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The effect of inflation and fiscal decentralization on income inequality in Sumatra Island of Indonesia: a panel data

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Abstract. *The aim of this research is to analyze the relationship between the influence of the fiscal independence index, regional spending and inflation on income inequality in ten provinces on the island of Sumatra. This research uses panel data regression, namely the Fixed Effect Model (FEM). The findings of this research indicate that regional spending has a significant negative relationship with income inequality. The role of regional spending has an impact on reducing income inequality. The fiscal independence index has a significant negative effect on reducing income inequality. Inflation has a positive and significant relationship to income inequality.*

Keywords: income inequality, local government expenditure, Fiscal Independence Index, inflation, Fixed Effect Model.

JEL Classification: E31, E43, E52.

Introduction

Inequality in terms of income in society occurs because of the background of social life which causes differences in carrying out economic activities such as per capita expenditure and income receipts. The high level of inequality in per capita income affects the economy of a region. This inequality often occurs due to differences in characteristics observed in farming and non agricultural households such as educational background, internal transmission and household composition, ethnicity and income. Households with a non-agricultural income base have more productive influence factors resulting in higher per capita consumption expenditure. (Pham et al., 2023). Reducing income inequality is an important goal of sustainable development for the welfare of the population because income inequality has a detrimental impact on the regional economy (Batuo, Kararach and Malki, 2022). A comprehensive assessment of income inequality requires integration between them (Kim, Park and Ju, 2024).

Figure 1 shows the region of Sumatra Island in Indonesia which consists of the provinces of Nangroe Aceh Darussalam, North Sumatra, Riau, West Sumatra, Jambi, Bengkulu, South Sumatra, Lampung, Riau Islands and Bangka Belitung Islands which have similar agglomerations limited by the same characteristics of economic and social life, faced with challenging problems in terms of income inequality in society in ten provinces. In the ten years period 2010-2023, conditions of unequal distribution of income exist in the population distribution in the Sumatra region with an average Gini index of 0.331, this suggests that the distribution of income inequality that occurs in Sumatra still exists and needs to be addressed by the regional government.

Figure 1. *Province on the Island of Sumatra in Indonesia*

Source: Indonesian Map, processed data, (2024).

One of the factors that influences the income gap is the implementation of the financing system in regional government units. The most important thing to consider is the impact on social life of equality in the context of regional financial policies that affect inequality which is the impact of implementing public sector income sharing both vertically and horizontally between population income levels and public authorities. (Gałecka et al., 2022). By providing wider regional fiscal capacity space so that the goal of regional fiscal independence is further increased. The implementation of policies on fiscal decentralization in the regions provides appropriate flexibility for regional government authority in the fiscal sector (Pietrovito et al., 2023).

Fiscal decentralization in the era of authority in terms of regional revenue management and expenditure arrangements within the scope of regional autonomy continues to be improved and innovated in seeking regional potential sources in the ten regional provinces of Sumatra. Fiscal consolidation has a positive impact on income inequality. This shows that if the difference between local government expenditure and income increases, it could lead to an increase in income inequality (Sarwar et al., 2023). The independence of regional autonomy policies that regulate, manage and manage regional financial capacity is reflected in the management of potential sources of regional tax revenue. Direct tax revenues can reduce income inequality, measured using the Gini index and indirect taxes can increase income inequality. Likewise, spending in the public development sector can reduce income inequality through job creation (S. Khan et al., 2022).

As a mandate from the central government for regional governments to have a stronger foundation for fiscal decentralization, the central government, through financial balance, has begun to reduce the value of transfers to regions, to assess the performance of regional development capabilities in financing public sector development. Increasing consumption of government spending can reduce inequality, which indicates that transfer spending has been successfully implemented in reducing income inequality (Destek, Sinha and Sarkodie, 2020). Decentralization in the form of direct regional government spending can affect income inequality. Widespread decentralization of autonomy, but the negative impact after the threshold is greater than the negative value before the threshold (Hung and Thanh, 2022). Consumption of government expenditure has the potential to reduce income inequality, but the effectiveness of its use is very dependent on the efficiency of government expenditure (Sergi, Balashova and Ratner, 2023). Regional government expenditure can reduce income inequality (Destek, Sinha and Sarkodie, 2020). Comparative analysis shows that financial development, human resource conditions, total productivity, inflation and urbanization are factors that influence each other on income inequality in a market economy (Wang, Gao and Luo, 2023).

Meanwhile, in terms of monetary policy, which has the effect of controlling inflation to reduce the negative impact of unequal inequality, it has a significant influence and regionally specific inflation can mitigate the impact of unanticipated monetary contractions which can cause income inequality (Tavares Garcia and Cross, 2024). Inflation control policies have contributed positively to reducing income inequality within households as measured by the Gini coefficient and minus the share of gross domestic product used for labor compensation (Altunbaş and Thornton, 2022). Inflation inequality that considers the distributional consequences of changes in product prices is important in several areas of dynamic policy making, starting from trade policy, monetary policy and tax redistribution (Jaravel, 2025).

Income inequality by evaluating the role of monetary policy in mitigating reducing income inequality is very important for local governments (Khan and Khan, 2023). Inflation control policies will have a positive impact which will result in a more equal distribution of income in developing countries (Glawe and Wagner, 2024). Monetary policy in controlling inflation can influence income inequality by influencing the income of high-income households in financial markets and business operations (Xiang et al., 2023).

Literature review

The view of several experts is that income inequality has a negative impact on economic growth. Economic policies and the influence of negative social impacts can be implemented to achieve the goal of reducing income inequality among middle-income people (Kanbur, Ortiz-Juarez and Sumner, 2024). The Lorenz curve provides an overview of the real quantitative-based relationship between the percentage value of income recipients and the percentage of total net income received during a certain time period, for example one quarter. The Lorenz curve is within the boundaries of a square with the vertical side explaining the cumulative percentage of national income, while the horizontal side explains the cumulative percentage of population. If the Lorenz curve approaches a straight line, it means that the distribution of national income is getting better. Policies in the economic sector can be achieved by economic growth and reducing population income inequality in the regional development transition (Nandan and Mallick, 2022). Income inequality is measured using the Gini Index indicator to see the causality between the amount of net income received by the population and total income receipts.

Fiscal decentralization in terms of local government expenditure arrangements aims to increase efficiency in reducing income inequality in countries with high income levels (Eifeky, El Nemr and Mousa, 2023). In the Keynesian general equilibrium model, macroeconomic policy is a way for the government to provide stimulus to aggregate demand by controlling regional tax revenues and intervening in regional spending. When regional expenditure consumption is increased and/or regional tax rates are reduced, there will be a multiplier effect from the government to the private sector in the form of investment which will impact demand for goods and services and capital will increase, if this is not followed by supply balance it will cause inflation occurs.

Decentralization of regional tax revenues will create a role between income redistribution and efficiency, with tax decentralization policies increasing regional fiscal space, but can also widen inter-regional inequality by triggering tax competition on mobile tax bases (Bellofatto and Besfamille, 2021). Meanwhile, the dynamic effects captured by increasing income inequality are still occurring in developed and developing countries. Empirical evidence shows that progressive income taxes respond more to reducing income inequality in developing countries and not in developed countries (Malla and Pathranarakul, 2022). Regional fiscal independence, by reducing dependence on transfers from the central government aims for better regional financial governance in terms of decision-making authority to regional governments, which can contribute to reducing income inequality by improving community welfare (Kim, Kim and Park, 2020).

The Keynesian view of uncontrolled inflation shocks because the population lives outside of its economic control and capabilities with a priority on how economic activity between population groups can have an impact on demand that is higher than the amount of goods and services provided. Contractionary monetary policy shocks increase income inequality with the implementation of inflation control reducing the magnitude of the impact of income inequality. This indicates that region-specific inflation by controlling inflation can mitigate the impact of unanticipated monetary contractions which can cause income inequality (Tavares Garcia and Cross, 2024). According to Friedman (1976) shocks caused by inflation continuously and occurring anywhere are a monetary phenomenon Friedman (1976) refined the quantity expenditure theory by developing a theory of money demand. Inflation can occur due to a demand pull caused by an increase in prices as a result of a shift in aggregate demand upwards, while inflation due to a cost push is caused by an increase in prices which influences an increase in supply and reduces aggregate demand.

Data and method

The focus of this research is on the influence analysis tools and main indicators of time series and cross sections for 2010-2023 in the ten provinces of Sumatra. The variables studied are the relationship between the Gini Index (GINI), local government expenditure (lnGE), Regional Fiscal Independence Index (IKF) and inflation (INF).

The method for estimating the panel data multiple regression model used in this research is the Common Effect Model (CEM) to estimate that the intercept and slope figures for the variables studied are the same for all cross section units and time series. Modeling does not have individual influence (common effect) is a grouped estimator based on time series data with an ordinary least squares (OLS) approach.

Fixed Effect Model (FEM) to estimate models using a dummy variable or fixed effect estimator approach and is also called a covariance model. The fixed effect model estimation method can be adjusted using no weight or least square dummy variable (LSDV) and by providing cross section weight or general least square (GLS) which aims to reduce the influence of heterogeneity between cross section units.

