

**PANEL DATA ANALYSIS OF ETHNIC FRACTIONALIZATION,  
ETHNIC TENSION, RELIGIOUS TENSION,  
AND THE GINI COEFFICIENT**

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The study uses an unbalanced panel of 103 countries, with data from 1988 to 2018, to examine the relationship between ethnic fractionalization, ethnic tension, religious tension, and the Gini coefficient. The econometric model uses Driscoll and Kraay standard errors to account for heteroscedasticity, autocorrelation, and cross-sectional dependence. The data is categorized based on income levels and regional distinctions to identify and understand the varying patterns and trends across different groups. Religious tension is statistically significant in more cases than ethnic fractionalization or ethnic tension. Increases in religious tension worsen income distribution. Ethnic tension is significant only in the lowest tension categories in the full and non-OECD panels. Increases in ethnic fractionalization can either worsen or improve income distribution, depending on the panel. Findings indicate that cultural tension can exacerbate economic conditions, potentially driving the observed deterioration in income distribution.

*Keywords:* Income Inequality, Ethnic Fractionalization, Religious and Ethnic Tension  
*JEL Classification:* O10

## 1. INTRODUCTION

Widening income inequalities is an international phenomenon (United Nations, 2020). Income inequality within and among countries has increased over the last 40 years (United Nations, 2020). The United Nations finds that 71 percent of individuals live in a country where income inequality has increased. Reducing income inequality is goal 10 of the sustainable development goals (SDGs). High levels of income inequality can adversely affect a country and its people. Income inequality can demoralize and cause individuals to believe they cannot control their fate. (Ariely and Uslander, 2017; Karklins, 2005). Income inequality can affect human capital investment decisions and,

ultimately, the accumulation of skills. Subsequently, some individuals may disengage, and a country's potential gross domestic product (GDP) is not achieved.

Researchers lack consensus on many potential determinants of income inequality (Sturm and De Haan, 2015). Sahota (1978) claims that nine major one-dimensional theories existed in the 19th Century to explain why incomes are unequal. The nine theories include ability, stochastic outcomes, individual choice, human capital, educational inequality, inheritance, life cycle, public income distribution, and distributive justice (2-3). Acemoglu et al. (2013) claim the distribution of innate abilities, property rights, technology, and market structures affect income distribution. Brown and Picket (2017) add that structural and institutional variables cause income inequality. Structural causes of income inequality include globalization, skill-biased technology change, change in work organization, change in household structure, and the development of winner-take-all markets. Institutional causes of income inequality include neoliberal government policies, changes in labor market institutions, financialization and rent-seeking, and macroeconomic government policies. Researchers continue to test potential determinants to understand further how other variables (e.g., marginal tax rate and internal conflict) affect income inequality (Parsons and Naghshpour, 2023, 2022).

The determinants of focus in this research are ethnic fractionalization, ethnic tension, and religious tension. This study examines fractionalization and tension determinants of the Gini coefficient from 1988 to 2018 and uses an unbalanced panel of 103 countries. The econometric model includes variables to account for economic development, institutional quality, demographics, trade and globalization, and macroeconomic conditions. The net Gini coefficient is the dependent variable and the measure of income inequality. The net Gini measures income distribution post-transfer and post-tax. Countries are grouped by income level and region to explore how the relationship between the explanatory variables and income inequality may change based on the characteristics of different groups. The findings add to the literature on the critical and evolving topic of income inequality.

The literature review focuses on the relationship between income inequality the determinants of focus: ethnic fractionalization, ethnic tension, and religious tension. The design of the panel data analysis is in the methods section. The findings, discussion, and conclusion sections offer insight into the results and reflect on the study's contributions and limitations.

