UNIVERSITÀ POLITECNICA DELLE MARCHE
FACOLTÀ DI ECONOMIA "GIORGIO FUÀ"

Corso di Laurea Magistrale in International Economics and Business

The Effect of Rice Price Changes on Poverty and Income Inequality in Indonesia

L'effetto delle variazioni del prezzo del riso sulla povertà e sulla disuguaglianza di reddito in Indonesia

Relatore:

Prof. Riccardo Lucchetti

Tesi di Laurea di:

Brenda Hadiana ADIWIJAYA

Anno Accademico 2021 - 2022

Table of Contents

Abstract

Domestic rice prices in Indonesia have been steadily increasing over the past two decades, and the government appears to be supporting it. They believe that higher rice prices will increase rice farmers' wealth and reduce poverty incidences, especially in poor rural areas. The underlying assumption is that rural poor rely heavily on agricultural activities for their livelihoods.

The scholars are divided into pro and anti-high price groups. The first group argues that spillover effects exist, and therefore higher rice prices will benefit the Indonesian economy as a whole. Meanwhile, the latter group shows that the majority of Indonesians are net rice consumers. Hence, higher prices will drive more people closer to the poverty line. Jokowi, the current president of Indonesia, with his rice import bans policies, stands with the pro-high price group.

With a panel regression analysis, I found that rising rice prices had a negative impact on both poverty and the Gini index. The higher rice prices, the higher the poverty and Gini index would be. This effect is especially significant for poverty incidence. The impact on the Gini index is weak, leaving us with two possibilities of what might happen to the rich when rice prices are high: their wealth is unchanged. Hence, the Gini index increases. Or, they suffer the negative impact as well, leaving the Gini index unchanged. Either way, the poor always suffer the negative impact.

Keywords: *rice prices, poverty, income inequality, panel, time trend, rice policies.*

Riassunto

I prezzi interni del riso in Indonesia sono aumentati costantemente negli ultimi due decenni e il governo offre un sostegno al prezzo. Si ritiene che l'aumento dei prezzi del riso aumenterà la ricchezza dei coltivatori e ridurrà l'incidenza della povertà, specialmente nelle aree rurali povere. Il presupposto di fondo è che, per il sostentamento, le zone rurali dipendono fortemente dalle attività agricole.

Gli studiosi sono divisi in gruppi pro e anti-prezzo elevato. Il primo gruppo sostiene che esistono effetti di ricaduta e quindi l'aumento dei prezzi del riso andrà a beneficio dell'economia indonesiana, mentre, il gruppo che segue un pensiero improntato sull'anti-prezzo elevato, mostra che la magior parte degli indonesiani sono consumatori netti di riso e di conseguenza, prezzi più alti porteranno più persone maggiormente vicino alla soglia di povertà. Jokowi, l'attuale presidente dell'Indonesia, con le sue politiche di divieto di importazione di riso, è dalla parte del gruppo pro-prezzo alto.

Con un'analisi di regressione panel, è stato scoperto che l'aumento dei prezzi del riso ha avuto un impatto negativo sia sulla povertà che sull'indice Gini. Maggiore è il prezzo del riso, maggiore sarebbe la povertà e l'indice Gini. Questo effetto è particolarmente significativo per l'incidenza della povertà. L'impatto sull'indice Gini è debole, lasciandoci con due possibilità di cosa potrebbe accadere ai ricchi quando i prezzi del riso sono alti: la loro ricchezza è invariata. Quindi, l'indice Gini aumenta, ma si può anche subire un impatto negativo, lasciando quest'ultimo invariato. In ogni caso, i poveri subiscono sempre un impatto negativo.

Keywords: prezzi del riso, povertà, disparità di reddito, panel, andamento temporale, politiche del riso.

Chapter 1

Introduction

Rice is the staple food for all social classes in Indonesia. Per capita rice consumption was recorded at 103,74 kilograms in 2019 (Susenas, 2019). In the same year, total rice consumption was 27,69 million tons, where 75% of it was household consumption. Rice constituted 21.55% of food expenditures in the lowest consumption quintile, compared to only 6.85% for the top quintile (BPS, 2019). This indicates that lower quintiles will be most likely to receive the impact of rice price fluctuation. As in other commodities, price fluctuation is highly affected by the movement of supply and demand. Rice production is seasonal, which causes abundant supply during harvesting season and scarcity during rainy season. Rice consumption, however, is stable throughout the year. The potential imbalance between rice supply and demand makes it very important to have a certain level of rice reserves. This reserve mostly comes from imported rice. Other than to ensure sufficiency of rice supply, the existence of imported rice also helps to keep rice prices at a reasonable level. In 2019, Indonesia imported 444 thousand tons of rice, mainly from Pakistan and Myanmar, whereas domestic production was recorded at 31,31 million tons (BPS, 2019).

Although Indonesia is the third-largest country in terms of global rice production, most farmers still use non-optimal production techniques. Rice production in Indonesia is dominated by smallholder farmers, not by big private or state-owned enterprises. Smallholder farmers account for around 90 percent of

Indonesia's rice production, with each farmer holding an average land area of less than 0.8 hectares. As of 2019, rice fields constituted 20% of land usage in Indonesia (Agricultural Ministry, 2019). Dry fields or gardens use up to 34% of Indonesia's cultivated land. This percentage is even smaller now considering many rice fields are being converted into non-rice fields usage. Seasonal harvesting, demanding maintenance (fertilizer, seeds, rent), and very low protection of rice farmers' welfare have made the number of rice farmers decrease every year. Not to mention industrialization, which has reached many rural areas. This in turn has motivated rice field owners to sell or convert their lands for other usages.

Traditional rice farmers dominate the lowest consumption quintile. Despite being a part of a commodity that is largely traded, small rice farmers barely enjoy a wealthy life, especially those who don't have their own rice fields. The required costs until harvesting season and small power in the rice market have left very little room for rice farmers to enjoy the benefits when rice prices are rising. Poverty and rice policy have long become part of debate subjects in Indonesia. When a seasonal import ban was applied in January 2004, rice prices steadily increased. The World Bank claimed that this has pushed at least 3.1 million people into poverty (World Bank, 2006). However, the Indonesian Farmers Association rejected this view, claiming that the rising price had instead boosted rice production since rice farmers were motivated by the higher price. Further, many academics criticized World Bank's research that attributed the rising rice prices primarily to import bans, and their claim that this was the main cause of rising poverty incidence.

Rice policy in Indonesia is mainly executed through Bulog (a state logistics agency). The policy used to be both highly restrictive and extremely liberal: restrictive because imports were only allowed by Bulog, but also liberal because Bulog was given an explicit mandate to stabilize prices around the world's price (McCulloch, 2008). Bulog successfully maintained a domestic price that followed the world's price until the late 1990s. The Asian Financial Crisis in 1998 ended this arrangement. The widespread perception of high levels of corruption within Bulog resulted in the removal of the agency's import monopoly and forced the liberalization of rice trading. Although a specific tariff was added a year later, the free trade policy in rice continued until January 2004. This was the starting point of rising rice prices since import bans were being debated between World Bank and Indonesian academics above. Today, rice import is strictly for reserves and only to obtain certain types of rice, such as those needed for people with diabetes or other diseases. The government aims to fulfill domestic rice needs only from domestic rice production. However, considering the non-optimal rice production process and the long distribution chain, rice price in Indonesia is now higher than the world level. Commentators have been urging the government to relax the rice trade policy so that more imported rice could enter the market, hence bringing domestic rice prices closer to the world's price. Lower rice price will benefit the end consumer. However, is it harmful to small rice farmers who are mostly living in poverty? Does higher prices help them to raise from poor welfare? Or, after all, does rice price actually have any effect on poverty levels? These are the questions that will be analyzed further in this thesis.

I will limit the observation period to be only from 2014 to 2019, which was the first presidential period of Joko Widodo, or better known as Jokowi. He rose to popularity during his governance as Mayor of Solo city in Central Java. He was perceived as pro-poor due to his humble background. Growing up in a poor family, his motivation to enter the political world was to help poor people to achieve a better life quality. He became Jakarta's governor in 2012 for 5 years period, but then left the title upon victory in the 2014 presidential election. His governance was not free from protests and critics. The most notable ones were his decision to cut fuel subsidies and letting rice prices keep rising. However, considering his motivation to increase the poor's welfare, Jokowi seemed to have succeeded. Farmers' welfare is often measured through *Nilai Tukar Petani* or Farmers Index, which is the ratio between farmers' cost and revenue to produce rice. The higher the index, the better the farmers' welfare. This index steadily increased throughout his governance. Therefore, now the question that this thesis tries to answer would be:

Did rising rice prices actually affect poverty and income inequality during Jokowi's first presidency period?

Chapter 2

Literature Review

2.1 The Importance of Rice to Indonesia

Rice is the main staple food for the 274 million people in the country. Its role in the economy is huge both at the macro and micro level. Food and drinks occupy 25% of Indonesia's CPI (Trading Economics, 2022). Rice itself is 14.9% of the food CPI (Statista, 2022). Hence, a change in rice prices would immediately show its impact on inflation, poverty, and eventually balance of payments. As will be elaborated further, rice import is one of the government's tools to prevent domestic rice prices from surpassing ceiling price. From the employment side, about 29% of Indonesian work in agriculture (Susenas, 2022), not to mention employment in the rice trade and processing. Employment in agriculture is still very significant, especially in rural areas which are dominated by the poor. Many of them produce rice as well as consume it. Given its importance in various aspects of Indonesians' lives, rice policy, especially related to the price, has long become the subject of heated debate in the political stage.

Indonesian rice consumption is barely affected by income level, which means that at any level of income, people would try to maintain the same amount of rice consumed. There are several substitute options such as corn, potato, and cassava. However, most Indonesians still choose rice to satisfy their carbohydrate needs. It's a common view that rice consumption signifies wealth. Changing from rice to cassava or corn is perceived as a "downgrade". Hence, no wonder that the

way the poor handled their decrease in purchasing power was by decreasing food quantity and changing food composition, where reducing rice consumption quantity would be the very last option. This of course, would negatively affect nutritional balance, especially for babies and growing children.

Asia produces 90% of total rice in the world (Mariyono, 2014), where the top five rice producer countries (according to the rankings) are China, India, Indonesia, Bangladesh, and Vietnam. However, only 5% of global rice production is traded on international markets, indicating a high level of each countries' own consumption. The high level of consumption has made rice prices incredibly sensitive to changes in supply and demand. Despite being one of the top five rice producer countries, Indonesia still imports rice every year. In fact, Indonesia is a net importer of rice. The growth in Indonesian rice production cannot keep up with Indonesian population growth, not to mention that rice stocks level depends on harvesting season. Hence, the shadow of rice scarcity lurks during the dry season, followed by the threat of rising prices. Rice import acts as the cushion to keep the stability of rice price and ensure sufficiency of rice stocks. The magnitude of import varies depending on level of domestic production, international prices, current rice stocks, and current rice import policy.

Considering the exporting countries also consume a great quantity of rice, their governments of course, would prioritize sufficiency of domestic stocks before releasing the rest to export. This is very true in case of natural disaster or changing climate which could affect rice harvesting quantity. A sudden change in rice exporters' trade policy could lead to stockpiling and speculation by rice importing countries. As a result, rice prices in the importing countries will

increase and poverty rates are very likely to increase as well, because poverty is often measured by the capability to afford basic food needs. To prevent this, and to reduce dependency toward other rice producing countries, it is very important to ensure that rice needs can be fulfilled from domestic production. Realizing the importance of rice for its people, Indonesian rice policies were aimed at achieving self-sufficiency.

Interestingly, one of the issues to be addressed in order to achieve rice self-sufficiency is diversification from rice to other carbohydrate sources. In the discussion about Indonesia's food security challenges, Timmer (2004) emphasized the benefit of diversification to rice farmers. He used the example of China's liberalization of grain trade. The liberalization caused the price of grain to fall and forced grain farmers to seek more profitable crops and livestock activities. Even though it seemed as if the grain farmers were put in an unfavorable position, it actually helped them to escape the trap of low incomes from grain production. They no longer rely on grain harvest and had additional sources of income. This, of course, could be applied to the case of Indonesian rice farmers.

The benefits of diversification from rice for the consumers were discussed by the trade ministry in the publication about rice commodity profile. To achieve rice self-sufficiency, one of the strategies is to reduce dependency on rice consumption. Reducing rice consumption will give time for rice production to keep up with Indonesian population growth. Additionally, it can enrich variation to Indonesian nutritional diet. Eventually, rice needs could be fulfilled by domestic production and rice imports would be no longer necessary. In other words, diversification from rice would contribute to Indonesia's balance of payments.

Taking into account the various importance of rice for Indonesia, rice policy has gone through several changes over the decades. So far, the focus of rice policy is centered on the price, with occasional programs to help rice farmers improve their productivity. This will be discussed further in the next section.

2.2 Evolution of Indonesian Rice Policy

Indonesia gained independence in August 1945. Since then, there have been three political periods with different approaches for development of rice sector. The first period was the "Old Order" under the presidency of Soekarno, who ruled from 1945 to 1967. In this era, agriculture, including rice production, was neglected since it was not regarded as a leading sector for economic growth (Kawagoe, 2004). Soekarno opted to focus on the establishment of metropolitan infrastructure. As a result, the rice economy in this era was inhibited by low per capita consumption, persistent imports, and volatile prices (Suwidjana, 1981). The neglection caused a lack of cultivated area and stagnating yields. Rice production growth was even lower than the rate of population growth.