Random Effect Model (REM) to estimate a fixed effect model by including dummy variables and including the consequences of weakening degrees of freedom which in the end can reduce the efficiency of parameter values. To overcome this effect, a confounding variable (error term) which is called a random effect, can be used. This method is for estimating panel data that has confounding variables that are correlated over time and between variables.

$$\mathrm{G}INI = \mathrm{f}\{\mathrm{GE}, \mathrm{IKF}, \mathrm{INF}\} \tag{1}$$

From equation (1) a regression equation can be formed for this research model, which is as follows

$$\mathrm{GINI_{it}} = \alpha_{0\mathrm{it}} + \alpha_1 \mathrm{lnGE_{it}} + \alpha_2 \mathrm{IKF_{it}} + \alpha_3 \mathrm{INF_{it}} + e_{\mathrm{it}} \tag{2}$$

Description: GINI is Gini Index (annual percentage); GE is a Local Government Expenditure (logaritma natural); IKF is Fiscal Indepence Index (Decentralization Fiscal); INF is Inflation; α_0 is a Constant; $\alpha_1 - \alpha_4$ is a parameter; i is the number of observations (cross-section); t is a time series; e is Error Term.

Table 1. *Variable Operational Definition*

Variable	Definition	Measurement	Source
Gini Index	The level of population income inequality is based on the cumulative proportion of expenditure and the cumulative proportion of the population	Cumulative proportion of population, cumulative proportion of expenditure (Index)	Indonesian Central Statistics Agency
Local Government Expenditure	Consumption of local government expenditure in the form of regional expenditure	Total local government expenditure (IDR)	DJPK, Ministry of Finance Republic Indonesia
Fiscal Independence Index	Regional independence in financing development sourced from Original Regional Income	Total Regional Original Income divided by total regional income (Index)	DJPK, Ministry of Finance Republic Indonesia
Inflation	Inflation in this study uses the Consumer Price Index (CPI) measure. The CPI measures the extent to which the prices of various goods and services consumed by the average household rise or fall over a period of time.	Consumer Price Index Total, Annual growth rate (%)	Indonesian Central Statistics Agency

Source: Author Compilation, (2024).

Result and discussion

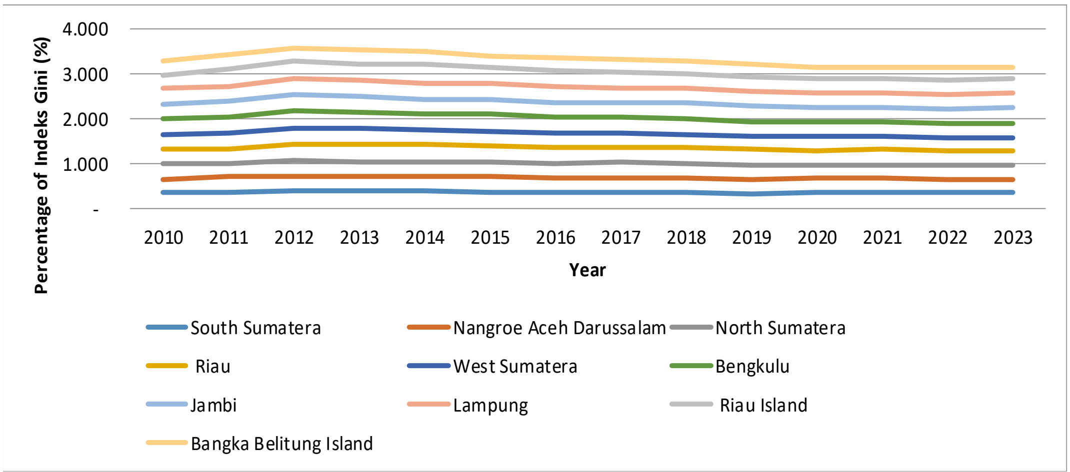
Variable Movements of Income Inequality on Provinces the Island of Sumatra

The existence of unequal distribution between population groups with high incomes and those with low incomes can cause income inequality within community groups. According to view (Adeleye et al., 2020) that the growth of income inequality will worsen poverty conditions and the interaction of poor economic performance and income inequality will worsen poverty rates. In aggregate, the average distribution of high inequality occurs in residents who live in urban areas compared to rural areas, this is because certain occupational groups are dominated by rich people with high educational backgrounds and competency abilities.

Meanwhile, the opportunity to pursue a higher level of education is still very limited for low-income population groups, so that employment opportunities at high wages are also limited. The performance of population income distribution has a significant mediating effect on the relationship between economic growth and poverty rates (Mageto Nyamweya and Ochieng Obuya, 2020). According to view (Brychka, Vyslobodska and Voitovych, 2023) states that the most significant factors for reducing poverty are loan interest rates, Gini index in income distribution, GDP per capita, income tax, unemployment rate and company profits.

The trend of income inequality in the ten provinces on the island of Sumatra is very fluctuating, not showing a trend that is sloping down or increasing significantly, however the regional government must see that the condition of income inequality continues to be reduced through several productive regional spending programs and relaxation in determining regional taxes. Stages for risk mitigation so that this condition of inequality does not widen, starting from opening access to education and health services for early childhood, preparing vocational education so that job opportunities are wide open, opening wide access to labor-intensive job vacancies for low-income residents and interventions through the determination of fair regional minimum wages.

Figure 2. *Income Inequality on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Figure 2 shows the performance of the Gini ratio in the research object area. In aggregate, the average inequality ratio is still quite high, between 0.279 - 0.354. The province with the highest average over fourteen years is South Sumatra Province with a value of 0.354, Riau Islands Province with a value of 0.353 and Bengkulu Province with a value of 0.348. The lowest inequality in a row is as follows: Bangka Belitung Islands Province with a value of 0.279, West Sumatra Province with a value of 0.316 and North Sumatra Province with a value of 0.320.

Variable Movements of Government Expenditure on Provinces the Island of Sumatra

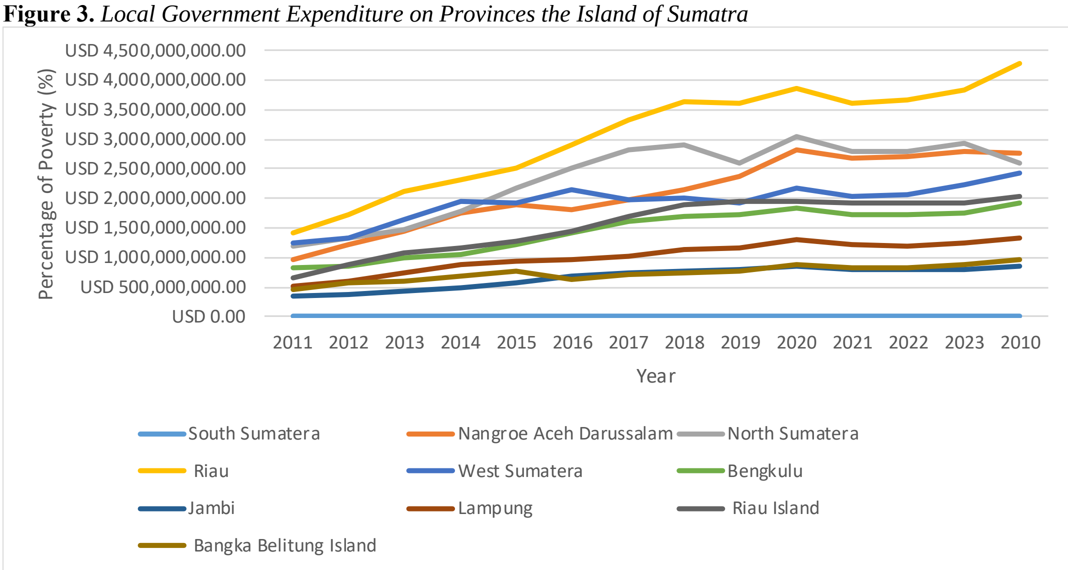
The role of regional governments in efforts to reduce income inequality in each region is reflected in the productivity of government consumption in the form of local government expenditure with a focus on programs to reduce income inequality. Local government governance in expenditure that is not yet good does not respond to reducing the index of misery or poverty (George-Anokwuru, 2023). Local governments can rely on local government expenditure priorities to achieve poverty alleviation programs to reduce disparities (Min and Rao, 2023). Local government expenditure in the areas of forestry, water resources and agriculture as well as urban and rural affairs, effectively narrows income gaps (Yan, Tu and Zheng, 2023).

Through the Regional Revenue and Expenditure Budget, with a composition of operating expenditure and development capital expenditure. Operational expenditures with scope include personnel expenditures as well as goods and services expenditures, to finance improvements in employee welfare with the hope of reducing the distribution of income inequality. Fiscal decentralization has an influence on the results of the human development index and poverty reduction depends on the nature and scope of fiscal decentralization, regional characteristics and capabilities and the design of fiscal decentralization (Mutembei, 2022). Interestingly, the research results show that improving the quality of governance in Africa can contribute to spurring positive urbanization which can contribute to improving urban economies and reducing income inequality (Dossou, 2023).

Consumption of government spending in socially valuable operating expenditures is associated with reduced income inequality, while unemployment and population size appear to widen income inequality (De Wettinck and van Mourik, 2024). Development capital expenditure is directed at creating a double multiplier effect for economic activity, including spending on the basic infrastructure sector as a pioneer of inter-regional connectivity so as to facilitate the flow of distribution of goods and services and reduce transportation logistics costs to make them cheaper. Consumption of development capital expenditure has a positive and statistically significant impact on income inequality (Chinedu, 2021; Obayori, J.B., 2020). Fiscal decentralization in terms of local government expenditure, especially in regional education and welfare sector spending as well as economic growth, has an impact on reducing regional income gaps (Pham et al., 2022). In Figure 3 below, the development of total local government expenditure in each region is presented.

Figure 3 shows the development of total regional expenditure on the research object. The period 2010-2023 shows that consumption of local government expenditure is increasing. The dynamics of development needs along with demand require increasingly large regional budgets.