## 2. LITERATURE REVIEW

Ethnic fractionalization is the probability that two randomly selected individuals do not belong to the same ethnolinguistic group. Research suggests ethnicity can influence earnings (Light and Gold, 2000; Borjas, 1999; Easterly, 1999; Lundberg and Startz, 1998). Although the research on the relationship between ethnic fractionalization and

income inequality is mixed, most research indicates increases in ethnic fractionalization lead to greater income inequality (Light and Gold, 2000; Borjas, 1999; Easterly, 1999; Lundberg and Startz, 1998). One explanation is the lack of agreement on policies, including income distribution, among ethnic groups (Easterly, 1999). The inability to reach agreements leads to failure to enact redistributive policies and a misallocation and under-allocation of resources (Casey and Owen, 2014). Alesina and Glaser (2004) find ethnic diversity hampers income redistribution when ethnic groups with higher incomes are less likely to support redistribution to those ethnic groups with lower incomes. Rodrik (1999) and Alesina and Drazen (1991) claim certain ethnic groups in ethnically divided countries resist reforms, so other ethnocentric groups pay most of the policy's cost. Becker (1967) claims individuals have more empathy towards people from their ethnolinguistic group. For example, Poterba (1997) finds older whites in urban areas in the United States are less likely to provide public education funds when the recipients are minority children. Robinson (2002) claims that ethno-racial groups, especially when they form isolated enclaves, may experience educational inequality that leads to income inequality. Minority ethnocentric groups may be unable to position themselves through politics or special interests to capture income from public redistribution. In addition, ethnocentric minority groups may not have the same access to institutions needed to reconfigure income distribution (Robinson, 2002).

Alesina et al. (2003) claim that “economic differences between ethnic groups” rather than the “degree of fractionalization” affect income inequality. Alesina et al. (2003) claim that ethnic and religious tension variables should be more statistically significant than variables on the level of fractionalization. The higher levels of ethnic and religious tension can affect economic conditions for a country and lead to lower economic activity. Lower levels of economic activity can lead to higher unemployment, which can increase income inequality (Furceri and Ostry, 2019)

On the other hand, Page (2007) and Ashraf and Galor (2011) find greater diversity can lead to increased productivity through idea generation and access to complementary skills. In this case, if income gained from increased productivity driven by increased idea generation from more ethnic diversity is disproportionately distributed to lower-income groups, higher levels of ethnic fractionalization could improve income distribution.

### 3. MODEL

The study has 103 countries in the following panels: full panel, OECD, Non-OECD, high-income, low-income, upper-middle income, lower-middle income, Africa, Europe, Americas, and Asia. The panel data set is unbalanced. Country-level data from 1988-2018 is included in the panel if at least 18 years of continuous data is available. There are tradeoffs with an unbalanced panel approach, but the dataset is more extensive and representative of more countries and observations. Missing data is flagged in the

data set and removed from the regressions.

Research offers many potential determinants for income inequality (Brown and Pickett, 2017; Acemoglu et al., 2013; Sahota, 1978). There is limited consensus on determinants in cross-national studies (Furceri and Ostry, 2019). Furceri and Ostry (2019) claim differences in findings result from uncertainty in econometric model design among researchers. Given all the possible variables that might affect income inequality, the inconclusiveness of many variables and differences in econometric design lead to discrepancies in results. Additionally, many previous studies may have failed to correct for cross-sectional dependence. Under these research conditions, panel data analysis has advantages over other methods when variable and model uncertainty exist. In panel data analysis, it is possible to observe variables better than other data formats (Baltagi, 2001). Panel data analysis can control for omitted variables which is often an issue in income inequality research (Furceri and Ostry, 2019).

The econometric model (1), influenced by Barro (2000) and Lundberg and Squire (2003), uses yearly unbalanced panel data. Barro (2000) and Lundberg and Squire (2003) models research both economic growth and Gini coefficient determinants.

