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The Impact of Uncertainty and Macroeconomic on Income Inequality in Indonesia

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ABSTRACT

One of the causes of income inequality is uncertainty shocks. These shocks impact the broader macroeconomy, which, in turn, affects inequality. This study examines income inequality in Indonesia, affected by global and macroeconomic uncertainties, by using the ARDL and ECM co-integration bound tests to analyze both long-term and short-term relationships over the period from 1991 to 2021. The results of the study indicate a long-term effect of global uncertainty on income inequality in Indonesia. Additionally, both long-term and short-term variables, such as unemployment and income, also influence income inequality in Indonesia.

1. Introduction [Heading of Section]

The shock of uncertainty affects the broader economy through multiple channels. During periods of heightened uncertainty, companies adapt their investment and hiring patterns, resulting in a decline in actual economic activity. Decreasing production might impact the overall demand, which then affects pricing[1]. Hence, comprehending the influence of uncertainty on the business cycle is essential for effectively managing and appropriately addressing periods of economic downturn.

Empirical data indicates that positive uncertainty shocks exert a contractionary impact, resulting in substantial decreases in output, inflation, employment, and their constituent elements. The migration patterns of individuals associated with this channel are frequently regarded as a crucial factor in determining income disparity[2].

A study undertaken by Baker et al. devised an Economic Policy Uncertainty (EPU) index with the purpose of examining uncertainty shocks[3]. The EPU index quantifies variations in economic uncertainty associated with policies, dependent on the frequency of newspaper reporting. The value of each monthly EPU index is directly proportionate to the proportion of newspaper articles in a country that address economic policy uncertainty for that specific month. Formulated by Baker, the EPU index encompasses 21 countries, representing around 71% of worldwide production when adjusted for purchasing power parity (PPP) and around 80% when adjusted for market exchange rates. Global Economic Policy Uncertainty (GEPU) index is created by combining the EPU indices of these 21 countries.

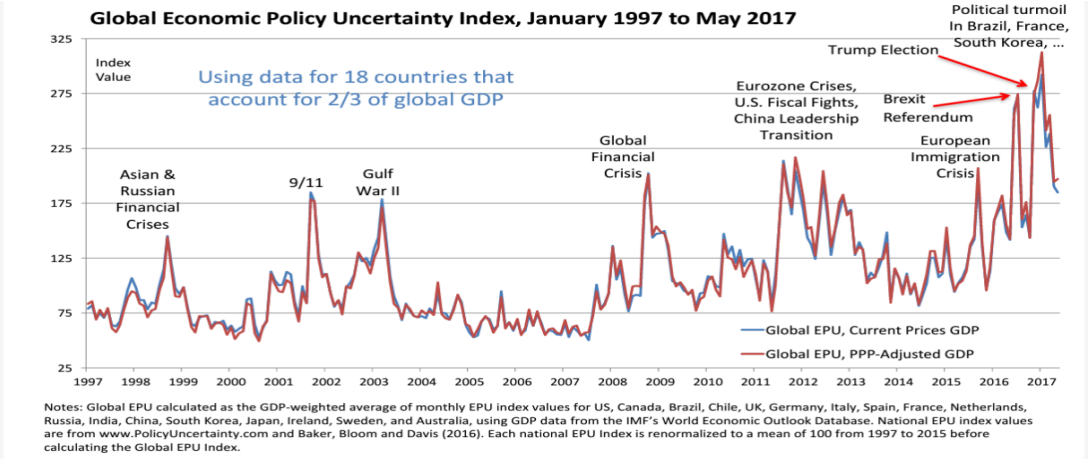

Figure 1. Global Economic Policy Uncertainty (GEPU)
Source: Policy Uncetainty

Several significant events, such as the Asian and Russian financial crises, the 9/11 attacks, the Second Gulf War, the global financial crisis, the Eurozone crisis, the US-China trade tensions, the Chinese leadership transition, the Trump election, the Brexit referendum, the European immigration crisis, and political turmoil in Brazil, France, and South Korea, contributed to the rise in the GEPU index shown in the chart above[3]. The upward trend in the GEPU index among 21 countries that make a substantial contribution to global production would unavoidably affect the macroeconomic conditions of countries globally, especially emerging nations such as Indonesia.

Fischer et al. found that higher levels of uncertainty have a substantial impact on reducing inflation. This is mostly because increased uncertainty leads to less consumption, which in turn reduces the demand for goods[1]. Consequently, firms are compelled to make pricing adjustments. This mechanism is conventionally known as the aggregate demand channel. Concurrently, there is a large decrease in GDP growth in the near term, reaching its highest point after around one quarter and then becoming negligible after one year. The recovery in actual economic activity can be ascribed to the phenomenon where enterprises, when confronted with significant levels of macroeconomic uncertainty, have a tendency to postpone their short-term investments. Nevertheless, once the ambiguity diminishes, companies recommence allocation of resources, therefore enhancing production by rising investment. Furthermore, increased uncertainty results in decreased interest rates, as central banks reduce policy rates to counterbalance the adverse impacts of uncertainty shocks on production and prices. Nationwide uncertainty shocks also impact the rates of unemployment, employment, and income.

The research undertaken by Leduc & Liu aligns with the conclusions of Fischer et al. indicating that uncertainty shocks lead to a substantial rise in unemployment that persists for almost two years,

whereas inflation experiences a notable decline for around 15 months[1], [4]. The standard response of monetary policy is to decrease the nominal interest rate. These results corroborate the idea that in the presence of increased uncertainty, firms modify their actions by postponing the recruitment of new employees until the economic forecast becomes stable. The result is a significant decrease in total earnings, which has contributed to a less robust labor market.

A study conducted by Theophilopoulou (2018) revealed that income disparity has a tendency to decline during periods of economic recession, however this is contingent upon the overall income distribution. One plausible rationale is because shareholders are more vulnerable to unfavorable fluctuations in the economic cycle, which are frequently accompanied by significant decreases in enterprise earnings and stock values. Conversely, if the proportion of capital income is really small in an economy, inequality may rise during a recession, as people with lower levels of skills are typically more susceptible to changes in the labor market and technology. A comprehensive grasp of the processes that propel fluctuations in income inequality is of utmost importance for policymakers in governmental institutions and central banks[5] . Furthermore, a study conducted by Fischer et al., reveals that income inequality is declining in the majority of states, although there is notable variation in the dynamics of this decline[1]. By contrast, a number of states, notably in the Midwest, have seen increasing levels of economic inequality as time has passed.