Figure 3. *Local Government Expenditure on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Fiscal decentralization with increasingly large spending capacity requires regional governments to be creative in finding sources of development financing, not just relying on APBD conditions. Fiscal decentralization aimed at redistributing mobilized income leads to a strengthening of fiscal space, while redistribution of profits results in a reduction in income inequality (Bilbiie, Känzig and Surico, 2022).

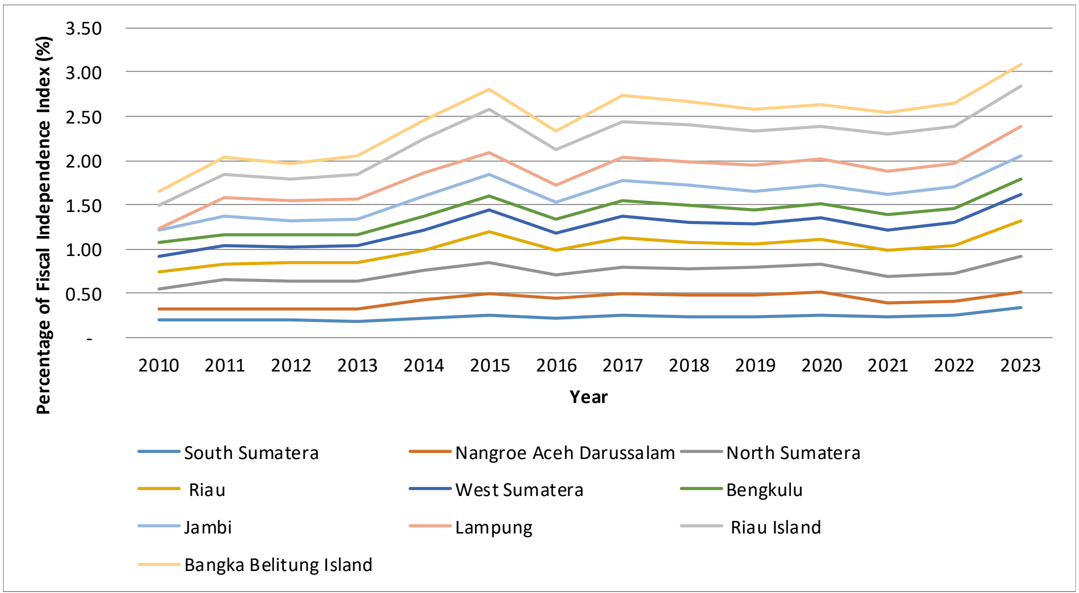
Variable Movements of Fiscal Independence Index on Provinces the Island of Sumatra

The implementation of regional autonomy opens up opportunities for regional governments in fiscal decentralization authority. The authority that has been given is in the form of more focused spending arrangements and looking for legitimate regional revenue sources. Regional revenues which are managed in accordance with the authority delegated from the central government are in the form of Regional Original Income which consists of components of regional taxes and levies, other legitimate regional original income as well as the results of separated regional assets. Governments in developing countries can increase revenue collection by strengthening the tax base, local borrowing and collecting taxes from fees. However, this is even more of a challenge for developing countries (e.g., Thailand and Indonesia) with larger informal sector revenues (Durongkaveroj, 2022).

Fiscal decentralization is expected to provide the ability to strengthen the regional tax sector with a strong tax base. Taxes administered by local governments on private companies in the regions can reduce regional income inequality permanently at no cost to aggregate growth, as can the implementation of uniformity in central transfer regulations (Yang et al., 2024). Fiscal decentralization independence with the Fiscal Independence Index (IKF) indicator is the ratio of PAD to total regional income receipts, where the higher the resulting ratio, the more independent a region is. If regions are independent in terms of regional revenues, this can have an impact on freedom in setting more focused thematic spending, such as spending on poverty alleviation themes. Fiscal decentralization and redistribution of intra-regional income inequality, with emphasis on the different roles of decentralization from the expenditure side and negative redistribution of income inequality from the income side (Pietrovito et al., 2023). Fiscal decentralization in terms of revenue receipts has an impact on income inequality reduction and has an impact on poverty alleviation (Pham et al., 2022). With limited state financial capacity and increasingly complex State Revenue and Expenditure Budget burdens, evaluation of central government transfer funds continues to be reduced. That decentralization on the revenue side has a negative and significant relationship to income inequality rates (Digdowiseiso, 2022). The following shows Figure 4 of the development of fiscal independence in the research object as follows.

Figure 4 shows the development of the fiscal independence index for the research object, where there are two provinces, namely Nangroe Aceh Darussalam Province and Bengkulu Province, which are in the not yet independent group with an IKF value of less than 0.25 and eight other provinces are in the towards independence group with a value of 0. 25 < IKF < 0.50. For the ten provinces on the island of Sumatra, not a single region is included in the regional category with fiscal independence of 0.5 < IKF < 0.75 or very independent IKF > 0.75.

Figure 4. *Fiscal Independence Index on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Variable Movement of Inflation on Provinces the Island of Sumatra

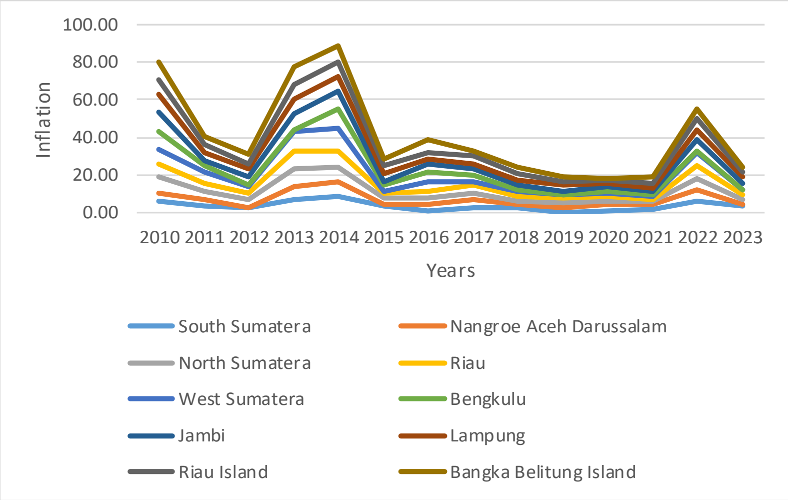
Inflation is often associated with the social life of the poor and has a negative impact on the distribution of per capita income. A consumer price index characterized by higher food prices can be detrimental to the welfare of poor people with low incomes, especially in some urban areas, but can provide benefits to producers and reduce poverty rates in rural areas. Based on food and non-food price data available at the level of each provincial region, it provides information that distinguishes the influence of food and non-food inflation on changes in income inequality.

If wage levels in rural areas are relatively elastic to food prices, higher food inflation will improve or at least not have a negative impact on income inequality in rural areas, but the impact in urban areas, like non-food inflation, will most likely be negative. With the consumer price index, we can assess the impact of food and non-food inflation separately on income inequality in rural and urban areas. Non-food inflation will result in poor performance for income inequality in both regions, but food inflation in urban areas is also estimated to further worsen the situation of income inequality.

However, if wage levels in rural areas respond elastically to increases in food prices, then higher food inflation should have a positive impact on reducing income inequality in rural areas. Regional governments implement various strategies and policies, including social safety net and redistribution policies as well as encouraging regional economic inclusion, with the collaboration of monetary policy and fiscal decentralization maintaining market balance, implementing progressive taxation, and changes in labor market demand (Ali &

Asfaw, 2023). Figure 5 presents data on the development of inflation control in ten provinces on the island of Sumatra as follows.

Figure 5. *Inflation on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Figure 5 shows inflation data in ten provinces on the island of Sumatra over a period of fourteen years 2010-2023. The highest average inflation was in the Bangka Belitung Islands Province at 5 percent, then West Sumatra Province at 4.68 percent and Lampung Province at 4. 54 percent. The lowest average inflation value was in Bengkulu Province at 2.79 percent, South Sumatra Province at 3.52 percent and Aceh Province at 3.53 percent.

Model Estimation Results

Chow Test Results

The chow test is used to estimate panel data models between common effects and fixed effects, the use of the chow test is to measure the stability performance of model parameters, this test hypothesis:
p-value is smaller than the 5% confidence level, then H0 is rejected and H1 is accepted
p-value is greater than the 5% confidence level, then H1 is rejected and H0 is accepted

Table 2. *Chow Test Results*

Effect Test	Statistik	d.f	p value
Cross-section F	21.520474	(9,127)	0.0000
Cross-section Chi^	129.677793	9	0.0000

Source: Author's calculation based on output E-Views 13 (2024).

Table 2 shows that the results of the Chow test, for F and Ch^ values respectively 0.0000, where the p-value is smaller than the confidence level of 0.05, then the hypothesis H0 is rejected and H1 is accepted, then the fixed effect model and conditions are chosen. is met to continue with the Hausman test.

Hausman Test Results

The Hausman test is a test to analyze the best model approach and is appropriate to regressed panel data, an approach carried out by comparing fixed effects and random effects. The Hausman test uses the Chi^ value, so that the conclusion on selecting the panel data method in this research can be determined statistically with the hypothesis:
H0: The model used is random effect
H1: The model used is fixed effect
p-value is smaller than the 5% confidence level, then H0 is rejected and H1 is accepted
p-value is greater than the 5% confidence level, then H1 is rejected and H0 is accepted

Table 3. *Hausman Test Results*

Test Summary	Ch^Statistik	Chi^d.f	p value
Cross-section random	11.190301	3	0.0107

Source: Author's calculation based on output E-Views 13 (2024).

Table 4 explains that the Hausman test results show a p-value of 0.0048 which is smaller than the confidence level of 0.05, so H0 is rejected and H1 is accepted so that the fixed effect model is better when compared to the random effect model.