Rice sector received more attention in the "New Order" era under the presidency of Soeharto, who ruled from 1967 to 1998. Rice production in Indonesia has always been characterized by a lack of efficiency and innovation. Soeharto's government launched various programmes to enhance rice sector development. However, most of these programs failed due to poor planning, mismanagement, and technical constraints. The common characteristics of these programs were that the government offered help in the form of packages to increase rice production, then required rice farmers to sell the government some parts of the harvested rice at a certain price. At the beginning, the packages consisted of seeds,

fertilizers, land cultivation equipments, and credit facilities. However, it was soon to be clear that most farmers didn't have the required skills and knowledge to utilize the aids. The government then included technical help to educate rice farmers. Some programs utilized students from agricultural universities, while some utilized professional assistance from foreign corporations.

None of these programs lasted until today. Some programs did succeed at the beginning, but later failed due to mismanagement and lack of motivation. This was mainly due to the obligation to sell the rice to the government at a price that was often below the market level. Farmers underreported the rice harvesting quantity to avoid selling to the government. Further, some farmers decided to sell the equipment, fertilizers, and seeds to the free market. Hence gaining profit because they got it for free or at cheap price with government's support. Many farmers even exploited the credit facilities by avoiding repayment. The government barely received any result, the budget for this program was running out, and rice farmers' productivity was, although improved, far below expectations.

Luckily, Soeharto's government also developed various infrastructures that were essential to the rice sector. Improvement of irrigation systems and roads in villages have eased the burden of rice farmers. Dry season was no longer a huge threat and harvested paddy could be transported easily to the mills and markets. Indonesian rice production grew at 4.6% annually from 1969 to 1990. Further, they also allocated generous budget to subsidize rice farming inputs. Soeharto's regime influenced the prices of all biochemical inputs to rice production since 1968.

The costs of seeds, water, fertilizers, pesticides, fuel and machinery were reduced at various times by specific price or credit subsidies.

It was also in Soeharto's era that the government started to intervene on rice prices in the market. The objective of the intervention was to stabilize rice prices at a level low enough for consumers but high enough to motivate farmers to produce. The price also must contain a sufficient range between floor and ceiling price to provide traders and millers a reasonable profit. Lastly, the domestic price must be close enough to the price in international markets. The stabilization also aimed to eliminate seasonal and geographical price variations.

As introduced before, the agency responsible for carrying out rice policies is Bulog, a state-owned logistics agency. They buy rice from areas with surplus rice production to prevent the price from falling below the floor price, then sell that rice surplus to areas deficit of rice to keep the rice price below the ceiling level. The floor price has covered production costs and a reasonable profit margin to incentivize farmers to increase their production. It is even adjusted every year to take inflation into account. However, it turned out that this policy benefited only farmers with marketable surpluses. Subsistence farmers that totally rely on rice cultivation barely receive any benefits from the policy, when in fact these subsistence farmers are the majority of Indonesian rice farmers. The floor price can be achieved only by farmers who have or own the threshing and drying facilities. Those that don't have the facilities must accept selling at a price that was 7 – 24% below the announced floor price. Hence, the buying from surplus and selling to deficit performed by Bulog concerned more about defending the ceiling price rather than ensuring all farmers received the floor price.

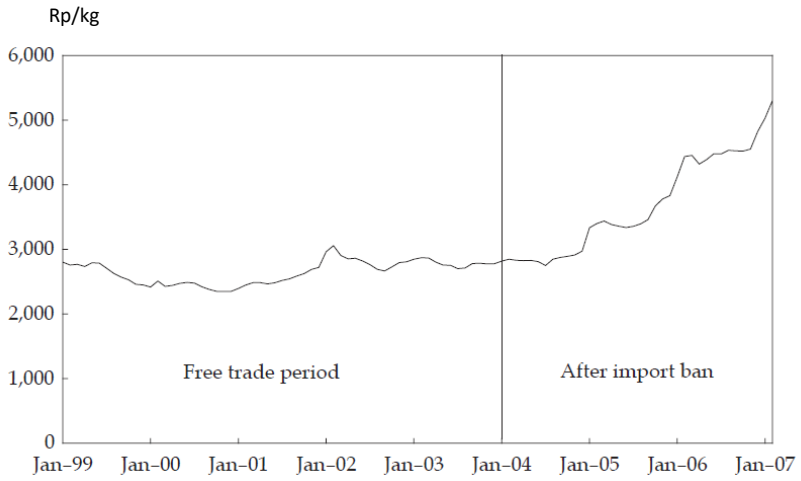
Bulog went on to perform rice logistics role until the end 1990s, before the Asian Financial Crisis hit in 1998. Despite various corruption issues, Bulog did manage to stabilize rice prices, which helped to equalize the portion of economic growth between the poor and the rich (McCulloch, 2008). The rice trade policy that was restrictive and liberal at the same time helped Indonesian rice prices to stay at the similar level with rice prices in the world market.

The financial crisis marked the end of Soeharto's regime. The preceding government's letter of intent to the IMF in September 1998 removed the rice trade monopoly by Bulog, including the import monopoly. Indonesia experienced free trade of rice for a while during the third political regime, which is often called the post-new order or reformation era. Before Jokowi, there have been three administrations in the reformation era: Abdulrahman "Gus Dur" Wahid (1999–2001), Megawati Soekarno Putri (2001–2004) and Susilo Bambang Yudhoyono (2004–2014). Under the first two presidents, agriculture together with other sectors experienced difficulties due to economic transition after the financial crisis and political instability.

Under the reformed era, development of the rice sector has become more decentralized. Local governments are empowered to take ownership of their own development paths. Agricultural District Services were born in various regions to supervise farmers in utilizing the help provided by local governments. The decentralization of agricultural research efforts has been identified in some countries as a necessary step to improve the research performance. It made services and research outputs more accessible and relevant to both regional and local levels (Indonesia Agricultural Agency for Research and Development, 2002).

Local governments have more rooms to explore and use their local resources to increase agricultural productivity. Because after all, they are the ones who know better about local conditions such as soil fertility levels, water resources and cropping patterns.

In terms of rice prices, after Soeharto's fall and temporary increase from the crisis, it was steady for a few years before starting to climb:



Source: McCulloch (2008)

Free trade took place from September 1998 until January 2004, and up until that Indonesian rice prices were still following the world level. When free trade was put to halt and import bans took place, rice prices started to rocket by 80% between January 2004 and January 2007. This was unsurprising because historically the amount of imported rice was around 4% of total Indonesian rice production. In the end, the government finally gave up and allowed some level of imports to reduce the price level.

Today, the government monitors rice price through a program called *Operasi Pasar Khusus* or OPK (Special Market Operation). They will send representatives to traditional market to identify the prevailing market price and based on the information will decide the necessity to import rice. To cater

especially for the poor, there is a program called *Raskin* or Rice for Poor Families. Poor families with valid identification can buy rice at very low price or even get the rice for free. Although, most of the time the rice quality is very poor and it is a common practice to resell the rice to other poor families who don't have the valid identification. In the end, *Raskin* program barely helps the poor to fulfill their food needs and alleviate poverty. It's not surprising that many studies have suggested that the market price of rice has a much higher impact on poverty than does the *Raskin* program.

The main debate in the rice economy is still torn between market liberalization and increased support for the rice sector. Freeing rice trade means rice imports will flow freely and Indonesian rice prices will soon decrease to follow the world price level. However, does the decreased rice price will hurt subsistence farmers, the group that dominates the poorest income quintile? On the other hand, increased support for the rice sector could mean the enhancement of protectionist policy. Rice imports will be either banned or subject to import tariffs, and self-sufficiency is a must.

2.3 The Effects of Rice Prices on Poverty and Income Inequality in Indonesia

Before diving further into the discussion, it is important to understand the mechanism of how rice prices will have an impact on poverty levels. McCulloch (2008), Warr and Yusuf (2005), Ikhsan (2005), and several other studies have agreed that there are at least three ways of how rice prices will affect the economic condition of the poor. The first, and the most obvious path, is through the net consumption position of a household. A household that consumes more rice than it produces will suffer a negative impact when prices are high. In other words, it

will get closer to the poverty line. Conversely, a household that produces more rice than it consumes will benefit from the rising price. This is known as the net benefit approach.

The second and third path is more of a spillover effect. When the price of a commodity is high, production output will be very likely to increase as well, so that they can gain more while the prices are high. Not only will higher output help farmers to increase their wealth, the need to increase production will open also more employment opportunities, including for unskilled labor. The rising employment demand will increase labor wages, and this is expected to counteract the negative effect of the rising rice price. Finally, the third path is through rising consumption expenditure in other sectors. Net rice producers who benefit from rising rice prices and unskilled labor who receive higher wages should have increased their consumption expenditure thanks to higher income. Since consumption expenditures come from various industries, the non-farm sectors should have enjoyed rising demand and rising wages as well. In the end, the whole economy received positive stimulation, which was started by the rising rice price.

So far, scholars who have studied this subject are divided into two groups: the anti-high price and the pro-high price. The first group argues using the first pathway of how rice price impacts poverty level, which is the net consumption or net production position. It is undeniable and statistically proven that majority of Indonesian are net rice consumers. They consume more than they produce, even those who dedicate their lives to working full time as rice farmers. McCulloch (2008) collected data on land ownership and agricultural employment in Indonesia. He found that agricultural land ownership is extremely skewed

towards larger land holders. More than 75% of Indonesian households do not control any rice fields. These rich landowners employ landless rice farmers to cultivate their rice fields. Hence, they are indirectly recognized as rice producers even though they do not work directly in the rice fields. In the event of rising rice prices, they are the clear winners. The vast land ownership makes them produce more rice than they consume. Landless households, on the other hand, will suffer because they have no option but to accept higher prices because, as elaborated before, rice consumption is barely changed regardless of higher prices. In the end, the study concluded that an increase in rice prices constitutes a transfer from the large majority of consumers to a minority of producers.

Ikhsan (2005) studied the change in welfare against increased rice prices. Similar to McCulloch, he found that an increase in rice prices has a negative impact on poverty levels. According to his study, each 10% increase in the price of rice will cause a 1% increase in the poor population. That means more than two million of Indonesian fall into poverty as the result of 10% increase in the price of rice. Another similar result was found in Warr's (2005) study. He used the general equilibrium approach to analyze the effect of a ban on rice imports. This approach takes into account the effect of import restrictions on both households' expenditures and incomes. It turned out that protectionist policy caused Indonesian rice prices to be higher than world level. He found that poverty incidence rose by a little under 1% and that it happened in both rural and urban areas. Only the rich farmers gain from the rising price.

On the opposing side, the pro-high price group argues with the spillover effect. Theoretically, this effect depends on the level of elasticity of Indonesian

market. The effect on wages also depends on how responsive the labor market and the change in wages are. McCulloch (2008) tried to analyze from the distributional effects point of view as well. He compared real agricultural wages and the lagged real farm-gate prices for paddy (freshly harvested rice) from the year 1996 to 2006. It turned out that the correlation was negative, which suggests that real wages are lower when real paddy prices are higher. However, this can be explained by an "imperfect transmission". There might be a lag between the period of rice price increase and the increased labor wages. Often times, rice millers fail to transmit rice price increases into higher buying prices from rice farmers. For example, the paddy price was 47% of the Bulog retail rice price in January 2004. In October 2006, the paddy price was still 47% of retail price, despite rice prices increasing by more than 60% over the period.

By using the general equilibrium model, Warr tested the claim that higher rice prices will motivate rice farmers to increase their output, hence gaining more during the period of high prices. He found that even with a large-estimated supply response, the effect was too small to counteract the increase in poverty due to higher rice prices. Hence, he stood on his conclusion that high rice prices hurt the majority of Indonesians, who are net rice consumers.

Gulati and Narayanan (2003) argue that while it is obvious the first and direct impact of higher rice prices would be beneficial mostly for net rice producers, one should take into account the spillover effect in the long run. Their paper encouraged rice trade liberalization. The expected effect of trade liberalization would be higher prices in the exporting countries and lower prices in the importing countries. Since Indonesia tends to be the importing countries, rice trade

liberalization would lower domestic rice prices. For the case of exporting countries such as Vietnam and Thailand, they found that rising rice prices reduced both the incidence and depth of poverty. As in the pro high price group, they use the spillover effects of rising labor wages and consumption demand in non-farm sectors as the drivers that reduce poverty index. Further, they point out that increased agricultural production would invite more investments into the sector. In the end, the economy as a whole will experience growth that was started by rising rice prices.

When it comes to income inequality, various studies (Asra, 2000; Leeuwen & Foldvari, 2017; McCulloch, 2008) have suggested that Soeharto's success in developing the agricultural sector in the 1980s had made economic growth in the period more equitable. Income inequality stayed around 33% from the early 1980s to 1998, which indicated that the poor enjoyed the positive impact from economic growth as much as the rich. As explained before, Soeharto's period was the one where domestic rice prices followed the world's price closely and where the government released generous funding to improve infrastructure related to farming activities. Clearly, it all points out to the fact that one of the key success to economic growth and equalized distribution is through agriculture, especially rice farming, considering its large impact on both rice producers and consumers.

Leeuwen and Foldvari (2017) analyzed the development of inequality and poverty in Indonesia from 1932 to 2008. They pointed out that poverty and inequality started to increase more upon Soeharto's fall. It is where Bulog was dethroned and the ensuing politicians started to promote protectionist rice policy. Imports were severely restricted through tariffs and quotas. Local production has

to work hard to fulfill the needs of local consumption. Domestic rice price started to climb, even exceeding world level. So, does the protectionist policy and high prices that follow are bad for Indonesians? Warr and Yusuf (2013) found that the import restrictions actually shielded Indonesia from the temporary world price increases in 2008. However, since world prices increased only temporarily, the long-run effect of Indonesia's protectionist policy was still deemed unbeneficial. It resulted in permanent increases in both domestic prices and poverty incidence. Their simulation showed that during the period of world food price increases, both rural and urban inequality in Indonesia decreased, but inequality in the whole economy increased. This was because the decrease in urban area was higher than that of rural area. Hence, when combined the overall inequality increased.

