke, C., Holling, C. S., … Pimentel, D. (1995). Economic growth, carrying capacity, and the environment 1. Ecological Economics, 268, 520–521. https:// doi.org/10.1016/0921- 8009(95)00059-3

Aung, T. S., Fischer, T. B., & Azmi, A. S. (2020). *Are large-scale dams environmentally detrimental? Lifecycle environmental consequences of mega-hydropower plants in Myanmar*. International Journal of Life Cycle Assessment, 25(9), 1749-1766. https://doi.org/10.1007/s11367-020-01795-9.

Austin, K. G., Mosnier, A., Pirker, J., McCallum, I., Fritz, S., & Kasibhatla, P. S. (2017). Shifting patterns of oil palm driven deforestation in Indonesia and implications for zero-deforestation commitments. *Land Use Policy*, *69*, 41–48. https://doi.org/10.1016/j.landusepol.2017.08.036

Austin, K. G., Schwantes, A., Gu, Y., & Kasibhatla, P. S. (2019). *What causes deforestation in Indonesia?*. Environmental Research Letters, *14*(2), 024007.

Bagaskara. (2022, December). *Indonesia Energy Transition Outlook 2023*. Www.sipet.org. https://www.sipet.org/Publications_details.aspx?id=9cWFMKs8suAWLQ2ctsU/dA==

Bank Indonesia. (n.d.). *Statistik Ekonomi dan Keuangan Indonesia*. Retrieved from Bank Indonesia: https://www.bi.go.id/id/statistik/ekonomi-keuangan/seki

Bappenas. (2019). *A Paradigm Shift Towards Low Carbon Development: a Green Economy in Indonesia*. https://lcdi-indonesia.id/wp-content/uploads/2022/03/Low-Carbon-Development-A-Paradigm-Shift-Towards-a-Green-Economy-in-Indonesia-Policymakers-Summary-2019.pdf

Baskoro, F. R., Takahashi, K., Morikawa, K., & Nagasawa, K. (2021). *System dynamics approach in determining coal utilization scenario in Indonesia*. Resources Policy, 73, 102209.

Bebbington, A. J., Bebbington, D. H., Sauls, L. A., Rogan, J., Agrawal, S., Gamboa, C., Imhof, A., Johnson, K., Rosa, H., Royo, A., Toumbourou, T., & Verdum, R. (2018). *Resource extraction and infrastructure threaten forest cover and community rights*. Proceedings of the National Academy of Sciences of the United States of America, 115(52), 13164–13173. https://doi.org/10.1073/pnas.1812505115

BMKG. (n.d.). *Temperatur: Maksimum, Minimum, Rata-rata*. Retrieved from Data Online Pusat Database BMKG.

Bowen, J. R. (1986). *On the Political Construction of Tradition: Gotong Royong in Indonesia*. The Journal of Asian Studies, *45*(3), 545–561. https://doi.org/10.2307/2056530

BPS-Statistics Indonesia (n.d.). *Input-output (IO) tables*. https://www.bps.go.id/en/statistics-table?subject=531

BPS-Statistics Indonesia. (2012). *Statistics of Social Capital 2012*. www.bps.go.id. https://www.bps.go.id/en/publication/2013/12/11/456a955a0562653f2f751c0f/statistics-of-social-capital-2012.html

BPS-Statistics Indonesia. (2014). *Statistics of Social Capital 2014*. www.bps.go.id. https://www.bps.go.id/en/publication/2016/10/03/67e4fcc2bf295324013567c7/statistics-of-social-capital-2014.html

BPS-Statistics Indonesia. (2019a). Integrated system of environmental-economic accounts of Indonesia 2014–2018. https://www.bps.go.id/en/publication/2019/12/27/53e7360b49c122c58475d2c9/sistem-terintegrasi-neraca-lingkungan-dan-ekonomi-indonesia-2014-2018.html

BPS-Statistics Indonesia. (2019b). *Buku Pedoman Pencacah Survei Penyusunan Disagregasi PMTB 2019*.

BPS-Statistics Indonesia. (2020). *Pertumbuhan ekonomi indonesia triwulan II-2020*. Berita Resmi Statistik, 64/08.

BPS-Statistics Indonesia. (2021a). *Motor vehicle growth*. https://www.bps.go.id/indicator/17/57/2/perkembangan-jumlah-kendaraan-bermotor-menurut-jenis.html

BPS-Statistics Indonesia. (2021b). *Road length according to the authority*. BPS. https://www.bps.go.id/indicator/17/50/2/panjang-jalan-menurut-tingkat-kewenangan.html

BPS-Statistics Indonesia. (2021c). *Statistik Modal Sosial 2021*. https://www.bps.go.id/id/publication/2022/12/27/d5d1866f6c0b8a348d2f3fdf/statistik-modal-sosial-2021.html

BPS-Statistics Indonesia. (2022a). *Statistik Transportasi Darat 2021*. https://www.bps.go.id/id/publication/2022/11/28/a2ae6b2aa8c5651063f45dfc/statistik-transportasi-darat-2021.html

BPS-Statistics Indonesia. (2022b). *Statistik Transportasi Laut 2021*. https://www.bps.go.id/id/publication/2022/11/28/6c1a952e39463ca8833bfaef/statistik-transportasi-laut-2021.html

BPS-Statistics Indonesia. (2023). *Statistik Industri Manufaktur Indonesia 2021*. https://www.bps.go.id/publication/2023/06/27/e6028b59bc585e7eae8db1b4/statistik-industri-manufaktur-indonesia-2021.html

British Petroleum. (2022). *Oil production in Indonesia from 2012 to 2021 (in 1,000 barrels a day)*. In Statista. Retrieved September 03, 2023, from https://remote-lib.ui.ac.id:6499/statistics/609047/oil-production-in-indonesia/

Brodjonegoro, B. & Smith, R. (2023, November 21.). GDP is way short of a comprehensive wealth measurement of a country. The Jakarta Post, https://www.thejakartapost.com/opinion/2023/11/21/gdp-is-way-short-of-a-comprehensive-wealth-measurement-of-a-country.html

C. Wulandari, M. Inoue. (2018) *The importance of social learning for the development of community based forest management in Indonesia: the case of community forestry in Lampung Province*. Small-scale For., 17 (3), pp. 361-376, 10.1007/s11842-018-9392-7

CBD. (n.d.). *Indonesia - Country Profile*. Retrieved from Convention on Biological Diversity: https://www.cbd.int/countries/profile?country=id

Christina Vania, L. A. (2022). *Indonesia's Nickel Industry in the Aftermath of Trade Dispute with the European Union*. Retrieved from Pusat Studi Perdagangan Dunia UGM: https://cwts.ugm.ac.id/en/2022/11/03/indonesias-nickel-industry-in-the-aftermath-of-trade-dispute-with-the-european-union/

Civelli, A., Gaduh, A., Rothenberg, A. D., & Wang, Y. (2022). Urban Sprawl and Social Capital:

Evidence from Indonesian Cities. *The Economic Journal*. https://doi.org/10.1093/ej/uead032

Climent-Gil, E., Aledo, A., & Vallejos-Romero, A. (2018). *The social vulnerability approach for social impact assessment*. Environmental Impact Assessment Review, 73(April), 70- 79. https://doi.org/10.1016/j.eiar.2018.07.005

Collins, Sakhrani, Selin, Alsaati, and K. S. (2014). *Using inclusive wealth for policy evaluation: the case of infrastructure capital*.

Convention on Biological Diversity. (2020). *Status and trends of biodiversity, including benefits from biodiversity and ecosystem services*. Retrieved from Convention on Biological Diversity: https://www.cbd.int/countries/profile/?country=id

Dasgupta, P. (2005). *Economics of Social Capital.* Economic Record, *81*(s1), S2–S21. https://doi.org/10.1111/j.1475-4932.2005.00245.x

Dasgupta, P. (2014). *Measuring the wealth of nations*. Annu. Rev. Resour. Econ., 6(1), 17-31.

Dasgupta, P., & Mäler, K. G. (2001). *Wealth as a criterion for sustainable development*. Beijer international institute of ecological economics.

Dhamira, A., & Irham, I. (2020). *The impact of climatic factors on rice production in Indonesia.* Agro Ekonomi, 31(1), 46-60.