Table 4. *Model Estimation Results*

Dependent Variable : GINI				
Variable	Coefficient	S.E	t-Statistic	p-value
C	0.709030	0.135824	5.220214	0.0000***
lnGE	-0.012227	0.004482	-2.727712	0.0073***
IKF	-0.044151	0.020196	-2.186124	0.0306**
INF	0.001519	0.000343	4.432945	0.0000***
R-squared			0.959136	
Adjusted R-squared			0.955275	
F-statistic			248.4039	
p-value (F-statistic)			0.000000	
Fixed Effects (cross)				
_Sumatera Selatan_C	0.029499			
_Aceh_C	-0.002701			
_Sumatera Utara_C	0.002340			
_Riau_C	0.019137			
_Sumatera Barat_C	-0.015197			
_Bengkulu_C	0.007144			
_Jambi_C	-0.002029			
_Lampung_C	0.005758			
_Kepulauan Riau_C	0.021258			
_Kepulauan Bangka Belitung_C	-0.065209			

Note: ***, ** and * represent statistical significance at 1%, 5% and 10%
Source: Author's calculation based on output E-Views 13, data processed, (2024)

The results of the model estimation test using the Fixed Effect Model are as follows:

$$\mathrm{GINI}_{\mathrm{it}} = 0.709030_{\mathrm{it}} - 0.012227\mathrm{lnGE}_{\mathrm{it}} - 0.044151\mathrm{IKF}_{\mathrm{it}} + 0.001519\mathrm{INF}_{\mathrm{it}} + e_{\mathrm{it}} \quad (3)$$

In equation (3) above, the constant value of 0.709030 explains that if regional expenditure (lnGE), Fiscal Independence Index (IKF) and inflation (INF) are zero or no performance, then income inequality (GINI) will increase by 0.709 percent. The lnGE variable coefficient of -0.012227 explains that if the value of the regional expenditure variable (lnGE) increases by one percent, with other variables considered constant, then the value of the GINI variable will decrease by 0.012 percent. The lnGE variable has a p-value of less than 0.01 which explains that at a confidence level of one percent it has a significant influence on GINI.

The IKF variable has a coefficient of -0.044151, explaining that if the value of the IKF variable increases by one percent and other variables are considered constant, then the value of the GINI variable will decrease by 0.044 percent. The IKF variable has a p-value of less than 0.05 which explains that at a confidence level of five percent it has a significant influence on the GINI variable. The INF variable has a coefficient of 0.001519, explaining that if the value of the INF variable increases by one percent and other variables are considered constant, then the value of the GINI variable will increase by 0.0015 percent. The INF variable has a p-value of less than 0.01, explaining that at a confidence level of one percent it has a significant influence on the GINI variable.

In equation (3) above, the coefficient of determination value obtained is an R-Squared value of 0.959136, which means that the influence of the variables studied lnGE, IKF and INF together influence income inequality in 10 provinces on the island of Sumatra by 95.91 percent. while the remaining 4.09 percent is influenced by other variables outside this research model. The F-statistic value in this model equation is 248.4039 with a significance value of 0.000000 or smaller than the confidence level of 0.01 so it can be interpreted that H0 is rejected and Ha is accepted, regional spending, the fiscal independence index and inflation simultaneously have a significant effect on income inequality in ten selected provinces on the island of Sumatra.

Discussion

The Effect of Government Expenditure on Income Inequality on Provinces the Island of Sumatra

The estimation results from the selected model from this research indicate that local government consumption in the form of regional spending has a negative relationship with reducing income inequality in ten provinces on the island of Sumatra. The results of this research confirm that they are in line with research conducted by (Jena and Barua, 2020). Local government expenditure is productive and focuses on reducing income inequality, either directly or as a derivative of the impact of development in other sectors, which provides a double multiplier effect. The results of this research indicate that they are in line with research conducted by (Yan and Mohd, 2023).

Operational expenditure takes the form of employee expenditure in the form of salaries and allowances to improve employee welfare as well as expenditure on goods and services to support the small and medium enterprise sector group. By improving employee welfare, you can increase consumption and increase individual business capital, thereby creating business opportunities that can absorb the workforce. Local government expenditure which focuses on forestry and water resources as well as agriculture in urban areas and rural affairs, effectively narrows income inequality, this result is in line with research conducted by (Yan, Tu and Zheng, 2023). Local government expenditure on a social security safety net for the population can reduce income inequality in rural areas. These results confirm in line with research conducted by (YU and LI, 2021).

Through spending on goods and services that can stimulate the growth of the Micro, Small and Medium Enterprises sector so that it can expand MSME business opportunities and absorb local workers. Efforts to overcome income inequality require an aspirational approach by combining innovative initiatives from the role of the private sector and government policy reform. The potential role of local government policies could help reduce income inequality and increase provincial regional minimum wages. This result is in line with opinion (Wang et al., 2024). With local wisdom in each region, MSMEs can be encouraged to provide food services and clothing convections that are characterized by regional local content. So, by extensifying the MSME business sector, it can increase demand for labor and reduce unemployment in the regions, this has a positive impact on reducing income inequality in the regions. The results of this research are in line with research conducted by (Ali & Asfaw, 2023).

Through the role of capital expenditure, infrastructure development can create a positive multiplier effect for inclusive economic growth, thereby reducing the negative impact of income inequality. The results of this research are in line with research by (Destek, Sinha and Sarkodie, 2020). Sustainable infrastructure development, creating good basic services thereby reducing disparities between regions, so that equitable development can be achieved. Local government expenditure on road infrastructure development strengthens the smooth flow of distribution of goods and services and can reduce logistics transportation costs so as not to cause high price disparities between regions. The impact of local government expenditure consumption in the form of regional spending on decreasing income distribution is in two ways, first, it will affect the number of low and middle income groups and second, it will have an impact on reducing high income groups. These results are in line with this view (Lian, Pei and Li, 2024).

The Effect of Fiscal Independence Index on Income Inequality on Provinces the Island of Sumatra

The estimation results from the model selected in this study show that the regional fiscal independence index has a negative and significant relationship to reducing income inequality in ten provincial regions on the island of Sumatra. The results of this research confirm that they are in line with research conducted by (Suhrab, Khan et al., 2022), but it is not in line with research (Hanny Tri Putri et al., 2022). The more independent a region is, the greater the regional government can allocate financing for regional development and the smaller the dependence on transfer funds from the central government.

Regional fiscal independence in terms of revenue means that the region is increasingly able to finance development by exploring potential sources of regional revenue. Through

Regional Original Income, revenues from the regional taxes and levies sector by strengthening the regional tax base, extensification and intensification as well as diversification of regional taxes can increase regional tax realization. This is in line with the view (Digdowiseiso, 2022) that decentralization on the revenue side has a negative and significant relationship to income inequality rates and is in line with research by (Pham et al., 2022).

Strengthening regional tax sector revenues and reducing dependence on central government transfer funds, so that regions can be more focused and flexible in managing program spending to reduce income inequality. These results confirm in line with the views (Pietrovito et al., 2023). Meanwhile, transfer funds from the central government have limitations and focus on handling other sectors. Intergovernmental transfer funds have a weak level in reducing inequality when compared with fiscal decentralization in the form of local government expenditure. These results are in line with research conducted by (Mutembei, 2022). Apart from increasing regional revenues from the regional tax sector, regional governments also play a role in providing stimulus or encouragement to the business sector in expanding its business, including by relaxing or providing tax incentives through reducing regional tax rates. These results are in line with research (Yang et al., 2024).

Thus, increasing the role of Regional Original Income to strengthen regional fiscal independence in terms of revenue is very meaningful for increasing the regional fiscal independence index. Policy implications that can reduce income inequality in the long term, especially through improving the quality and skills of the workforce, as well as the good role of local governments by using redistributive income with instruments such as progressive income tax and cash assistance to low-income groups. These results are in line with this view (Goh et al., 2023).

The Effect of Inflation on Income Inequality on Provinces the Island of Sumatra

The estimation results from the model selected in this study show that inflation has a positive and significant relationship to reducing income inequality in ten provincial regions on the island of Sumatra. The results of this research confirm that they are in line with research conducted by (Tavares Garcia and Cross, 2024). Shocks that occur as a result of uncontrolled inflation cause the price of goods in the product market to experience a significant increase which can affect consumption per capita expenditure very limited.

Inflation can influence the continuous increase in prices of goods and the effects of inflation from previous periods can still be felt during current conditions. Inflation control policies must remain controlled by the Central Bank authority, one of which is a structured monetary policy starting from controlling bank loan interest rates and controlling the money supply. These results are in line with research conducted by (Altunbaş and Thornton, 2022).

When there is an increase in inflation in an area, the aggregate demand for goods and services in the product market will decrease, causing income from production factors to decrease. To reduce fixed production costs for goods, some companies will reduce employee spending incentives and this will even have an impact on reducing the number of employees, resulting in unemployment which will have a negative impact on income inequality. Reducing the number of employees with low educational backgrounds, so that the proportion of the population with low income or no income increases. These results are in line with research conducted by (Jaravel, 2025).

However, the disinflation policy implemented by the Central Bank will have a good impact, most likely resulting in a more equal distribution of income in countries with high inflation. There is no such effect in low inflation situations (Glawe and Wagner, 2024).

Conclusion

The results of the estimation of the selected model in research from panel data show that regional spending shows a negative and significant relationship to income inequality. In line with this, regional government efforts to reduce income inequality have focused on operational spending which directly touches on improving employee welfare through employee allowances and incentives which have helped small and medium businesses. Meanwhile, spending on goods and services also provides stimulus to micro, small and medium enterprises, helping business capital. Capital expenditure for infrastructure development which continues to be increased has a multi-flyer effect on the regional economy, thereby providing an incentive for every factor of production to generate income.