$$Gini_{it} = \alpha + X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \text{ and } (i = 1, \dots, n; t = 1, \dots, T), \quad (1)$$

where  $Gini_{it}$  is the measure of income inequality for country ( $i$ ) and time ( $t$ ).  $X_{it}$  is the vector set of explanatory variables used in the model that vary across time and countries. The parameter  $\alpha$  contains a constant and individual-specific variable invariant over time.  $\mu_i$  captures unobservable individual-specific effects and  $\lambda_t$  captures unobservable time-specific effects.  $\varepsilon_{it}$  is the error term. The Hausman test results support the fixed-effect model over random effect. A joint test for the time indicator variables indicates a time-fixed effect in the model. The same procedure suggests the presence of a country-fixed effect as well. The Wald test shows heteroscedasticity in the fixed effect regression model-the research tests for cross-sectional dependence and contemporaneous correlation with the Pesaran cross-sectional dependence (CD) test. The Pesaran CD test indicates a cross-sectional dependence in the data. The research also tests autocorrelation with the Woolridge test for autocorrelation in panel data. The study finds the presence of autocorrelation in the panel data.

Statistical packages provide methods to compensate for correlations and heteroscedasticity. Hoechle (2007) develops a Stata program with Driscoll and Kraay (1998) standard errors. The Driscoll and Kraay (1998) standard errors contain cross-sectional averages of nonparametric standard errors for heteroscedasticity, autocorrelation, and cross-sectional dependence (HAC). The program uses Newey-West (1987) corrections to cross-sectional averages while changing the standard error estimates to ensure the covariance matrix estimators remain consistent and independent of the cross-sectional dimension. The program permits fixed effects for country and time. The nonparametric method of estimating standard error places no restrictions on the

number of panels. The size of the cross-sectional dimensions in finite samples does not constrain feasibility (Hoechle, 286). There is an error term lag of three years to mitigate endogeneity concerns including reverse causality. Multicollinearity is tested through the variance inflation factors. The mean score across explanatory variables is 2.47. See Table A3 in the Appendix for the correlation matrix.

## 4. EMPIRICAL INVESTIGATIONS

### 4.1. Data Description

See Table A1 in the Appendix for information on data sources and descriptive statistics.

The net Gini coefficient is the dependent variable for the study. Data is from the Standardized World Income Inequality Database (SWIID) (Solt, 2015). The net Gini coefficient measures income inequality post-tax and post-transfer. The SWIID measures income inequality on a scale between 0 and 100, with higher values denoting higher income inequality. The SWIID provides the most complete net Gini coefficient data (Solt, 2015).

Data from the Historical Index of Ethnic Fractionalization (HIEF) measures the determinant of ethnic fractionalization (Drazanova, 2019). The HIEF index computes the probability that two randomly drawn individuals from a country are not from the same group. Data on HIEF is from 1988 to 2013.

Alesina et al. (2003) claim that the tension among ethnicities within a country, not the level of fractionalization, has a more significant effect on income distribution. This study uses ethnic and religious tension measurements from the International Country Risk Guide (ICRG) to test the claim. The ICRG measures of ethnic and religious tension are on a scale of (0) high to (6) low tension. Ethnic tension is based on levels of racial, nationality, and language divisions. Religious tension is based on the suppression of religious freedom and the exclusion of one or more religions from the political and social process. The ICRG measurements of ethnic and religious tensions cover 1988-2018.

All other variables in the model are from the World Bank or the Penn World Tables:

Our model's natural log of per capita GDP accounts for economic development (Heston et al., 2012). Education is used in many studies to control for differences in economic development (Aspergis, Dincer and Payne, 2010). The human capital index accounts for education. The human capital index is based on schooling average and educational returns (Feenstra, Inklaar and Timmer, 2015).

The model uses employment in manufacturing to account for structural differences. A movement from agriculture to industry has been shown to improve income distribution for low-income households. Young (2013) claims urban-rural inequalities, based on economies' structural elements, account for 40 percent of intercountry income

inequality.

To account for demographic distribution, the researchers use the dependency ratio. The dependency ratio influences age-earning percentages and thus may lead to income inequality variations (Burtless, 2009). The dependency ratio is the percentage of the population in the working-age category.