Mahadevan, Nugroho, and Amir (2016) investigated the effect of inward-looking trade policies on poverty and income inequality in Indonesia. Authors argue that import tariffs are basically an income redistribution from domestic consumers to domestic producers of the protected industry. Import tariffs have caused limited goods distribution at the expense of customers, because now they have to pay more for goods that could've been cheaper had the flow of imported goods been open. The general equilibrium model helped the authors to analyze the impact of mineral export taxes and import tariffs on poverty and income inequality in both rural and urban areas of Indonesia. For the case of import tariffs, there was no impact on both poverty and income inequality. However, the authors warned that any increase in the tariffs would cause a rise in rural and urban poverty and income inequality. As mentioned before, the majority of Indonesians, especially poor households, spend their expenditures on food. Since import tariffs

are the form of income transfer from consumers to producers, any further increase will harm consumers' ability to obtain goods, putting them closer to the poverty line. Income inequality is very likely to increase too, since disparities between consumers and producers will be higher as the producers in the protected industry received more income due to the import restrictions.

2.4 Rice Economy, Poverty, and Income Inequality in Jokowi's First Presidential Era

As introduced earlier, because of Jokowi's humble background, he made it his mission to raise people out of poverty. During his presidential campaign, he came to be viewed as a pro-poor figure. However, share of the population living in poverty increased during his first semester as president (October 2014 – March 2015), despite economic growth was close to 5% (Yusuf and Sumner, 2015). Rising food prices, the falling real wages of farmers, and the delayed disbursement of fuel-price compensation were blamed as the cause of this poverty increase. As hinted at in previous discussions, many studies blamed protectionist policy, particularly import bans, as the cause of rising rice prices and ended up putting more people closer to the poverty line.

Jokowi basically inherited protectionist policy from his predecessors. The idea of protectionism for food self-sufficiency was first sounded by Soekarno, the first president of Indonesia. Soeharto picked up and developed this idea through huge spending to develop the agricultural sector, especially rice. As elaborated above, Soeharto's rice economy was not fully protectionist. He welcomed the flow of rice imports (although highly controlled by Bulog, the state-owned food logistics company) as long as it helped stabilize domestic rice prices according to world price

levels. When the financial crisis hit Indonesia hard in 1998, the IMF came to the rescue to help Indonesia rise from the crisis. Ironically, the IMF's help was one of the factors that woke the nationalism tendency.

Patunru and Rahardja (2015) put forward four factors that motivated the rise of protectionism in Indonesia. Two reasons are related to the shifts in international trading events: a drop in Indonesia's competitiveness and a rise in active industrial policies in East Asian countries. Indonesia's competitiveness fell hard after the end of the commodity boom and China's accession to the WTO. Indonesia does not feel confident to compete with China, especially in labor-intensive products such as garments and furniture. Indonesia responded by closing itself off toward international trade in the hope of relying on domestic production and consumption. Related to China's economic success, many Asian countries now realize the importance of supporting domestic industries that are essential to economic growth. Hence, Indonesia is just one of the Asian countries that are now limiting themselves from international trade to focus on developing their own strategic industries.

As briefly mentioned before, the third reason for the rise of nationalism is that Indonesia suffered trauma from the IMF's help in the 1998 financial crisis. The long list of conditions that followed the IMF's loan did not help to overcome the crisis and limit the contagion. Not to mention the humiliation that many Asians felt during the negotiation process (Ito, 2012). After the 1998 crisis, it took five years for Indonesia to achieve the same level of GDP as before the crisis, seven years to return to the same level of GDP per capita, and fifteen years to restore its share of world GDP. Welcoming foreign investments and acceptance of financing

by foreign financial institutions were seen as a sign that Indonesia once again would follow foreigners' orders and not its people.

Just like the case where rice import bans protected Indonesia's domestic rice price from the world's food price increase in 2008, Indonesia's economic performance was overall healthy during the global financial crisis that year. Many commentators, especially the anti-foreigners group, argued that Indonesia managed to escape the crisis' impact due to its less engagement in foreign trade and higher orientation in the domestic economy. Lastly, the rise of nationalism is because of Jokowi's ambition himself. During the presidential campaign, he emphasized his nationalism tendency and repeatedly pointed out the importance of self-sufficiency in various aspects, not just in the food sector. It is also worth mentioning that his political party is led by the daughter of Soekarno, the first president of Indonesia, an ultra-nationalist.

The effect of protectionist policy is often deemed as harmful to the economy as a whole. In their analysis of trade protectionism in Indonesia, Patunru and Rahardja (2015) concluded that pursuing protectionist policy is more likely to be counterproductive for Indonesia. The reason is that Indonesia still suffers from various underdevelopments: infrastructures of energy, logistics, services, even economic regulations. Protectionism wouldn't improve the ability of domestic industries to compete at the global level. Further, it can hinder access to inputs, industry knowledge and technology.

Focusing on the impact of protectionist policies on rice and fuel, Patunru (2018) also concluded that nationalism in the form of rice import bans is harmful,

especially for the poor. He showed that Indonesia's rice price at the end of 2012 was 65% higher than the international price, and this drove millions of people into poverty. Rising rice price can easily drive people into poverty because of its significant share in households' expenditure. If only imported rice could flow into the market easily, market prices could be toned down and people, especially the poor, wouldn't have to worry whether they can afford to buy rice today or not. A similar view of impact was expressed by Yusuf and Sumner (2015) and McCulloch (2008). Some rice farmers might enjoy higher incomes, but this positive effect is outweighed by the loss in millions of rural poor who are net consumers of rice. After all, the main beneficiaries of higher rice prices are the rich, who own significant amounts of rice fields and capital. As mentioned before, farmers without access to rice mills wouldn't even get the floor price fully. Patunru (2018) hinted that Jokowi's motivation to enhance rice protectionist policy could be basically driven by political lobbying. Indonesian Farmers Association (HKTI) is the most vocal group when it comes to protection of the domestic rice industry. Key members of this association are rich farmers and traders, and not poor farmers. It's proven that trade restrictions tend to favor the organized group, who might lose its share when trade volume is increased.

A study by Hamilton-Hart (2019) analyzed Jokowi's policy package dedicated to developing the agricultural sector. She agreed that the main beneficiaries from protectionist policy (hence rising domestic prices) would still be those with vast amounts of rice fields and capital. However, there is an inclusivity potential in the food self-sufficiency movement. The old-school view is that development means a structural change from agriculture to manufacturing

industry. Today, many nations have realized the potential that the agricultural sector has to support economic growth and empower rural populations. The key lies in the emergence of relatively small-scale farming operations, which would help to spread the channel of economic growth. This of course, requires a breakthrough against domination of large landholdings. Japan, South Korea, and Taiwan are the success stories of how land reforms and shared growth could help the economy to develop further as a whole. Hence, basically, her argument is that while the outcomes of food self-sufficiency movement for totally poor and landless farmers might still be unbeneficial, the emergence of middle-sized farmers has at least seized a portion that all this time is enjoyed by only rich landowners. This could be the first foundation to lay down the channels for more inclusive growth.

To conclude, Jokowi's rice economy is inherited from his predecessors. He merely continued the food self-sufficiency movement and amplified it with increased subsidies to farming inputs such as seeds and fertilizers, and even credit facilities. Moreover, he instituted new policies to allocate land for agriculture. The aim was to redistribute at least nine million hectares of agricultural land to people in rural communities (Sulistyo, 2017). Nevertheless, this move was not free from criticism. Often times, these "allocated" lands were basically already owned and utilized by certain companies or people. So, Jokowi's land allocation program was simply the distribution of land certificates, not freeing up unoccupied lands and giving them to farmers in need. Despite the lack of actual land distribution, formalization of land ownership truly helped marginalized groups whose land claims were under the takeover threat in the absence of formal titles (Hall, Hirsch, and Li 2011).

2.5 Measurement of Poverty and Inequality in Indonesia: The Issues

Official estimates of poverty and income inequality are released by Indonesia's Statistics Center (for more explanation, please refer to Chapter 3). Unfortunately, poverty figures are often believed as inaccurate. Estimates of poverty levels are often accused of being much lower than in real situations. White (1996) argued that while it was true Indonesia's poverty level declined throughout Soeharto's government, the actual poverty incidence might not decline at the rate indicated by the official figures. He believed that poverty and inequality measurements were politically oriented.

Asra (2000) in his paper regarding poverty and inequality in Indonesia argued that non-food expenditures are the cause of why the official poverty line might be too low. Poverty line consists of food and non-food expenditures. The poverty line for food expenditures is calculated first, then adjusted for non-food expenditures. The problem is that Indonesia's adjustment for non-food expenditures is too low. For example, adjustment for non-food expenditures in Philippines' poverty line is between 40% to 90%, while in Indonesia (from 1981 to 1996) ranged between 14% to 22% in urban areas and 3% to 16% in rural areas.

Ideally, the proportion of food and non-food expenditures in poverty line should be close to the observed consumption pattern in national surveys. From 1984 to 1996, the share of the non-food component in the average per capita monthly expenditure varied between 46% to 52 % in urban areas and between 31% to 37% in rural areas. Meanwhile, in 1993, for example, the non-food share in the urban poverty line was 16.5% and 14.6% in the rural poverty line. Thus, the non-food share in total poverty line has been much lower than the non-food share

observed in the consumption patterns of Indonesian society. Does this mean that official poverty estimates are unreliable? Certainly not. Government is undoubtedly the most important party to reduce poverty incidence. Past economic policies did work to alleviate poverty. Hence, we still can utilize these figures for further analysis.

Regarding income inequality, the issue is more focused on its impact to economic growth as a whole. Is rising income inequality bad for the economy? Turns out, not always. A decline in the expenditure share of a group may occur at the same time as its increase in average expenditure (Asra, 2000). Inequality may increase simply because of expenditure or income of rich classes grows at higher rates than the rates of those in poor classes. Since the poor also experience improvement in their living standards, the increase in inequality may not pose serious problems. Further, rising inequality may also simply reflect a movement of people from low to high-income groups.

Gini coefficient is often thought of as 'too' aggregate to accurately examine the inequality of either income or consumption. Relying only on a single figure may lead to a failure in capturing distributional changes. Use of disaggregate data would have been more appropriate to evaluate changes in inequality across groups, for example, at the provincial level. This will help to improve evaluation of the distributional impact of government's developmental projects.

Further, one should pay attention to how long the different rates of increase in income/expenditure took place. The poor classes of course, would compare their own position relative to the so-called 'reference group' or higher expenditure

classes. When the lower classes see neither the overall changes in inequality (as measured by the Gini coefficient), nor the absolute increase in their real expenditure or income, they would understand that the gap is still increasing, and they certainly will question the distribution of economic growth for them.

2.6 What are we looking for?

Numerous studies have shown that increasing rice prices hurt the poor. More than 50% of their consumption expenditure is spent on food, especially rice. Indonesia is dominated by net rice consumers, including poor rice farmers in rural areas. Therefore, an increase in rice prices would hurt their buying power and put them closer to the poverty line. Considering that Jokowi has enhanced protectionist policies throughout his presidency, we could expect to see a rise in poverty incidence.

The effect on income inequality would depend on who received the benefits the most from rising rice prices. As hinted in the literature review above, land distribution in Indonesia is unequal. McCulloch (2008) has shown that ownership of rice fields is dominated by rich landowners. They would be the first to benefit from rising rice prices, and hence we can expect to see a rise in income inequality. However, Jokowi has put land redistribution as one of his policy packages to develop the agricultural sector. There is a possibility that income inequality would decrease instead, since previously landless farmers now own rice fields and could also benefit from the rising price.

And finally, my objective is to find out if rising rice prices do have any visible effects toward poverty and income inequality in a relatively short period.

Considering the huge portion spent on rice consumption in everyday life, I am expecting to see some degree of influence among rice prices, poverty level, and income inequality, in particular in the rural areas of Indonesia. I will use panel regression in the hope of finding out how far rice prices can affect poverty and income inequality, and how significant is the effect that is particular to each province.

2.7 Empirical evidence: What are the previous studies telling us?

Poverty and rice economy have long become the center of debates in Indonesia, especially nearing election. Hence, studies covering these subjects are abundant as well. However, there is not much that immediately links the impact of rice prices movements on poverty and income inequality. Some studies that did link these subjects used the general equilibrium model and net benefit approach (net producers vs net consumers) to analyze the impact of rice prices fluctuation in the past few years.

Table 2.1 shows the summary of past studies that are the most relevant to this topic to highlight their approach and results. I also included some research that focused on economics policy and its impact on poverty and income inequality in Jokowi's first presidential era. There are several points that stand out:

1. The scholars are divided into pro and anti-high rice price groups. According to the anti-high price group, increasing rice prices will increase poverty incidence, because the majority of the poor, especially those in rural areas, are net rice consumers. On the other hand, the pro-high price groups use the spillover effect as their argument. They argue that there is a possibility where increased rice

prices would motivate rice producers to increase their output. No matter whether the rice producer is a rich or small landowner, the need to increase output will open more employment opportunities. This will raise rural labor wages. The rise in rural income will also open the possibility of a rise in consumption expenditures, including non-food consumption. Eventually, the whole economy will benefit from rising rice price.

