Asian Journal of Innovative Research in Social Science
Vol 1, No.2, 2022
ISSN: 2829-3061
https://journal.das-institute.com/index.php/ajirss

Review of Gini Ratio on Economic Growth with Human Mobility Mediation during Indonesia's Covid-19 Era

Sri Indriyani Siregar[1], Firda Agil Al Rasyid[2]
[1]BPS-Statistics North Padang Lawas, North Sumatra
[2]BPS-Statistics North Buton, Southeast Sulawesi
E-mail: sriindriyanisiregar@gmail.com

Abstract

The COVID-19 pandemic has changed people's lives a lot; even the realization of the National Mid-Term Development Plan (RPJMN) has been disrupted. The changes in population mobility patterns have intervened in the efforts to reduce regional inequality to increase economic growth. This study aims to gain new insight into the provincial classification of the Gini ratio and the relationship between economic growth and the Gini ratio, as well as human mobility. In addition, this aims to know whether mobility is proven to mediate the Gini ratio and economic growth relationship using Path Analysis using Robust Regression. As for the data source, this study uses the provincial panel data from the 1st Semester of 2020 to the 2nd Semester of 2021 from Statistics Indonesia and Google Community Mobile Reports. This study shows that the Gini ratio has changed many provinces to a lower classification, indicating that the pandemic affects the upper-middle-class economy. Furthermore, it can be significantly proven that human mobility affects the relationship between income inequality and economic growth (Sobel test p-value = 0.0207). This study can be used as an evaluation material for the government and the stakeholders. Especially to formulate strategies so that the increase of human mobility has an economic goal and in a fit human body condition to restore the economic wheels and not become a time bomb for the COVID-19 transmission in Indonesia.

Keywords: Gini Ratio, Economic Growth, Human Mobility, Path Analysis, Robust Regression

1. Introduction

Economic growth is the eighth goal of the Sustainable Development Goals (SDGs), which supports inclusive and sustainable economic growth, full and productive employment, and decent work for all. The Indonesia Government has also integrated this into the National Mid-Term Development Plan (RPJMN) for 2020-2024 by the National Development Planning Agency (BAPPENAS). Economic growth from 2020 to 2024 is expected to grow by 5.7 to 6 percent annually (BAPPENAS, 2019).

However, it is not only economic growth that needs to be the focus of attention, but also the problem of inequality. This is because high economic growth does not guarantee a low level of income inequality as measured by the Gini ratio. In fact, research conducted in 50 countries shows that economic growth has a significant positive impact on income inequality (Alamanda, 2021). This is also in line with research conducted by Barro (1999). In his research, a broad panel of countries shows little overall relation between income inequality and rates of growth and investment. In addition, high inequality can hinder growth in poor countries and encourage growth in rich countries. This indicates that the higher the economic growth, the bigger the gap between the poor and the rich. In addition, the Gini ratio is also one of the SDGs, namely the tenth goal, which is reducing inequality within and between countries.

Since the COVID-19 pandemic, Indonesia has continued to experience a Gini ratio increase from 2020 to 2021 (BPS, 2021). The 2020 and 2021's Gini ratio is higher than in 2019 when the COVID-19 pandemic had not yet occurred. During the COVID-19 pandemic, the government imposed several policies related to population mobility to prevent the COVID-19 virus spread. One of the policies implemented is the restrictions on community activities (PPKM). The PPKM implementation impacts several economic sectors such as transportation, trade, as well as accommodation and food service activities. With the implementation of this policy, there is a possibility of income decreases in the community. The longer the PPKM implementation will cause more decline in the income of micro, small and medium enterprises (MSMEs) (Fathoni, 2020). In addition, based on BPS data, the community's per capita income has decreased compared to before the COVID-19 pandemic when the PPKM policy has not been implemented.

Therefore, a study on the relationship between economic growth, Gini ratio, and human mobility is needed. Existing study often only describes the relationship between the Gini ratio and economic growth, or human mobility and economic growth. Thus, this study is considered necessary because it uses all three variables at once.

This study aims to gain new insights into the Gini ratio's provincial classification and the relationship between economic growth and the Gini ratio, as well as human mobility. Besides, it aims to determine whether mobility is proven to mediate the Gini ratio and the relationship between economic growth. This study is hoped to be used as an evaluation material for government policies and stakeholders, especially human mobility. Because when the policies implemented are not effective, they can impact the community's health, social, and economic survival.