The commencement of the Reform Era signified a phase of economic revival for Indonesia following the Asian financial crisis. The nation successfully rebounded rapidly, sustaining continuously sound economic expansion from 1999 to the onset of the COVID-19 epidemic[6], [7]. Nevertheless, this notable economic expansion was accompanied by a rise in wealth disparity[8]. Data from the World Inequality Report reveals that in 2021, the poorest 50% of Indonesia's population possessed a mere 12.4% of the overall national income, which is a decrease from 17.4% twenty years ago. Concurrently, the top decile accounted for 48% of the total national income in 2021, which is a rise from 41.5% in 2001.

Considerable research has been undertaken on inequality, including investigations on Economic Policy Uncertainty (EPU) carried out by previous research [1], [2], [4], [9]. Analysis of data in most inequality studies is conducted using the Gini ratio measure. Concurrently, the quantitative assessment of uncertainty is conducted using the Economic Policy Uncertainty (EPU) index. In order to monitor economic uncertainty associated with policy, the EPU index examines the frequency of newspaper coverage that incorporates three essential terms: economy (E), policy (P), and uncertainty (U).

The current body of empirical research on the dynamic correlation between uncertainty and income disparity is somewhat little. The present study seeks to fill this research vacuum by investigating the phenomenon of income disparity in Indonesia. Moreover, a collection of national macroeconomic indicators, including inflation, unemployment, and real income, operate as crucial determinants of the business cycle. The proposed methodology facilitates a comprehensive analysis of whether uncertainty shocks generate unequal impacts on macroeconomic indicators, therefore enabling a more profound exploration of the transmission mechanisms by which uncertainty shocks influence income inequality.

The objective of this study is to investigate the impact of global uncertainty and macroeconomic activity on income inequality in Indonesia, both in the long and short term. Additionally, it aims to assess the suitable economic policies to counter income inequality in the face of global uncertainty.

2. Theoritical and Empirical Review

This section specifically addresses numerous crucial matters. First, it highlights empirical literature relating to the impact of global uncertainty, macroeconomic issues, and income inequality[1], [2], [4], [9]. It is anticipated that this method would help in developing policies to tackle uncertainty. Furthermore, it specifically concentrates on observations obtained from a solitary country, Indonesia, in order to mitigate any worries regarding homogeneity and disparities in data

sources. Prior research on economic policy uncertainty (EPU) has mostly focused on investigating domestic uncertainty, namely the U.S. Economic Policy Uncertainty Index (EPU)[1], [2], [9]. The present study undertakes a comprehensive empirical investigation of the Global Economic Policy Uncertainty (GEPU), which encompasses the combined Economic Policy Uncertainty (EPU) of 21 countries. The objective is to explore the repercussions of global uncertainty on the macroeconomic stability of Indonesia, hence influencing the overall income inequality within the country. Thirdly, this research employed the Global Economic Policy Uncertainty (GEPU) to examine the impact of global uncertainty, the Gini ratio as an indicator of inequality, the Consumer Price Index (CPI) for inflation measurement, Gross National Income (GNI) for income assessment, and the unemployment rate for unemployment measurement.

The Global Economic Policy Uncertainty (GEPU) is a composite index that combines the national Economic Policy Uncertainty (EPU) indices of 21 countries: Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States. The calculation includes the weighted average of these indexes based on GDP. The Economic Policy Uncertainty (EPU) index of each country quantifies the frequency of newspaper articles that address three specific topics related to economics (E), policy (P), and uncertainty (U). For the generation of the GEPU, the EPU index of each country is first standardized to a mean value of 100. Revised using a regression-based method, the missing values for certain countries are then estimated. The result of this process is a panel of monthly EPU index values with a balanced distribution, studied in 21 countries. The Gross Economic Policy Uncertainty (GEPU) for each month is calculated by analysing the average GDP-weighted value of the 21 national Economic Policy Uncertainty (EPU) indices. This calculation is based on GDP data sourced from the IMF's World Economic Outlook Database. This group of 21 countries collectively accounts for over 71% of the global output when adjusted for purchasing power parity (PPP) and around 80% when evaluated using market exchange rates.

An essential field of analysis is the theoretical examination of the effects of uncertainty, macroeconomics, and inequality. Numerous studies have demonstrated that uncertainty shocks exert an impact on macroeconomic fluctuations by influencing consumption, savings, and investment choices. A prior investigation on uncertainty conducted by Fischer et al. mainly concentrated on U.S. states, examining the interplay between national macroeconomic factors (such as inflation, GDP, and one-year treasury rates) and state-level factors associated with income distribution (such as unemployment, employment, and total real personal income per capita)[1]. The results indicate that global uncertainty has a substantial and adverse impact on inflation. In the short term, GDP growth experiences a rapid decrease, reaches its highest point after around one quarter, and then becomes negligible after one year. Furthermore, with heightened uncertainty, there is a corresponding decrease in interest rates, an increase in unemployment, and a significant decrease in overall income, resulting in less robust labor markets. Although there is evident variety in dynamic reactions, income inequality declines in most states. In contrast, other states, primarily situated in the Midwest, exhibited a progressive rise in income disparity during successive years.

Concurrently, a study carried out by Leduc and Liu, indicates that uncertainty functions as a detrimental shock to aggregate demand, that leads to higher unemployment rates and lower inflation[4]. The results were derived from conventional uncertainty metrics like the VIX and a novel measure devised from Michigan poll data. An analysis conducted by Theophilopoulou, examined the impact of macroeconomic uncertainty on income, wage disparity, and consumption[9]. The findings suggest that inequality first increases after uncertainty shocks but then decreases over the medium to long term, eventually reaching a lower level. There is a strong correlation between macroeconomic uncertainty and the fluctuations in income and consumption disparity. This work analyzes household income using precise microdata to investigate the transmission mechanisms by which uncertainty shocks affect different percentiles of the income and consumption distribution. The varied reaction appears to be significantly influenced by financial segmentation and portfolio processes.