2. The effect of rising rice prices on income inequality has not been explored much yet, although it is implied that the effect would be similar as in poverty incidence. Since land distribution in Indonesia is skewed toward rich landowners, the tendency is that rising rice prices will increase income inequality.
3. The rice economy in Jokowi's era is still preserving the protectionist policy that was inherited from his predecessors. Past studies have suggested that Indonesia is not ready for a protectionist policy. The insufficient production capacity, infrastructure, and logistics facilities have caused domestic rice prices to exceed world prices. Import ban would inhibit the access to cheap rice prices, hurting majority of Indonesian who are net rice consumers.
4. The land redistribution policy has opened the possibility for rural farmers to have legal land ownership. Currently, the medium-sized landowners are already on the rise, and their existence has seized a portion of the benefit from higher rice prices that is usually enjoyed by only the rich landowners. Hence, Jokowi's land redistribution policy might have the possibility to equalize the benefits from rising rice prices

In this study, the panel regression will help to show the significance of rice prices fluctuation to poverty and income inequality, while taking into account the different effect that each province has in response.

Table 2. 1: Summary of relevant studies

Study	Title	Methodology	Findings
McCulloch (2008)	Rice Prices and Poverty in Indonesia	Net benefit approach	- The majority of Indonesians are net rice consumers. Hence, an increase in rice prices would increase poverty incidences. - Gains from rising rice prices are enjoyed the most by rich landowners. - Some medium-sized farms did enjoy the gains as well, but the positive impact is outweighed by the negative impact for the majority of Indonesian
Ikhsan (2005)	Rice Price Adjustment and its Impact to the Poor	Net benefit approach	- The majority of Indonesians are net rice consumers. - Increase in rice prices will raise poverty incidences - Spatial inequality will increase as a result of higher rice prices
Gulati, Narayanan (2003)	Rice Trade Liberalisation and Poverty	Empirical analysis	- Rice trade should be liberalized - The impact of declining rice prices for rice farmers would be outweighed by an increase in farmers' wages and overall consumption in rural areas

			- Trade liberalization will increase activity in the rice industry, which then invites more investment. Overall, liberalization will have a positive impact on economic growth.
Warr (2005)	Food policy and poverty in Indonesia: a general equilibrium analysis	General equilibrium analysis	- Rice import bans caused an increase in domestic prices relative to import price - Poverty incidence rose by almost 1% in both rural and urban areas - Only the richest farmers that gain from an increase in rice prices
Warr and Yusuf (2013)	World food prices and poverty in Indonesia	General equilibrium analysis	- Rice import ban saved Indonesia temporarily from world food price increase in 2008 - The impact of permanent rice import ban is still rising domestic price compared to world price, which resulted in increase of poverty incidence. Rural areas suffered higher poverty increases than urban areas

			- Gains to poor farmers were outweighed by loss for the majority of rural poor who are net rice consumers - Main beneficiaries of higher rice prices are owners of agricultural land and capital
Mahadevan, Nugroho, Amir (2016)	Do inward looking trade policies affect poverty and income inequality? Evidence from Indonesia's recent wave of rising protectionism	General equilibrium analysis	- The currently imposed import tariffs do not affect poverty or income inequality. However, any further increase will cause a rise in poverty and income inequality, in both rural and urban areas. - Protectionism policy which was intended to improve trade balance did bring some improvement. Nevertheless, it costs a substantial decline in real household consumption expenditure. Hence, it eventually leads to a fall in GDP growth.

Yusuf and Sumner (2015)	Growth, Poverty, and Inequality under Jokowi	Empirical analysis	- Slowing growth, rising food prices, the fall in farmers' real wages, and the delayed disbursement of fuel-price compensation had contributed to the rise in poverty despite economic growth was close to 5%. - Jokowi has to enhance his spending on infrastructure development and social spending to avoid further increases in poverty and to realize a more equal share of economic growth.
Patunru and Rahardja (2015)	Trade protectionism in Indonesia: Bad times and bad policy	Empirical analysis	- Reliance on protectionist policy is harmful for Indonesia's economic growth as it will miss the chance to participate in global trade chains. - Rather than pursuing interventionist policies, the government should have focused more on infrastructure, logistics, and consistency of rules and regulations.
Patunru (2018)	Rising Economic Nationalism in Indonesia	Empirical analysis	Protectionist policy is harmful, especially for rice commodity. The import ban has caused domestic prices to be higher than world price, which has pushed millions of people into poverty.

Hamilton-Hart (2019)	Indonesia's Quest for Food Self-sufficiency: A New Agricultural Political Economy?	Empirical analysis	Large landowners are still the main beneficiaries of rising rice prices. However, there is a rise of smallholding landowners who own a significant share of many agricultural crops. This can be the channel to equalize the share of economic growth. Land holdings can be further distributed through one of Jokowi's agricultural policy packages, which is to allocate and certify agricultural lands to people in rural areas.

Chapter 3

Data and Methodology

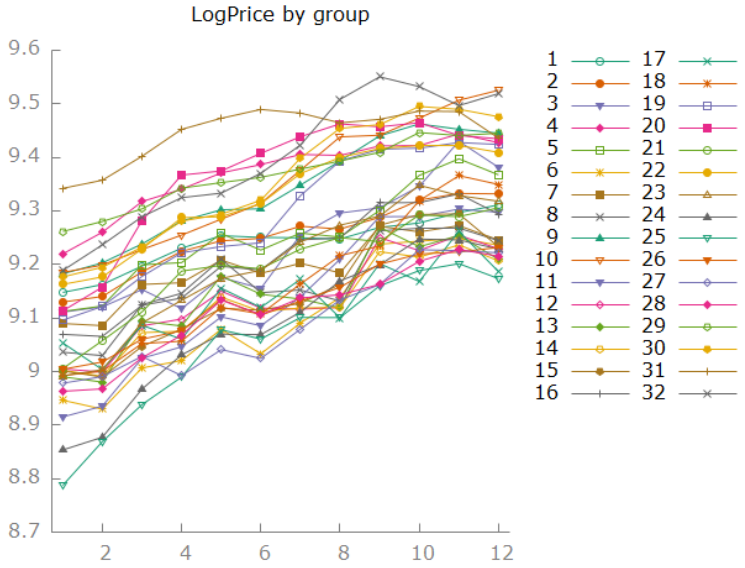
3.1 Data: The National Socioeconomic Survey (SUSENAS)

Susenas is a series of large-scale, multi-purpose, socioeconomic surveys that was started in 1963 and has been updated every year or two since then. Since 1993, SUSENAS surveys cover a nationally representative sample typically composed of 200,000 households. Each survey contains a core questionnaire which identifies household members' sex, age, marital status, and educational attainment. It is also supplemented by modules covering about 60,000 households that are rotated over time to collect additional information such as health care and nutrition, household income and expenditure, and labor force experience. The survey results are published in different issues/publications depending on the type of data collected. In this research, I use three data collected by Susenas: rice prices, poverty index, and Gini index. As of August 2022, there are 37 provinces in Indonesia. However, for the purposes of this study, I use data from 32 provinces because the last three provinces were officially recognized on 30 June 2022. The 2 provinces not included in this study are DKI Jakarta, which is the capital, and therefore not categorized as rural area, and North Kalimantan, because it was recognized as a separate province only in October 2012, and survey data of this province are still included in the data for East Kalimantan. The period covered is from March 2014 to September 2019.

3.1.1 Rice Prices

The rice price data is taken from Susenas' publication that is titled "Rural Consumer Price Statistics – Food Groups". This is an annual publication that comprises of foods' consumer prices in traditional markets of rural areas. The survey is performed monthly to calculate several indices such as Farmers Index and Household Consumption Price Index, which could indicate the rice farmers' wealth and rural households' buying power. Since 2009, the survey covers 32 provinces in Indonesia except DKI Jakarta, the capital, because the main purpose of this publication is to show consumer's food prices in rural areas.

The survey is performed between the dates of 10 to 14 every month. For January, the published price is based on average prices from three to four different traders of the same goods. For the other months, the calculation is based on a ratio between the average price of the respective month to the average price of the previous month. The panel plot below shows the movement of rice prices throughout the observation period.



There are 12 time periods in the panel plot because the observation spanned from March 2014 to September 2019, and the data is presented per semester. The overall trend of rice prices was increasing. There were some decreases at some point, but in the end, the prices in all provinces as of September 2019 were higher than their beginning point in March 2014.

3.1.2 Poverty Headcount

Poverty is calculated from consumption and expenditure data every March and September of each year. Someone is categorized as poor when he lives below the poverty line. Poverty line consists of consumption expenditures of foods and non-foods. The first step is to determine a reference population, that is, 20% of people who live above last year's poverty line (adjusted with inflation). Then, calculate the value of consumption expenditures on 52 basic food commodities of this reference group. The value is simply the average price of each commodity multiplied by the consumption quantity.

$$\sum_{k=1}^{52} \mathrm{V}jkp = \sum_{k=1}^{52} (\mathrm{P}jkp \; x \; \mathrm{Q}jkp)$$

Vjkp = Value of consumption expenditure for commodity k in area j in province p

Pjkp = Price of commodity k in area j in province p

Qjkp = Consumption quantity of commodity k in area j in province p

Then, it is converted into expected calorie consumption, which is 2,100 kilo calorie per capita per day.

$$\text{APK}jp = \frac{\sum_{k=1}^{52} \text{V}jkp}{\sum_{k=1}^{52} \text{K}jkp} \text{ x } 2{,}100$$

APKjp = Average price of calorie consumption in area *j* in province *p*

V*jkp* = Value of consumption expenditure for commodity *k* in area *j* in province *p*

K*jkp* = Calorie of commodity *k* in area *j* in province *p*

Non-food expenditures are calculated by summing up the selected non-food commodities that are deemed essentials, such as housing, clothing, education, and health. The selection is updated to follow the changes in consumption patterns. To calculate the minimum expenditure value, we need a ratio between a group's expenditure on a certain commodity versus the total expenditure recorded in Susenas' survey. However, this ratio has not been updated since 2004. Minimum non-food expenditures are simply calculated by multiplying the ratio with the value of non-food expenditures

$$\text{MNFE}jp = \sum_{k=1}^{52} (\text{R}kj \ \ x \ \text{V}kjp)$$

MNFEjp = Minimum Non-Food Expenditures of area *j* and province *p*

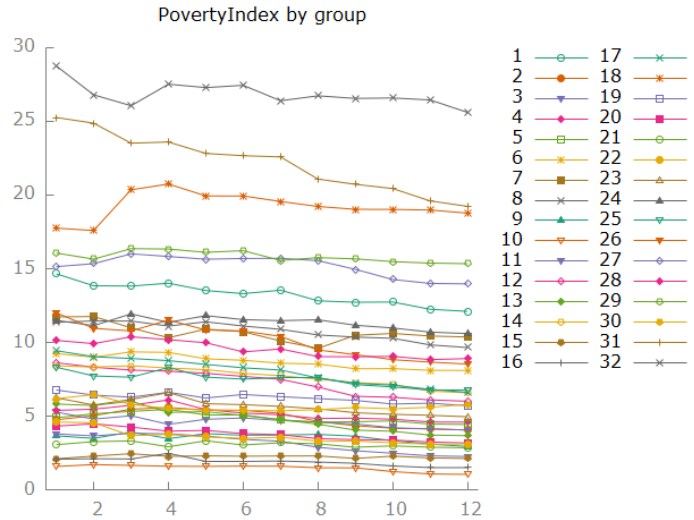
Rkj = Ratio of non-food expenditures for commodity *k* in area *j*

V*kjp* = Value of non-food expenditures for commodity *k* in area *j* province *p*

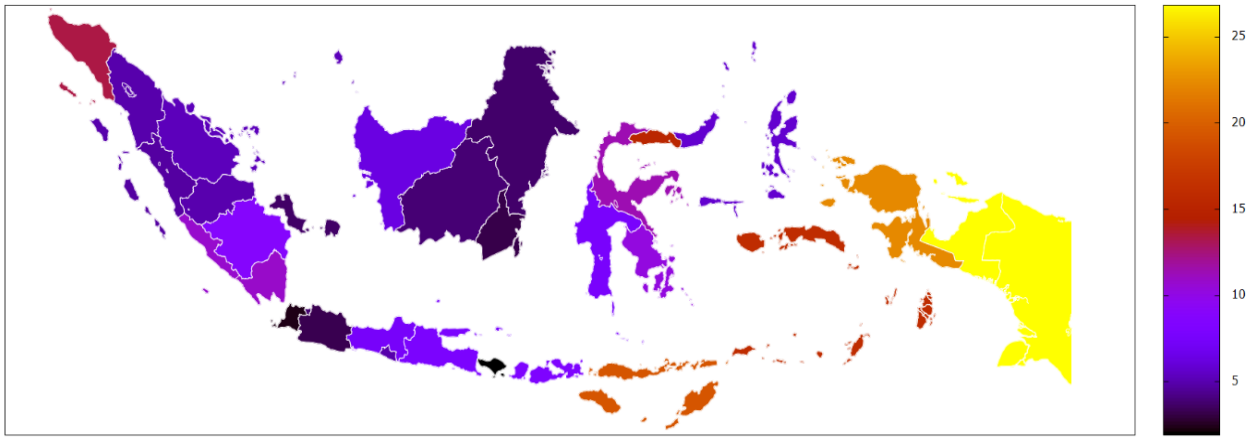
Finally, the poverty line is simply: Poverty Line = APK*jp* + MNFE*jp*

The panel plot of the poverty index shows a different story from the fluctuation of rice prices. The trend of poverty index in the observation period was decreasing.