2. Literature Review

Economic growth is one indicator that determines the development successfully in a region in a certain period (Nuraini & Hariyani, 2019). Thus, the higher the economic growth in a region, the faster the development occurs in the region, and the economic policies implemented in the region can be declared successful.

Economic growth can be related to income, where people with higher incomes can spend more money. So that the person has a better standard of living. Economic growth is calculated through Gross Domestic Product (GDP) at constant prices for growth at the national level and Gross Regional Domestic Product (GRDP) at constant prices for growth at the regional level.

Pizutto at al. (2020) researched the impact of the pandemic on the economy. The research shows that the pandemic that has happened before has increased the Gini index and the income of the upper class. This indicates that COVID-19 could have a worse impact on the economy than any previous pandemic.

GDP can be one of the things that can capture the main component of well-being. However, economic growth described by GDP is often in the opposite direction on the Gini ratio. The Gini ratio is a measuring tool to determine income inequality in a region. The Gini ratio is 0 to 1, where the closer to 1, the higher the income inequality in an area. The occurrence of this pandemic can also affect the Gini ratio. Galletta and Giommoni (2020) researched the Spanish flu pandemic which increased income inequality in society.

High economic growth better be able to prosper the entire population, not just a few people (Cerra et al., 2021). In Finland, Israel, Sweden, Spain, and the US there is a large gap between low and middle-income households through measuring the Gini coefficient. Even in other countries such as Australia, the UK and the US show that the top 1% of households account for 20% until 50% percent of the total income in a country. Even though these countries have high GDP, but GDP does not always reflect equality or well-being. This is supported by research conducted by Madsen et al. (2018) that the higher the Gini ratio will hamper economic growth. However, it is often found that a high Gini ratio accompanies high economic growth (Brueckner & Lederman, 2018).

According to Tarigan (2004), the correlation between economic growth and income inequality has several patterns. One of them is a country with high economic growth has a high income inequality as well. Several

countries' studies have described the relationship between the Gini ratio and economic growth. In the UK, income inequality has a negative impact on economic growth (Davtyan, 2017). On the other hand, in the US and Canada, income inequality positively impacts economic growth. Another study also shows the same thing; in most countries in Asia, income inequality has a positive impact on economic growth (Kang, 2015).

However, the OECD countries show something different; economic growth reduces income inequality. This is because these countries are already in the mature stage of the Kuznets curve. This is in line with research conducted by Sirtama (2021) in the Province of Nusa Tenggara Barat (NTB) in the period 2001-2020 which shows the results that the Kuznet curve hypothesis is valid. In 2001-2010, which is early period of the economic growth, income inequality has increased. Then, in 2011-2020 the increase in economic growth was followed by a decrease in income inequality.

During the pandemic, the government implemented several regulations to prevent the transmission of COVID-19. (Activities outside the home began to decrease to reduce human mobility. Meanwhile, activities inside the house increased, so that economic activities were adjusted, such as working from home). (Achyunda, Rendra et al., 2020). This causes changes in the two economic indicators, such as economic growth and the gini ratio (T. Chen et al., 2021; Xiang et al., 2021).

One of the approaches to finding out people's mobility is the human mobility index from the Google Community Mobile Reports. Google Community Mobile Reports are a mobility index accumulated from the individuals' mobility to several categories of places obtained from google accounts that enable location on their device (Bustaman, 2021).

Pappalardo et al. (2016) in his research found a positive bidirectional relationship between mobility and socioeconomic indicators. In his research, Pappalardo et al. (2016) used mobile phone data and the research was conducted in France. Their findings suggest that more developed areas have diverse mobility tendencies. Therefore, developed cities are cities that have a diversity of mobility patterns.

The COVID-19 pandemic caused human mobility to be limited and there were also several policies carried out by the government regarding mobility. Restricted activities include activities in public places such as retail, stations and terminals, and offices. One of the policies taken by government is the lockdown. The lockdown, which is one of the human mobility restrictions policies, also affects the community's economy (Atalan, 2020). There will be office closures, flight restrictions, and restrictions on activities outside the home with this policy. Thus, people with high mobility will be disturbed by their economic activities with this policy (Fadly, 2021).