The regional fiscal independence index in terms of regional income shows a negative and significant relationship with efforts to reduce income inequality. Creative efforts to find potential sources of regional income continue to be increased by strengthening the regional tax revenue base through tax extensification, intensification and diversification. Then encourage the participation of Regional Owned Enterprises to be more independent and create increased income from regional levies and provide opportunities for the private sector through collaboration between government and business entities. Partnership patterns are an important factor in reducing income inequality and changing selection to partnerships can answer the challenge of changing income inequality for the better (Erola and Kilpi-Jakonen, 2022). Reducing dependence on regional revenues from central government financial balancing funds so that regions are more independent in their ability to finance regional development.

Inflation shows a positive and significant relationship to reducing income inequality, this proves that the collaboration of monetary policy in controlling inflation with fiscal decentralization policy in terms of regional income and expenditure has gone hand in hand in creating balance in the product market and money market. The inflation rate can be controlled in line with the Central Bank's policy to control the amount of money in circulation and control bank loan interest rates.

Regional policy makers need to consider that income inequality in society is a key indicator of regional economic success and look at regional spending, regional fiscal independence and controlling inflation as preventive measures so that income inequality does not widen further.

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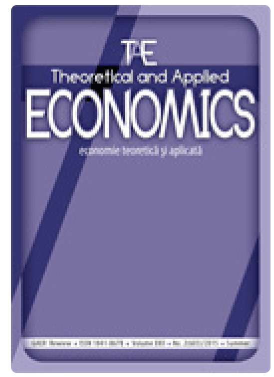

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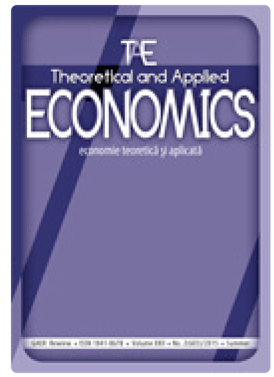

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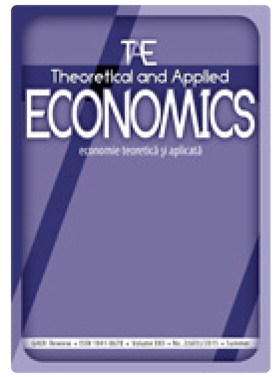

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The effect of inflation and fiscal decentralization on income inequality in Sumatra Island of Indonesia: a panel data

by Ariodillah Hidayat

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The effect of inflation and fiscal decentralization on income inequality in Sumatra Island of Indonesia: a panel data

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Abstract. *The aim of this research is to analyze the relationship between the influence of the fiscal independence index, regional spending and inflation on income inequality in ten provinces on the island of Sumatra. This research uses panel data regression, namely the Fixed Effect Model (FEM). The findings of this research indicate that regional spending has a significant negative relationship with income inequality. The role of regional spending has an impact on reducing income inequality. The fiscal independence index has a significant negative effect on reducing income inequality. Inflation has a positive and significant relationship to income inequality.*

Keywords: income inequality, local government expenditure, Fiscal Independence Index, inflation, Fixed Effect Model.

JEL Classification: E31, E43, E52.

Introduction

Inequality in terms of income in society occurs because of the background of social life which causes differences in carrying out economic activities such as per capita expenditure and income receipts. The high level of inequality in per capita income affects the economy of a region. This inequality often occurs due to differences in characteristics observed in farming and non agricultural households such as educational background, internal transmission and household composition, ethnicity and income. Households with a non-agricultural income base have more productive influence factors resulting in higher per capita consumption expenditure. (Pham et al., 2023). Reducing income inequality is an important goal of sustainable development for the welfare of the population because income inequality has a detrimental impact on the regional economy (Batuo, Kararach and Malki, 2022). A comprehensive assessment of income inequality requires integration between them (Kim, Park and Ju, 2024).

Figure 1 shows the region of Sumatra Island in Indonesia which consists of the provinces of Nangroe Aceh Darussalam, North Sumatra, Riau, West Sumatra, Jambi, Bengkulu, South Sumatra, Lampung, Riau Islands and Bangka Belitung Islands which have similar agglomerations limited by the same characteristics of economic and social life, faced with challenging problems in terms of income inequality in society in ten provinces. In the ten years period 2010-2023, conditions of unequal distribution of income exist in the population distribution in the Sumatra region with an average Gini index of 0.331, this suggests that the distribution of income inequality that occurs in Sumatra still exists and needs to be addressed by the regional government.

Figure 1. *Province on the Island of Sumatra in Indonesia*

Source: Indonesian Map, processed data, (2024).

One of the factors that influences the income gap is the implementation of the financing system in regional government units. The most important thing to consider is the impact on social life of equality in the context of regional financial policies that affect inequality which is the impact of implementing public sector income sharing both vertically and horizontally between population income levels and public authorities. (Gałecka et al., 2022). By providing wider regional fiscal capacity space so that the goal of regional fiscal independence is further increased. The implementation of policies on fiscal decentralization in the regions provides appropriate flexibility for regional government authority in the fiscal sector (Pietrovito et al., 2023).

Fiscal decentralization in the era of authority in terms of regional revenue management and expenditure arrangements within the scope of regional autonomy continues to be improved and innovated in seeking regional potential sources in the ten regional provinces of Sumatra. Fiscal consolidation has a positive impact on income inequality. This shows that if the difference between local government expenditure and income increases, it could lead to an increase in income inequality (Sarwar et al., 2023). The independence of regional autonomy policies that regulate, manage and manage regional financial capacity is reflected in the management of potential sources of regional tax revenue. Direct tax revenues can reduce income inequality, measured using the Gini index and indirect taxes can increase income inequality. Likewise, spending in the public development sector can reduce income inequality through job creation (S. Khan et al., 2022).

As a mandate from the central government for regional governments to have a stronger foundation for fiscal decentralization, the central government, through financial balance, has begun to reduce the value of transfers to regions, to assess the performance of regional development capabilities in financing public sector development. Increasing consumption of government spending can reduce inequality, which indicates that transfer spending has been successfully implemented in reducing income inequality (Destek, Sinha and Sarkodie, 2020). Decentralization in the form of direct regional government spending can affect income inequality. Widespread decentralization of autonomy, but the negative impact after the threshold is greater than the negative value before the threshold (Hung and Thanh, 2022). Consumption of government expenditure has the potential to reduce income inequality, but the effectiveness of its use is very dependent on the efficiency of government expenditure (Sergi, Balashova and Ratner, 2023). Regional government expenditure can reduce income inequality (Destek, Sinha and Sarkodie, 2020). Comparative analysis shows that financial development, human resource conditions, total productivity, inflation and urbanization are factors that influence each other on income inequality in a market economy (Wang, Gao and Luo, 2023).

Meanwhile, in terms of monetary policy, which has the effect of controlling inflation to reduce the negative impact of unequal inequality, it has a significant influence and regionally specific inflation can mitigate the impact of unanticipated monetary contractions which can cause income inequality (Tavares Garcia and Cross, 2024). Inflation control policies have contributed positively to reducing income inequality within households as measured by the Gini coefficient and minus the share of gross domestic product used for labor compensation (Altunbaş and Thornton, 2022). Inflation inequality that considers the distributional consequences of changes in product prices is important in several areas of dynamic policy making, starting from trade policy, monetary policy and tax redistribution (Jaravel, 2025).

Income inequality by evaluating the role of monetary policy in mitigating reducing income inequality is very important for local governments (Khan and Khan, 2023). Inflation control policies will have a positive impact which will result in a more equal distribution of income in developing countries (Glawe and Wagner, 2024). Monetary policy in controlling inflation can influence income inequality by influencing the income of high-income households in financial markets and business operations (Xiang et al., 2023).

Literature review

The view of several experts is that income inequality has a negative impact on economic growth. Economic policies and the influence of negative social impacts can be implemented to achieve the goal of reducing income inequality among middle-income people (Kanbur, Ortiz-Juarez and Sumner, 2024). The Lorenz curve provides an overview of the real quantitative-based relationship between the percentage value of income recipients and the percentage of total net income received during a certain time period, for example one quarter. The Lorenz curve is within the boundaries of a square with the vertical side explaining the cumulative percentage of national income, while the horizontal side explains the cumulative percentage of population. If the Lorenz curve approaches a straight line, it means that the distribution of national income is getting better. Policies in the economic sector can be achieved by economic growth and reducing population income inequality in the regional development transition (Nandan and Mallick, 2022). Income inequality is measured using the Gini Index indicator to see the causality between the amount of net income received by the population and total income receipts.

Fiscal decentralization in terms of local government expenditure arrangements aims to increase efficiency in reducing income inequality in countries with high income levels (Eifeky, El Nemr and Mousa, 2023). In the Keynesian general equilibrium model, macroeconomic policy is a way for the government to provide stimulus to aggregate demand by controlling regional tax revenues and intervening in regional spending. When regional expenditure consumption is increased and/or regional tax rates are reduced, there will be a multiplier effect from the government to the private sector in the form of investment which will impact demand for goods and services and capital will increase, if this is not followed by supply balance it will cause inflation occurs.

Decentralization of regional tax revenues will create a role between income redistribution and efficiency, with tax decentralization policies increasing regional fiscal space, but can also widen inter-regional inequality by triggering tax competition on mobile tax bases (Bellofatto and Besfamille, 2021). Meanwhile, the dynamic effects captured by increasing income inequality are still occurring in developed and developing countries. Empirical evidence shows that progressive income taxes respond more to reducing income inequality in developing countries and not in developed countries (Malla and Pathranarakul, 2022). Regional fiscal independence, by reducing dependence on transfers from the central government aims for better regional financial governance in terms of decision-making authority to regional governments, which can contribute to reducing income inequality by improving community welfare (Kim, Kim and Park, 2020).