Poverty incidence in most provinces decreased, only East Nusa Tenggara (province 18) that was visibly increased.



Using poverty index data and Geojson map, I developed the Indonesian poverty map to show how each province is facing different poverty incidences:



[redacted]

Areas with darker color have a somewhat better poverty incidence than those with lighter color. The eastern part of Indonesia, starting from East Nusa Tenggara (right under Sulawesi, the "k" shaped island), suffers the most poverty, and it's getting even worse on Papua Island. These regions often suffer drought, malnutrition, and underdeveloped infrastructure.

It is worth mentioning that Java island produces majority of rice supply in Indonesia, followed by Sulawesi and Sumatera island. The eastern islands do have vast amounts of land, but they are mostly dry lands which are not suitable for rice fields. Papua has better soil quality compared to the Nusa islands, but most of it is still wild and needs to be irrigated before ready for planting. However, due to its far distance from the rest of Indonesia, Papua's rate of emigration is very low. Since land utilization for rice fields is not even across islands, forcing domestic rice production to fulfill local needs is more likely to be harmful than it is to motivate higher production. However, we will discuss this further in the next chapter.

3.1.3 Gini Index

The Gini index is a single number that shows the degree of inequality in a distribution of income/wealth. The calculation is based on the difference between an individual's income and a group's average income. Hence, it is an estimation of how far the group's wealth or income distribution deviates from a totally equal distribution.

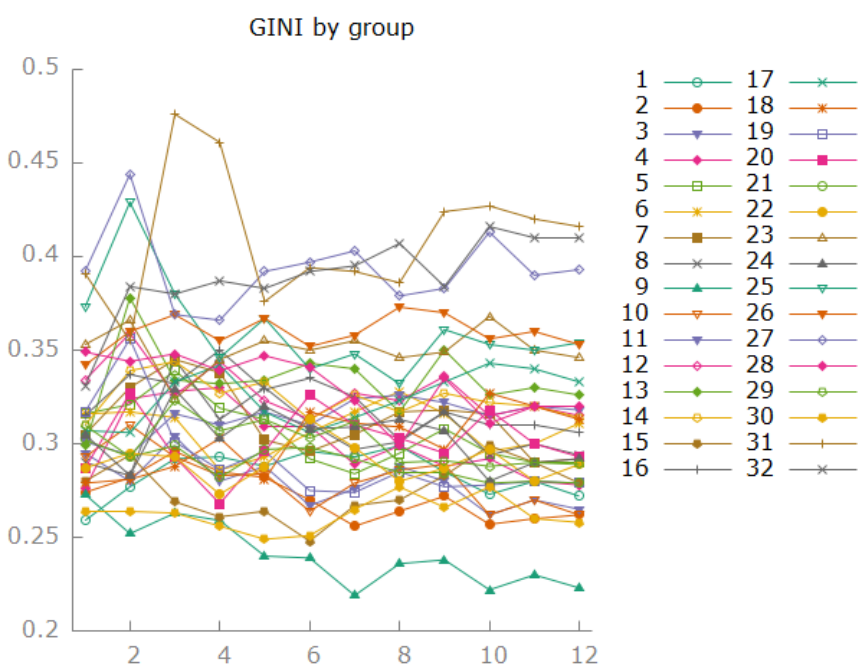
The Gini index can be calculated as the normalized average of the absolute difference between all pairs in the population:

$$\text{Gini} = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|yi-yj|}{2n^2\bar{y}} \quad \text{where } i \neq j$$

In relation to the Lorenz curve, Gini is the area between the perfect equality line and the Lorenz curve itself:

Despite representing income inequality, consumption expenditure is more often to be used as a proxy for income in Gini calculations because it is easier to measure. Indonesia's Gini index is calculated with consumption expenditures. The value is between zero and one, where the closer the index is to a value of 1, the higher the inequality.

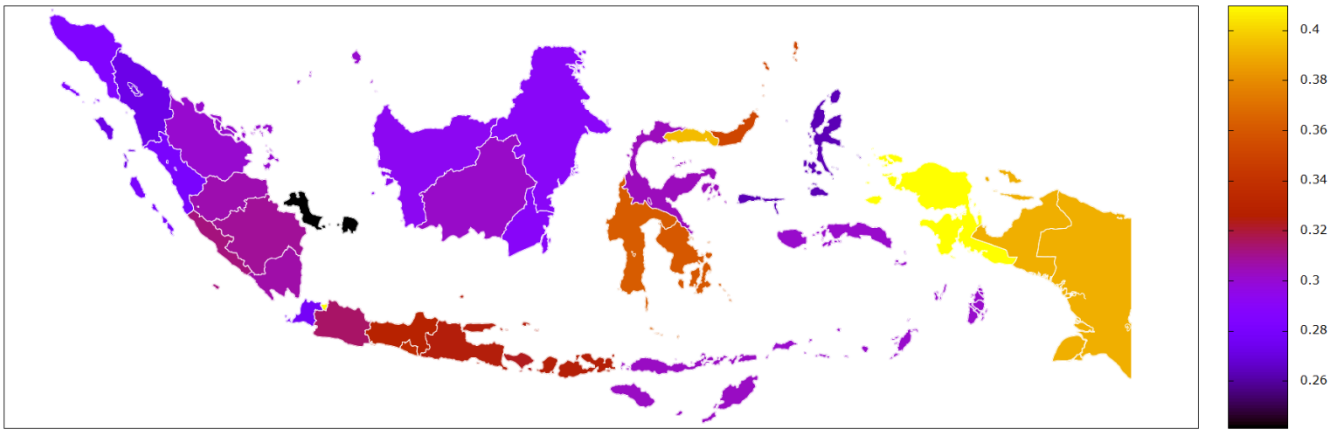
The panel plot below shows the Gini index fluctuation in the observed period:



Compared to poverty, the Gini fluctuation is way more varied. Some provinces ended up with higher indexes and some ended up with lower figures. This reflects the differences in development of provinces throughout Indonesia. Based on standard deviation, the Gini index fluctuates the most in West Papua, the second poorest province in Indonesia. The poorest Indonesian province, Papua, stood at the 4th rank in Gini fluctuation for the period. The highest Gini occurred in March 2015 in the West Papua province at 0.476 level. As mentioned in the second chapter, the period from September 2014 to March 2015 was the first semester of Jokowi's presidency. Poverty incidence rose despite economic growth recorded at 5%. One of the drivers of this increase was the rise in fuel prices and late fuel compensation.

The first thing Jokowi did in his governance was to cut fuel subsidy. This step was controversial but necessary, because the cut was essential for reallocation to higher spending on infrastructure and social aid. Howes and Davies (2014) in their discussion about Indonesia's recent development pointed out that without a cut to fuel subsidies, Indonesia will face major trade-offs between deficit control and investment in social programs and economic infrastructure. Since the 1997–98 crisis, increasingly large fuel subsidies have curtailed the fiscal space for additional government social spending. Despite the subsidy cut, Jokowi realized the impact that rising fuel costs meant rising prices, both for food and non-food items. Hence, he introduced direct transfer to the eligible poor to help them cope with the rising prices. Some administration mishaps naturally occurred and caused late disbursement. The compensation was delayed from November 2014 (right after the subsidy cut) to April

2015. Therefore, the poor were left unprotected to rising prices, especially in the first three months of 2015 where the impact of the fuel subsidy cut was visible. Upon the transfer realization, fortunately, the poor can cope better, hence we can see that the Gini index in most provinces declined after March 2015.



[redacted]

The map above shows the differences in the Gini index across provinces throughout Indonesia. Once again, Papua Island suffers the highest income inequality compared to the rest of Indonesia. As mentioned before, Papua suffers the lag in development due to its huge distance from Java island, the most developed region in Indonesia. Over the past few decades, West Papua has been the home to PT Freeport Indonesia, a subsidiary of the giant mining corporation Freeport McMoran. They do help to develop some infrastructure there, but only if it is relevant and beneficial for their operations.

So far, working for this corporation (and some other foreign companies there) is one of the few ways to get out of poverty in Papua. The recruitment process is considered difficult, but it is understandable considering that they do pay the

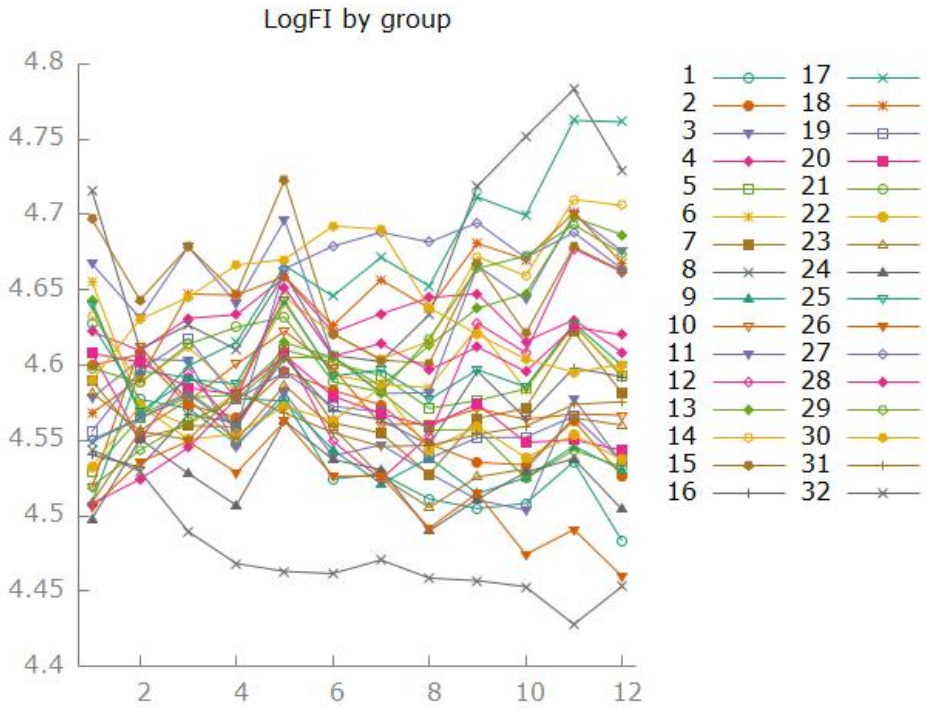
employees really well. However, the existence of this company is also one of the reasons why income inequality in Papua is high. Basically, living in Papua can be comfortable if you work for foreign companies. Working for local government? Much lower, but can afford you daily needs. Other than that? It's most likely back to traditional lifestyles such as fishing, gardening, and informal labor. The lack of access to education there has hindered even the literacy rate. Income inequality, which then translates into social inequality, has caused even further problems such as riots, terrors on working sites, and a generally unsafe environment.

3.1.4 Control Variable: Farmers Index

Control variables are necessary to infer the relationship between dependent and independent variables. Control variables are those that may have a potential effect on the dependent variable, but they are not of our particular interest in the study. Realistically, there are many variables other than independent variables included in a model that can affect the dependent variables. Control variables help us to diminish the potential spuriousness in the model due to variables that are not included in it. Hence, control variables account for additional explanations for the relationship between dependent and independent variables. This enables us to get a more useful result in the research.

In this research, I will use the farmer's index as the control variable. The farmer's index is the indicator that can immediately tell us about the level of farmers' wealth. As briefly mentioned before, 29% of Indonesian labor force work in agricultural activities. Hence the fluctuation of this index certainly relevant to

changes in poverty and income inequality. This index is a comparison between the amount received by farmers and the amount paid by the farmers. The amount received is obviously derived from the prevailing market price of the commodity, while the amount paid by the farmers consists of their living costs plus the costs needed for farming activities such as seeds, fertilizers, pesticides, farm equipments, etc. Farmers index that is higher than 100 indicates that farmers are experiencing surplus, and index values that are lower than 100 indicate that farmers are suffering deficits.



Similar to Gini, the panel plot of the farmer's index has a more varied trend compared to the poverty index. The farmer's index is basically a ratio between a farmer's output and input value. The lower the input value, the higher the index is. As mentioned in the second chapter, the development of the rice sector under the reformation era is entrusted to each local government. This includes the freedom to

subsidize farming inputs and fund research activities to increase the efficiency of inputs usage. Hence, this has driven variation in the farmer's index across provinces. Mariyono (2014), in his research to evaluate rice production efficiency, found that efficiency of rice farming outside of Java and Bali islands is still low.

3.2 Why Panel?

Past studies that relate rice prices with poverty and income inequality used the net benefit approach and the general equilibrium method. These approaches are more suitable when the aim is to determine the size of the impact of rice prices fluctuation toward poverty and income inequality. In net benefit approach, severity of the impact is based on net position in terms of rice consumption. As mentioned before, when the net position is net consumer (rice consumption is higher than rice production), this group will suffer the most from rising rice prices. And vice versa, when a group's position is net producer (rice consumption is lower than rice production), this group will be the beneficiary of rising prices.

On the other hand, the general equilibrium model is more robust compared to the net benefit approach. The robustness appears from the fact that it takes into consideration not only the change in consumption expenditure but also the change in incomes. This approach gives the best results when we want to prove whether rice price changes do have a spillover effect toward incomes, especially to the unskilled labors in rice farming areas. As in the argument of the pro-high price group, the negative effect of rising rice prices is countered by the positive effect which takes form

of rising real wages, as well as rising consumption in non-farming industries due to now people in farming industry have higher consumption power.