The strict implementation of the lockdown policy has caused a country to experience a very significant decline in economic activity (Canaks et al,. 2020). However, Indonesia does not use the lockdown term but PPKM (Enforcement of Community Restrictions Activities) based on Minister of Health Regulation No. 9 of 2020. With this policy, community mobility is limited, namely road blockades by security forces and also reduced operating hours in public places. Thus, the economic activities of the community will be hampered (Mawar et al., 2021).

Moreover, the economic effects of lockdown shocks in one region can affect other regions. Therefore, it is necessary to coordinate policies between regions to reduce economic losses due to the lockdown (Inoue et al., 2021). In Hubei, a strict lockdown has had a huge negative impact on the economy. In the first quarter of 2020 where the 76 days lockdown was imposed it caused a 37% impact on GDP. But this caused the death rate to decline and then the economy began to recover (Ke, X., & Hsiao, C., 2022).

In addition, the government also needs to consider the effectiveness of the mobility restrictions policy, especially for the lower-middle-class community, whose basic needs often cannot be guaranteed (Ristyawati, 2020). This is in line with the study conducted by Beck et al. (2020) that people with lower incomes are more impacted by the restricting mobility policy than people in the upper-middle class. In addition, research conducted by Bonaccorsi et al. (2020) shows that groups with a high Gini ratio are affected by a mobility restriction policy, such as a lockdown.

3. Research Methods

3.1 Data

This study uses data from the 1st Semester of 2020 to the 2nd Semester of 2021 in 34 provinces in Indonesia. To determine the economic growth, this study used the GDRP growth at constant prices. The economic growth and Gini ratio data were obtained from Statistics Indonesia's publication and dynamic table in each province. Meanwhile, the human mobility data were obtained from Google Community Mobile Reports, which uses big data to get the index.

3.2 Analysis Method

Regarding the analysis, this study employed two types of analyses. First, the descriptive analysis to gain fresh insight into the Gini ratio before and after the COVID-19 pandemic era. Moreover, to gain the trend of the Gini ratio as well as human mobility and their relation to the economic growth. Second, inferential analysis (Path Analysis using Robust Regression) is used because it is able to overcome the problem of outliers. The Gini Ratio is classified by the Natural Breaks method. This study's data processing tools, namely Ms. Excel, ArcGIS, and R-Studio.

3.2.1 Path Analysis

The path analysis method extends multiple linear regression analysis to estimate causality relationships between tiered variables based on theory (Lleras, 2005). Path analysis is used to determine the direct relationship of the independent variable to the dependent variable and the indirect relationship through the intervening variable (Nina & Rustariyuni, 2018). In path analysis, correlations between variables are related to the model's parameters, which are expressed by path diagrams.

Path analysis wants to test the regression equation involving several exogenous and endogenous variables to allow testing of the mediating or intervening variables. One of the tests that can test the significance of the indirect effect is the Sobel test (Gio & Caraka, 2019). Furthermore, the Sobel test requires an unstandardized path coefficient as input to calculate the statistical value of the Sobel test (z_{Sobel}) (Hair Jr et al., 2021).

3.2.2 Robust Regression

The outliers problem in the least square method estimation can be overcome by using an estimation method that is robust to outliers, known as robust regression (Srinadi, 2014). Robust regression is used when the distribution of the residuals is not normal, and several outliers affect the regression analysis results. There are several parameter estimation procedures in robust regression, three of which are the M-Estimator (Maximum likelihood type estimator), S-Estimator (Scale estimator), and MM-Estimator (Method of Moment estimator) (Chen, 2002).

The M-estimator was introduced by Huber in 1973, the S-estimator was introduced by Rousseeuw and Yohai in 1984, and the MM-estimator was introduced by Yohai in 1987. In this study, estimation was carried out using these three methods, and then the best estimator was selected through the smallest standard error parameter criterion. The best estimator is used for decision-making related to the significance of the independent variable on the dependent variable.

M-estimator tends to be sensitive to leverage. S-estimator is better at handling leverage, but its efficiency is lower when compared to M-estimator. MM-estimator is a combination of M-estimator and S-estimator, so it is resistant and tends to have higher efficiency (Utomo et al., 2014). However, if the ratio of the number of parameters to the sample size is large, the efficiency of the MM-estimator will be lower than the nominal result (Fitrianto & Xin, 2022).