The quality of institutions and bureaucracy affects income equality through property rights and policy continuity (Huber, 2002). The ICRG measure of institutional strength and quality of bureaucracy is on a scale of (0) low institutional strength and bureaucracy quality to (4) high institutional strength and bureaucracy quality. Higher scores are allotted to countries where bureaucracy has more strength and expertise. Also, lower scores are assigned to countries that undergo much bureaucratic turmoil when governments change.

The study accounts for trade and globalization through the GDP-adjusted sum of imports and exports. The Stolper-Samuelson (1941) theorem predicts increases in income inequality when an advanced economy's abundant resource is high-skilled labor. Alternatively, in a developing economy, the higher demand for low-skilled abundant labor could raise wages, thus decreasing income inequality. The globalization element of trade affects resource allocation. Opening domestic markets to trade can lead to greater unemployment if domestic producers in sectors with much employment are not competitive with foreign products. Higher levels of trade and globalization can lead to either increases or decreases in income inequality, depending on the level of economic development.

Inflation and unemployment are often short-run issues. However, some countries have high levels of long-run unemployment because of structural unemployment. Countries can have high inflation for more extended periods because of business cycles and currency mismanagement. Additionally, high unemployment levels lead to higher income inequality because it affects the labor distribution of income (Furceri and Ostry, 2019). Inflation affects income inequality since low-income individuals hold more income in accounts that do not gain interest. The outcome is that lower-income individuals purchasing power will be reduced more than higher-income individuals (Albanesi, 2007). The unemployment rate and the GDP deflator are to account for macroeconomic conditions.

## **4.2. Findings**

### *4.2.1. Ethnic Fractionalization*

Table 1 provides the base model's findings. Results suggest in most panels, including the full panel, the Gini coefficient has a direct relationship with per capita GDP, dependency ratio, unemployment, imports/exports as a percentage of GDP, and inflation rate. Thus, increases in per capita GDP, the dependency ratio, unemployment, imports/exports as a percentage of GDP, and inflation correlate with an increase in