Empirical evidence suggests that uncertainty shocks exacerbate and extend economic downturns. During an economic downturn, several dimensions of income, wages, and distribution of consumption are impacted. The earnings of low-wage workers in the United States undergo significant decreases and exhibit high levels of fluctuation, but high-income people see relatively modest wage growth during periods of economic depression[10], [11]. According to Attanasio and Pistaferri, an analysis of the development of consumption disparity in the United States revealed a notable reduction in consumption inequality during the Great Recession, over a period of 10 years[12].

Analysis conducted by Belfield et al. reveals that as of 2016, indicators of income inequality, such as the Gini Coefficient and the 90:10 ratio, had reverted to levels observed during the 1990s[13]. The financial crisis of 2007-2008 largely curtailed the upward trajectory of these measures, mostly as a result of the decline in real income among high-income households and the augmented benefits from social security systems. Their results suggest that the personal incomes of middle- and high-income households started to increase at a sluggish pace, while the actual benefits for low-income families also experienced a deceleration. The research conducted by Giorgi and Gambetti, revealed a procyclical pattern in consumption inequality in the United States, namely among right-wing consumers who are more susceptible to economic volatility[14]. Individuals exhibiting high levels of consumption were discovered to shoulder three times the financial burden of business cycles compared to other consumers. Upon analyzing the influence of Total Factor Productivity (TFP) and Economic Policy Uncertainty (EPU) on consumption distribution, researchers found substantial effects concentrated at the higher end of the distribution. During periods of high Economic Policy Uncertainty (EPU), high-consumption percentiles significantly decreased their consumption in comparison to low EPU, resulting in a decrease in consumption inequality.

Ren et al. conducted research that demonstrates the asymmetrical character of the impact of EPU shocks on monetary and fiscal policy, which is strongly interconnected with the condition of the macroeconomy[15]. Furthermore, Bonciani and Ricci, discovered that global financial uncertainty shocks have a detrimental influence on output, trade, and unemployment[16]. However, the impact on nominal variables varies considerably among different nations. Furthermore, the consequences are more pronounced in nations characterized by elevated levels of trade or financial openness, increased susceptibility, less robust institutions, or during periods of economic decline.

The research undertaken by Ahiadorme, employed financial uncertainty as a proxy for global uncertainty. Stock market returns (measured by the Center for Research in Security Prices value-weighted stock market return index) and the real price of gold were among the external variables utilized for identifying purposes[17]. The gold price and stock market return series were obtained from Ludvigson et al., while the uncertainty calculation can be found on Sydney Ludvigson's website at https://www.sydneyludvigson.com.

The study by Canh et al., defines the economic policy uncertainty (EPU) variable through three components: (i) newspaper coverage of policy-related economic uncertainty, (ii) the number of federal tax code provisions set to expire in the coming years, and (iii) disagreement among economic forecasters as a proxy for uncertainty[18]. The study utilizes a large set of control variables, including real GDP growth (GDPg), inflation (Inf), gross capital formation (Cap) as a proxy for infrastructure development, human capital (HC), domestic credit provided by the financial sector (FD) as a proxy for financial development, CO2 emissions (CO2) as a proxy for environmental factors, energy security (ES) as a proxy for resource factors, the real exchange rate (REER), trade openness (Trade), and institutional quality (INST), measured by control of corruption, government effectiveness, regulatory quality, political stability, rule of law, and voice and accountability. The results indicate that domestic EPU has a significant negative effect on FDI inflows, while an increase in global EPU shows a significant positive impact on FDI inflows.

According to the research conducted by Al-Thaqeb, policy uncertainty exerts a substantial influence on both company financial planning and consumer expenditure[19]. Particularly, corporations have a tendency to adopt a more cautious approach during times of significant

uncertainty, which results in a deceleration of investments in production and employment. The Economic Policy Uncertainty (EPU) index is a comprehensive measure of economic policy uncertainty that incorporates uncertainty from news, policies, capital markets, and economic indicators. The index is computed based on three factors: the level of newspaper reporting on economic uncertainty associated to policies, the number of provisions in the federal tax code that are about to expire, and the level of disagreement among economic forecasters. The level of uncertainty can be quantified by conducting a search for newspaper articles that include keywords associated with economics, uncertainty, regulation, and legislation.

According to the research conducted by Cerda et al. elevated levels of economic uncertainty result in a decrease in GDP, investment, and employment, especially when considering Chile's relatively small open economy[20]. The uncertainty measurement was conducted using an index that comprehensively captures the extent of coverage on several subjects pertaining to economic uncertainty, obtained by scanning digitized newspaper archives. These archives enabled the computation of the quantity of articles that include references to both economics and uncertainty.

China has gained greater worldwide influence, the United States continues to hold the dominating position in all markets[21]. Rather than economic objectives, the data indicate that concerns about China's competitiveness with the U.S. in defining the global order are more likely to be motivated by political considerations. The Economic Policy Uncertainty (EPU) indices as the main indicators for representing China and the U.S.[22]

Based on to investigates the correlation between uncertainty shocks and income disparity in several states of the United States[2]. Economic shocks caused by uncertainty affect the whole economy through multiple channels. During periods of heightened uncertainty, companies adapt their investment and hiring patterns, resulting in a decrease in actual economic activity. The decline in production might impact the overall demand, so exerting an effect on prices. The fluctuations in variables linked to these channels are generally seen as crucial factors influencing income inequality. The analysis utilizes data on unemployment, real income, employment, and income inequality measures derived from surveys for all states in the United States, including the District of Columbia. Additionally, it incorporates a collection of national macroeconomic aggregates that serve as shared factors influencing state business cycles. The empirical results indicate that uncertainty shocks result in diverse reactions among states, with the majority of U.S. states demonstrating that uncertainty plays a substantial role in driving variations in income inequality, especially in certain locations and time periods. Contrasting responses to income inequality in basic regression analysis indicate that differences among states can be accounted for by differences in income distribution and labor market characteristics.

Numerous prior research have reported consistent results concerning uncertainty, which is widely seen as harmful to economic performance, particularly in the immediate term. Income inequality has been observed to decline during periods of economic recession[23], [24], [25]. One plausible explanation is that individuals who own capital are more vulnerable to negative fluctuations in the business cycle, which are frequently accompanied by significant decreases in company earnings and stock values. However, if the proportion of capital income is really small in a certain economy, inequality may rise during a period of economic downturn. This phenomenon arises from the premise that individuals with lower levels of expertise are generally more susceptible to fluctuations in the labor market and advancements in technology. A comprehensive grasp of the processes that propel fluctuations in income inequality is of utmost importance for policymakers in governmental institutions and central banks. Several research emphasize the correlation between family income disparity and the occurrence of crises[26].