Hypothesis testing was using a robust standard error often used in econometrics. The robust standard error is resistant to violations of the assumptions of heteroscedasticity, normality, and autocorrelation. Robust standard errors are also known as HAC (Heteroscedasticity-Autocorrelation Consistent) standard errors. Data processing is carried out using R software with the “lmrob” function. The function has used the HAC standard error in calculating the variance-covariance matrix (Utomo et al., 2014).

4. Results and Discussion

Figures 1a and 1b below show the Gini ratio classification of provinces in Indonesia before the pandemic (2019) and after the pandemic (2021). Gini ratio cluster classification is divided into low, medium, and high. This classification using the natural breaks method shows that with a cluster of 3, it is said to be in a low category when the Gini ratio value is below 0.324. Meanwhile, the classification is moderate when it is between 0.324 to 0.365 and high classification when it is above 0.365.

From Figures 1, it can be seen that many provinces in Indonesia have changed the Gini ratio classification to a lower direction. This indicates that the community with the upper-middle-class economy in several provinces is quite affected by the pandemic, so the expenditure value (consumption, investment, etc.) is reduced, which impacts the gap between community groups not as high as before the COVID-19 pandemic.

However, this does not apply to the provinces on Java Island. Figures 1a and 1b show no change in the Gini ratio classification towards a lower level in Java after the pandemic, even though Java Island is one of the areas with the most COVID-19 cases. This condition is in line with another study which found that provinces with many COVID-19 cases tended to experience increased inequality in urban areas but decreased inequality in rural areas (Brata et al., 2021). Because there are many urban areas in Java, this is a sign that the pandemic cannot change the condition of inequality between community groups, especially in urban areas.

Figure 1a. Gini Ratio of Provinces Classifications in Indonesia Before the COVID-19 Pandemic (2019)

Figure 1b. Gini Ratio of Provinces Classifications in Indonesia After the COVID-19 Pandemic (2021)

On the western island of Indonesia, Sumatra Island, there seems to be little difference between before and after the pandemic. Riau, Bengkulu, and Lampung, which were previously included in the Gini ratio cluster, are currently low during the pandemic. The same case for most of the provinces on Kalimantan Island. It can be seen that Central Kalimantan, South Kalimantan, and East Kalimantan also experienced changes in the Gini ratio classification after the pandemic. However, this does not mean that the low Gini ratio classification is a good sign for better economic equality in the community. Because there are indications that this will not last long and, even after the pandemic, will return to the initial inequality and may even lead to a deeper gap if not anticipated, especially in urban areas (BPS, 2022)

Figure 2 below shows economic growth trends in the three provinces with the highest Gini ratio in 2021 Semester 2. Two of them are located on Java Island, reflecting the high inequality on Java Island. The figure

shows an increasing trend of economic growth in the three provinces from time to time. Therefore, visually, it can be shown that there is an indication of a positive relationship between the Gini ratio and economic growth. However, further statistical testing will better confirm the relationship between these two variables.