**Table 1.** Ethnic Fractionalization

|                                 | Full Panel           | High Income         | Low Income         | Lower Middle        | Upper Middle         | OECD                 | Non-OECD             | Africa               | America              | Asia                | Europe               |
|---------------------------------|----------------------|---------------------|--------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|----------------------|
| Countries                       | 98                   | 36                  | 10                 | 24                  | 28                   | 33                   | 65                   | 25                   | 20                   | 20                  | 31                   |
| <b>Obs.</b>                     | 2291                 | 860                 | 212                | 551                 | 668                  | 793                  | 1498                 | 566                  | 500                  | 487                 | 686                  |
| <b>F Stat</b>                   | ***                  | ***                 | ***                | ***                 | ***                  | ***                  | ***                  | ***                  | ***                  | ***                 | ***                  |
| <b>R<sup>2</sup></b>            | 0.242                | 0.313               | 0.483              | 0.274               | 0.466                | 0.339                | 0.256                | 0.216                | 0.700                | 0.450               | 0.425                |
| <b>Ethnic Fraction.</b>         | -3.21<br>(4.42)      | -4.31<br>(2.88)     | -16.5**<br>(6.37)  | 21.2*<br>(11.2)     | -7.21<br>(6.57)      | -4.26<br>(3.18)      | -5.27<br>(7.52)      | -3.53<br>(4.12)      | 27.7***<br>(3.45)    | 16.3***<br>(3.99)   | -15.7***<br>(4.00)   |
| <b>GDP Per Cap (log)</b>        | 3.51***<br>(0.486)   | -1.91***<br>(0.591) | 2.54***<br>(0.618) | 3.71***<br>(0.582)  | 5.73***<br>(0.714)   | 0.451<br>(0.749)     | 4.38***<br>(0.604)   | 2.71***<br>(0.335)   | -2.05***<br>(0.564)  | 5.18***<br>(0.830)  | 0.019<br>(0.727)     |
| <b>Dependency Ratio</b>         | 0.064***<br>(0.010)  | 0.045*<br>(.242)    | -0.003<br>(.047)   | 0.105***<br>(.020)  | 0.059***<br>(0.013)  | 0.083***<br>(0.022)  | 0.046***<br>(0.011)  | 0.053***<br>(0.007)  | 0.036<br>(0.030)     | 0.087***<br>(0.018) | 0.049*<br>(0.025)    |
| <b>Unemployed</b>               | .065***<br>(0.017)   | -.007<br>(0.029)    | -.490**<br>(0.217) | .049***<br>(0.016)  | 0.023<br>(0.027)     | -0.001<br>(0.031)    | 0.078**<br>(0.029)   | -0.030<br>(0.022)    | 0.044<br>(0.042)     | -0.059*<br>(0.033)  | 0.039<br>(0.024)     |
| <b>% Industry</b>               | -0.125***<br>(0.021) | -0.077**<br>(0.036) | -0.048<br>(0.042)  | 0.136***<br>(0.045) | -0.273***<br>(0.036) | -0.088***<br>(0.027) | -0.123***<br>(0.032) | -0.074***<br>(0.013) | -0.222***<br>(0.025) | -0.043<br>(0.027)   | -0.080<br>(0.051)    |
| <b>Imports and Exports</b>      | 0.001<br>(0.002)     | 0.006**<br>(0.003)  | 0.012<br>(0.010)   | -0.013*<br>(0.007)  | 0.001<br>(0.010)     | 0.004<br>(0.005)     | -0.001<br>(0.003)    | 0.006<br>(0.007)     | -0.020*<br>(0.010)   | -0.007<br>(0.005)   | 0.008<br>(0.005)     |
| <b>Human Capital</b>            | -2.17***<br>(0.623)  | 0.301<br>(0.430)    | 5.07***<br>(1.29)  | -1.58<br>(1.01)     | -4.97***<br>(0.925)  | -0.847**<br>(0.363)  | -2.52***<br>(0.891)  | 2.84***<br>(0.364)   | -7.77***<br>(0.927)  | -2.57***<br>(0.902) | -0.674<br>(0.840)    |
| <b>Bureaucracy Institutions</b> | -0.300***<br>(0.106) | -0.433<br>(0.316)   | -0.243<br>(0.307)  | -0.433**<br>(0.176) | -0.237<br>(0.146)    | -0.164<br>(0.283)    | -0.335***<br>(0.118) | -0.607***<br>(0.157) | -0.053<br>(0.149)    | 0.470***<br>(0.148) | 0.329<br>(0.292)     |
| <b>Inflation</b>                | 0.001**<br>(0.000)   | -0.001<br>(0.006)   | 0.003<br>(0.003)   | 0.009***<br>(0.003) | 0.001***<br>(0.000)  | 0.011***<br>(0.003)  | 0.001**<br>(0.000)   | 0.003**<br>(0.001)   | 0.001***<br>(0.000)  | 0.026**<br>(0.010)  | -0.003***<br>(0.001) |

Note: \*\*\*p<0.01, \*\*p<0.05, \*p<0.10. The dependent variable is the net Gini coefficient. Standard Errors are in parenthesis.

income inequality (i.e., larger Gini coefficients). Increases in human capital index scores (more years of education and return to education), bureaucratic quality scores, and labor forces in the industrial sector correlate to improvement in income distribution (i.e., smaller Gini coefficients). As a reminder, the ethnic fractionalization from the HIEF index computes the probability that two randomly drawn individuals from a country are not from the same group, and larger numbers signify more ethnic diversity (Drazanova, 2019).