The Keynesian view of uncontrolled inflation shocks because the population lives outside of its economic control and capabilities with a priority on how economic activity between population groups can have an impact on demand that is higher than the amount of goods and services provided. Contractionary monetary policy shocks increase income inequality with the implementation of inflation control reducing the magnitude of the impact of income inequality. This indicates that region-specific inflation by controlling inflation can mitigate the impact of unanticipated monetary contractions which can cause income inequality (Tavares Garcia and Cross, 2024). According to Friedman (1976) shocks caused by inflation continuously and occurring anywhere are a monetary phenomenon Friedman (1976) refined the quantity expenditure theory by developing a theory of money demand. Inflation can occur due to a demand pull caused by an increase in prices as a result of a shift in aggregate demand upwards, while inflation due to a cost push is caused by an increase in prices which influences an increase in supply and reduces aggregate demand.

Data and method

The focus of this research is on the influence analysis tools and main indicators of time series and cross sections for 2010-2023 in the ten provinces of Sumatra. The variables studied are the relationship between the Gini Index (GINI), local government expenditure (lnGE), Regional Fiscal Independence Index (IKF) and inflation (INF).

The method for estimating the panel data multiple regression model used in this research is the Common Effect Model (CEM) to estimate that the intercept and slope figures for the variables studied are the same for all cross section units and time series. Modeling does not have individual influence (common effect) is a grouped estimator based on time series data with an ordinary least squares (OLS) approach.

Fixed Effect Model (FEM) to estimate models using a dummy variable or fixed effect estimator approach and is also called a covariance model. The fixed effect model estimation method can be adjusted using no weight or least square dummy variable (LSDV) and by providing cross section weight or general least square (GLS) which aims to reduce the influence of heterogeneity between cross section units.

Random Effect Model (REM) to estimate a fixed effect model by including dummy variables and including the consequences of weakening degrees of freedom which in the end can reduce the efficiency of parameter values. To overcome this effect, a confounding variable (error term) which is called a random effect, can be used. This method is for estimating panel data that has confounding variables that are correlated over time and between variables.

$$GINI = \mathrm{f}\{\mathrm{GE, IKF, INF}\} \tag{1}$$

From equation (1) a regression equation can be formed for this research model, which is as follows

$$\mathrm{GINI_{it}} = \alpha_{0it} + \alpha_1 \mathrm{lnGE_{it}} + \alpha_2 \mathrm{IKF_{it}} + \alpha_3 \mathrm{INF_{it}} + e_{it} \tag{2}$$

Description: GINI is Gini Index (annual percentage); GE is a Local Government Expenditure (logaritma natural); IKF is Fiscal Indepence Index (Decentralization Fiscal); INF is Inflation; α_0 is a Constant; $\alpha_1 - \alpha_4$ is a parameter; i is the number of observations (cross-section); t is a time series; e is Error Term.

Table 1. *Variable Operational Definition*

Variable	Definition	Measurement	Source
Gini Index	The level of population income inequality is based on the cumulative proportion of expenditure and the cumulative proportion of the population	Cumulative proportion of population, cumulative proportion of expenditure (Index)	Indonesian Central Statistics Agency
Local Government Expenditure	Consumption of local government expenditure in the form of regional expenditure	Total local government expenditure (IDR)	DJPK, Ministry of Finance Republic Indonesia
Fiscal Independence Index	Regional independence in financing development sourced from Original Regional Income	Total Regional Original Income divided by total regional income (Index)	DJPK, Ministry of Finance Republic Indonesia
Inflation	Inflation in this study uses the Consumer Price Index (CPI) measure. The CPI measures the extent to which the prices of various goods and services consumed by the average household rise or fall over a period of time.	Consumer Price Index Total, Annual growth rate (%)	Indonesian Central Statistics Agency

Source: Author Compilation, (2024).

Result and discussion

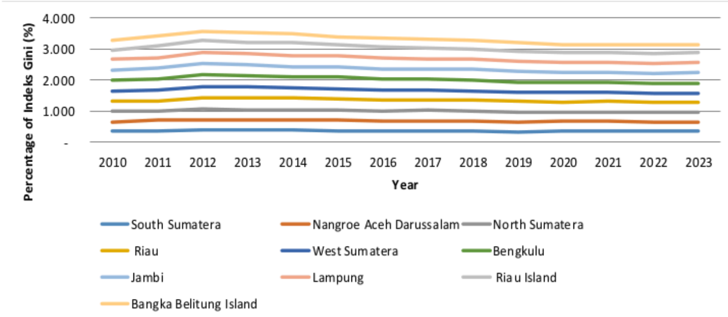
Variable Movements of Income Inequality on Provinces the Island of Sumatra

The existence of unequal distribution between population groups with high incomes and those with low incomes can cause income inequality within community groups. According to view (Adeleye et al., 2020) that the growth of income inequality will worsen poverty conditions and the interaction of poor economic performance and income inequality will worsen poverty rates. In aggregate, the average distribution of high inequality occurs in residents who live in urban areas compared to rural areas, this is because certain occupational groups are dominated by rich people with high educational backgrounds and competency abilities.

Meanwhile, the opportunity to pursue a higher level of education is still very limited for low-income population groups, so that employment opportunities at high wages are also limited. The performance of population income distribution has a significant mediating effect on the relationship between economic growth and poverty rates (Mageto Nyamweya and Ochieng Obuya, 2020). According to view (Brychka, Vyslobodska and Voitovych, 2023) states that the most significant factors for reducing poverty are loan interest rates, Gini index in income distribution, GDP per capita, income tax, unemployment rate and company profits.

The trend of income inequality in the ten provinces on the island of Sumatra is very fluctuating, not showing a trend that is sloping down or increasing significantly, however the regional government must see that the condition of income inequality continues to be reduced through several productive regional spending programs and relaxation in determining regional taxes. Stages for risk mitigation so that this condition of inequality does not widen, starting from opening access to education and health services for early childhood, preparing vocational education so that job opportunities are wide open, opening wide access to labor-intensive job vacancies for low-income residents and interventions through the determination of fair regional minimum wages.

Figure 2. *Income Inequality on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Figure 2 shows the performance of the Gini ratio in the research object area. In aggregate, the average inequality ratio is still quite high, between 0.279 - 0.354. The province with the highest average over fourteen years is South Sumatra Province with a value of 0.354, Riau Islands Province with a value of 0.353 and Bengkulu Province with a value of 0.348. The lowest inequality in a row is as follows: Bangka Belitung Islands Province with a value of 0.279, West Sumatra Province with a value of 0.316 and North Sumatra Province with a value of 0.320.

Variable Movements of Government Expenditure on Provinces the Island of Sumatra

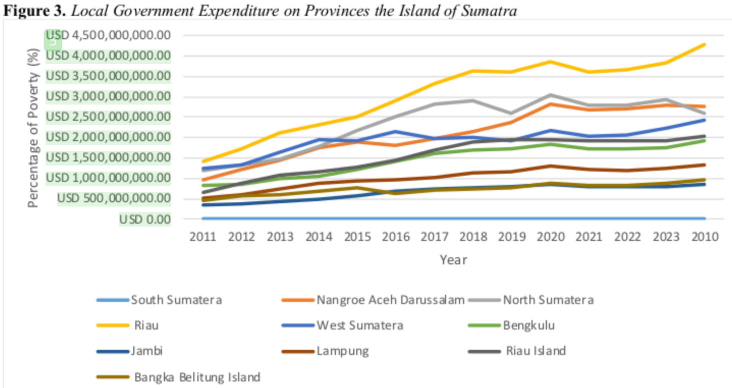
The role of regional governments in efforts to reduce income inequality in each region is reflected in the productivity of government consumption in the form of local government expenditure with a focus on programs to reduce income inequality. Local government governance in expenditure that is not yet good does not respond to reducing the index of misery or poverty (George-Anokwuru, 2023). Local governments can rely on local government expenditure priorities to achieve poverty alleviation programs to reduce disparities (Min and Rao, 2023). Local government expenditure in the areas of forestry, water resources and agriculture as well as urban and rural affairs, effectively narrows income gaps (Yan, Tu and Zheng, 2023).

Through the Regional Revenue and Expenditure Budget, with a composition of operating expenditure and development capital expenditure. Operational expenditures with scope include personnel expenditures as well as goods and services expenditures, to finance improvements in employee welfare with the hope of reducing the distribution of income inequality. Fiscal decentralization has an influence on the results of the human development index and poverty reduction depends on the nature and scope of fiscal decentralization, regional characteristics and capabilities and the design of fiscal decentralization (Mutembei, 2022). Interestingly, the research results show that improving the quality of governance in Africa can contribute to spurring positive urbanization which can contribute to improving urban economies and reducing income inequality (Dossou, 2023).

Consumption of government spending in socially valuable operating expenditures is associated with reduced income inequality, while unemployment and population size appear to widen income inequality (De Wettinck and van Mourik, 2024). Development capital expenditure is directed at creating a double multiplier effect for economic activity, including spending on the basic infrastructure sector as a pioneer of inter-regional connectivity so as to facilitate the flow of distribution of goods and services and reduce transportation logistics costs to make them cheaper. Consumption of development capital expenditure has a positive and statistically significant impact on income inequality (Chinedu, 2021; Obayori, J.B., 2020). Fiscal decentralization in terms of local government expenditure, especially in regional education and welfare sector spending as well as economic growth, has an impact on reducing regional income gaps (Pham et al., 2022). In Figure 3 below, the development of total local government expenditure in each region is presented.