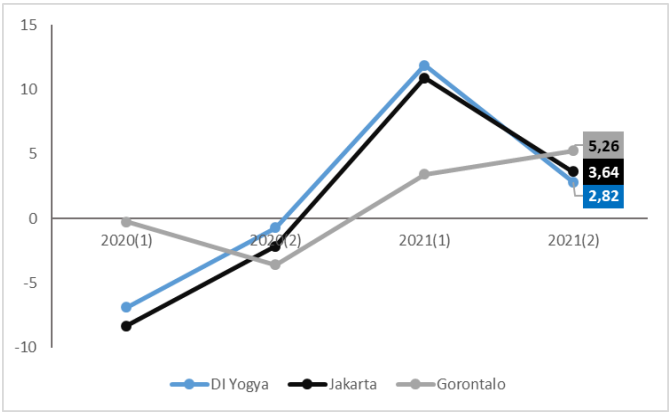

Figure 2. Economic Growth Trends in Three Provinces with The Highest Gini Ratio

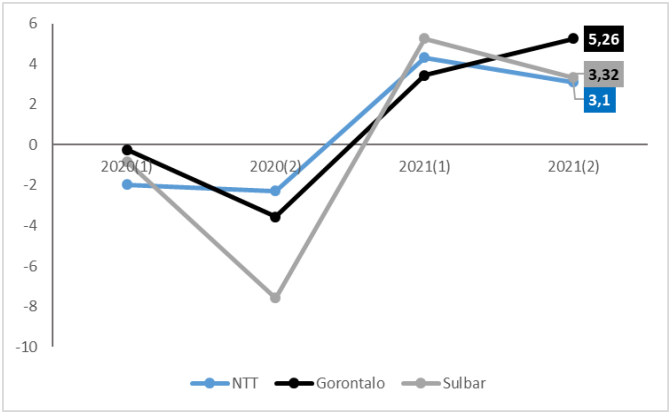

Figure 3. Economic Growth Trends in Three Provinces with The Highest Human Mobility

Meanwhile, Figure 3 above shows economic growth trends in the three provinces with the highest mobility in 2021 Semester 2. Two of them are located on Sulawesi Island, reflecting the high mobility of the population on Sulawesi Island. The figure shows an increasing trend of economic growth in the three provinces from time to time. Therefore, visually, it can be shown that there is an indication of a positive relationship between population mobility and economic growth. However, statistical evidence through inferential analysis is needed to obtain more definite results regarding the direction of the relationship and its significance.

Table 1 below shows the inferential modeling with robust regression. Based on these results, information can be obtained that in model 1, human mobility has a positive and significant effect on economic growth. When the population mobility score increases by 1 point, the average economic growth in a province will increase by 0.395%. This result aligns with Fadly (2021) and Putra & Arini (2020), who also conducted their study in Indonesia in 2020. Fadly (2021) showed the influence of human mobility on jobs and non-jobs factors on economic growth. Meanwhile, Putra & Arini (2020) show a positive and significant influence of human mobility on economic growth in Indonesia in 2020.

Meanwhile, the Gini ratio has no significant effect on economic growth from 2020 to 2021. This result aligns with the Yumna et al. (2014) study conducted in Indonesia and Cingano (2014) in the OECD Countries.

However, Yumna et al. (2014) stated that consumption inequality affects economic growth while education inequality does not. However, the government still needs to be careful because these results show that educational inequality affects unemployment. In addition, Cingano (2014) states that gross income inequality does not significantly affect economic growth.

Table 1. Robust Regression Results

Model 1 (Dependent Variable: Economic Growth)					
Variable	**Estimated Coef.**	**Std. Error**	**Unstd. Coef.**	**P-Value**	**VIF**
Intercept	5.786	9.24	-	0.53	
Mobility	0.395	0.11	0.647	0.00	1.03
Gini ratio	-4.761	26.93	-0.033	0.86	1.03
Adj. $R^2 = 0.67$					
Robust RSE = 4.923					
Model 2 (Dependent Variable: Mobility)					
Variable	**Estimated Coef.**	**Std. Error**	**Unstd. Coef.**	**P-Value**	
Intercept	14.331	8.15	-	0.0808	
Gini ratio	-70.963	23.72	-0.296	0.0033	
Adj. $R^2 = 0.297$					
Robust RSE = 8.128					

The results of model 1 can be trusted because it meets the assumption of multicollinearity or there is no relationship between independent variables. This can be shown through its Variance Inflation Factor (VIF) value of 1.03, which is smaller than 10. In addition, from the two models above, it is concluded that the better robust regression estimator, based on the robust RSE (Residual Standard Error) category, is the S-estimator.

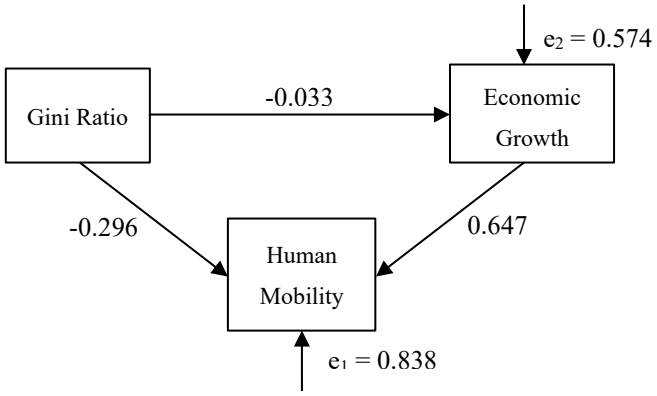

Figure 3. Path Analysis Results

Meanwhile, from model 2, the Gini ratio has been shown to have a negative effect on population mobility. When the Gini ratio score increases by 1 point, the mobility of the population in a province on average will increase by 70,963 points. This is in line with Bonaccorsi et al. (2020) study in Italy, which shows that groups with a high Gini ratio are affected by a lockdown policy. Economic disparities between community groups encourage the lower-middle-class community to do mobility to earn daily income. Moreover, it was also found that mobility contractions were stronger in urban areas where the Gini ratio was high (Bonaccorsi et