Several empirical studies have aimed to investigate the relationship between uncertainty and macroeconomic activity on inequality. However, only a few have analyzed the long-term impact of uncertainty and macroeconomic activity on inequality in Indonesia. Based on theoretical frameworks and literature reviews, the research framework is presented in Figure 1. The hypothesis is that uncertainty and macroeconomic activity influence inequality in Indonesia.

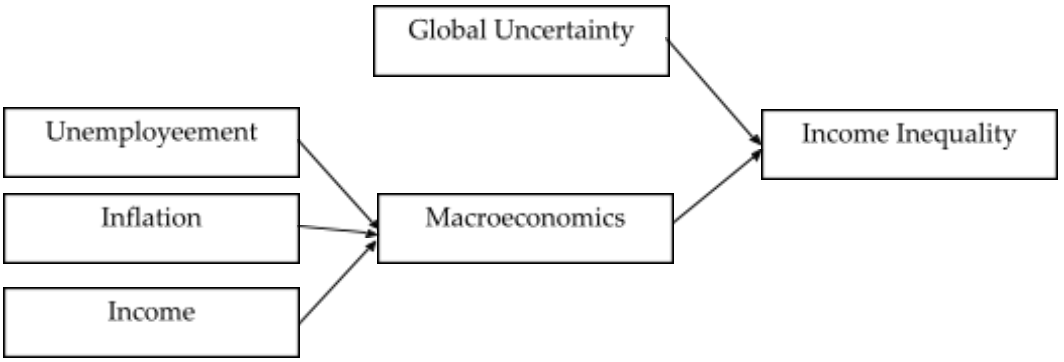

Figure 2. Research Framework

3. Method

3.1. *Data and Model Specifications*

The hypothesis developed in this study posits that income inequality is influenced by global uncertainties and macroeconomic activities, as expressed in Equation (1). The model utilizes data from Indonesia covering the period 1991–2021. Data collection is sourced from the World Bank (WDI) and the Economic Policy Uncertainty index.

$$INQ = \alpha_0 + \alpha_1 GU + \alpha_2 ME + \varepsilon_t \quad (1)$$

The Gini coefficient, denoted by (INQ), is used to measure income inequality, while policy uncertainty, denoted by (GU), represents global uncertainty. Macroeconomic factors are denoted by (ME), which include dimensions such as unemployment (UNM), inflation (INF), and real income (GNI). The model is estimated using the co-integration autoregressive distributed lag (ARDL) approach. Table 1 provides the definitions and sources of the variables analyzed.

Table 1. Variable definitions and sources

Variable	**Notation**	**Size**	**Data source**
Inequality	INQ	Gini index	WDI, Word bank
Global uncertainty	GU	*Economic policy uncertainty*(EPU)	*Policy uncertainty*
Unemployment	UM	*Unemployment rate*	WDI, World Bank
Inflation	INF	*Consumer price index*(CPI)	WDI, World Bank
Real income	GNI	GNI per capita	WDI, World Bank

Source: data processed, 2024

To assess the dimensions of macroeconomic activity—namely unemployment (UNM), inflation (INF), and real income (GNI)—this study develops a model represented by Equation (2):

(2)

$$ME = f\,(UNM,\ INF,\ GNI)$$

3.2. *Co-integration with ARDL*

This study conducts an empirical investigation into the long-term relationship and dynamic interaction between income inequality, financial development, and controllable variables. The model is estimated using the autoregressive distributed lag (ARDL) co-integration approach. Sehrawat and Giri, emphasize that the application of this approach is based on three distinct reasons[27]. The bound co-integration test is relatively simpler compared to other multivariate co-integration procedures. After selecting the appropriate lag order, the ordinary least squares (OLS) method can be used to evaluate the co-integration relationship. Furthermore, as highlighted by Camba Jr. and Camba (2021), the bound testing process differs from other procedures, such as Engle and Granger (1987) and Johansen (1992), because it does not require pre-testing for unit roots in the variables included in the model. This approach ensures that all variables are integrated in a consistent order, particularly at the first order (I(1)). Alternatively, a loss of predictive capacity may occur.

However, the ARDL technique can be used regardless of whether the regressors in the model exhibit stationarity (I(0)) or integration (I(1)). Additionally, it is important to note that testing shows improved efficiency when conducted with smaller sample sizes, as demonstrated in this study. Furthermore, the error correction approach effectively integrates short-term dynamics with long-term equilibrium, thus preserving valuable long-term information. The application of the unrestricted error correction model (UECM) within the autoregressive distributed lag (ARDL) framework is used to test both long-term and short-term relationships, as represented in Equation (3).

$$\Delta LINQ = \delta_0 + \delta_1 T + \delta_2 GU_{t-1} + \delta_3 LUM_{t-1} + \delta_4 LINF_{t-1} + \delta_5 LGNI_{t-1} + \sum_{i=1}^{q} \alpha_i \Delta LINQ_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LGU_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LUM_{t-i} \quad (3)$$

The series is defined as previously stated, with TTT representing the time trend and LLL indicating that the variables have been transformed into their natural logarithmic form. The initial components of Equation (3), involving the variables and δ_2, δ_3, δ_4 , correspond to the long-term coefficients, while the subsequent components relate to the short-term coefficients. The null hypothesis posits the absence of co-integration, whereas the alternative hypothesis asserts the presence of co-integration among the variables (Equation 3). $\alpha,\ \beta,\ \mu, \sigma\ H0 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = 0 H1 = \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq 0$

3.3. *The ARDL Bound Test for Co-integration Procedure*

The initial stage of the ARDL test uses ordinary least squares (OLS) to estimate Equation (3) and examine the long-term relationships between variables. The F-test assesses the significance of the lagged level coefficients, with the null and alternative hypotheses. The co-integration test, using critical values for H0, H1, and I(d), determines whether the F-statistic falls within the critical value range, leading to the acceptance or rejection of the null hypothesis regarding the long-term relationship. Moreover, if the calculated value lies between the lower and upper bounds, co-integration remains inconclusive, as the value of d is constrained between 0 and 1. I(0) and I(1) values are used. The ARDL bound testing approach utilizes the co-integration formula to estimate the number of regressions. The variable "q" determines the maximum number of lags used, while (ϱ+1)^q ϱq represents the total number of variables.