Figure 3 shows the development of total regional expenditure on the research object. The period 2010-2023 shows that consumption of local government expenditure is increasing. The dynamics of development needs along with demand require increasingly large regional budgets.

Figure 3. *Local Government Expenditure on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Fiscal decentralization with increasingly large spending capacity requires regional governments to be creative in finding sources of development financing, not just relying on APBD conditions. Fiscal decentralization aimed at redistributing mobilized income leads to a strengthening of fiscal space, while redistribution of profits results in a reduction in income inequality (Bilbiie, Känzig and Surico, 2022).

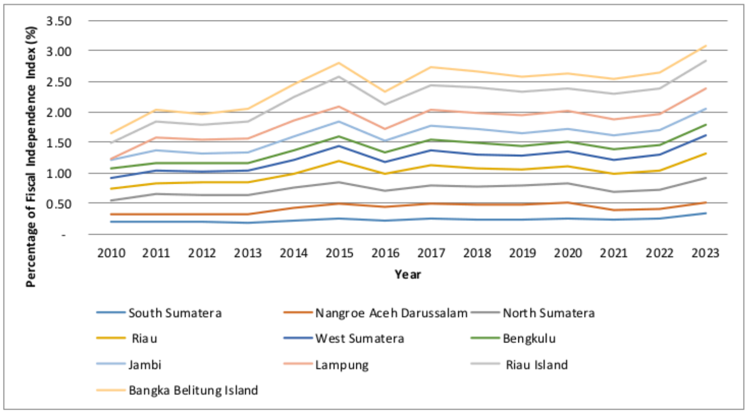
Variable Movements of Fiscal Independence Index on Provinces the Island of Sumatra

The implementation of regional autonomy opens up opportunities for regional governments in fiscal decentralization authority. The authority that has been given is in the form of more focused spending arrangements and looking for legitimate regional revenue sources. Regional revenues which are managed in accordance with the authority delegated from the central government are in the form of Regional Original Income which consists of components of regional taxes and levies, other legitimate regional original income as well as the results of separated regional assets. Governments in developing countries can increase revenue collection by strengthening the tax base, local borrowing and collecting taxes from fees. However, this is even more of a challenge for developing countries (e.g., Thailand and Indonesia) with larger informal sector revenues (Durongkaveroj, 2022).

Fiscal decentralization is expected to provide the ability to strengthen the regional tax sector with a strong tax base. Taxes administered by local governments on private companies in the regions can reduce regional income inequality permanently at no cost to aggregate growth, as can the implementation of uniformity in central transfer regulations (Yang et al., 2024). Fiscal decentralization independence with the Fiscal Independence Index (IKF) indicator is the ratio of PAD to total regional income receipts, where the higher the resulting ratio, the more independent a region is. If regions are independent in terms of regional revenues, this can have an impact on freedom in setting more focused thematic spending, such as spending on poverty alleviation themes. Fiscal decentralization and redistribution of intra-regional income inequality, with emphasis on the different roles of decentralization from the expenditure side and negative redistribution of income inequality from the income side (Pietrovito et al., 2023). Fiscal decentralization in terms of revenue receipts has an impact on income inequality reduction and has an impact on poverty alleviation (Pham et al., 2022). With limited state financial capacity and increasingly complex State Revenue and Expenditure Budget burdens, evaluation of central government transfer funds continues to be reduced. That decentralization on the revenue side has a negative and significant relationship to income inequality rates (Digdowiseiso, 2022). The following shows Figure 4 of the development of fiscal independence in the research object as follows.

Figure 4 shows the development of the fiscal independence index for the research object, where there are two provinces, namely Nangroe Aceh Darussalam Province and Bengkulu Province, which are in the not yet independent group with an IKF value of less than 0.25 and eight other provinces are in the towards independence group with a value of $0.25 < IKF < 0.50$. For the ten provinces on the island of Sumatra, not a single region is included in the regional category with fiscal independence of $0.5 < IKF < 0.75$ or very independent $IKF > 0.75$.

Figure 4. *Fiscal Independence Index on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Variable Movement of Inflation on Provinces the Island of Sumatra

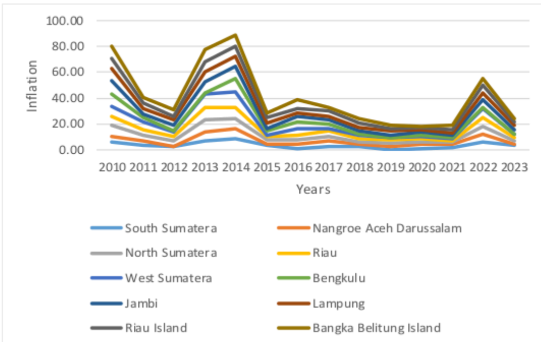
Inflation is often associated with the social life of the poor and has a negative impact on the distribution of per capita income. A consumer price index characterized by higher food prices can be detrimental to the welfare of poor people with low incomes, especially in some urban areas, but can provide benefits to producers and reduce poverty rates in rural areas. Based on food and non-food price data available at the level of each provincial region, it provides information that distinguishes the influence of food and non-food inflation on changes in income inequality.

If wage levels in rural areas are relatively elastic to food prices, higher food inflation will improve or at least not have a negative impact on income inequality in rural areas, but the impact in urban areas, like non-food inflation, will most likely be negative. With the consumer price index, we can assess the impact of food and non-food inflation separately on income inequality in rural and urban areas. Non-food inflation will result in poor performance for income inequality in both regions, but food inflation in urban areas is also estimated to further worsen the situation of income inequality.

However, if wage levels in rural areas respond elastically to increases in food prices, then higher food inflation should have a positive impact on reducing income inequality in rural areas. Regional governments implement various strategies and policies, including social safety net and redistribution policies as well as encouraging regional economic inclusion, with the collaboration of monetary policy and fiscal decentralization maintaining market balance, implementing progressive taxation, and changes in labor market demand (Ali &

Asfaw, 2023). Figure 5 presents data on the development of inflation control in ten provinces on the island of Sumatra as follows.

Figure 5. *Inflation on Provinces the Island of Sumatra*



Source: Indonesian Central Statistics Agency, processed data, (2024).

Figure 5 shows inflation data in ten provinces on the island of Sumatra over a period of fourteen years 2010-2023. The highest average inflation was in the Bangka Belitung Islands Province at 5 percent, then West Sumatra Province at 4.68 percent and Lampung Province at 4. 54 percent. The lowest average inflation value was in Bengkulu Province at 2.79 percent, South Sumatra Province at 3.52 percent and Aceh Province at 3.53 percent.

Model Estimation Results

Chow Test Results

The chow test is used to estimate panel data models between common effects and fixed effects, the use of the chow test is to measure the stability performance of model parameters, this test hypothesis:
p-value is smaller than the 5% confidence level, then H0 is rejected and H1 is accepted
p-value is greater than the 5% confidence level, then H1 is rejected and H0 is accepted

Table 2. *Chow Test Results*

Effect Test	Statistik	d.f	p value
Cross-section F	21.520474	(9,127)	0.0000
Cross-section Chi^	129.677793	9	0.0000

Source: Author's calculation based on output E-Views 13 (2024).

Table 2 shows that the results of the Chow test, for F and Ch^ values respectively 0.0000, where the p-value is smaller than the confidence level of 0.05, then the hypothesis H0 is rejected and H1 is accepted, then the fixed effect model and conditions are chosen. is met to continue with the Hausman test.

Hausman Test Results

The Hausman test is a test to analyze the best model approach and is appropriate to regressed panel data, an approach carried out by comparing fixed effects and random effects. The Hausman test uses the Chi^ value, so that the conclusion on selecting the panel data method in this research can be determined statistically with the hypothesis:
H0: The model used is random effect
H1: The model used is fixed effect
p-value is smaller than the 5% confidence level, then H0 is rejected and H1 is accepted
p-value is greater than the 5% confidence level, then H1 is rejected and H0 is accepted

Table 3. *Hausman Test Results*

Test Summary	Ch^Statistik	Chi^d.f	p value
Cross-section random	11.190301	3	0.0107

Source: Author's calculation based on output E-Views 13 (2024).

Table 4 explains that the Hausman test results show a p-value of 0.0048 which is smaller than the confidence level of 0.05, so H0 is rejected and H1 is accepted so that the fixed effect model is better when compared to the random effect model.

Table 4. *Model Estimation Results*

Dependent Variable : GINI				
Variable	**Coefficient**	**S.E**	**t-Statistic**	**p-value**
C	0.709030	0.135824	5.220214	0.0000***
lnGE	-0.012227	0.004482	-2.727712	0.0073***
IKF	-0.044151	0.020196	-2.186124	0.0306**
INF	0.001519	0.000343	4.432945	0.0000***
R-squared			0.959136	
Adjusted R-squared			0.955275	
F-statistic			248.4039	
p-value (F-statistic)			0.000000	
Fixed Effects (cross)				
_Sumatera Selatan_C	0.029499			
_Aceh_C	-0.002701			
_Sumatera Utara_C	0.002340			
_Riau_C	0.019137			
_Sumatera Barat_C	-0.015197			
_Bengkulu_C	0.007144			
_Jambi_C	-0.002029			
_Lampung_C	0.005758			
_Kepulauan Riau_C	0.021258			
_Kepulauan Bangka Belitung_C	-0.065209			

Note: ***, ** and * represent statistical significance at 1%, 5% and 10%
Source: Author's calculation based on output E-Views 13, data processed, (2024)

The results of the model estimation test using the Fixed Effect Model are as follows:

$$\mathrm{GINI}_{it} = 0.709030_{it} - 0.012227\ln\mathrm{GE}_{it} - 0.044151\mathrm{IKF}_{it} + 0.001519\mathrm{INF}_{it} + e_{it} \quad (3)$$

In equation (3) above, the constant value of 0.709030 explains that if regional expenditure (lnGE), Fiscal Independence Index (IKF) and inflation (INF) are zero or no performance, then income inequality (GINI) will increase by 0.709 percent. The lnGE variable coefficient of -0.012227 explains that if the value of the regional expenditure variable (lnGE) increases by one percent, with other variables considered constant, then the value of the GINI variable will decrease by 0.012 percent. The lnGE variable has a p-value of less than 0.01 which explains that at a confidence level of one percent it has a significant influence on GINI.