al., 2020). Therefore, policies are needed to address economic disparities if the government plans to limit human mobility.

Furthermore, the path diagram in Figure 3 above shows the indirect effect of the Gini ratio variable on economic growth through the population mobility variable. The value of the indirect effect is -0.1915 (19.15%), which means that the Gini ratio has a greater influence on economic growth if it is through the variable of human mobility. So, reducing inequality can further increase economic growth if human mobility is higher.

In addition to comparing the magnitude of the direct and indirect effects, it is also necessary to do statistical testing so that the decision is more definite. A mediation test was conducted to examine the effect of human mobility in mediating the relationship between income inequality and economic growth, whose results are in Table 2.

Tabel 2. Mediation Test Results

Test	Test Statistic	P-Value
Sobel	2.313	0.0207
Aroian	2.263	0.0236
Goodman	2.367	0.0179

The results above show that from the three types of mediation tests (Sobel, Aroian, and Goodman), it can be significantly proven that human mobility affects the relationship between income inequality and economic growth. Therefore, the results of this study can complement previous studies, such as Madsen et al. (2018); Brueckner & Lederman (2018), which only examine the relationship between the Gini ratio and economic growth. Therefore, the central and regional governments are expected to try their best and be as effective as possible in carrying out the limiting population mobility policy to accelerate Indonesia's economic recovery after the COVID-19 pandemic.

5. Conclusion

This study aims to gain new insights into the current provincial classification of the Gini ratio compared to before the COVID-19 pandemic. It also aims to determine whether mobility is proven to mediate the relationship between the Gini ratio and economic growth. Existing research often only describes the relationship between the Gini ratio and economic growth, or human mobility and economic growth. This study shows that many provinces change into a lower classification of Gini ratio after the pandemic, indicating that the pandemic affects the upper-middle-class community's economy, except in Java. Furthermore, it can be significantly proven that human mobility affects the relationship between income inequality and economic growth. Non-linear and dynamic panel models can be developed with a longer study period for further study. This study hopes this can be used as an evaluation material for government policies and stakeholders, especially regarding human mobility. Because when the policies implemented are not effective, they can impact the community's health, social, and economic survival.

References

Alamanda, A. (2021). the Effect of Economic Growth on Income Inequality:Panel Data Analysis From Fifty Countries. *Info Artha*, *5*(1), 1–10. https://doi.org/10.31092/jia.v5i1.1176

Atalan, A. (2020). Is the lockdown important to prevent the COVID-19 pandemic? Effects on psychology, environment and economy-perspective. *Annals of Medicine and Surgery*, *56*, 38–42. https://doi.org/10.1016/j.amsu.2020.06.010

BAPPENAS. (2019). *National Midterm Development Plan (RPJMN) 2020-2024*. Jakarta: BAPPENAS.

Barro, Robert J. 1999. Inequality, Growth, And Investment. NBERWorking Paper Series. Working Paper 7038. National Bureau of Economic Research. Cambridge http://www.nbr.org/paper/w708

Beck, M. J., Hensher, D. A., & Wei, E. (2020). Slowly coming out of COVID-19 restrictions in Australia: Implications for working from home and commuting trips by car and public transport. *Journal of Transport Geography*, *88*(August), 102846. https://doi.org/10.1016/j.jtrangeo.2020.102846

Bonaccorsi, G., Pierri, F., Cinelli, M., Flori, A., Galeazzi, A., Porcelli, F., Schmidt, A. L., Valensise, C. M., Scala, A., Quattrociocchi, W., & Pammolli, F. (2020). Economic and social consequences of human mobility restrictions under COVID-19. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(27), 15530–15535. https://doi.org/10.1073/pnas.2007658117