Djaenudin, Deden & Oktaviani, Rina & Hartoyo, Sri & Dwiprabowo, Hariyatno & Penelitian, Pusat & Sosial, Pengembangan & Perubahan, Dan. (2018). *Analysis of Probability for Achieving the Reduction of Deforestation Rate: Forest Transition Theory Approach*. Jurnal Penelitian Sosial dan Ekonomi Kehutanan. 15. 10.20886/jpsek.2017.15.1.15-2

ELAW. (n.d.). *Mangroves Threats - ELAW: Environmental Law Alliance Worldwide*. Environmental Law Alliance Worldwide. Retrieved July 18, 2024, from https://elaw.org/mangroves-threats

ERIA. (2021). *Maritime Policy and Eastern Indonesia Development*. https://www.eria.org/research/maritime-policy-and-eastern-indonesia-development/

European Commission. Eurostat., United Nations., Food and Agriculture Organization of the United Nations., International Monetary Fund., Organisation for Economic Co-operation and Development., & World Bank. (2014). *System of environmental-economic accounting 2012 : central framework*. UNO.

FAOSTAT. (2024). Forestry production and trade. https://www.fao.org/faostat/en/#data/FO

Fernández-Portillo, A., Almodóvar-González, M., & Hernández-Mogollón, R. (2020). *Impact of ICT development on economic growth. A study of OECD European union* countries. *Technology in Society*, *63*, 101420.

Friederich, M. C., & van Leeuwen, T. (2017). *A review of the history of coal exploration, discovery and production in Indonesia: The interplay of legal framework, coal geology and exploration strategy.* International Journal of Coal Geology, *178*, 56–73.

Fuglie, K. O. (2004). *Productivity growth in Indonesian agriculture, 1961–2000*. Bulletin of Indonesian Economic Studies, 40(2), 209-225.

Geological Agency. (2018). *Indonesian Minerals Yearbook 2018*. https://geologi.esdm.go.id/assets/media/content/content-indonesian-minerals-yearbook-2018.pdf

Giljum, S.; Maus, V.; Kuschnig, N.; Luckeneder, S.; Tost, M.; Sonter, L.J.; Bebbington, A.J. (2022). *A Pantropical Assessment of Deforestation Caused by Industrial Mining*. Proc. Natl. Acad. Sci. USA 2022, 119, e2118273119

Global Forest Watch. (n.d.). *Interactive World Forest Map*. Retrieved from Global Forest Watch.

Gokkon, B. (2022a). *Indonesia announces plan to protect 10% of its seas by 2030, and 30% by 2045*. Retrieved from Mongabay: https://news.mongabay.com/2022/08/indonesia-announces-plan-to-protect-10-of-its-seas-by-2030-and-30-by-2045/

Gokkon, B. (2022b). *Indonesia's 'essential' mangroves, seagrass and corals remain unprotected*. Retrieved from Mongabay: https://news.mongabay.com/2022/12/indonesias-essential-mangroves-seagrass-and-corals-remain-unprotected/

Government of Indonesia. (2013). *Presidential Instruction 6/2013*. Office of the President, Jakarta, Indonesia

Government of Indonesia. (2019). *Presidential Regulation 5/2019*. Office of the President, Jakarta, Indonesia

H.J. Boer. (2020). *Power, REDD+ and reforming forest governance in Indonesia*. Third World Q., 41 (5) (2020), pp. 783-800, 10.1080/01436597.2019.1703178

Hafiluddin, N., & Patunru, A. A. (2022). The impact of foreign investment on firm performance: Indonesia after the 2007 FDI reform. Economics and Finance in Indonesia, 68(1), Article 4, 1–14. https://scholarhub.ui.ac.id/cgi/viewcontent.cgi?article=1003&context=efi

Halimatussadiah, A., Widyasanti, A. A., Damayanti, A., Verico, K., Qibthiyyah, R. M., Kurniawan, R., Rezki, J. F., Rahardi, F., Sholihah, N. K., Budiantoro, S., Halimatussadiah, A., Cesarina, A., Siregar, A. A., Hanum, C., Wisana, D., Rahardi, F., Bintara, H., Rezki, J. F., Husna, M., … Sofiyandi, Y. (2020). *Thinking Ahead: Indonesia' s Agenda on Sustainable Recovery from COVID -19 Pandemic*. LPEM FEB UI.

Hamilton, K., & Clemens, M. (1999). *Genuine savings rates in developing countries*. The World Bank Economic Review, 13(2), 333-356.

Hanadian Nurhayati-Wolff. (2021). *Government expenditure on information communication technology (ICT) infrastructure in Indonesia from 2016 to 2020*. Statistita. https://www.statista.com/statistics/1250821/indonesia-government-spending-on-information-communication-technology-infrastructure/

Handayani, C. N. (2022). *The rapid expansion of Indonesia's marine protected area requires improvement in management effectiveness*. Elsevier.

Handayani, K., Filatova, T., & Krozer, Y. (2019). The Vulnerability of the Power Sector to Climate Variability and Change: Evidence from Indonesia. *Energies*, *12*(19), 3640. https://doi.org/10.3390/en12193640

Harish, F. (2023, February 28). *Commuter Line passengers face service deterioration with plan to retire 10 trains*. The Jakarta Post. https://www.thejakartapost.com/indonesia/2023/02/28/commuter-line-passengers-face-service-deterioration-with-plan-to-retire-10-trains.html

Harrison, M. E., Ottay, J. B., D'Arcy, L. J., Cheyne, S. M., Belcher, C., Cole, L., Dohong, A., Ermiasi, Y., Feldpausch, T., & Gallego-Sala, A. (2020). *Tropical forest and peatland conservation in Indonesia: challenges and directions*. *People and Nature*, *2*(1), 4–28.

Hein, L., Bagstad, K. J., Obst, C., Edens, B., Schenau, S., Castillo, G., Soulard, F., Brown, C., Driver, A., Bordt, M., Steurer, A., Harris, R., & Caparrós, A. (2020). *Progress in natural capital accounting for ecosystems*. In *Science* (Vol. 367, Issue 6477, pp. 514–515). American Association for the Advancement of Science. https://doi.org/10.1126/science.aaz8901

Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J., & Zenghelis, D. (2020). *Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change? Oxford Review of Economic Policy*, *36*.

I.G.N.P. Widiatedja. (2021). "Indonesia's Export Ban On Nickel Ore: Does It Violate The World Trade Organization (WTO) Rules?". J. World Trade, 55 (4) (2021), pp. 667-696, 10.54648/trad2021028.

IEA (2022), An Energy Sector Roadmap to Net Zero Emissions in Indonesia, IEA, Paris https://www.iea.org/reports/an-energy-sector-roadmap-to-net-zero-emissions-in-indonesia, License: CC BY 4.0

IEA. (2021). *The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transitions*. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions

IFLS. (2007). *Indonesian Family Life Survey (IFLS4) Survey*. www.rand.org. https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS/ifls4.html

IFLS. (2014). *Indonesian Family Life Survey (IFLS5) Survey*. www.rand.org. https://www.rand.org/well-being/social-and-behavioral-policy/data/FLS/IFLS/ifls5.html

IHS Markit. (2021). *Indonesia Manufacturing PMI* (Issue August, pp. 2020–2021).

Institute for Social Capital. (2019). *Definitions of Social Capital - Social Capital Research & Training*. Social Capital Research & Training. https://www.socialcapitalresearch.com/literature/definition/

Interactive Country Fiches. (2022). Country in a Nutshell. Retrieved from Interactive Country Fiches: https://dicf.unepgrid.ch/indonesia/biodiversity

International IDEA. (n.d.). *Voter Turnout Database*. Retrieved from International IDEA: https://www.idea.int/data-tools/data/voter-turnout-database

International Institute for Sustainable Development. (2018). *Comprehensive wealth in Canada 2018: Measuring what matters in the long term.* https://www.iisd.org/system/files/publications/comprehensive-wealth-canada-2018.pdf

International Trade Administration. (2022, July 28). *Indonesia - Information and Telecommunications Technology. Country Commercial Guides.* Retrieved December 2, 2023, from https://www.trade.gov/country-commercial-guides/indonesia-information-and-telecommunications-technology

Irawan, B. (2008). *Meningkatkan Efektifitas Kebijakan Konversi Lahan*.

IRENA. (2022). *Indonesia Energy Transition Outlook*. https://www.irena.org/publications/2022/Oct/Indonesia-Energy-Transition-Outlook

Jingyu, W., Yuping, B., Yihzong, W., Zhihui, L., Xiangzheng, D., Islam, M., & Managi, S. (2020). Measuring inclusive wealth of China: Advances in sustainable use of resources. *Journal of Environmental Management*, *264*, 110328.