In the next stage, once co-integration is established, the estimation of the long-term ARDL model depends on the variable LINQtLINQ_tLINQt and can be represented by Equation (4).

$$\Delta LINQ = \alpha_0 + \sum_{i=1}^{q} \delta_1 LINQ_{t-i} + \sum_{i=1}^{q} \delta_2 LGU_{t-i} + \sum_{i=1}^{q} \delta_3 LUM_{t-i} + \sum_{i=1}^{q} \delta_4 LINF_{t-i} + \sum_{i=1}^{q} \delta_5 LGNI_{t-i} + \varepsilon_t \quad (4)$$

Where all variables have been previously defined. This involves the selection of the ARDL order. q_1, q_2, q_3, q_4, q_5 The model uses the SIC.

In the third and final step, we obtain the short-term dynamic parameters by estimating the error correction model (ECM) using the long-term estimates. This is determined by using Equation (5):

$$\Delta LINQ = \mu + \sum_{i=1}^{q} \alpha_i \Delta LINQ_{t-i} + \sum_{i=1}^{q} \beta_i \Delta LGU_{t-i} + \sum_{i=1}^{q} \mu_i \Delta LUM_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LINF_{t-i} + \sum_{i=1}^{q} \sigma_i \Delta LGNI_{t-i} + \phi ECM_{t-1} + \varepsilon_t \quad (5)$$

Where β represents the short-term dynamic coefficient toward equilibrium, and λ is the speed of adjustment coefficient. $\alpha, \beta, \mu, \sigma\phi$

4. Results and Discussion

4.1. *Results*

Stationarity tests were conducted to meet one of the requirements for ARDL modeling. The Augmented Dickey-Fuller (ADF) test was used in this study to check for stationarity. Non-stationary data can lead to false or spurious regressions. The results of the stationarity tests for each variable, performed using STATA 15, are as follows.

Table 2. Stationarity Test

. dfuller D.y

Dickey-Fuller test for unit root — Number of obs = 29

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.313	-3.723	-2.989	-2.625

MacKinnon approximate p-value for Z(t) = 0.0004

. dfuller D.x1

Dickey-Fuller test for unit root — Number of obs = 29

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.503	-3.723	-2.989	-2.625

MacKinnon approximate p-value for Z(t) = 0.0002

. dfuller D.x2

Dickey-Fuller test for unit root — Number of obs = 30

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.949	-3.716	-2.986	-2.624

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller D.x3

Dickey-Fuller test for unit root — Number of obs = 30

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-7.621	-3.716	-2.986	-2.624

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller D.x4

Dickey-Fuller test for unit root — Number of obs = 29

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-2.921	-3.723	-2.989	-2.625

MacKinnon approximate p-value for Z(t) = 0.0430

In Table 2 above, it can be observed that the variables of inequality, uncertainty, unemployment, inflation, and income are stationary at the first difference. Therefore, further tests can be conducted.

In Table 3, the results of multiple regression tests show that the global uncertainty variable, unemployment rate, and real income significantly affect the income inequality variable, with a p-value of $p>|t| < 0.05$. However, the inflation variable does not have a significant effect on income inequality, as indicated by a p-value of $p>|t| > 0.05$.

Table 3 Regression Test

```
. regress y x1 x2 x3 x4
```

Source	SS	df	MS		
				Number of obs	= 31
				F(4, 26)	= 65.18
Model	276.789485	4	69.1973713	Prob > F	= 0.0000
Residual	27.6040751	26	1.0616952	R-squared	= 0.9093
				Adj R-squared	= 0.8954
Total	304.39356	30	10.146452	Root MSE	= 1.0304

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1	-.02612	.0044202	-5.91	0.000	-.0352059	-.0170341
x2	.0996656	.0447045	2.23	0.035	.0077741	.1915571
x3	.0212491	.0212534	1.00	0.327	-.022438	.0649361
x4	.003443	.0002741	12.56	0.000	.0028795	.0040064
_cons	29.72076	.9136928	32.53	0.000	27.84264	31.59888

Table 4. Residual Stationarity Test

```
. dfuller ect

Dickey-Fuller test for unit root                    Number of obs   =        30
```

	Test Statistic	Interpolated Dickey-Fuller 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.168	-3.716	-2.986	-2.624

```
MacKinnon approximate p-value for Z(t) = 0.0007
```

In Table 4 above, the residual stationarity test at the level degree is presented. Since the residuals are stationary, further tests can be conducted.

Table 5. ECM test

```
. regress D.y D.x1 D.x2 D.x3 D.x4 L1.ect
```

Source	SS	df	MS		
				Number of obs	= 30
				F(5, 24)	= 6.07
Model	23.6716562	5	4.73433123	Prob > F	= 0.0009
Residual	18.7180042	24	.779916842	R-squared	= 0.5584
				Adj R-squared	= 0.4664
Total	42.3896604	29	1.46171243	Root MSE	= .88313

D.y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x1 D1.	-.0090041	.0053353	-1.69	0.104	-.0200156	.0020074
x2 D1.	.2419268	.1075429	2.25	0.034	.0199692	.4638844
x3 D1.	.0163724	.0138608	1.18	0.249	-.0122348	.0449796
x4 D1.	.0043654	.0009707	4.50	0.000	.0023619	.006369
ect L1.	-.6314633	.2082523	-3.03	0.006	-1.061275	-.2016516
_cons	-.2941646	.211898	-1.39	0.178	-.7315005	.1431713

In the ECM equation above, the value for ect L1 falls within the range of 0 to -1, with a value of -0.6314633, indicating that it meets the criteria for the ECT variable, and the variable is stationary. This suggests that the short-term and long-term adjustment variables are significant, with a p-value of 0.006 < 0.05, confirming co-integration between the dependent and independent variables.