BPS. (2021). *Gini Ratio Menurut Provinsi dan Daerah 2020-2021*. BPS. https://www.bps.go.id/indicator/23/98/1/gini-rasio.html

BPS. (2022). *[Revisi per 25 Jan 2022] Gini Ratio September 2021 tercatat sebesar 0,381*. Berita Resmi Statistik. https://www.bps.go.id/pressrelease/2022/01/17/1932/-revisi-per-25-jan-2022--gini-ratio-september-2021-tercatat-sebesar-0-381.html

Brata, A. G., Pramudya, E. P., Astuti, E. S., Rahayu, H. C., & Heron, H. (2021). *COVID-19 and Socio-Economic Inequalities in Indonesia: A Subnational-level Analysis* (Issue 371).

Brueckner, M., & Lederman, D. (2018). Inequality and economic growth: the role of initial income. *Journal of Economic Growth*, *23*(3), 341–366. https://doi.org/10.1007/s10887-018-9156-4

Bustaman, U. (2021). Mobility-COVID-19 Impact Quadrant : Quantitative Approach To Analyze Community Responses to Covid-19. *Jurnal Aplikasi Statistika & Komputasi Statistik*, *14*(1), 55–68.

Canaks, C., Garcia-Arenas, J., Jimeno, E., Camarasa, P. (2020). The COVID-19 dilemma : mobility and economy. International Economy, June, 16–17.

Cerra, V., Lama, R., & Loayza, N. (2021). Links Between Growth, Inequality, and Poverty: A Survey, *IMF Working Papers*, *2021*(068), A001. Retrieved May 20, 2022, from https://www.elibrary.imf.org/view/journals/001/2021/068/article-A001-en.xml

Chen, C. (2002). Robust Regression and Outlier Detection with the ROBUSTREG Procedure. *SAS Institute Inc.*, *September*, 265–27.

Chen, T., Gozgor, G., & Koo, C. K. (2021). Pandemics and Income Inequality: What Do the Data Tell for the Globalization Era? *Frontiers in Public Health*, *9*(May). https://doi.org/10.3389/fpubh.2021.674729

Cingano, F. (2014). Trends in Income Inequality and its Impact on Economic Growth. *OECD Social, Employment, and Migration Working Papers*, *163*, 0_1,5-59. https://doi.org/http://dx.doi.org/10.1787/5jxrjncwxv6j-en

Davtyan, K. (2017). The distributive effect of monetary policy: The top one percent makes the difference. *Economic Modelling*, *65*(April), 106–118. https://doi.org/10.1016/j.econmod.2017.05.011

Fadly, F. (2021). The Effects of Human Mobility Restriction During Covid-19 Pandemic to Indonesia's Economy. *Kajian Ekonomi Dan Keuangan*, *4*(3), 263–280. https://doi.org/10.31685/kek.v4i3.678

Fathoni, A. (2020). Dampak COVID-19 dan Kebijakan PSBB Pemerintah Terhadap UMKM di Wiyung Surabaya. *Dinar : Jurnal Prodi Ekonomi Syari'ah*, *3*(1), 30–69. https://e-jurnal.stail.ac.id/index.php/dinar/article/view/126/109

Fitrianto, A., & Xin, S. H. (2022). Comparisons Between Robust Regression Approaches in The Presence of Outliers and High Leverage Points. *BAREKENG: Jurnal Ilmu Matematika dan Terapan*, *16*(1), 243–252.

Galletta, S. and T. Giommoni (2020), The Effect of the 1918 Influenza Pandemic on Income Inequality: Evidence from Italy, *COVID Economics*, 33, 73– 104.

Gio, P. U., & Caraka, R. E. (2019). *Path Analysis dengan STATCAL Disertai Perbandingan Hasil dengan SPSS, AMOS & LISREL*.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Inoue, H., Murase, Y., & Todo, Y. (2021). Do economic effects of the anti-COVID-19 lockdowns in different regions interact through supply chains? *PLoS ONE*, *16*(7 July), 1–19. https://doi.org/10.1371/journal.pone.0255031

Kang, J. W. (2015). *Interrelation between Growth and Inequality*. *447*.