Juhro, S. M., Narayan, P. K., Iyke, B. N., & Trisnanto, B. (2022). Social capital, R&D and provincial growth in Indonesia. Regional Studies, 56(12), 2117-2132.

K. Korhonen Kurki, B. Maria, M. Efrian, et al. (2017). Analyzing REDD+ as an experiment of transformative climate governance: insights from Indonesia. Environ. Sci. Pol., 73 (2017), pp. 61-70, 10.1016/J.ENVSCI.2017.03.014

Keeley, A. R., Halimatussadiah, A., Brodjonegoro, B., Agarwala, M., Adriansyah, M., Kurniawan, R., ... & Riefky, T. (2023). A Framework to Enhance Financing Capacity and Incentivise Preservation of Natural Assets.

Kemlu. (2018). *Indonesia Akhiri Kerja Sama Redd Dengan Norwegia | Portal Kementerian Luar Negeri Republik Indonesia*. Kemlu.go.id. https://kemlu.go.id/portal/id/read/2912/berita/indonesia-akhiri-kerja-sama-redd-dengan-norwegia

Ko, G., Routray, J. K., & Ahmad, M. M. (2019). ICT infrastructure for rural community sustainability. *Community Development*, *50*(1), 51–72.

Kuo, C. S. (2012). *The mineral industry of Indonesia.*

Kusmana, C. (2011). Forest resources and forestry in Indonesia. *Forest Science and Technology*, *7*(4), 155–160.

L. Giessen, S. Burns, M.A.K. Sahide, et al. (2016). From governance to government: the strengthened role of state bureaucracies in forest and agricultural certification. Polic. Soc., 35 (1) (2016), pp. 71-89, 10.1016/j.polsoc.2016.02.001

Lakshmi, A. A. (2024, March 29). *Indonesia to accelerate nickel output despite low global prices*. Www.ft.com. https://www.ft.com/content/ba1e9856-66aa-4082-b6cd-261b798d050f

Le, T. – Gibson, J. – Oxley, L. (2003): Cost- and Income-Based Measures of Human Capital. Journal of Economic Surveys, 17(3): 271–307.

Managi, S., & Kumar, P. (2018). *Inclusive wealth report 2018*. Taylor & Francis.

Managi, S., Bhattacharya, A., & Bhattacharya, T. (2023*). Inclusive Wealth Index: A Comprehensive Measure of LiFE Towards 'Net Zero'.*

Margono, B. A., Potapov, P. v, Turubanova, S., Stolle, F., & Hansen, M. C. (2014). Primary forest cover loss in Indonesia over 2000–2012. *Nature Climate Change*, *4*(8), 730–735.

Maulana, H., & Kanai, H. (2020). Multi-criteria decision analysis for determining potential agriculture commodities in Indonesia. *J. Eng. Sci. Technol.*, *15*(Special Issue on INCITEST2020), 33–40.

McDonald, G., & Meylinah, S. (2021). *If at First You Do Not Succeed - An Overview of Indonesia's Food Estate Project* (p. 6). Global Agricultural Information Network.

McMillan, M., & Rodrik, D. (2011). *Globalization, Structural Change and Productivity Growth*. https://doi.org/10.3386/w17143

Md. Monirul Islam, Kazi Sohag, Suleiman O. Mamman, Heyvon Herdhayinta, (2023). Response of Indonesian mineral supply to global renewable energy generation: Analysis based on gravity model approach, Geoscience Frontiers, 2023, 101658, ISSN 1674-9871,

Merk, J. (2022). Can fishing in Indonesia be sustainable?. Accessed from https://www.dw.com/en/sustainable-fishing-by-2025-what-is-the-current-situation-in-indonesia/a-60134067

Ministry of Agriculture Indonesia. (2020). Statistik Lahan Pertanian Tahun 2015-2019. Accessed from https://satudata.pertanian.go.id/assets/docs/publikasi/Statistik_Lahan_Pertanian_Tahun_2015-2019.pdf

Ministry of Agriculture Republic of Indonesia. (2021). Second Amendment of the Ministry of Agriculture Decree No. 259/KPTS/RC.020/M/05/2020 on Strategic Plan of Ministry of Agriculture, 2020-2024.

Ministry of Education, Culture, Research, and Technology Republic of Indonesia. (2023). *Rapor Pendidikan Indonesia tahun 2022*. https://raporpendidikan.kemdikbud.go.id/

Ministry of Energy and Mineral Resources Republic of Indonesia. (2020). *Handbook of energy and economic statistics of Indonesia 2020*. https://www.esdm.go.id/assets/media/content/content-handbook-of-energy-and-economic-statistics-of-indonesia-2020.pdf

Ministry of Energy and Mineral Resources Republic of Indonesia. (2021a). *Menteri ESDM: Cadangan Minyak Indonesia Tersedia untuk 9,5 Tahun dan Cadangan Gas 19,9 Tahun*.

Ministry of Energy and Mineral Resources Republic of Indonesia. (2021b). *Electrification ratio by 2020*. MEMR. https://onemap.esdm.go.id/news/rasio_elektrifikasi.html

Ministry of Energy and Mineral Resources Republic of Indonesia. (2022). *ESDM One Map*. https://geoportal.esdm.go.id/

Ministry of Energy and Mineral Resources Republic of Indonesia. (2023). Coal reserves in Indonesia in 2022, by calorific value (in billion metric tons) [Graph]. In Statista. Retrieved August 29, 2023, from https://remote-lib.ui.ac.id:6499/statistics/1311720/indonesia-coal-reserves-by-calorific-value

Ministry of Environment and Forestry Republic of Indonesia. (2018). *The state of Indonesia's forests 2018*.

Ministry of Environment and Forestry Republic of Indonesia. (2020). *The state of Indonesia's forests 2020*.

Ministry of Environment and Forestry Republic of Indonesia. (2021). *Peta Mangrove Nasional 2021*.

Ministry of Environment and Forestry Republic of Indonesia. (2021). *SIARAN PERS Nomor: SP. 062/HUMAS/PP/HMS.3/3/2021*. Retrieved from Pejabat Pengelola Informasi dan Dokumentasi Kementerian Lingkungan Hidup dan Kehutanan: https://ppid.menlhk.go.id/berita/siaran-pers/5848/laju-deforestasi-indonesia-turun-7503

Ministry of Environment and Forestry Republic of Indonesia. (2022). *The state of Indonesia's forests 2022*.

Ministry of Marine Affairs and Fisheries Republic of Indonesia. (n.d.). *Data Statis Produksi Perikanan*. Retrieved from Statistik KKP: https://statistik.kkp.go.id/home.php?m=prod_ikan_prov&i=2#panel-footer-kpda

Ministry of National Development Planning Republic of Indonesia. (2019). *Indonesia Growth Diagnostics: Strategic Priority to Boost Economic Growth.* https://perpustakaan.bappenas.go.id/e-library/file_upload/koleksi/migrasi-data-publikasi/file/Policy_Paper/Direktorat_Perencanaan_Makro_dan_Analisis_Statistik_Indonesia__Growth_Diagnostics_English_Language.pdf

Ministry of National Development Planning Republic of Indonesia. (2020). *Independent Assessment of Indonesia's Energy Infrastructure Sector.* https://perpustakaan.bappenas.go.id/e-library/file_upload/koleksi/migrasi-data-publikasi/file/Policy_Paper/Independent%20Assesment%20of%20Indonesia_s%20Energy%20Infrastructure%20Sector.pdf

Ministry of Transportation Republic of Indonesia. (2023). *Transportation Information 2022*. Retrieved December 2, 2023, from https://cloud.dephub.go.id/index.php/s/rUA3CaXAGJNpkiP

Ministry of Transportation Republic of Indonesia. (n.d.). *Sea Transportation Dashboard*. Retrieved December 2, 2023, from https://sigita.dephub.go.id/portal/apps/opsdashboard/index.html#/25f3bd888f3b40e28f6cc026a120418e

Moeis, F. R., Dartanto, T., Moeis, J. P., & Ikhsan, M. (2020). A longitudinal study of agriculture households in Indonesia: The effect of land and labor mobility on welfare and poverty dynamics. *World Development Perspectives*, *20*, 100261.

Muzayanah, I. F. U., Nazara, S., Mahi, B. R., & Hartono, D. (2020). Is there social capital in cities?

The association of urban form and social capital formation in the metropolitan cities of Indonesia. *International Journal of Urban Sciences*, 1–25. https://doi.org/10.1080/12265934.2020.1730934

Napitupulu, L., Nurhasan, M., McCarthy, J., & Samsudin, Y. B. (2021, December 8). *Addressing food security in Indonesia.* New Mandala. https://www.newmandala.org/addressing-food-security-in-indonesia/

Nasution, A. (1999). The financial crisis in Indonesia. East Asia's Financial System: Evolution and Crisis, 76.