Table 6. ARDL test

```
. ardl y x1 x2 x3 x4, lags(1 1 1 1 1) ec1
ARDL(1,1,1,1,1) regression
Sample:      1992 -      2021                 Number of obs     =         30
                                              R-squared         =     0.5765
                                              Adj R-squared     =     0.3859
Log likelihood =  -34.86521                   Root MSE          =     0.9474
```

D.y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ADJ						
y L1.	-.6520696	.2399904	-2.72	0.013	-1.152681	-.1514585
LR						
x1 L1.	-.0312239	.0070153	-4.45	0.000	-.0458576	-.0165901
x2 L1.	.1463495	.0782419	1.87	0.076	-.0168603	.3095592
x3 L1.	.0418904	.0492699	0.85	0.405	-.0608849	.1446657
x4 L1.	.0037621	.0004464	8.43	0.000	.0028309	.0046933
SR						
x1 D1.	-.0103575	.0063331	-1.64	0.118	-.0235681	.002853
x2 D1.	.2684826	.1311504	2.05	0.054	-.0050924	.5420575
x3 D1.	.0240298	.0242373	0.99	0.333	-.0265284	.074588
x4 D1.	.0046012	.0012962	3.55	0.002	.0018973	.0073051
_cons	18.3589	7.20701	2.55	0.019	3.325341	33.39246

In Table 6, it is shown that there is co-integration between the dependent and independent variables in both the long term and short term at probability levels of 5% and 10%. The global uncertainty variable has a long-term negative effect on income inequality, with a probability level of 1%. The unemployment variable has a positive effect on income inequality in both the long term and short term, with a probability level of 10%. Meanwhile, the inflation variable has no effect in either the long term or short term. Lastly, the income variable has a positive influence on income inequality in both the long term and short term, with a probability level of 1%.

Table 7. Heteroskedasticity and Autocorrelation Test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of D.y

         chi2(1)      =     3.46
         Prob > chi2  =   0.0629

. estat bgodfrey

Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
1	0.914	1	0.3389

H0: no serial correlation

Based on Table 7 above, it is stated that the null hypothesis (H0) assumes constant variance and no serial correlation. This indicates the presence of heteroscedasticity and autocorrelation.

4.2. *Discussion*

Previous research has shown that uncertainty affects income inequality[1], [9]. Econometric analysis indicates that the global economic policy uncertainty (GEPU) variable significantly influences income inequality in Indonesia in the long run ($p < 0.05$). This suggests that an increase in global uncertainty can be a factor contributing to income inequality in Indonesia.

Based on policy uncertainty data, there was a significant increase in Global Economic Policy Uncertainty (GEPU) between 1997 and 2017. This surge can be attributed to several events including the Asian and Russian financial crises, the 9/11 attacks, the Second Gulf War, the global financial crisis, the Eurozone crisis, the trade tensions between the US and China, the change in Chinese leadership, the Trump election, the Brexit referendum, the European immigration crisis, and political disorder in Brazil, France, and South Korea. Thus, a rise in Gross Economic Product (GEPU) can have an effect on income inequality in Indonesia.

Amid times of heightened uncertainty, households often curtail their expenditure, delay the acquisition of long-lasting products, and augment their savings. Corporations may postpone investments, embracing a cautious strategy, and prioritize temporary employees over permanent personnel. The labour market is influenced by changes in employment rates, working hours, and salary adjustment. Furthermore, uncertainty has a direct effect on financial markets, resulting in significant fluctuations in returns. The credit circumstances exert increasing restrictions on both firms and people. These elements together function as causes of income disparity on the backdrop of global uncertainty.

The results of the study indicate that Global Economic Policy Uncertainty (GEPU) has a negative effect on income inequality. This means that an increase in GEPU reduces income inequality in Indonesia. This finding aligns with research by Theophilopoulou, which stated that during periods of global uncertainty, economic downturns occur, and income inequality decreases depending on the composition of income[9]. Similarly, research by Fischer et al., found that in three out of four census areas, the Gini coefficient responded negatively to uncertainty, while in the Midwest USA, income inequality increased due to uncertainty[1]. Historical decomposition allows for an investigation into whether and when uncertainty shocks significantly influence income inequality over the estimation period.

The decline in income inequality in Indonesia due to Global Economic Policy Uncertainty (GEPU) is influenced by the fact that capital owners, or the top 10% group, are more exposed to adverse business cycle movements, often accompanied by sharp declines in company profits and share prices. Meanwhile, for the bottom 50%, the government's efforts to stimulate the economy through looser monetary policy and social assistance programs help mitigate the impact, leading to a reduction in income inequality.

However, according to research conducted by Chikhale, wealth inequality rose sharply after the financial crisis[2]. The mechanism reinforcing inequality after global uncertainty is that wealthy individuals invest a large portion of their wealth in uncertain assets, which tend to yield higher average returns[28]. This makes the top 1% less impacted by uncertainty, while the bottom 50% struggle to recover, falling further into poverty. Therefore, effective policies are needed to address the challenges posed by global uncertainties.

Based on the results of statistical tests, unemployment has a positive effect on income inequality in Indonesia both in the long term and short term, with P-values of 0.080 and 0.033, respectively, at a 10% probability level. This indicates that as the unemployment rate increases in Indonesia, income inequality also worsens.

Increase in unemployment leads to greater income inequality, particularly in economies where the share of capital income is relatively low, especially for the bottom 50% of the population[1], [4]. When labour demand decreases, wages also fall, and the workforce responds by reducing spending, though by a smaller margin, which contributes to a further decline in consumption growth. In situations where wealth is concentrated among the top 1% and 10%, and the majority of the income for the bottom 50% comes from labour, rising unemployment exacerbates income inequality.

The Central Statistics Agency (BPS) recorded that around 1.7 million workers in the industrial sector were laid off due to the COVID-19 pandemic. These layoffs primarily impacted the bottom 50% of the population. As a result, an increase in unemployment exacerbates income inequality between the top 10% and the bottom 50%.

The following graph shows the number of industrial workers in Indonesia who experienced layoffs (PHK) during 2019-2020.