So far, there is barely any study which has tried to identify the effect that is unique to each province when facing the fluctuation of rice prices. This difference is one of the reasons why government intervention in the form of Bulog was needed in the first place. Some provinces simply have better soil fertility than the others. Hence, they can produce more rice than the others. Or, some provinces have fewer people. Hence, they don't run out of rice as fast as the other provinces. This was where Bulog came up to purchase rice from provinces with surplus rice stocks, then sell it to provinces with low supply of rice to make sure that rice prices throughout Indonesia were under the ceiling price. Now that Bulog's role in terms of price intervention is no longer intense, the endurance against poverty threat due to rising rice prices practically depends on each province itself. Panel regression will help us identify the significance of this unique component.

As is well known (see Verbeek, 2000), panel data allow identification of certain parameters or questions, without the need to make restrictive assumptions. It is most useful when we suspect that a response variable depends on explanatory variables which are not observable, but are correlated with the observed explanatory variables. In this research, the possible unobservable variables could be the family size, the amount of cash transfers received from the government, land ownership size, etc. If such omitted variables are constant over time, panel data estimators allow to consistently estimate the effect of the observed explanatory variables. A panel data

set contains repeated observations over the same units throughout certain periods. The availability of repeated observations on the same units will enable us to specify and estimate more complicated and more realistic models than a single cross-section or a single time series would do. Panel data are suitable not only to model or explain why individual units behave differently but also to model why a given unit behaves differently at different time periods, for example, because of a different past. Panel data makes it possible to identify the source of changes on an individual level.

Suppose that we are observing variables for individual i (i = 1, …, N) within period t (t = 1, …, T). The standard linear regression model would be:

$$Y_{it} = \beta_0 + x_{it}\beta + \varepsilon_{it}$$

In this model, the intercept β_0 and the slope of β are identical for all observations and periods. All unobservable factors that affect Y_{it} are contained in the error term ε_{it} that varies over individuals and time. In regular OLS, the error term is assumed to be uncorrelated over different time. However, since in panel data we observe the same thing over several periods, it is unlikely that the error terms in different periods are uncorrelated. In this research, for example, poverty will be affected by unobservable characteristics that may vary over time. Since the error term in panel data cannot be assumed to be uncorrelated over different times, the error term is divided into two terms:

$$\varepsilon_{it} = \alpha_i + u_{it}$$

The u_{it} is the one assumed to be homoskedastic and uncorrelated over time, while the α_i is time invariant and homoskedastic across individuals. This is the so-called random effects model. It assumes that although explanatory variables have fixed relationships with the response variable across all observations, these fixed effects may vary from one observation to another. When the error term is constructed in this way, the resulting estimators β_0 and β will be more efficient than estimators from regular OLS.

When we assume that $E\{x_{it}\varepsilon_{it}\} = 0$, we also assume that observable regressors, the x_{it}, are uncorrelated with unobservable characteristics in both αi and u_{it}. In reality, however, it is very likely that $E\{x_{it}\alpha_i\} \neq 0$, which means that the unobserved heterogeneity in α_i is correlated with one or more of the explanatory variables. With the availability of repeated observations over the same individuals in a panel dataset, we can use the fixed effects model to address this problem. Fixed effects model uses individual-specific intercept terms in the model:

$$y_{it} = \alpha_i + x_{it}\beta + u_{it}$$

where α_i acts as the fixed unknown constants that are estimated along with β, and the u_{it} is the error term assumed to be i.i.d. over individuals and time. The regular constant, the β_0, is omitted and replaced by the individual intercepts α_i. It is common to refer to α_i as fixed (individual) effects. This captures both the observable and unobservable time-invariant differences across individuals. It is called fixed effects because the intercept has the same effect for either a change from one period to the

other, or a change from one individual to another. In this approach, consistent estimation does not impose that α_i and x_{it} are uncorrelated.

3.2.1 The Model

I will develop both fixed effects and random effects models, then show the comparison to determine which one is the most suitable model for further analysis. Choosing between fixed and random effects is not easy. Random effects models enable us to make inferences with respect to the population's characteristics, because fixed effects vary over different observations. However, when we suspect that α_i and x_{it} are correlated, a fixed effects model would be more appropriate. Hausman test will help us to decide. The idea of the test is to compare how different the estimators from fixed effects and random effects are, with the null hypothesis that x_{it} and α_I are uncorrelated. A significant difference between the two estimators indicates that we should reject the null hypothesis. Which in that case a fixed effects model would be more appropriate.

Further, I will also run the model with and without a time trend regressor. A time trend, or time index, is the ordered set of natural numbers, for example, t = (1, 2, 3, 4 …), that measures the time span between observations. The slope of a time-trend line represents the growth of a variable. Time trends are often used in regression equations to predict or explain economic variables. It serves as a proxy for non-measurable variables when explaining economic relationships. For example, in our study we specified poverty and income inequality as a function of rice price changes and the farmer's index. A time regressor will capture other factors that affect

changes in poverty and income inequality, such as changes in education level (increasing school attendance), improved access to cheaper production factors, etc. Hence, the models will be formulated as follows:

- Fixed effects – Poverty (POV) – with time regressor

$$POV_{it} = \alpha_i + \beta_1 P_{it} + \beta_2 FI_{it} + \beta_3 t + u_{it}$$

- Fixed effects – Poverty (POV) – without time regressor

$$POV_{it} = \alpha_i + \beta_1 P_{it} + \beta_2 FI_{it} + u_{it}$$

- Fixed effects – Income inequality (Gini) – with time regressor

$$Gini_{it} = \alpha_i + \beta_1 P_{it} + \beta_2 FI_{it} + \beta_3 t + u_{it}$$

- Fixed effects – Income inequality (Gini) – without time regressor

$$Gini_{it} = \alpha_i + \beta_1 P_{it} + \beta_2 FI_{it} + u_{it}$$

- Random effects – Poverty (POV) – with time regressor

$$POV_{it} = \beta_1 P_{it} + \beta_2 FI_{it} + \beta_3 t + \varepsilon_{it}$$

- Random effects – Poverty (POV) – without time regressor

$$POV_{it} = \beta_1 P_{it} + \beta_2 FI_{it} + \varepsilon_{it}$$

- Random effects – Income inequality (Gini) – with time regressor

$$Gini_{it} = \beta_1 P_{it} + \beta_2 FI_{it} + \beta_3 t + \varepsilon_{it}$$

- Random effects – Income inequality (Gini) – without time regressor

$$Gini_{it} = \beta_1 P_{it} + \beta_2 FI_{it} + \varepsilon_{it}$$

where P represents rice price changes, FI represents farmer's index, and t represents the time regressor. I transform the value of rice price and farmers index into a natural logarithm so that the resulting coefficients can be interpreted as a relative change. Upon running the regression, I will take a look at the results of Hausman test to determine whether fixed effects model or random effects model is the most suitable. I use Gretl to run the regression and various tests to analyze the fitness of the model.

Chapter 4

Analysis

4.1 With or without time regressor?

As mentioned before, I run the panel regression two times for each fixed effects and random effects model, where one is without a time regressor and one is with a time regressor. I also use robust standard error to deal with heteroskedasticity problems.

Turns out that time variable plays an important role: without a time regressor, the correlation between rice price and poverty and the Gini index is negative. This means that the higher the rice price, the lower the poverty and Gini index should be. It's as if the data support the spillover effect, where rising rice prices will result in higher net income for rice farmers and giving a positive impact into non-rice industries as well. This is of course possible. However, we need to take into account that our dependent variables, which are poverty and the Gini index, are affected not only by rice prices and the farmer's index that we have included in the model, but also by various economic factors. Which is why in the next models we use the time variable as one of the regressors.

The coefficient sign for rice price is changed when we insert a time variable into the model. The coefficient sign for rice price becomes positive, both when we use poverty and the Gini index as the dependent variable. Hence, the higher rice prices, the higher the poverty and Gini index would be. The sign for the time coefficient is

negative, which means that regardless of the independent variables, both poverty and Gini index will go down anyway over time because that is what appeared in the time trend. And this is of course caused by various factors, both measurable and non-measurable. As explained before, time trend variable helps us to capture the effect from exogenous variables that affect the dependent variable. When we omit the time variable from the model, the sign can be misleading because in reality there are various factors that can affect the fluctuation of poverty and the Gini index. Hence, we can say that the model with a time regressor is more representative of the actual condition.

4.2 Fixed or random effects model?

Some may say that a random effects model is more preferable than a fixed effects model, because the individual effects vary across observation. However, when we suspect that the explanatory variables (the x_{it}) and individual effects (α_i) are correlated, we have to use the fixed effects model, because the random effects ignore this correlation and could give us inconsistent estimators.

Hausman test helps us to choose between fixed and random effects models. This test measures how different the estimators are in the two models. The null hypothesis is that explanatory variables (the x_{it}) and individual effects (α_i) are uncorrelated. Since we will use models with time regressors for further analysis, we will pay attention only to the results of Hausman tests of these models. The p-values of Hausman tests for random effects models are 0.6823 (poverty index as dependent

variable) and 0.1642 (Gini as dependent variable). Since both p-values were higher than 5%, we accepted the Ho and used the random effects model for further analysis.

The regression results are summarized in the table below:

dependent variable: poverty index

	without time regressor		**with time regressor**	
Variables	**Fixed effects**	**Random effects**	**Fixed effects**	**Random effects**
Constant	50.0682 (***)	50.1428 (***)	-16.9532	-17.0147
LogPrice	-3.80418 (***)	-3.79222 (***)	3.38483 (**)	3.40216 (**)
LogFI	-1.43292	-1.47324	-0.96122	-0.982056
Time	N/A	N/A	-0.222123 (***)	-0.222544 (***)
Breusch – Pagan test	N/A	0	N/A	0
Hausman test	N/A	0.592723	N/A	0.682315

dependent variable: Gini

	without time regressor		**with time regressor**	
Variables	**Fixed effects**	**Random effects**	**Fixed effects**	**Random effects**
Constant	0.589443 (***)	0.608034 (***)	-0.0585724	0.0466606
LogPrice	-0.0226924	-0.0232416	0.0468165	0.0362348
LogFI	-0.0144009	-0.0173484	-0.0098401	-0.0118963
Time	N/A	N/A	-0.00214766 (**)	-0.00187182 (***)
Breusch – Pagan test	N/A	2.27646e-309	N/A	1.29392e-307
Hausman test	N/A	0.354657	N/A	0.164169

4.3 The effect of rice price changes on poverty index

The model is as follows:

```
? panel PovertyIndex 0 LogPrice LogFI time --robust --random
Model 7: Random-effects (GLS), using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: PovertyIndex
Robust (HAC) standard errors

             coefficient   std. error      z      p-value
  -------------------------------------------------------
  const      -17.0147      13.2780      -1.281    0.2000
  LogPrice     3.40216      1.49798      2.271    0.0231   **
  LogFI       -0.982056     1.20837     -0.8127   0.4164
  time        -0.222544     0.0504919   -4.408    1.05e-05 ***

Mean dependent var   8.408594   S.D. dependent var   5.995655
Sum squared resid    13436.62   S.E. of regression   5.938580
Log-likelihood      -1227.451   Akaike criterion     2462.902
Schwarz criterion    2478.705   Hannan-Quinn         2469.170
rho                  0.546739   Durbin-Watson        0.655505

'Between' variance = 36.8483
'Within' variance = 0.214379
theta used for quasi-demeaning = 0.977987
corr(y,yhat)^2 = 0.0282738

Joint test on named regressors -
  Asymptotic test statistic: Chi-square(3) = 87.5083
  with p-value = 7.51021e-019

Breusch-Pagan test -
  Null hypothesis: Variance of the unit-specific error = 0
  Asymptotic test statistic: Chi-square(1) = 2047.7
  with p-value = 0

Hausman test -
  Null hypothesis: GLS estimates are consistent
  Asymptotic test statistic: Chi-square(2) = 0.764528
  with p-value = 0.682315
```

As mentioned before, the model is based on data from rural areas in 32 provinces of Indonesia within March 2014 to September 2019. The effect of rice price changes on the poverty index appears to be quite significant with a p-value of 2.31%. Hence, we've found the answer to the question of whether rice price changes affect poverty: yes,

there is some effect of rice price changes on poverty levels. The coefficient sign is positive 3.4, and since it is expressed in logs, we can say that the relative response of the poverty index to a change in rice price is 3.4. For example, a 10% increase in rice prices could push the poverty index to become 30.4% higher.

The log of the farmer's index does not appear to have an impact on poverty levels. The coefficient sign is negative, which we could interpret as the higher the farmers index, the lower the poverty level should be. This makes sense, because a farmer's index is calculated by dividing farmers' income with farmers' expenses. High farmer's index indicates wealthy farmers. The index's increase could be caused by rising income for the farmers (driven by rising prices and/or rising quantity), or lower expenses (driven by lower farmers' living costs and/or decreasing farming expenses due to subsidies). Despite more than 25% of Indonesian works in agriculture, this index does not have significant impact to changes in poverty level in this model.

The time trend variable has the highest significance in the equation. The p-value is way smaller than 5% that it receives 3 stars, which indicates its importance in the model. Therefore, time regressors have been proven to have a significant impact toward changes in poverty index. As mentioned before, the coefficient is negative, which means that over time the poverty index will decrease regardless of what happened to the rice prices and farmer's index.