Neilson, J., & Wright, J. (2017). The state and food security discourses of Indonesia: feeding thebangsa. *Geographical Research*, *55*(2), 131–143. https://doi.org/10.1111/1745-5871.12210

Norway and Indonesia. (2010). Letter of Intent between the Government of the Kingdom of Norway and the Government of the Republic of Indonesia on cooperation on reducing greenhouse gas emissions from deforestation and forest degradation. Oslo, Norway

OECD. (2009a). *Measuring Capital: OECD Handbook*. s: Organisation for Economic Co-operation and Development. https://www.oecd.org/sdd/productivity-stats/43734711.pdf

OECD. (2009b). *Measuring Capital* (2nd ed.). https://doi.org/10.2307/1924083

OECD. (2023a). *Decline in educational performance only partly attributable to the COVID-19 pandemic.* https://www.oecd.org/newsroom/decline-in-educational-performance-only-partly-attributable-to-the-covid-19-pandemic.htm

OECD. (2023b). *PISA 2022 Results Factsheets for Indonesia*. https://www.oecd.org/publication/pisa-2022-results/country-notes/indonesia-c2e1ae0e/

Oxford Business Group. (2019). *ICT sector gains strength as Indonesia prioritizes digital economy*. The Jakarta Post. https://www.thejakartapost.com/news/2019/12/10/ict-sector-gains-strength-as-indonesia-prioritizes-digital-economy.html

Palmer, M. A. (2010). Beyond infrastructure. *Nature*, *467*(7315), 534–535. https://doi.org/10.1038/467534a

Pandyaswargo, A. H., Wibowo, A. D., Maghfiroh, M. F. N., Rezqita, A., & Onoda, H. (2021). The Emerging Electric Vehicle and Battery Industry in Indonesia: Actions around the Nickel Ore Export Ban and a SWOT Analysis. *Batteries*, *7*(4), 80.

Pasaribu, D. H. (2020). Natural resource prices and welfare: Evidence from Indonesia's coal and palm oil boom. Working Papers in Trade and Development (No. 2020/16). Australian National

University. https://acde.crawford.anu.edu.au/sites/default/files/publication/acde_crawford_anu_edu_au/2020-11/acde_td_pasaribu_2020_16.pdf

Pereira, R. (2021). Public participation, indigenous peoples' land rights and major infrastructure projects in the Amazon: The case for a human rights assessment framework. *Review of European, Comparative & International Environmental Law*.

Pransuamitra, P.A. (2023). *Ketahanan Pangan RI di Bawah Rata-Rata Dunia, Begini Faktanya*. Accessed from https://www.cnbcindonesia.com/research/20230516074542-128-437635/ketahanan-pangan-ri-di-bawah-rata-rata-dunia-begini-faktanya/3

Pratomo, D. S., Syafitri, W., & Anindya, C. S. (2020). Expanding Middle Class in Indonesia. *The Journal of Indonesia Sustainable Development Planning*, *1*(3), 307–312.

Purwanto, W. W., Muharam, Y., Pratama, Y. W., Hartono, D., Soedirman, H., & Anindhito, R. (2016). Status and outlook of natural gas industry development in Indonesia. *Journal of Natural Gas Science and Engineering*, *29*, 55–65.

PwC. (2019). *Oil and Gas in Indonesia Investment and Taxation Guide*.

PwC. (2023, July 21). *Supply chain: Indonesian Chamber of Commerce & Industry Predicts Logistics to grow 6%*. https://www.pwc.com/id/en/media-centre/infrastructure-news/july-2023/supply-chain-indonesian-chamber-of-commerce-and-industry-predicts-logistics-to-grow-6-percent.html

Rahman, A., Dargusch, P., & Wadley, D. (2021). The political economy of oil supply in Indonesia and the implications for renewable energy development. In *Renewable and Sustainable Energy Reviews* (Vol. 144). Elsevier Ltd. https://doi.org/10.1016/j.rser.2021.111027

Resosudarmo, B.P., Resosudarmo, I.A.P., Sarosa, W., Subiman, N.L. (2009). Socioeconomic conflicts in Indonesia's mining industry. Exploit. Nat. Resour. Growth, Instab. Confl. Middle East Asia, Washington, DC Henry L. Stimson Cent. 33–48. http://www.jstor.com/stable/resrep10917.8.

Reuters. (2017). Indonesia president approves two-year extension of forest moratorium Thomson Reuters reports (https:// reuters.com/article/us-indonesia-environment-forests/ indonesia-president-approves-two-year-extension-offorest-moratorium-idUSKBN18K0CV)

Revina, S., Pramana, R. P., Fillaili, R., & Suryadarma, D. (2020). Sytematic Constraints Facing Teacher Professional Development in a Middle-Income Country: Indonesia's Experience Over Four Decades. *RISE Working Paper Series. 20/054*, *October*, 1–35.

Roberts, M., Sander, G., & Tiwari, S. (2019). Time to ACT. *Worldbank.org*.

https://doi.org/10.1596/978-1-4648-1389-4

Rondhi, M., Pratiwi, P. A., Handini, V. T., Sunartomo, A. F., & Budiman, S. A. (2019). Agricultural Land Conversion and Food Policy in Indonesia: Historical Linkages, Current Challenges, and Future Directions. In *Current Trends in Landscape Research* (pp. 631–664). Springer.

Satgas REDD+. (2012). REDD+ National Strategy. Indonesian REDD+ Task Force (Satgas REDD+), Jakarta.

Saturi, S., Sigit, R. R., Nugraha, I., & Jacobson, P. (2015, May 14). Indonesia extends moratorium on partial forest clearing. *The Guardian*.

https://www.theguardian.com/environment/2015/may/14/indonesia-extends-moratorium-on-partial-forest-clearing

SEEA. (n.d.). *Natural Capital and Ecosystem Services FAQ*. Retrieved from SYSTEM OF ENVIRONMENTAL ECONOMIC ACCOUNTING: https://seea.un.org/content/natural-capital-and-ecosystem-services-faq

Setiawan, S.R.D. (2014). Subsidi BBM 2013 Bengkak Jadi Rp201 Triliun. KOMPAS. https://money.kompas.com/read/2014/01/06/1555539/Subsidi.BBM.2013.Bengkak.Jadi.Rp.201.Triliun

Setyowati, A. B. (2021). *Mitigating inequality with emissions? Exploring energy justice and financing transitions to low carbon energy in Indonesia.* Energy Research & Social Science, 71, 101817. https://doi.org/10.1016/J.ERSS.2020.101817

Shrestha, R., & Coxhead, I. (2018). Can Indonesia Secure a Development Dividend from Its Resource Export Boom? ERIA Discussion Paper Series (ERIA-DP-2018-04). https://www.eria.org/uploads/media/ERIA_DP_2018_04.pdf

Sigit, H. (2004). Total factor productivity growth: survey report. *Tokyo: Asian Productivity Organization*.

Sloan, S. (2014). Indonesia's moratorium on New Forest Licenses: An update. *Land Use Policy*, *38*, 37–40. https://doi.org/10.1016/j.landusepol.2013.10.018

Snäll, T., Lehtomäki, J., Arponen, A., Elith, J., & Moilanen, A. (2016). Green infrastructure design based on spatial conservation prioritization and modeling of biodiversity features and ecosystem services. *Environmental Management*, *57*(2), 251–256.

Soetirto, E. (2013). Policy on Livestock Development in Indonesia. Accessed from http://ciat-library.ciat.cgiar.org/articulos_ciat/policy_livestock_29.pdf

Stiglitz, J. E., Sen, A., & Fitoussi, J. P. (2009). *Measurement of economic performance and social progress.* Online document http://bit. ly/JTwmG. Accessed June, 26, 2012.

Suryahadi, A., & Hadiwidjaja, G. (2011). The role of agriculture in poverty reduction in Indonesia. In Centre for Strategic Economic Studies–Australian Centre for International Agricultural Research International Workshop on the Role of Agriculture in Poverty Reduction, Melbourne.

Sutrisno, A. (2021). " Governing The Mining Industry in Indonesia: a Return of Resources Nationalism?" . ICE-BEES 2021, July 27-28, Semarang, Indonesia. DOI 10.4108/eai.27-7-2021.2316814.

Tacconi, L. & Muttaqin, M. Z. (2019). Reducing emission from land use change in Indonesia: An overview. Forest Policy and Economics, 108, 101979.