The study finds ethnic fractionalization is statistically significant in the low-income, Americas, Asia, and Europe panels. Increases in ethnic fractionalization correlate to larger net Gini coefficients in the America and Asia panels. Increases in ethnic fractionalization correlate to smaller net Gini coefficients in the low-income and European panels. The findings from the American and Asian country panels support Lazear's (1995) claims that greater ethnic homogeneity improves income redistribution. Since results show increases in ethnic fractionalization correlate to smaller Gini coefficients in European countries, we find some support for Page's (2007) and Ashraf and Galor's (2011) claim that greater ethnic diversity can correlate to lower income inequality. Our results suggest it is limited to European and low-income countries, and future research should test the claim of greater productivity through idea generation, which, if shared, leads to lower income inequality. Another explanation is that European countries with greater ethnic fractionalization have more income redistributive policies and possibly more educational/occupational opportunities than more homogenous ones. Lastly, we find that in most panels, ethnic fractionalization is not statistically significant. The results suggest other explanatory variables are more important than ethnic fractionalization in moderating income inequality.

#### 4.2.2. *Ethnic Tension*

Ethnic tension is based on levels of racial, nationality, and language divisions and larger numbers signify less tension. Ethnic tension does not meet the statistical significance level in *any* panel. See Table 2. The results do not support Alesina et al. (2003) claim that ethnic tension is more important than ethnic fractionalization. Ethnic fractionalization is statistically significant in more panels than ethnic tension. The results suggest differences in race, nationality, and language do little to explain income distribution across panels.

#### 4.2.3. *Religious Tension*

Religious tension is the suppression of religious freedom and exclusion of one or more religions from the political and social process. As with ethnic tension, larger numbers signify less tension. See Table 3 for results. The religious tension indicator meets statistical significance in all panels except the high-income, upper-middle-income, OECD, and Asia. Decreases in religious tension levels correlate to lower income



**Table 2.** Ethnic Tension

|                                 | Full Panel           | High Income          | Low Income          | Lower Middle         | Upper Middle         | OECD                 | Non-OECD             | Africa               | America              | Asia                | Europe               |
|---------------------------------|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|----------------------|
| Countries                       | 103                  | 38                   | 11                  | 26                   | 28                   | 35                   | 68                   | 27                   | 20                   | 21                  | 33                   |