Time regressor reminds us to take into consideration other things that could affect poverty. We can find tons of studies regarding factors that affect changes in poverty in Indonesia since this is one of the most popular debate topics, especially

nearing the presidential campaign. Using time-series OLS regression analysis, Asrol and Ahmad (2018) found that GDP, average length of education, life expectancy, and government spending on infrastructure are factors that significantly affect poverty. They suggest that the poverty problem can be addressed through a more equal spread of economic growth. This can be done through increasing the average length of education and life expectancy, creating a more conducive investment climate and labor-intensive works, and population control through family planning programs. Last but not least, the government needs to pay more attention to infrastructure development, especially in poor areas. Human and infrastructure development in Indonesia is still uneven, which is visible from the spread of poverty index in different provinces. Provinces number 32 and 31 are Papua and West Papua, which are well known for being the poorest provinces in Indonesia. The long distance from the capital, lack of reliable human resources and proper infrastructure have long become problems which hinder both human and economic development there.

Using panel regression analysis on subnational data in Indonesia, Balisacan, Pernia, and Asra (2000) found that there is a huge difference in poverty change across the country, mainly due to the difference in subnational economic growth and local attributes. Economic growth is not the only factor to affect the rate of poverty change. Infrastructure, human capital development, agricultural price incentives and access to technology influence the welfare of the poor, both directly and indirectly through their impact on economic growth itself. Alleviating poverty requires not only fostering economic growth (which often times is measured through GDP growth) but also

taking into account the effect of non-measurable factors that can contribute to improve welfare of the poor. In relation to this study, it's clear that raising rice prices alone is unlikely to boost productivity (hence the farmers' income) in the hope of reducing poverty. When the price is high, a rice farmer may receive more selling value than usual. However, does this higher income hold when compared to the farmer's overall living costs? Does he actually experience income growth compared to when rice prices were low? Poverty is a dimensional problem and reducing it needs careful assessment. Rising the price of a commodity that is well known as the most popular source of income for the poor is not necessarily the right step to alleviate poverty.

4.4 The effect of rice price changes on Gini index

The model is as follows:

```
? panel Gini 0 LogPrice LogFI time --robust --random
Model 10: Random-effects (GLS), using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: Gini
Robust (HAC) standard errors

             coefficient   std. error       z      p-value
  -----------------------------------------------------------
  const       0.0466606    0.247464       0.1886   0.8504
  LogPrice    0.0362348    0.0299361      1.210    0.2261
  LogFI      -0.0118963    0.0348732     -0.3411   0.7330
  time       -0.00187182   0.000685349   -2.731    0.0063  ***

Mean dependent var   0.314078   S.D. dependent var   0.040820
Sum squared resid    0.654573   S.E. of regression   0.041449
Log-likelihood       679.0153   Akaike criterion    -1350.031
Schwarz criterion   -1334.228   Hannan-Quinn        -1343.763
rho                  0.192977   Durbin-Watson        1.432024

'Between' variance = 0.00142244
'Within' variance = 0.000264513
theta used for quasi-demeaning = 0.876469
corr(y,yhat)^2 = 0.000890307

Joint test on named regressors -
```

```
  Asymptotic test statistic: Chi-square(3) = 11.4868
  with p-value = 0.009365

Breusch-Pagan test -
  Null hypothesis: Variance of the unit-specific error = 0
  Asymptotic test statistic: Chi-square(1) = 1405.57
  with p-value = 1.29392e-307


  Hausman test -
  Null hypothesis: GLS estimates are consistent
  Asymptotic test statistic: Chi-square(2) = 3.61372
  with p-value = 0.164169
```

In this model, neither rice price changes nor farmer's index have a significant impact on the Gini index. Nevertheless, the signs of these coefficients are as expected. LogPrice has a positive coefficient, which implies that the higher rice price, the higher the Gini index would be. On the other hand, the coefficient for the farmer's index is negative, just as in the model where poverty index was the dependent variable. Hence, the higher the farmer's index, the lower the Gini index should be. The only significant variable in this model is the time trend. The coefficient sign of this variable is -0.00187, which means that over time the Gini index will decrease regardless of changes in rice prices or farmer's index. Therefore, from this model we have figured out that rice price changes do not affect the Gini index.

The Gini index is calculated with consumption expenditure, which consists of food and non-food expenditure. So why does rice price have an effect on poverty index but not Gini index? The difference is rooted from the method used in consumption measurements to calculate poverty and the Gini index. As mentioned in the second chapter, the food consumption in poverty line is more reflective of the actual situation, while non-food consumption is often suspected to be too low. The food consumption is

calculated based on the price of minimum calorie consumption, adjusted every year for inflation. Since the composition of calorie consumption is barely changed, the figure is heavily affected by the changes in the price of the commodities. On the other hand, the composition of non-food consumption in the poverty line has not been updated since 2004, not to mention that its proportion does not reflect the non-food consumption in expenditure data that SUSENAS also collects. Since Gini is calculated with actual consumption expenditure, the non-food expenditures are more reflective of actual condition. Although food consumption (hence the rice consumption) is also significant in total consumption expenditure (food consumption is 25% of Indonesian's CPI), the effect of changes in food consumption is not as strong in the Gini index as it is in the poverty index. Therefore, the possibility that changes in rice prices affect the poverty index is stronger than in the Gini.

Similar to poverty, the issue of income distribution is also a hugely debated topic. This provides us with various studies that tried to identify factors affecting income inequality and how to deal with it. Most these studies agrees that infrastructure development is the key factor to reduce income inequality across provinces in Indonesia. With Tobit regression analysis, Kataoka (2017) found that R&D expenses, infrastructure investment, and interprovincial connectivity affect technical efficiency of input-output operation in Indonesia. This level of efficiency contributes significantly to interprovincial income inequality.

Using panel data from 26 provinces in Indonesia, Kuncoro and Murbarani (2016) also found that infrastructure development through investments affect income

inequality, in addition to economic openness. Further, they also found that income inequality from 1994 – 2012 showed a decline, although the pattern was that inequality tended to rise before decreasing. As discussed by Asra (2000), a rise in income inequality may simply reflect a movement of people from low to high-income groups. As long as the poor also enjoyed the growth, at least at the equal rate, the curve would decrease over the time, which indicates a decrease in inequality.

Jokowi did make a difference compared to his predecessors to tackle unequal developments across provinces. One of his programs called "Sea Highway" is aimed to enhance connectivity of the eastern part of Indonesia. For now it is focused on logistics. Rice price in West Papua as of March 2014 was Rp 11,409/kg. As of September 2019 the price in the same province was Rp 12,531/kg, which increased only by 10%. The increase in other regions could vary up to 47%. Hence, this "Sea Highway" program did succeed to ease the logistics access for people in the eastern part of Indonesia. Indonesia still has a long way to solve unequal income distribution. The journey might be rough and difficult, but it's certainly possible.

Chapter 5

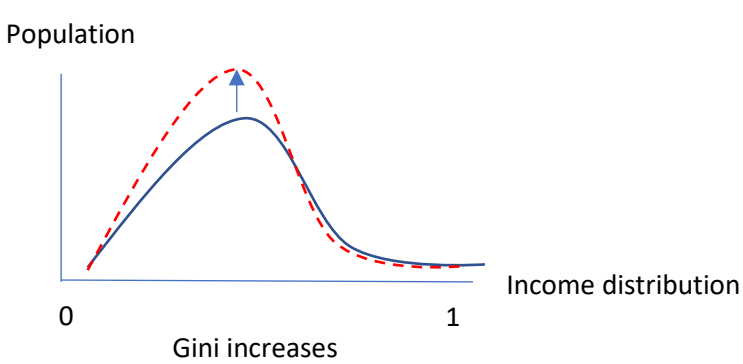
Conclusions

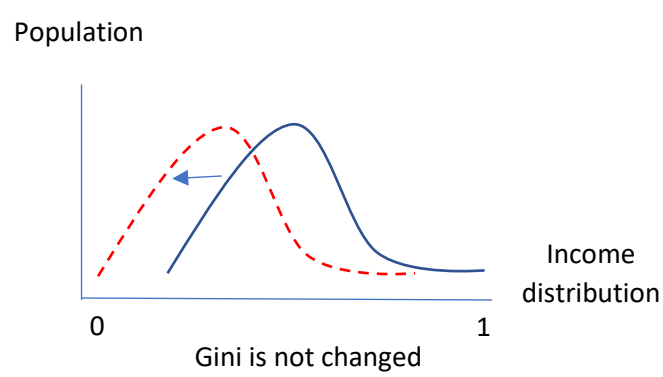
We started this study by questioning whether rice price changes affected poverty and income inequality during Jokowi's first presidential era. Upon gathering the existing literature, we found that there are two views regarding rice prices: those who are pro-high prices and those that are against high prices. The pro-high price group convinces us with a spillover effect, that higher rice prices would motivate farmers to increase their productivity. The rise in productivity will open more employment opportunities, which then translate into rising real farmers' wages, and eventually benefit the non-farm industries because of the higher buying power of rice farmers. Those that are against the high price argue that the majority of Indonesians are net rice consumers, even those who work full-time as rice farmers. Hence, rising rice prices would end up hurting the majority of the population and worsen the poverty incidence.

To answer our question, we develop a panel linear regression, and per our screening process in Chapter 4, we decided that it is best to focus on the random effects model with a time regressor. The result is that the effect of rice price increases is negative toward both poverty and the Gini index. The positive coefficient of rice price in the two equations shows that the higher the rice price, the higher the poverty and Gini index would be. The impact toward Gini is insignificant, while toward poverty is significant, but at least the coefficient sign in both equations is as expected.

We obtain this result after taking into account that both poverty and the Gini index have their own trend over time. If we did not consider this, we would have obtained a misleading result, which has been explained in Chapter 4 (*4.1 With or without time regressor?*).

The weak impact of rice price changes on a change in the Gini index leaves us with two possibilities of what happen to the rich when rice price increases. First, suppose that the reality adheres to our model that, albeit weak, the Gini index will increase when rice price increases. This implies that while the poor suffer the negative impact, the rich don't suffer anything at all, which is why the Gini index increases: the poor are worse off, the rich are not, hence the income distribution becomes more unequal. However, since the significance of rice price is so weak that it is considered insignificant, it could also be the case that a rice price increase wouldn't change the Gini index at all. If this is the truth, it means that the Gini index does not change because both the poor and the rich suffer the negative impact from increases in rice prices. The composition of the poor versus the rich is still the same. It is just that the curve of the income distribution is shifted to the left, because everybody is worse off. The poor are always worse off in both scenarios.





The results of this study add further evidence that higher rice prices are harmful for Indonesians. The supporting studies have shown that the majority of Indonesians are net rice consumers. Rice farmers may enjoy higher selling value in periods of high prices, but eventually they have to pay more to consume rice. The benefit of higher selling value is outweighed by rising consumption expenditure. Raising rice prices is not sufficient and not necessarily true to reduce poverty and income inequality. It is apparent that Indonesia still lacks the required infrastructure and dynamics to realize the spillover effect.

For future studies, it can be useful to:

1. study the impact of rice price changes on total consumption expenditure, but disaggregated based on income quintile. It is supposed to give a clearer picture of how each income quintile responds to changes in one of the most significant consumption expenditure components.
2. increase the period of Gini index used to obtain more representative result
3. apply dynamic linear model to deal with autocorrelation problems.

Appendix

Panel regression – fixed effects model, without time regressor

```
? panel PovertyIndex 0 LogPrice LogFI --robust

Model 1: Fixed-effects, using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: PovertyIndex
Robust (HAC) standard errors

             coefficient   std. error   t-ratio   p-value
  -------------------------------------------------------
  const       50.0682       8.57524      5.839    1.94e-06 ***
  LogPrice    -3.80418      0.480342    -7.920    6.11e-09 ***
  LogFI       -1.43292      1.53569     -0.9331   0.3580

Mean dependent var   8.408594   S.D. dependent var   5.995655
Sum squared resid    111.3339   S.E. of regression   0.564001
LSDV R-squared       0.991914   Within R-squared     0.331999
Log-likelihood      -307.1555   Akaike criterion     682.3109
Schwarz criterion    816.6328   Hannan-Quinn         735.5889
rho                  0.657160   Durbin-Watson        0.525508

Joint test on named regressors -
  Test statistic: F(2, 31) = 31.4392
  with p-value = P(F(2, 31) > 31.4392) = 3.47813e-008

Robust test for differing group intercepts -
  Null hypothesis: The groups have a common intercept
  Test statistic: Welch F(31, 124.8) = 378.023
  with p-value = P(F(31, 124.8) > 378.023) = 6.03985e-109
```

```
? panel Gini 0 LogPrice LogFI --robust

Model 5: Fixed-effects, using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: Gini
Robust (HAC) standard errors

             coefficient   std. error   t-ratio   p-value
  -------------------------------------------------------
  const       0.589443     0.177833      3.315    0.0023  ***
  LogPrice   -0.0226924    0.0164814    -1.377    0.1784
  LogFI      -0.0144009    0.0330506    -0.4357   0.6661

Mean dependent var   0.314078   S.D. dependent var   0.040820
Sum squared resid    0.095729   S.E. of regression   0.016538
LSDV R-squared       0.849996   Within R-squared     0.021211
Log-likelihood       1048.129   Akaike criterion    -2028.257
Schwarz criterion   -1893.935   Hannan-Quinn        -1974.979
rho                  0.213692   Durbin-Watson        1.406548

Joint test on named regressors -
  Test statistic: F(2, 31) = 1.36598
  with p-value = P(F(2, 31) > 1.36598) = 0.27006

Robust test for differing group intercepts -
  Null hypothesis: The groups have a common intercept
  Test statistic: Welch F(31, 124.9) = 45.8992
  with p-value = P(F(31, 124.9) > 45.8992) = 2.89239e-054
```