Teresia, A. (2023). *Indonesia cites deforestation decline from stricter controls*. Retrieved from Reuters.com: https://www.reuters.com/world/asia-pacific/indonesia-cites-deforestation-decline-stricter-controls-2023-06-26/#:~:text=JAKARTA%2C%20June%2026%20(Reuters),stricter%20permitting%20for%20tree%20clearance.

Teresia, A. (2023, June 26). *Indonesia cites deforestation decline from stricter controls*. Reuters.com; reuters. https://www.reuters.com/world/asia-pacific/indonesia-cites-deforestation-decline-stricter-controls-2023-06-

26/#:~:text=JAKARTA%2C%20June%2026%20(Reuters),stricter%20permitting%20for%20tree%20clearance.

Toll Road Regulatory Body (*Badan Pengatur Jalan Tol*/BPJT). (2023). *Laporan Tahunan Badan Pengatur Jalan Tol 2022*. https://bpjt.pu.go.id/booklet/buku_tahunan_BPJT_2022/mobile/index.html

Triyanti, Annisa et al. (2023). Environmental Governance in Indonesia. Springer, Vol 61 : Jakarta, Indonesia.

Tsujino, R., Yumoto, T., Kitamura, S., Djamaluddin, I., & Darnaedi, D. (2016). History of forest loss and degradation in Indonesia. *Land Use Policy*, *57*, 335–347.

Turubanova, S., Potapov, P. v, Tyukavina, A., & Hansen, M. C. (2018). Ongoing primary forest loss in Brazil, Democratic Republic of the Congo, and Indonesia. *Environmental Research Letters*, *13*(7), 074028.

U.S. Department of State. (2021). Investment climate statements: Indonesia. https://www.state.gov/reports/2021-investment-climate-statements/indonesia/

UN Statistics Division. (2012). *REVISION OF THE SYSTEM OF ENVIRONMENTAL - ECONOMIC ACCOUNTING (SEEA)* .

UN Statistics Division. (n.d.). *Glossary of the 1993 SNA*. Retrieved from UN Statistics Division: https://unstats.un.org/unsd/nationalaccount/glossary.asp

UNCTAD. (2021). *Product concentration and diversification indices of exports and imports (online database)*. http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx

UNFCCC. (2021). Why Bioiversity Matters. Retrieved from UNFCCC: https://unfccc.int/blog/why-biodiversity-matters?gclid=CjwKCAjwxaanBhBQEiwA84TVXMixxZ3pv7JlSZV7-Z8fpJ2wE-gBQ-u2MgVGdxtAkhuaTZQoSgr4MRoCEO0QAvD_BwE

UNFCCC. (2022). Enhanced Nationally Determined Contribution Republic Indonesia. Jakarta: RI.

United Nations et al. (2021). System of Environmental-Economic Accounting—Ecosystem Accounting (SEEA EA). White cover publication, pre-edited text subject to official editing. Available at: https://seea.un.org/ecosystem-accounting

United Nations University International Human Dimensions Programme on Global Environmental Change and UN Environment Programme. (2014). Inclusive wealth report 2014: Measuring progress toward sustainability. Cambridge University Press. https://www.greengrowthknowledge.org/research/inclusive-wealth-report-2014-measuring-progress-toward-sustainability

Usher, A. (2013, June 3). Mining in Indonesia taking a heavy social, environmental toll. Retrieved from Mongabay: https://news.mongabay.com/2013/06/mining-in-indonesia-taking-a-heavy-social-environmental-toll/

VOI.id. (2022, July 6). *Until 2030, DJKA Targets The Construction Of A 10,524 Km Railway Network*. https://voi.id/en/economy/187329

Von Rintelen, K., Arida, E., & Häuser, C. (2017). A review of biodiversity-related issues and challenges in megadiverse Indonesia and other Southeast Asian countries. *Research Ideas and Outcomes*, *3*, e20860.

Warburton, E. (2017). RESOURCE NATIONALISM IN INDONESIA: OWNERSHIP STRUCTURES AND SECTORAL VARIATION IN MINING AND PALM OIL. Journal of East Asian Studies, 17(3), 285-312. doi:10.1017/jea.2017.13

Wibowo, A., Pratiwi, S., & Giessen, L. (2019). Comparing management schemes for forest certification and timber-legality verification: Complementary or competitive in Indonesia?. *Journal of Sustainable Forestry*, *38*(1), 68-84.

Widi, S. (2023). *Luas Kawasan Hutan Indonesia Mencapai 125,76 Juta Hektare*. Retrieved from Data Indonesia: https://dataindonesia.id/agribisnis-kehutanan/detail/luas-kawasan-hutan-indonesia-mencapai-12576-juta-hektare

Wihardja, M.M. (2016). *The Effect of the Commodity Boom on Indonesia's Macroeconomic Fundamentals and Industrial Development*. International Organisations Research Journal, 11(1). https://iorj.hse.ru/data/2016/11/15/1110407997/M.M.%20Wihardja.pdf

Winanti, P. S., Diprose, R. (2020). *Reordering the Extractive Political Settlement: Resource Nationalism, domestic ownership, and Transnational Bargains in Indonesia*. The Extractive Industries and Society, 7(4), 1534–1546. https://doi.org/10.1016/j.exis.2020.08.015

Winona, C., Singarimbun, L., Sarwendah, M., & Paramastuti, N. (2022, November 3). *Indonesia's Nickel Industry in the Aftermath of Trade Dispute with the European Union*. Https://Cwts.ugm.ac.id. https://cwts.ugm.ac.id/en/2022/11/03/indonesias-nickel-industry-in-the-aftermath-of-trade-dispute-with-the-european-union/

World Bank, & Ministry of Finance Republic of Indonesia. (2020). *Indonesia Public Expenditure Review: Spending for Better Results*. https://thedocs.worldbank.org/en/doc/787371590233774656-0070022020/original/IDPER2020ESCh1Overview.pdf

World Bank. (2011). The changing wealth of nations: Measuring sustainable development in the new millennium. The World Bank. https://documents1.worldbank.org/curated/en/630181468339656734/pdf/588470PUB0Weal101public10BOX353816B.pdf

World Bank. (2015). *Commodity Markets Outlook: January 15*. https://www.worldbank.org/content/dam/Worldbank/GEP/GEPcommodities/GEP2015a_commodity_Jan2015.pdf

World Bank. (2020). *Revealing How Indonesia’s Subnational Governments Spend their Money on Education: Subnational Education Public Expenditure Review 2020*. https://www.worldbank.org/en/country/indonesia/publication/subnational-education-public-expenditure-review-2020

World Bank. (2021a). The Changing Wealth of Nations 2021: Managing Assets for the Future. Washington. https://openknowledge.worldbank.org/entities/publication/e1399ed3-ebe2-51fb-b2bc-b18a7f1aaaed

World-Bank. (2021b). *Manufacturing, value added (% of GDP)*. World-Bank. https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=IDf

World Bank. (2022). *Climate change knowledge portal (Indonesia)*.

World Bank. (2023). *The Logistics Performance Index and Its Indicators 2023*. https://lpi.worldbank.org/sites/default/files/2023-04/LPI_2023_report_with_layout.pdf

World Bank. (n.d.). *Agriculture, forestry, and fishing, value added per worker (constant 2015 US$) - Indonesia.* Retrieved from World Bank Open Data: https://data.worldbank.org/indicator/NV.AGR.EMPL.KD?locations=IDWorld Bank; ADB. (2021). *Climate Risk Country Profile: Indonesia 2021*World Energy Council. (2022). *WORLD ENERGY TRILEMMA INDEX 2022.* https://www.worldenergy.org/assets/downloads/World_Energy_Trilemma_Index_2022.pdf?v=1669842216

World Values Survey. (n.d.). *WVS Database.* Www.worldvaluessurvey.org. https://www.worldvaluessurvey.org/wvs.jsp

WWF. (2022). *Living Planet Report 2022 – Building a nature-positive society.* Almond, R.E.A., Grooten, M., Juffe Bignoli, D. & Petersen, T. (Eds). WWF, Gland, Switzerland

WWF. (n.d.). *Coral Triangle Facts.* Retrieved from WWF: https://wwf.panda.org/discover/knowledge_hub/where_we_work/coraltriangle/coraltrianglefacts/#:~:text=76%25%20(605)%20of%20the,%25%20of%20the%20world's%20total)

X.F. Zheng, C.X. Liu, Y.Y. Yan, Q. Wang. (2014). *A Review Of Thermoelectrics Research–Recent Developments And Potentials For Sustainable And Renewable Energy Applications*. Renew. Sustain. Energy Rev., 32 (2014), pp. 486-503, 10.1016/j.rser.2013.12.053.