The IKF variable has a coefficient of -0.044151, explaining that if the value of the IKF variable increases by one percent and other variables are considered constant, then the value of the GINI variable will decrease by 0.044 percent. The IKF variable has a p-value of less than 0.05 which explains that at a confidence level of five percent it has a significant influence on the GINI variable. The INF variable has a coefficient of 0.001519, explaining that if the value of the INF variable increases by one percent and other variables are considered constant, then the value of the GINI variable will increase by 0.0015 percent. The INF variable has a p-value of less than 0.01, explaining that at a confidence level of one percent it has a significant influence on the GINI variable.

In equation (3) above, the coefficient of determination value obtained is an R-Squared value of 0.959136, which means that the influence of the variables studied lnGE, IKF and INF together influence income inequality in 10 provinces on the island of Sumatra by 95.91 percent. while the remaining 4.09 percent is influenced by other variables outside this research model. The F-statistic value in this model equation is 248.4039 with a significance value of 0.000000 or smaller than the confidence level of 0.01 so it can be interpreted that H0 is rejected and Ha is accepted, regional spending, the fiscal independence index and inflation simultaneously have a significant effect on income inequality in ten selected provinces on the island of Sumatra.

Discussion

The Effect of Government Expenditure on Income Inequality on Provinces the Island of Sumatra

The estimation results from the selected model from this research indicate that local government consumption in the form of regional spending has a negative relationship with reducing income inequality in ten provinces on the island of Sumatra. The results of this research confirm that they are in line with research conducted by (Jena and Barua, 2020). Local government expenditure is productive and focuses on reducing income inequality, either directly or as a derivative of the impact of development in other sectors, which provides a double multiplier effect. The results of this research indicate that they are in line with research conducted by (Yan and Mohd, 2023).

Operational expenditure takes the form of employee expenditure in the form of salaries and allowances to improve employee welfare as well as expenditure on goods and services to support the small and medium enterprise sector group. By improving employee welfare, you can increase consumption and increase individual business capital, thereby creating business opportunities that can absorb the workforce. Local government expenditure which focuses on forestry and water resources as well as agriculture in urban areas and rural affairs, effectively narrows income inequality, this result is in line with research conducted by (Yan, Tu and Zheng, 2023). Local government expenditure on a social security safety net for the population can reduce income inequality in rural areas. These results confirm in line with research conducted by (YU and LI, 2021).

Through spending on goods and services that can stimulate the growth of the Micro, Small and Medium Enterprises sector so that it can expand MSME business opportunities and absorb local workers. Efforts to overcome income inequality require an aspirational approach by combining innovative initiatives from the role of the private sector and government policy reform. The potential role of local government policies could help reduce income inequality and increase provincial regional minimum wages. This result is in line with opinion (Wang et al., 2024). With local wisdom in each region, MSMEs can be encouraged to provide food services and clothing convections that are characterized by regional local content. So, by extensifying the MSME business sector, it can increase demand for labor and reduce unemployment in the regions, this has a positive impact on reducing income inequality in the regions. The results of this research are in line with research conducted by (Ali & Asfaw, 2023).

Through the role of capital expenditure, infrastructure development can create a positive multiplier effect for inclusive economic growth, thereby reducing the negative impact of income inequality. The results of this research are in line with research by (Destek, Sinha and Sarkodie, 2020). Sustainable infrastructure development, creating good basic services thereby reducing disparities between regions, so that equitable development can be achieved. Local government expenditure on road infrastructure development strengthens the smooth flow of distribution of goods and services and can reduce logistics transportation costs so as not to cause high price disparities between regions. The impact of local government expenditure consumption in the form of regional spending on decreasing income distribution is in two ways, first, it will affect the number of low and middle income groups and second, it will have an impact on reducing high income groups. These results are in line with this view (Lian, Pei and Li, 2024).

The Effect of Fiscal Independence Index on Income Inequality on Provinces the Island of Sumatra

The estimation results from the model selected in this study show that the regional fiscal independence index has a negative and significant relationship to reducing income inequality in ten provincial regions on the island of Sumatra. The results of this research confirm that they are in line with research conducted by (Suhrab, Khan et al., 2022), but it is not in line with research (Hanny Tri Putri et al., 2022). The more independent a region is, the greater the regional government can allocate financing for regional development and the smaller the dependence on transfer funds from the central government.

Regional fiscal independence in terms of revenue means that the region is increasingly able to finance development by exploring potential sources of regional revenue. Through

Regional Original Income, revenues from the regional taxes and levies sector by strengthening the regional tax base, extensification and intensification as well as diversification of regional taxes can increase regional tax realization. This is in line with the view (Digdowiseiso, 2022) that decentralization on the revenue side has a negative and significant relationship to income inequality rates and is in line with research by (Pham et al., 2022).

Strengthening regional tax sector revenues and reducing dependence on central government transfer funds, so that regions can be more focused and flexible in managing program spending to reduce income inequality. These results confirm in line with the views (Pietrovito et al., 2023). Meanwhile, transfer funds from the central government have limitations and focus on handling other sectors. Intergovernmental transfer funds have a weak level in reducing inequality when compared with fiscal decentralization in the form of local government expenditure. These results are in line with research conducted by (Mutembei, 2022). Apart from increasing regional revenues from the regional tax sector, regional governments also play a role in providing stimulus or encouragement to the business sector in expanding its business, including by relaxing or providing tax incentives through reducing regional tax rates. These results are in line with research (Yang et al., 2024).

Thus, increasing the role of Regional Original Income to strengthen regional fiscal independence in terms of revenue is very meaningful for increasing the regional fiscal independence index. Policy implications that can reduce income inequality in the long term, especially through improving the quality and skills of the workforce, as well as the good role of local governments by using redistributive income with instruments such as progressive income tax and cash assistance to low-income groups. These results are in line with this view (Goh et al., 2023).

The Effect of Inflation on Income Inequality on Provinces the Island of Sumatra

The estimation results from the model selected in this study show that inflation has a positive and significant relationship to reducing income inequality in ten provincial regions on the island of Sumatra. The results of this research confirm that they are in line with research conducted by (Tavares Garcia and Cross, 2024). Shocks that occur as a result of uncontrolled inflation cause the price of goods in the product market to experience a significant increase which can affect consumption per capita expenditure very limited.

Inflation can influence the continuous increase in prices of goods and the effects of inflation from previous periods can still be felt during current conditions. Inflation control policies must remain controlled by the Central Bank authority, one of which is a structured monetary policy starting from controlling bank loan interest rates and controlling the money supply. These results are in line with research conducted by (Altunbaş and Thornton, 2022).

When there is an increase in inflation in an area, the aggregate demand for goods and services in the product market will decrease, causing income from production factors to decrease. To reduce fixed production costs for goods, some companies will reduce employee spending incentives and this will even have an impact on reducing the number of employees, resulting in unemployment which will have a negative impact on income inequality. Reducing the number of employees with low educational backgrounds, so that the proportion of the population with low income or no income increases. These results are in line with research conducted by (Jaravel, 2025).

However, the disinflation policy implemented by the Central Bank will have a good impact, most likely resulting in a more equal distribution of income in countries with high inflation. There is no such effect in low inflation situations (Glawe and Wagner, 2024).

Conclusion

The results of the estimation of the selected model in research from panel data show that regional spending shows a negative and significant relationship to income inequality. In line with this, regional government efforts to reduce income inequality have focused on operational spending which directly touches on improving employee welfare through employee allowances and incentives which have helped small and medium businesses. Meanwhile, spending on goods and services also provides stimulus to micro, small and medium enterprises, helping business capital. Capital expenditure for infrastructure development which continues to be increased has a multi-flyer effect on the regional economy, thereby providing an incentive for every factor of production to generate income.

The regional fiscal independence index in terms of regional income shows a negative and significant relationship with efforts to reduce income inequality. Creative efforts to find potential sources of regional income continue to be increased by strengthening the regional tax revenue base through tax extensification, intensification and diversification. Then encourage the participation of Regional Owned Enterprises to be more independent and create increased income from regional levies and provide opportunities for the private sector through collaboration between government and business entities. Partnership patterns are an important factor in reducing income inequality and changing selection to partnerships can answer the challenge of changing income inequality for the better (Erola and Kilpi-Jakonen, 2022). Reducing dependence on regional revenues from central government financial balancing funds so that regions are more independent in their ability to finance regional development.

Inflation shows a positive and significant relationship to reducing income inequality, this proves that the collaboration of monetary policy in controlling inflation with fiscal decentralization policy in terms of regional income and expenditure has gone hand in hand in creating balance in the product market and money market. The inflation rate can be controlled in line with the Central Bank's policy to control the amount of money in circulation and control bank loan interest rates.

Regional policy makers need to consider that income inequality in society is a key indicator of regional economic success and look at regional spending, regional fiscal independence and controlling inflation as preventive measures so that income inequality does not widen further.

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