Panel regression – fixed effects model, with time regressor

```
? panel PovertyIndex 0 LogPrice LogFI time --robust
Model 6: Fixed-effects, using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: PovertyIndex
Robust (HAC) standard errors

             coefficient   std. error   t-ratio   p-value
  -----------------------------------------------------------
  const      -16.9532      13.6687      -1.240    0.2242
  LogPrice     3.38483      1.48174      2.284    0.0294   **
  LogFI       -0.961220     1.20668     -0.7966   0.4318
  time        -0.222123     0.0500174   -4.441    0.0001   ***

Mean dependent var   8.408594   S.D. dependent var   5.995655
Sum squared resid    74.81815   S.E. of regression   0.463010
LSDV R-squared       0.994566   Within R-squared     0.551093
Log-likelihood      -230.8406   Akaike criterion     531.6813
Schwarz criterion    669.9538   Hannan-Quinn         586.5262
rho                  0.546739   Durbin-Watson        0.655505

Joint test on named regressors -
  Test statistic: F(3, 31) = 28.7891
  with p-value = P(F(3, 31) > 28.7891) = 4.30614e-009

Robust test for differing group intercepts -
  Null hypothesis: The groups have a common intercept
  Test statistic: Welch F(31, 124.8) = 583.338
  with p-value = P(F(31, 124.8) > 583.338) = 1.30591e-120
```

```
? panel Gini 0 LogPrice LogFI time --robust
Model 9: Fixed-effects, using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: Gini
Robust (HAC) standard errors

             coefficient   std. error    t-ratio   p-value
  ---------------------------------------------------------
  const      -0.0585724    0.263933      -0.2219   0.8258
  LogPrice    0.0468165    0.0318380      1.470    0.1515
  LogFI      -0.00984010   0.0336677     -0.2923   0.7720
  time       -0.00214766   0.000789364   -2.721    0.0106  **

Mean dependent var   0.314078   S.D. dependent var   0.040820
Sum squared resid    0.092315   S.E. of regression   0.016264
LSDV R-squared       0.855346   Within R-squared     0.056115
Log-likelihood       1055.100   Akaike criterion    -2040.201
Schwarz criterion   -1901.928   Hannan-Quinn        -1985.356
rho                  0.192977   Durbin-Watson        1.432024

Joint test on named regressors -
  Test statistic: F(3, 31) = 3.52688
  with p-value = P(F(3, 31) > 3.52688) = 0.0262124

Robust test for differing group intercepts -
  Null hypothesis: The groups have a common intercept
  Test statistic: Welch F(31, 124.9) = 43.3988
  with p-value = P(F(31, 124.9) > 43.3988) = 6.66588e-053
```

Panel regression – random effects model, without time regressor

```
? panel PovertyIndex 0 LogPrice LogFI --random --robust

Model 3: Random-effects (GLS), using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: PovertyIndex
Robust (HAC) standard errors

             coefficient   std. error      z       p-value
  ---------------------------------------------------------
  const       50.1428       8.58259      5.842    5.15e-09  ***
  LogPrice    -3.79222      0.474664    -7.989    1.36e-015 ***
  LogFI       -1.47324      1.53812     -0.9578   0.3382

Mean dependent var   8.408594   S.D. dependent var   5.995655
Sum squared resid    13977.56   S.E. of regression   6.049005
Log-likelihood      -1235.029   Akaike criterion     2476.058
Schwarz criterion    2487.910   Hannan-Quinn         2480.759
rho                  0.657160   Durbin-Watson        0.525508

'Between' variance = 36.8397
'Within' variance = 0.318097
theta used for quasi-demeaning = 0.973185
corr(y,yhat)^2 = 0.00153556

Joint test on named regressors -
  Asymptotic test statistic: Chi-square(2) = 63.987
  with p-value = 1.27468e-014

Breusch-Pagan test -
  Null hypothesis: Variance of the unit-specific error = 0
  Asymptotic test statistic: Chi-square(1) = 1997
  with p-value = 0

Hausman test -
  Null hypothesis: GLS estimates are consistent
  Asymptotic test statistic: Chi-square(2) = 1.04606
  with p-value = 0.592723
```

```
? panel Gini 0 LogPrice LogFI --random --robust

Model 7: Random-effects (GLS), using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: Gini
Robust (HAC) standard errors

             coefficient   std. error      z      p-value
  -----------------------------------------------------------
  const       0.608034     0.177620      3.423    0.0006  ***
  LogPrice   -0.0232416    0.0170063    -1.367    0.1717
  LogFI      -0.0173484    0.0347710    -0.4989   0.6178

Mean dependent var   0.314078   S.D. dependent var   0.040820
Sum squared resid    0.623489   S.E. of regression   0.040400
Log-likelihood       688.3564   Akaike criterion    -1370.713
Schwarz criterion   -1358.861   Hannan-Quinn        -1366.012
rho                  0.213692   Durbin-Watson        1.406548

'Between' variance = 0.00142169
'Within' variance = 0.00027351
theta used for quasi-demeaning = 0.874385
corr(y,yhat)^2 = 0.032786

Joint test on named regressors -
  Asymptotic test statistic: Chi-square(2) = 3.03125
  with p-value = 0.219671

Breusch-Pagan test -
  Null hypothesis: Variance of the unit-specific error = 0
  Asymptotic test statistic: Chi-square(1) = 1413.65
  with p-value = 2.27646e-309

Hausman test -
  Null hypothesis: GLS estimates are consistent
  Asymptotic test statistic: Chi-square(2) = 2.07321
  with p-value = 0.354657
```

Panel regression – random effects model, with time regressor

```
? panel PovertyIndex 0 LogPrice LogFI time --robust --random
Model 7: Random-effects (GLS), using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: PovertyIndex
Robust (HAC) standard errors

             coefficient   std. error      z      p-value
  -----------------------------------------------------------
  const      -17.0147      13.2780      -1.281    0.2000
  LogPrice     3.40216      1.49798      2.271    0.0231   **
  LogFI       -0.982056     1.20837     -0.8127   0.4164
  time        -0.222544     0.0504919   -4.408    1.05e-05 ***

Mean dependent var   8.408594   S.D. dependent var   5.995655
Sum squared resid    13436.62   S.E. of regression   5.938580
Log-likelihood      -1227.451   Akaike criterion     2462.902
Schwarz criterion    2478.705   Hannan-Quinn         2469.170
rho                  0.546739   Durbin-Watson        0.655505

'Between' variance = 36.8483
'Within' variance = 0.214379
theta used for quasi-demeaning = 0.977987
corr(y,yhat)^2 = 0.0282738

Joint test on named regressors -
  Asymptotic test statistic: Chi-square(3) = 87.5083
  with p-value = 7.51021e-019

Breusch-Pagan test -
  Null hypothesis: Variance of the unit-specific error = 0
  Asymptotic test statistic: Chi-square(1) = 2047.7
  with p-value = 0

Hausman test -
  Null hypothesis: GLS estimates are consistent
  Asymptotic test statistic: Chi-square(2) = 0.764528
  with p-value = 0.682315
```

```
? panel Gini 0 LogPrice LogFI time --robust --random
Model 10: Random-effects (GLS), using 384 observations
Included 32 cross-sectional units
Time-series length = 12
Dependent variable: Gini
Robust (HAC) standard errors

             coefficient   std. error       z      p-value
  ---------------------------------------------------------
  const       0.0466606    0.247464       0.1886   0.8504
  LogPrice    0.0362348    0.0299361      1.210    0.2261
  LogFI      -0.0118963    0.0348732     -0.3411   0.7330
  time       -0.00187182   0.000685349   -2.731    0.0063  ***

Mean dependent var   0.314078   S.D. dependent var   0.040820
Sum squared resid    0.654573   S.E. of regression   0.041449
Log-likelihood       679.0153   Akaike criterion    -1350.031
Schwarz criterion   -1334.228   Hannan-Quinn        -1343.763
rho                  0.192977   Durbin-Watson        1.432024

'Between' variance = 0.00142244
'Within' variance = 0.000264513
theta used for quasi-demeaning = 0.876469
corr(y,yhat)^2 = 0.000890307

Joint test on named regressors -
  Asymptotic test statistic: Chi-square(3) = 11.4868
  with p-value = 0.009365

Breusch-Pagan test -
  Null hypothesis: Variance of the unit-specific error = 0
  Asymptotic test statistic: Chi-square(1) = 1405.57
  with p-value = 1.29392e-307

Hausman test -
  Null hypothesis: GLS estimates are consistent
  Asymptotic test statistic: Chi-square(2) = 3.61372
  with p-value = 0.164169
```

Bibliography

Amir H, Mahadevan R, Nugroho A. 2017. Do inward looking trade policies affect poverty and income inequality? Evidence from Indonesia's recent wave of rising protectionism. Economic Modelling 62. 23-34.

Asra, A. 2000. Poverty and Inequality an Indonesia, Journal of the Asia Pacific Economy 5:1-2. 91-111.

Asra A, Balisacan AM, Pernia EM. 2003. Revisiting growth and poverty reduction in Indonesia: what do subnational data show?. Bulletin of Indonesian Economic Studies 39:3. 329-351.

Asrol A, Hafsah A. 2018. Analysis of factors that affect poverty in Indonesia. Revista 39. 14-26.

Földvári P, Leeuwen B. 2016. The Development of Inequality and Poverty in Indonesia, 1932–2008, Bulletin of Indonesian Economic Studies. 52:3. 379-402.

Gulati A, Narayanan S. 2003. Rice Trade Liberalisation and Poverty. Economic and Political Weekly 38: 1. 45-51.

Hall, D., P. Hirsch, and T. M. Li. 2011. Powers of Exclusion: Land Dilemmas in Southeast Asia. Singapore: NUS Press.

Hamilton-Hart, N. 2019. Indonesia's Quest for Food Self-sufficiency: A New Agricultural Political Economy?. Journal of Contemporary Asia 49:5. 734-758.

Ikhsan, M. 2005. Rice Price Adjustment and its Impact to the Poor. Economics and Finance in Indonesia 53:1. 61-97.

Indonesia Agricultural Agency for Research and Development. 2002. Decentralization issues in agricultural research and development in Indonesia. Jakarta.

Kataoka M. 2018. Inequality convergence in inefficiency and interprovincial income inequality in Indonesia for 1990–2010. Asia-Pac J Reg Sci (2018) 2. 297–313.

Kawagoe, T. 2004. The political economy of rural development in Indonesia. Canberra: Asia Pacific Press. 162-213.

Kuncoro M, Murbarani N. 2016. Regional inequality in indonesia, 1994-2012. The Business and Management Review 8:1. 38-52.

Mariyono, J. 2014. Rice production in Indonesia: policy and performance. Asia Pacific Journal of Public Administration 36:2. 123-134.

McCulloch, N. 2008. Rice Prices and Poverty in Indonesia, Bulletin of Indonesian Economic Studies 44:1. 45-64.

Patunru, AA. 2018. Rising Economic Nationalism in Indonesia. Journal of Southeast Asian Economies 35: 3. Special Issue: The Indonesian Economy in Transition: Policy Challenges in the Jokowi Era and Beyond. 335-354.

Patunru A, Rahardja S. 2015. Trade protectionism in Indonesia: Bad times and bad policy. Lowy Institute.

Sulistyo, E. 2017. "Nawacita Reforma Agraria". Presidential Staff Office. https://ppid.atrbpn.go.id/bpn/content/details?key=lahirnya-reforma-agraria-bagi-kesejahteraan-masyarakat-indonesia. Accessed on 30 July 2022.

Sumner A, Yusuf AA. 2015. Growth, Poverty, and Inequality under Jokowi. Bulletin of Indonesian Economic Studies 51:3. 323-348.

Susenas. 2014 – 2019. Farmer's Index. https://www.bps.go.id/indicator/22/10/1/ntp-menurut-provinsi.html. Indonesia Statistical Bureau. Accessed on 30 July 2022.

Susenas. 2014 – 2019. Gini Ratio Based on District and Province. https://www.bps.go.id/indicator/23/98/1/Gini-ratio-menurut-provinsi-dan-daerah.html. Indonesia Statistical Bureau. Accessed on 30 July 2022.

Susenas. 2022. Indonesian Labour Market Indicator. Indonesia Statistical Bureau.

Susenas. 2014 – 2019. Poverty Incidence Based on District and Province. https://www.bps.go.id/indicator/23/185/1/jumlah-penduduk-miskin-ribu-jiwa-menurut-provinsi-dan-daerah.html. Indonesia Statistical Bureau. Accessed on 30 July 2022.

Susenas. 2014 – 2019. Rural Consumer Price Statistics – Food Groups. Indonesia Statistical Bureau.

Statista. 2022. https://www.statista.com/statistics/1301972/apac-cpi-food-basket-of-rice-and-rice-products-share-by-country-or-territory/. Accessed on 30 July 2022.

Suwidjana, N. 1981. Indonesia's Rice Policy: Development Patterns, Accomplishment and Problems. Southeast Asian Affairs. 146-157.

Timmer, CP. 2004. Food Security in Indonesia: Current Challenges and the Long Run Outlook. Working Paper 48. Center For Global Development.

Trading Economics. 2022. https://tradingeconomics.com/indonesia/consumer-price-index-cpi. Accessed on 30 July 2022.

Verbeek, M. 2000. A Guide to Modern Econometrics. John Wiley & Sons, Ltd.

Warr, P. 2005. Food policy and poverty in Indonesia: a general equilibrium analysis. The Australian Journal of Agricultural and Resource Economics 49. 429-451.

Warr P, Yusuf AA. 2013. World food prices and poverty in Indonesia. The Australian Journal of Agricultural and Resource Economics 58. 1-21.