Y. Wang, C. Guo, S. Zhuang, X. Chen, L. Jia, Z. Chen, Z. Xia, Z. Wu, "Major Contribution To

Carbon Neutrality By China's Geosciences And Geological Technologies". China Geol., 4 (2021), pp. 329-352, 10.31035/cg2021037.

Yamamoto, Y., Shigetomi, Y., Ishimura, Y., & Hattori, M. (2019). *Forest change and agricultural productivity: Evidence from Indonesia.* World Development, *114*, 196-207.

Appendix A. Produced Capital

A.1. Details of Produced Capital Index Measurements

For estimating Produced Capital stocks time-series data, a simplified approach adapted from the OECD *Measuring Capital* handbook (Organisation for Economic Co-operation and Development [OECD], 2009) is utilized. It consists of three main steps. First, economic growth, Gross Fixed Capital Formation (GFCF), and its breakdown are deflated using an appropriate price index. Second, the initial capital stock of 1990 is estimated. Third, a time series of Produced Capital stocks from 1990 to the most recent year in real prices is estimated by accumulating GFCF and considering depreciation.

Adopting the OECD approach, a reasonable estimate of the stock of any produced asset in any year is derived by dividing the value of the gross investment in that asset in that year by the sum of the asset's deprecation rate plus the long-term growth rate of real GDP. Equation 1 expresses this approach in algebraic notation:

$$K_0^{ij} = \frac{I_0^{ij}}{(\partial^{ij} + \theta)} \quad \text{..... Equation 1}$$

where,

- K_0^{ij} is the real value of the Produced Capital stock of type i ($i \in$ machinery, buildings, etc.) in industry j ($j \in$ agriculture, forestry, mining, manufacturing, etc.) in the base year
- I_0^{ij} is the real value of GFCF of capital type i in industry j in the base year
- ∂^{ij} is the annual rate of depreciation of capital type i in industry j (a constant)
- θ is the long-term annual growth of real GDP in the economy (a constant).

In implementing Equation 1, we want to avoid situations in which an outlier GFCF value for 1990 would unduly influence the value of I_0^{ij}. To avoid this, we propose to average GFCF from 1988 to 1992 to estimate the value of I_0^{ij}. Equation 2 expresses this in algebraic terms:

$$I_0^{ij} = \frac{\sum_{t=1988}^{1992} I_t^{ij}}{5} \quad \text{..... Equation 2}$$

where I_t^{ij} is the real value of GFCF of capital type i in industry j in year t ($t \in \{1988, 1989, 1990, 1991, 1992\}$).

Values for the annual rate of depreciation of Produced Capital by type and industry (∂^{ij}) and for long-term real economic growth (θ) are employed. We applied a deprecation rate of 3%, as suggested by the survey report of the Asian Productivity Organization (APO), specifically for the Indonesia case (Sigit, 2004).

Once initial capital was obtained, a time series of real capital stock estimates for 1990 to the present for each industry and capital type was estimated. This was accomplished by using a simple approach of accumulating real GFCF each year and depreciating the capital stock of the previous year. This is shown algebraically in Equation 3:

$$K_t^{ij} = K_{t-1}^{ij} + GFCF_t^{ij} - (\partial^{ij} * K_{t-1}^{ij}) \quad \text{.....Equation 3}$$

where,

- K_t^{ij} is the real value of the Produced Capital stock of type i in industry j in year t
- K_{t-1}^{ij} is the real value of the Produced Capital stock of type i in industry j in year $t-1$
- $GFCF_t^{ij}$ is the real value of GFCF of Produced Capital of type i in industry j in year t
- and other variables are as previously defined.

Annual data covering the period 1990–2020 are utilized in this Produced Capital estimation. Data for economic growth, investment, GFCF, and its sectoral breakdown are derived from BPS-Statistics Indonesia. BPS-Statistics Indonesia provides GFCF and GDP in local currency, based on different System of National Account (SNA), SNA 1968 Seri 1983 (1990–1993), SNA 1968 Seri 1993 (1993–2000), SNA 1993 Seri 2000 (2000–2010), SNA 2008 (2010–2020). We also calculate the Produced Capital estimation in USD.

A.2. Data Overview of Produced Capital Index

Table A1. Data used in the calculation of the Produced Capital Index

Fiscal year	Produced Capital (billion IDR)	Produced Capital per capita (IDR)	Produced Capital (billion USD)	Produced Capital per capita (USD)	Nominal GDP (GDP at current market prices) in billions of IDR	Real GDP (GDP at constant market prices) in Billions of IDR	Real GDP growth	Consumer Price Index (CPI), 2017=100	Gross fixed capital formation in billions of IDR	Gross fixed capital formation in billions USD	Gross fixed capital formation as % GDP	Population in millions	Population growth rate
1990	7,789,955	43,459,142	1,659	9,255	249,843	2,807,571	7.2%	9	713,556	151.96	31%	179.25	0.06%
1991	8,305,216	45,398,556	1,769	9,668	290,596	2,984,427	6.9%	10	748,960	159.50	31%	182.94	2.06%
1992	8,828,124	47,452,136	1,880	10,106	331,959	3,170,677	6.5%	10	772,064	164.42	30%	186.04	1.70%
1993	9,341,043	49,388,072	1,989	10,518	385,778	3,359,765	6.5%	11	777,763	165.63	30%	189.14	1.66%
1994	9,932,166	51,671,764	2,115	11,004	447,127	3,587,941	7.5%	12	871,354	185.57	32%	192.22	1.63%
1995	10,610,667	54,482,185	2,260	11,603	531,699	3,899,255	8.2%	14	976,467	207.95	34%	194.75	1.32%
1996	11,395,718	57,461,262	2,427	12,237	623,008	4,231,487	7.8%	15	1,103,370	234.98	36%	198.32	1.83%
1997	12,224,536	60,711,933	2,603	12,929	734,290	4,695,002	4.7%	16	1,170,690	249.31	37%	201.35	1.53%
1998	12,868,395	62,959,232	2,740	13,408	1,118,058	4,511,670	-13.1%	25	1,010,595	215.22	29%	204.39	1.51%
1999	13,246,716	63,858,954	2,821	13,600	1,286,486	4,308,946	0.8%	30	764,373	162.78	23%	207.44	1.49%
2000	13,767,599	68,417,180	2,932	14,570	1,479,725	4,779,867	4.9%	31	918,285	195.56	26%	201.23	-2.99%
2001	14,321,418	68,708,685	3,050	14,632	1,752,882	5,078,230	3.6%	35	966,847	205.90	26%	208.44	3.58%
2002	14,836,081	70,292,190	3,160	14,970	1,939,754	5,021,989	4.5%	39	944,305	201.10	26%	211.06	1.26%
2003	15,372,544	71,927,655	3,274	15,318	2,144,012	5,199,466	4.8%	41	981,546	209.03	25%	213.72	1.26%
2004	16,125,629	74,512,493	3,434	15,868	2,444,427	5,589,078	5.0%	44	1,214,261	258.59	28%	216.42	1.26%
2005	17,040,843	78,156,478	3,629	16,644	2,953,850	6,114,675	5.7%	48	1,398,983	297.93	29%	218.03	0.75%
2006	18,049,217	81,030,159	3,844	17,256	3,555,352	6,506,862	5.5%	55	1,519,599	323.62	28%	222.75	2.16%
2007	19,254,582	85,332,437	4,101	18,173	4,206,620	7,235,255	6.3%	58	1,746,841	372.01	29%	225.64	1.30%
2008	20,880,895	91,373,158	4,447	19,459	5,268,999	8,221,707	6.0%	64	2,203,951	469.36	31%	228.52	1.28%
2009	22,941,332	99,154,521	4,886	21,116	5,969,072	8,922,710	4.6%	67	2,686,863	572.20	30%	231.37	1.25%
2010	25,278,507	106,372,523	5,383	22,653	6,864,133	9,759,590	6.2%	70	3,025,415	644.30	31%	237.64	2.71%
2011	27,829,113	115,000,754	5,927	24,491	7,831,726	10,569,243	6.2%	74	3,308,961	704.69	32%	241.99	1.83%
2012	30,642,507	124,854,769	6,526	26,589	8,615,705	11,150,087	6.0%	77	3,648,267	776.94	33%	245.43	1.42%
2013	33,434,374	134,372,755	7,120	28,616	9,546,134	11,609,735	5.6%	82	3,711,142	790.33	33%	248.82	1.38%
2014	36,359,996	144,191,403	7,743	30,707	10,569,705	12,081,942	5.0%	87	3,928,654	836.66	32%	252.16	1.35%
2015	39,333,683	153,894,932	8,377	32,774	11,526,333	12,387,222	4.9%	93	4,064,486	865.58	32%	255.59	1.36%
2016	42,347,757	163,823,329	9,018	34,888	12,401,729	12,874,085	5.0%	96	4,194,085	893.18	32%	258.50	1.14%
2017	45,447,899	173,893,027	9,679	37,033	13,589,826	13,589,826	5.1%	100	4,370,575	930.77	33%	261.36	1.11%
2018	48,727,183	184,459,752	10,377	39,283	14,838,756	14,378,870	5.2%	103	4,642,721	988.73	33%	264.16	1.07%
2019	52,082,043	195,128,216	11,092	41,555	15,832,535	14,890,578	5.0%	106	4,816,675	1,025.77	33%	266.91	1.04%
2020	55,039,154	203,694,878	11,721	43,379	15,434,152	14,242,306	-2.1%	108	4,519,572	962.50	32%	270.20	1.23%