| <b>Obs.</b>                     | 2776                 | 1077                 | 254                 | 668                  | 777                  | 998                  | 1778                 | 656                  | 587                  | 588                 | 883                  |
| <b>F Stat</b>                   | ***                  | ***                  | ***                 | ***                  | ***                  | ***                  | ***                  | ***                  | ***                  | ***                 | ***                  |
| <b>R<sup>2</sup></b>            | 0.247                | 0.335                | 0.452               | 0.378                | 0.488                | 0.350                | 0.269                | 0.175                | 0.704                | 0.402               | 0.309                |
| <b>Ethnic Tension</b>           | 0.063<br>(0.081)     | 0.112<br>(0.087)     | 0.037<br>(0.133)    | 0.072<br>(0.090)     | -0.264*<br>(0.146)   | 0.154<br>(0.100)     | 0.024<br>(0.109)     | 0.012<br>(0.064)     | 0.057<br>(0.227)     | -0.051<br>(0.127)   | 0.100<br>(0.132)     |
| <b>GDP Per Cap (log)</b>        | 3.23***<br>(0.541)   | -2.71***<br>(0.634)  | 4.03***<br>(0.867)  | 2.90***<br>(0.958)   | 5.66***<br>(0.509)   | -0.214<br>(0.685)    | 4.28***<br>(0.626)   | 3.03***<br>(0.478)   | -2.64***<br>(0.617)  | 4.42***<br>(0.985)  | -0.401<br>(0.675)    |
| <b>Dependency Ratio</b>         | 0.086***<br>(0.016)  | 0.050**<br>(0.020)   | 0.082**<br>(0.036)  | 0.086***<br>(0.011)  | 0.061***<br>(0.016)  | 0.089***<br>(0.014)  | 0.071***<br>(0.016)  | 0.053***<br>(0.010)  | 0.055**<br>(0.023)   | 0.102***<br>(0.016) | 0.011<br>(0.028)     |
| <b>Unemployed</b>               | 0.076***<br>(0.017)  | -0.021<br>(0.028)    | -0.549**<br>(0.201) | 0.129***<br>(0.030)  | 0.015<br>(0.031)     | -0.011<br>(0.029)    | 0.103***<br>(0.027)  | -0.039<br>(0.030)    | 0.097<br>(0.072)     | 0.004<br>(0.027)    | 0.033<br>(0.027)     |
| <b>% Industry</b>               | -0.083***<br>(0.021) | -0.071***<br>(0.025) | -0.015<br>(0.037)   | 0.298***<br>(0.067)  | -0.333***<br>(0.046) | -0.099***<br>(0.026) | -0.074**<br>(0.033)  | -0.044<br>(0.026)    | -0.254***<br>(0.030) | -0.006<br>(0.030)   | -0.045<br>(0.051)    |
| <b>Imports and Exports</b>      | 0.007***<br>(0.002)  | 0.012***<br>(0.002)  | 0.007<br>(0.007)    | -0.014**<br>(0.005)  | 0.013<br>(0.008)     | 0.007***<br>(0.002)  | 0.005<br>(0.003)     | -0.001<br>(0.008)    | -0.020**<br>(0.008)  | -0.001<br>(0.006)   | 0.013***<br>(0.004)  |
| <b>Human Capital</b>            | -1.75***<br>(0.415)  | 0.816***<br>(0.236)  | 3.28***<br>(1.10)   | -4.19***<br>(1.01)   | -4.06***<br>(0.820)  | -0.186<br>(0.423)    | -2.00***<br>(0.680)  | 2.08***<br>(0.180)   | -7.360***<br>(1.190) | -1.86***<br>(0.619) | -0.600<br>(1.350)    |
| <b>Bureaucracy Institutions</b> | -0.356***<br>(0.117) | -0.293<br>(0.290)    | -0.474*<br>(0.272)  | -0.652***<br>(0.203) | -0.255<br>(0.159)    | 0.047<br>(0.217)     | -0.417***<br>(0.125) | -0.658***<br>(0.180) | -0.248<br>(0.205)    | -445**<br>(0.217)   | 0.003<br>(0.533)     |
| <b>Inflation</b>                | 0.001**<br>(0.000)   | 0.004<br>(0.008)     | 0.004<br>(0.004)    | 0.010**<br>(0.040)   | 0.001***<br>(0.000)  | 0.014***<br>(0.003)  | 0.001***<br>(0.000)  | 0.005**<br>(0.002)   | 0.001***<br>(0.000)  | 0.015***<br>(0.005) | -0.004***<br>(0.001) |