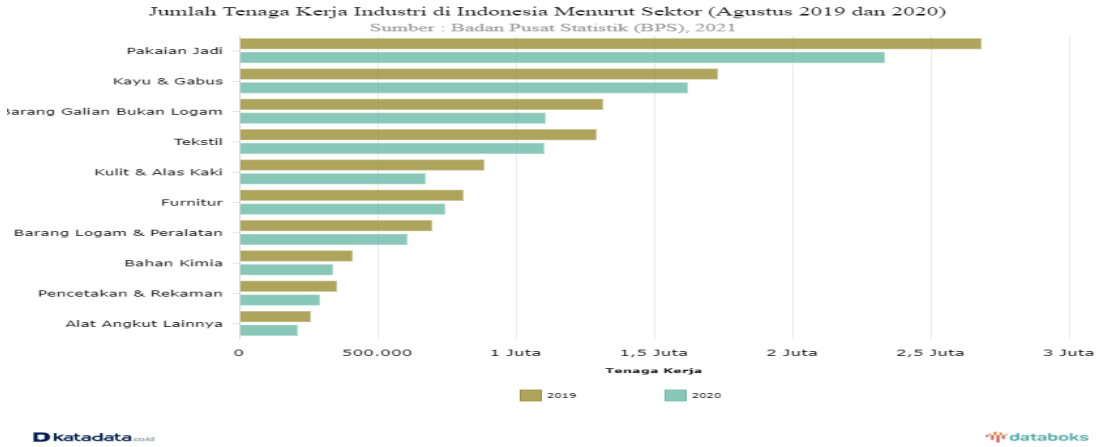

Figure 3. Number of Industrial Workers in Indonesia by Sector
Source: Central Bureau of Statistics (BPS), Katadata.co.id

Based on the results of statistical tests, neither the short-term nor the long-term relationship of inflation has any effect on income inequality in Indonesia, with P-values of 0.563 and 0.422, respectively. This indicates that the inflation rate does not significantly impact income inequality in Indonesia, which contrasts with the findings of Chikhale and Fischer et al,.[1], [2] Although this study shows that inflation has no direct effect on income inequality, the government must still monitor inflation rates to achieve its broader goal of economic stability.

Based on the results of statistical tests, the income variable has a positive influence on income inequality both in the long term and short term, with P-values of 0.000 and 0.002, respectively, at a 1% probability level. This indicates that an increase in income leads to an increase in income inequality. This finding contrasts with previous research by Fischer et al., which stated that a decrease in income would reduce income inequality[1].

According to world uncertainty data, a significant portion of individual wealth in Indonesia is controlled by the top group. The top 1% controls 30.2% of the total wealth of Indonesia's population, followed by the top 10%, which controls 61%. Meanwhile, the bottom 50% controls only 4.5% of the country's total wealth. In 2021, the bottom 50% held just 12.4% of total national income, a decrease from 17.4% in 2001. In contrast, the top 10% controlled 48% of total national income in 2021, up from 41.5% in 2001 (katadata.co.id). This suggests that when the top 10% experiences income growth, income inequality in Indonesia increases if the bottom 50% cannot keep pace. Even if the bottom 50% experiences income growth, it would have little impact on reducing inequality due to the significant income gap between the top 10% and the bottom 50%. Thus, any increase in income tends to exacerbate income inequality in Indonesia. The following

figure illustrates the distribution of individual wealth and income between the top 10% and bottom 50% from 2001 to 2021.

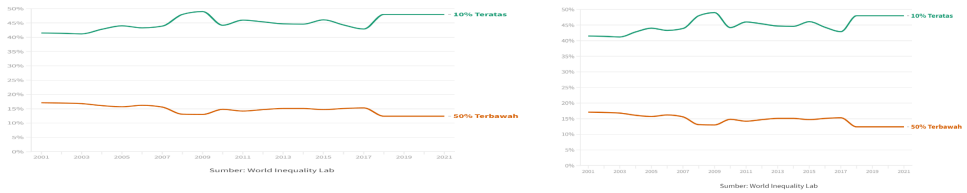

Figure 4. Income Distribution Between Top 10% and Bottom 50% (2001-2021)
Source: World Inequality

5. Conclusions

This paper examines the existence of both long-term and short-term relationships between global uncertainty, macroeconomic activity, and income inequality in Indonesia, using the ARDL and ECM co-integration bound tests over the 1991–2021 period. The results indicate a long-term negative relationship between global uncertainty and income inequality. Additionally, both long-term and short-term effects are observed between rising unemployment and increasing income inequality. Finally, income has a significant influence on income inequality in Indonesia, in both the long and short term.

Based on the research results, it is evident that global uncertainty and macroeconomic activity influence income inequality in Indonesia. Therefore, it is crucial for policymakers, both in government institutions and central banks, to address these global uncertainties and macroeconomic factors when formulating policies to mitigate their impact on income inequality.

The study findings suggest a persistent inverse correlation between global uncertainty and income disparity. Higher levels of Global Economic Policy Uncertainty (GEPU) result in greater vulnerability of the top 1% to negative fluctuations in the business cycle. This vulnerability leads to significant decreases in company profits and share prices, ultimately lowering their earnings. In the case of the lowest 50%, global uncertainty diminishes the demand for labor, resulting in a decrease in income. Thus, this group tends to curtail expenditure, albeit to a comparatively lesser extent.

To stabilize the economy amid global uncertainty, the government should implement pro-growth policies, ensuring that banks have the capacity to continue lending and facilitating ease of investment. Maintaining the stability of the banking sector is crucial for sustaining economic growth. For the bottom 50% of the population, the government should provide effective social protection programs, ensuring that income inequality continues to decrease after periods of global uncertainty. According to research by Chikhale (2023), income inequality tends to rise sharply following global uncertainties.

The results of the study indicate that an increase in unemployment can lead to higher income inequality. Therefore, the best government policy is to create more job opportunities, ensuring that these jobs are of high quality, formal in nature, and offer decent wages and benefits. This should be supported by free education, access to credit for Micro, Small, and Medium Enterprises (MSMEs), and infrastructure investment. Additionally, the government should expand social assistance programs that guarantee income and provide basic services for vulnerable and poor communities.

Based on world inequality data, the bottom 50% controlled only 4.5% of the total wealth in Indonesia in 2021, while the top 1% and 10% controlled 30.2% and 61%, respectively. An increase in income for the top 1% and 10% can exacerbate income inequality compared to the bottom 50%. Therefore, an effective policy would be to implement a highly progressive income tax, prioritizing public interests over private gains. Without such a tax or similar policies, there is a serious risk that the wealth share of the top percentile will continue to grow indefinitely, leading to ever-increasing inequality.

Currently, there are many government programs aimed at addressing income inequality between the top 1% and 10% and the bottom 50%, but they have not been properly implemented. One of the most critical policies for the success of these programs is the eradication of corruption. Even though government programs have been designed to reduce income inequality in Indonesia, corruption by certain individuals undermines their effectiveness, preventing these policies from achieving their intended impact.