Source: Authors' calculation based on data from BPS-Statistics Indonesia and the World Bank Data Bank.

Table A2. **Produced Capital by asset type in billions of IDR**

	Building	Machine and equipment	Vehicles	Others	Total
2000	10,367,003	1,232,069	840,539	1,327,988	13,767,599
2001	10,766,981	1,278,658	888,715	1,387,064	14,321,418
2002	11,151,935	1,327,808	925,828	1,430,510	14,836,081
2003	11,594,515	1,363,345	940,852	1,473,832	15,372,544
2004	12,141,855	1,447,558	978,052	1,558,164	16,125,629
2005	12,789,681	1,563,137	1,039,644	1,648,381	17,040,843
2006	13,548,335	1,645,624	1,103,196	1,752,062	18,049,217
2007	14,451,428	1,764,416	1,160,272	1,878,465	19,254,582
2008	15,623,808	1,945,537	1,260,001	2,051,549	20,880,895
2009	17,164,317	2,141,556	1,376,934	2,258,526	22,941,332
2010	18,900,793	2,382,564	1,512,361	2,482,789	25,278,507
2011	20,746,563	2,682,700	1,669,761	2,730,089	27,829,113
2012	22,762,534	3,024,283	1,860,459	2,995,230	30,642,507
2013	24,792,898	3,352,178	2,030,461	3,258,837	33,434,374
2014	26,944,259	3,671,397	2,189,130	3,555,210	36,359,996
2015	29,157,027	3,981,084	2,341,575	3,853,998	39,333,683
2016	31,418,445	4,254,695	2,509,221	4,165,396	42,347,757
2017	33,747,452	4,546,875	2,687,005	4,466,566	45,447,899
2018	36,173,515	4,905,461	2,878,666	4,769,541	48,727,183
2019	38,684,492	5,273,918	3,053,321	5,070,311	52,082,043
2020	40,937,654	5,568,344	3,186,624	5,346,532	55,039,154

Source: Authors' calculation based on data from BPS-Statistics Indonesia.

Table A3. **Produced Capital by sector in billions of IDR**

	Agriculture, forestry, and fishing	Mining and quarrying	Manufacturing	Electricity and gas	Water supply, sewerage, waste management, and remediation activities	Construction	Wholesale and retail trade, repair of motor vehicles and motorcycles	Transportation and storage	Accommodation and food service activities	Information and communication	Financial and insurance activities	Real estate activities	Business activities	Public administration and defence, compulsory social security	Education	Human health and social work activities	Other services activities	Total
2010	3,061,424	2,356,480	5,539,278	786,910	140,393	1,476,952	1,487,496	2,039,099	594,495	844,804	398,599	4,364,272	354,598	1,997,347	885,731	487,579	604,250	42,741,164
2011	3,220,328	2,465,704	5,873,011	846,227	148,012	1,536,947	1,581,616	2,165,150	625,618	879,852	422,647	4,589,374	375,246	2,107,963	927,201	512,490	636,091	28,916,739
2012	3,434,216	2,590,460	6,208,521	919,142	159,115	1,604,742	1,709,139	2,256,924	657,116	933,754	441,942	4,862,306	399,239	2,223,987	968,892	538,959	665,348	30,573,801
2013	3,616,199	2,729,440	6,560,387	960,196	165,002	1,731,634	1,774,167	2,380,189	694,712	990,877	470,894	5,144,727	409,247	2,374,220	1,034,881	566,052	708,138	32,310,962
2014	3,782,827	2,911,837	6,875,398	1,000,887	169,982	1,865,644	1,833,846	2,518,265	746,580	1,056,239	499,335	5,438,944	445,949	2,500,615	1,103,066	603,128	761,563	34,114,104
2015	4,036,101	3,134,847	7,096,765	1,036,877	180,038	1,945,278	1,939,835	2,651,165	786,682	1,128,174	538,147	5,747,116	481,040	2,673,040	1,176,871	632,836	817,227	36,002,037
2016	4,267,876	3,283,007	7,503,223	1,078,870	200,076	1,993,005	2,051,843	2,745,488	820,811	1,202,281	573,859	6,083,126	515,531	2,829,189	1,236,912	685,350	893,113	37,963,560
2017	4,501,593	3,423,209	7,918,014	1,166,454	218,161	2,088,792	2,181,544	2,859,386	849,578	1,260,867	603,453	6,462,608	551,673	3,024,919	1,264,696	727,554	950,918	40,053,416
2018	4,724,544	3,576,246	8,364,045	1,269,003	240,646	2,139,187	2,350,919	3,012,080	882,958	1,365,948	632,916	6,910,015	584,845	3,187,161	1,288,741	766,956	999,913	65,870,974

Source: Authors' calculation based on data from BPS-Statistics Indonesia

Appendix B. Measuring Human Capital

The Human Capital Index presented here is based on the discounted flow of total market labour compensation. Conceptually, we value human capital for a particular year based on the accumulated present value of its expected future returns – i.e., labour income.

First, we calculate the total market labour compensation for each year. This is obtained from input/output (IO) tables for 1995, 2000, 2005, 2010, and 2016. For other data points, we interpolate based on the average share of labour income to GDP for each of the nine sectors. We consider what part of Indonesia's gross domestic product is attributed to labour, which in this case are wages, and parts of operating surplus are considered as mixed income. The latter is relevant in a country where informality is high and there is a considerable number of unincorporated enterprises, such as in Indonesia. We assume the proportion of operating surplus is mixed income, as detailed in Table B1.

Table B1. Proportion of GOS considered as mixed income

Sector	% of Gross operating surplus (GOS) considered mixed income
Agriculture, forestry, and fisheries	0.8
Mining and quarrying	0.2
Processing industry	0.2
Electricity, gas, and water	0
Construction	0.2
Wholesale and retail trade; car and motorcycle repair	0.8
Transportation and communication	0.3
Financial, real estate, corporate services	0.95
Services	0.95

Source: Authors' assumptions

The second step is to take the net present value of expected future labour income, assuming the current total market labour compensation is reflective of future earnings. We utilize the following formula, where we set the discount rate (r) at 4%, as used for other accounts.

$HCt=LCt/r$ ..... Equation 4

where,

- HCt is the Human Capital Index of time t
- LCt is the labour compensation of time t
- r is the discount rate

Appendix C.Natural Capital

C.1. Details of Natural Capital Index Measurements

For each type of market Natural Capital, the valuation process involves three steps. Initially, the annual resource rent for each type of capital is determined by considering the generated revenue and all associated costs. Following this, the present value of the expected future rent generated from its use can be calculated by considering the first step and the asset life. The asset life is the expected time over which an asset can be used in production, considering the available physical stock of the asset. Finally, to adjust the annual resource rent for inflation, a suitable price index is applied, enabling the derivation of a real per capita measure of market Natural Capital wealth.

Step 1: Estimating the annual resource rent

Estimating resource rent requires data on revenues, costs, interest rates, produced assets used in the production, and the depreciation rate of produced assets. The rent is derived from the equation below:

$$RR_t^i = TR_t^i - C_t^i - \left(r_K K_t^i + \partial^{\mathrm{i}}\right) \quad \text{..... Equation 5}$$

where,

- RR_t^i= rent of market natural asset i in year t
- TR_t^i = total revenue from resource extraction (net of subsidies) of market natural asset i in year t
- C_t^i = total extraction costs (materials, energy, labour) of the market natural asset i in year t
- r_k= rate of return to capital
- K_t^i= the value of the Produced Capital stock used in the extraction process of market Natural Capital asset i in year t
- ∂^i = depreciation of produced assets used in the production of market Natural Capital asset i, assumed constant.