Ke, X., & Hsiao, C. (2022). Economic impact of the most drastic lockdown during COVID-19 pandemic—The experience of Hubei, China. *Journal of Applied Econometrics*, 37(1), 187– 209. https://doi.org/10.1002/jae.2871

Lleras, C. (2005). Path Analysis. In *encyclopedia of Social Measurement* (Vol. 3, Issue 1, pp. 25–30).

Madsen, J. B., Islam, M. R., & Doucouliagos, H. (2018). Inequality, financial development and economic growth in the OECD, 1870–2011. *European Economic Review*, *101*, 605–624. https://doi.org/10.1016/j.euroecorev.2017.11.004

Mawar, Andriyani, L., Gultom, A., & Ketiara, K. (2021). Dampak Sosial Ekonomi Kebijakan Pemberlakuan Pembatasan Kegiatan Masyarakat (PPKM) di Indonesia. *Seminar Nasional Penelitian LPPM UMJ*, 2.

Nina, G. A., & Rustariyuni, S. D. (2018). Pengaruh Gini Rasio, Pengeluaran Non Makanan dan Belanja Modal Terhadap Tingkat Kesejahteraan Masyarakat di Provinsi Bali. *Jurnal Ilmu Ekonomi Dan Pembangunan*, *18*(2), 121–141.

Nuraini, I., & Hariyani, H. F. (2019). Quality Economic Growth as an Indicator of Economic Development. *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi Dan Pembangunan*, *20*(1), 80–86. https://doi.org/10.23917/jep.v20i1.7104

Pappalardo, L., Vanhoof, M., Gabrielli, L., Smoreda, Z., Pedreschi, D., & Giannotti, F. (2016). An analytical framework to nowcast well-being using mobile phone data. International Journal of Data Science and Analytics, 2(1–2), 75–92. https://doi.org/10.1007/s41060-016-0013-2

Putra, R. A. A., & Arini, S. (2020). Measuring the Economics of a Pandemic: How People Mobility depict Economics? An Evidence of People's Mobility Data towards Economic Activities. *8th IMF Statistical Forum*, 1–24.

Pizzuto P., et al (2020), 'Will Covid-19 Affect Inequality? Evidence from Past Pandemics', COVID Economics, 12(1), pp.138-57.

Ristyawati, A. (2020). Efektifitas Kebijakan Pembatasan Sosial Berskala Besar Dalam Masa Pandemi Corona Virus 2019 oleh Pemerintah Sesuai Amanat UUD NRI Tahun 1945. *Administrative Law and Governance Journal*, *3*(2), 240–249. https://doi.org/10.14710/alj.v3i2.240-249

Sirtama, B. W. (2021). Hubungan Antara Pertumbuhan Ekonomi dan Ketimpangan Pendapatan di Provinsi Nusa Tenggara Barat (Pembuktian Hipotesis Kuznets). *Jurnal Ilmu Ekonomi JIE*, *5*(4), 654 - 664. https://doi.org/10.22219/jie.v5i04.17810

Srinadi, G. A. M. (2014). Pengaruh Outlier Terhadap Estimator Parameter Regresi dan Metode Regresi Robust. *Prosiding Konferensi Nasional Matematika XVII - 2014*, *June 2014*, 1259–1266.

Tarigan, Robinson. 2004. Perencanaan dan Pembangunan Wilayah, Bumi Aksara, Jakarta.

Utomo, A. P., Sumartini, N. P., Pinta, A., Siregar, G., Nagari, N., Tinggi, S., Statistik, I., Otista, J., & No, R. (2014). Regresi Robust untuk Memodelkan Pendapatan Usaha Industri Makanan Non-Makloon Berskala Mikro Dan Kecil Di Jawa Barat Tahun 2013. *Jurnal Matematika, Sains Dan Teknologi*, *15*(2), 63–74.

Xiang, L., Tang, M., Yin, Z., Zheng, M., & Lu, S. (2021). The COVID-19 Pandemic and Economic Growth: Theory and Simulation. *Frontiers in Public Health*, *9*(September), 1–14. https://doi.org/10.3389/fpubh.2021.741525

Yumna, A., Rakhmadi, M. F., Hidayat, M. F., Gultom, S. E., & Suryahadi, A. (2014). *Estimating the Impact*

of Inequality on Growth and Unemployment in Indonesia. http://www.smeru.or.id/publicationdetail.php?id=353