6. References

[1] M. M. Fischer, F. Huber, and M. Pfarrhofer, "Journal of Economic Behavior and Organization The regional transmission of uncertainty shocks on income inequality in the United States," *J. Econ. Behav. Organ.*, vol. 183, pp. 887–900, 2021, doi: https://doi.org/10.1016/j.jebo.2019.03.004.

[2] N. Chikhale, "The Effects of Uncertainty Shock : Implications of wealth inequality," *Eur. Econ. Rev.*, vol. 104412, 2023, doi: https://doi.org/10.1016/j.euroecorev.2023.104412.

[3] S. R. Baker *et al.*, "Measuring Economic Policy uncertainty," 2015.

[4] S. Leduc and Z. Liu, "Uncertainty shocks are aggregate demand shocks $," *J. Monet. Econ.*, vol. 82, pp. 20–35, 2016, doi: https://doi.org/10.1016/j.jmoneco.2016.07.002.

[5] J. E. Stiglitz, "Journal of Human Development and Capabilities : A Multi-Disciplinary Macroeconomic Fluctuations , Inequality , and Human Development Macroeconomic Fluctuations , Inequality , and Human Development," pp. 37–41, 2012.

[6] P. Vujanovic, "Policies for inclusive and sustainable growth in Indonesia," vol. 1246, 2015.

[7] A. Geise and N. Bariyah, "Impact of institutional determinants on income inequalities in Indonesia during the Era Reformasi," vol. 82, pp. 0–1, 2022, doi: https://doi.org/10.1016/j.asieco.2022.101526.

[8] C. Basri and H. Hill, "Making Economic Policy in a Democratic Indonesia : The First Two Decades," pp. 1–21, 2020, doi: https://doi.org/10.1111/aepr.12299.

[9] A. Theophilopoulou, "The impact of macroeconomic uncertainty on inequality : An empirical study for the UK The impact of macroeconomic uncertainty on inequality : An empirical study for the UK. 90448.," 2018.

[10] J. Heathcote, F. Perri, and G. L. Violante, "Review of Economic Dynamics Unequal we stand : An empirical analysis of economic inequality in the United States," *Rev. Econ. Dyn.*, vol. 13, no. 1, pp. 15–51, 2010, doi: https://doi.org/10.1016/j.red.2009.10.010.

[11] A. Guvenen, O. Serdar, and J. Song, "The Nature Of countercyclical Income Risk," vol. 122, no. 3, pp. 621–660, 2014.

[12] B. O. Attanasio and L. Pistaferri, "Consumption Inequality over the Last Half Century : Some Evidence Using the New PSID Consumption Measure," vol. 104, no. 5, pp. 122–126, 2014.

[13] C. Belfield, R. Blundell, J. Cribb, A. Hood, and R. Joyce, "Two d ecades of i ncome i nequality in Britain : t he r ole of w ages , h ousehold e arnings and r edistribution Two Decades of Income Inequality in Britain : The Role of Wages , Household Earnings and Redistribution," 2017.

[14] G. De Giorgi and L. Gambetti, "Business Cycle Fluctuations and the Distribution of Consumption," 2015.

[15] Y. Ren, Q. Guo, H. Zhu, and W. Ying, "The effects of economic policy uncertainty on China ' s economy : evidence from time-varying parameter FAVAR," *Appl. Econ.*, vol. 00, no. 00, pp. 1–19, 2019, doi: https://doi.org/10.1080/00036846.2019.1707475.

[16] D. Bonciani and M. Ricci, "The international effects of global financial uncertainty shocks," *J. Int. Money Financ.*, vol. 109, 2020, doi: https://doi.org/10.1016/j.jimonfin.2020.102236.

[17] J. W. Ahiadorme, "On the aggregate effects of global uncertainty : Evidence from an emerging economy," pp. 390–407, 2022, doi: https://doi.org/10.1111/saje.12309.

[18] N. P. Canh, N. T. Binh, S. D. Thanh, and C. Schinckus, "Determinants of foreign direct

investment inflows: The role of economic policy uncertainty," *Int. Econ.*, 2020, doi: https://doi.org/10.1016/j.inteco.2019.11.012.
[19] S. Al-Thaqeb, "Economic policy uncertainty: A literature review," *J. Econ. Asymmetries*, vol. 20, 2019, doi: https://doi.org/10.1016/j.jeca.2019.e00133.
[20] R. Cerda, Á. Silva, and J. T. Valente, "Impact of economic uncertainty in a small open economy : the case of Chile," *Appl. Econ.*, vol. 00, no. 00, pp. 1–15, 2017, doi: https://doi.org/10.1080/00036846.2017.1412076.
[21] D. Zhang, L. Lei, Q. Ji, and A. M. Kutan, "Economic Policy Uncertainty in the US and China and their Impact on the Global Market," *Econ. Model.*, 2018.
[22] S. R. Baker *et al.*, "Measuring Economic Policy Uncertainty," *March*, 2016.
[23] M. Aguiar *et al.*, "Inequality and Aggregate Demand," 2018.
[24] A. C. Bianchi and E. F. Corugedo, "Uncertainty, Financial Frictions, and Nominal Rigidities: A Quantitative Investigation," pp. 551–557, 2018, doi: https://doi.org/10.1007/s11127-014-0188-9.
[25] J. Benhabib, A. Bisin, and M. Luo, "Earnings Inequality and Other Determinants of Wealth Inequality," vol. 107, no. 5, pp. 593–597, 2017.
[26] J. Fernández-villaverde and P. A. Guerrón-quintana, "Review of Economic Dynamics Uncertainty shocks and business cycle research," *Rev. Econ. Dyn.*, vol. 37, pp. S118–S146, 2020, doi: https://doi.org/10.1016/j.red.2020.06.005.
[27] M. Sehrawat and A. K. Giri, "Financial development and income inequality in India: An application of ARDL approach," *Int. J. Soc. Econ.*, vol. 42, no. 1, pp. 64–81, 2015, doi: https://doi.org/10.1108/IJSE-09-2013-0208.
[28] K. Kasa and X. Lei, "Risk , uncertainty , and the dynamics of inequality R," *J. Monet. Econ.*, vol. 94, pp. 60–78, 2018, doi: https://doi.org/10.1016/j.jmoneco.2017.11.008.