Step 2: Estimating the present value of the expected future rent

The monetary value (wealth) of a market natural asset i is computed as the present value of the expected future rent generated from its use:

$$V_t^i = \sum_{t=1}^{T} \frac{RR_t^i}{(1+r_d)^t} \quad \text{..... Equation 6}$$

where,

- V_t^i = *in situ* value of the market natural asset i in year t
- T = the expected remaining asset life (infinity in the case of renewable resources)
- r_d= discount rate
- RRt = annual resource rent (in equation 5).

Step 3: Aggregation and deflation

The final estimated series of Natural Capital values should be deflated since comprehensive wealth is measured in real (or inflation-adjusted) terms. Prior to deflating, the total value of all natural assets in year t is estimated by summing all individual V_t^i calculated in equation 6:

$$V_t^T = \sum_{i=1}^{N} V_t^i \quad \text{..... Equation 7}$$

Where,

- V_t^T is the total value of Natural Capital in year t
- N is the number of individual natural assets.

To deflate the nominal value of Natural Capital, the overall GDP implicit price index is applied. The overall implicit price index for GDP can be derived by dividing the nominal value of GDP by its real value. This study uses 2017 as the base year.

C.2. Data Sources of Natural Capital Measurements

The index is created by combining the BPS-Statistics Indonesia quantity index of fossil fuels, minerals, and agricultural land with estimates of commercial timber volumes and built-up land into an annual quantity index for 1990 to 2020.

Table C1. Natural Capital components data sources

	Component	Variables	Data sources	Notes
Market Assets	Agriculture	Cost	BPS-Statistics Indonesia	Survey of Farmer Business (1990–2018), Interpolated for other years and several commodities
		Production	Ministry of Agriculture	
		Price	FAO and Ministry of Agriculture	Producer price data, interpolated for missing data
	Aquaculture	Cost	BPS-Statistics Indonesia	Survey of Aquaculture Business (1993 & 2014), Others interpolated
		Production	BPS-Statistics Indonesia	Statistics of Aquaculture (1990–2020)
		Revenue	BPS-Statistics Indonesia	Statistics of Aquaculture (2000–2020), 1990–1999 Interpolated
	Fisheries	Cost	BPS-Statistics Indonesia	Survey of Fisheries Business (1993 & 2014), Others Interpolated
		Production	BPS-Statistics Indonesia	Statistics of Fisheries (1990–2020)
		Revenue	BPS-Statistics Indonesia	Statistics of Fisheries (2000–2020), 1990–1999 Interpolated
	Forestry	Cost	BPS-Statistics Indonesia	Statistics of Forest Concession Establishment 1990–2020, Statistics of Timber Culture Estate 1993–2020 (Timber Culture is Interpolated from 1990–1992)
		Production	BPS-Statistics Indonesia	Statistics of Forest Concession Establishment 1990–2020, Statistics of Timber Culture Estate 1993–2020 (Timber Culture is Interpolated from 1990–1992)
		Revenue	BPS-Statistics Indonesia	Statistics of Forest Concession Establishment 1990–2020, Statistics of Timber Culture Estate 1993–2020 (Timber Culture is Interpolated from 1990–1992)
	Livestock	Cost	BPS-Statistics Indonesia	Livestock Business Cost Structure 2014 & 2017 (Cost is interpolated for other data points)
		Production	BPS-Statistics Indonesia	Statistics of Livestock 2000–2020 (Production is Interpolated from 1990–1999)
		Price	BPS-Statistics Indonesia	Consumer and producer price statistics 2009-2020 (Price is interpolated based on export/import prices for 1990–2009)
	Fossil	Cost	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990–2020)
		Depreciation	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990–2020)

		Production	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990–2020)
		Rate of return	Financial Services Authority of Indonesia (2019)	
		Reserve	U.S. Energy Information Administration (2022)	
		Revenue	BPS-Statistics Indonesia	Mining Statistics of Petroleum and Gas (1990–2020)
	Minerals	Cost	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990–2020)
		Depreciation	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990–2020)
		Production	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990–2020)
		Rate of return	Financial Services Authority of Indonesia (2019)	
		Reserve	BPS-Statistics Indonesia and USGS	
		Revenue	BPS-Statistics Indonesia	Mining Statistics of Non-Petroleum and Gas (1990–2020)
Non-market	Precipitation		BPS-Statistics Indonesia	
	Temperature		BPS-Statistics Indonesia	

Source: authors' elaborations

Appendix D. Measuring Financial Capital

In this study, the **Financial Capital Index** (FCI) is represented by the IIP, which is calculated as follows:

$$Net\ foreign\ assets = total\ foreign\ assets - total\ foreign\ liabilities$$

Total foreign assets consist of direct investment, portfolio investment, financial derivatives, other investments, and reserve assets, whereas total foreign liabilities comprise the exact same components, with the exception of reserve assets, as the nature of reserve assets does not entail corresponding liabilities.

Note that Indonesia's IIP does not yet include the international investment activity of households. Other noteworthy points include:

- The direct investment position is based solely on data from companies participating in the direct investment survey and the Foreign Exchange Transactions in the International Transactions Reporting System, as well as contractors in the oil and gas sector.
- In terms of financial derivatives, it exclusively encompasses the banking sector.
- Finally, the international investment activities of the general government may not be fully accounted for by the existing sources and methodologies.

These nuances should be considered when utilizing Indonesia's IIP data for analysis and decision making. The IIP values were obtained from Bank Indonesia for the period 2001–2020. Financial capital is calculated by deflating the nominal values of Bank Indonesia's IIP using the Indonesian Consumer Price Index (constant 2017) and dividing it by the population.

Appendix E. Measuring Social Capital

Social capital is assessed through various measures derived from multiple datasets. The main source is the World Values Survey (WVS) (Inglehart et al., 2022), conducted in Indonesia in 2001 (Wave 4, n= 1,000), 2006 (Wave 5, n = 2,015), and 2018 (Wave 7, n= 3,200). The WVS contains questions related to group membership, political actions, trust, confidence in institutions, and tolerance. It also covers the widest time length compared to other possible data sources, with many questions comparable across waves. However, its sample size is relatively small, and its regional sampling is not as thorough as other samples (despite being designed to represent Indonesia). This study utilized the individual-level sections from the 2007 and 2014 iterations of the Indonesian Family Life Survey (IFLS). Results from the IFLS can be seen as representative of the Indonesian population living in the 13 IFLS provinces in 2007 and 2014. Lastly, the calculation also utilized BPS-Statistics Indonesia (2014), which reports the results of the Social Resilience modules in the 2012 and 2014 Socio-Economic Survey (n=75,000 in 2014). While the BPS-Statistics Indonesia data uses a larger sample size drawn from all provinces of Indonesia, it lacks the time span to cover the period of interest. Table E1 compares the three data sources:

Table E1. Comparison of the main data sources

	World Values Survey	Indonesian Family Life Survey	Socio-Economic Survey (Social Resilience)
Temporal coverage	2001, 2006, 2018	2007, 2014	2012, 2014
Sample size	2001: n =1,000 2006: n = 2,015 2018: n = 3,200	2007: 29,000 2014: 31,000	2014: 75,000
Regional coverage	2001: 5/34 provinces 2006: 10/34 provinces 2018: 20/34 provinces	13/34 provinces	34/34 provinces with sampling in all cities/regencies
Intended represented population	Adult population of Indonesia	Adult population of the 13 provinces sampled	Adult population of Indonesia
Covered items	Group membership, political actions, trust, confidence in institutions, as well as tolerance	Trust, tolerance	Community participation, trust, tolerance
Advantage	Extensive list of questions and objects, extensive temporal coverage, key items are consistent over waves, open access	Adequate list of questions, possibility to conduct cross-section and longitudinal analysis	Large sample size, large population size, several key items are covered
Disadvantage	Sample size and regional coverage are relatively small, different surveying standards between waves	Regional coverage is relatively small, temporal coverage is relatively small (only seven years)	Questions differ over waves, consistency between waves is not as robust as IFLS or WVS, limited temporal coverage, limited access

Sources: BPS-Statistics Indonesia, 2012, 2014; World Value Survey (Inglehart et al., 2022); Rand, 2007, 2014.