Note: \*\*\*p<0.01, \*\*p<0.05, \*p<0.10. The dependent variable is the net Gini coefficient. Standard Errors are in parenthesis.

Table 3. Religious Tension

|                                 | Full Panel           | High Income          | Low Income           | Lower Middle         | Upper Middle         | OECD                 | Non-OECD             | Africa               | America              | Asia                | Europe               |
|---------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|----------------------|
| Countries                       | 103                  | 38                   | 11                   | 26                   | 28                   | 35                   | 68                   | 27                   | 20                   | 21                  | 33                   |
| <b>Obs.</b>                     | 2776                 | 1077                 | 254                  | 668                  | 777                  | 998                  | 1778                 | 656                  | 587                  | 588                 | 883                  |
| <b>F Stat</b>                   | ***                  | ***                  | ***                  | ***                  | ***                  | ***                  | ***                  | ***                  | ***                  | ***                 | ***                  |
| <b>R<sup>2</sup></b>            | 0.258                | 0.334                | 0.482                | 0.420                | 0.486                | 0.348                | 0.280                | 0.214                | 0.713                | 0.404               | 0.312                |
| <b>Religious Tension</b>        | -0.295***<br>(0.083) | 0.043<br>(0.102)     | -0.339***<br>(0.117) | -0.518***<br>(0.125) | -0.174<br>(0.197)    | -0.040<br>(0.117)    | -0.301***<br>(0.108) | -0.249***<br>(0.069) | -0.736***<br>(.169)  | -0.130<br>(.127)    | -0.228**<br>(0.107)  |
| <b>GDP Per Cap (log)</b>        | 3.29***<br>(0.540)   | -2.61***<br>(0.627)  | 3.54***<br>(0.758)   | 3.38***<br>(0.943)   | 5.33***<br>(0.538)   | 0.092<br>(0.710)     | 4.23***<br>(0.596)   | 3.25***<br>(0.499)   | -2.12***<br>(.680)   | 4.35***<br>(0.917)  | -0.117<br>(0.653)    |
| <b>Dependency Ratio</b>         | 0.077***<br>(0.017)  | 0.049**<br>(0.019)   | 0.078**<br>(0.036)   | 0.064***<br>(0.015)  | 0.065***<br>(0.016)  | 0.087***<br>(0.013)  | 0.060***<br>(0.018)  | 0.043***<br>(0.009)  | 0.052***<br>(0.017)  | 0.098***<br>(0.017) | 0.008<br>(0.008)     |
| <b>Unemployed</b>               | 0.070***<br>(0.017)  | -0.022<br>(0.028)    | -0.457**<br>(0.184)  | 0.111***<br>(0.031)  | 0.031<br>(0.030)     | -0.012<br>(0.029)    | 0.096***<br>(0.028)  | -0.060**<br>(0.028)  | 0.118*<br>(0.060)    | 0.007<br>(0.022)    | 0.033<br>(0.025)     |
| <b>% Industry</b>               | -0.094***<br>(0.022) | -0.079***<br>(0.026) | -0.032<br>(0.035)    | 0.279***<br>(0.064)  | -0.307***<br>(0.045) | -0.115***<br>(0.027) | -0.081**<br>(0.034)  | -0.039<br>(0.026)    | -0.269***<br>(0.028) | -0.009<br>(0.029)   | -0.057<br>(0.054)    |
| <b>Imports and Exports</b>      | 0.007***<br>(0.002)  | 0.012***<br>(0.005)  | 0.012**<br>(0.005)   | -0.014***<br>(0.005) | 0.013<br>(0.009)     | 0.006***<br>(0.002)  | 0.006*<br>(0.003)    | -0.001<br>(0.006)    | -0.020**<br>(0.008)  | -0.001<br>(0.006)   | 0.014***<br>(0.004)  |
| <b>Human Capital</b>            | -1.89***<br>(0.442)  | 0.897***<br>(0.221)  | 2.43**<br>(0.936)    | -4.43***<br>(0.881)  | -4.14***<br>(0.807)  | 0.016<br>(0.376)     | -2.20***<br>(0.720)  | 1.81***<br>(0.565)   | -7.62***<br>(1.18)   | -1.91***<br>(0.599) | -0.171<br>(1.58)     |
| <b>Bureaucracy Institutions</b> | -0.297**<br>(0.112)  | -0.265<br>(0.290)    | -0.637*<br>(0.358)   | -0.467**<br>(0.172)  | -0.229<br>(0.140)    | 0.090<br>(0.227)     | -0.366***<br>(0.118) | -0.651***<br>(0.160) | -0.180<br>(0.197)    | 0.439**<br>(0.184)  | 0.082<br>(0.466)     |
| <b>Inflation</b>                | 0.001**<br>(0.000)   | 0.003<br>(0.009)     | 0.004<br>(0.004)     | 0.010***<br>(0.003)  | 0.001***<br>(0.000)  | 0.012***<br>(0.003)  | 0.001**<br>(0.000)   | 0.005**<br>(0.002)   | 0.001***<br>(0.000)  | 0.014**<br>(0.007)  | -0.004***<br>(0.001) |

Note: \*\*\*p<0.01, \*\*p<0.05, \*p<0.10. The dependent variable is the net Gini coefficient. Standard Errors are in parenthesis.

inequality in each case of statistical significance. The results support Alesina et al.’s (2003) claim that religious tension is more important than the level of fractionalization. Religious tension was statistically significant in more panels than ethnic fractionalization or ethnic tension combined. A possible explanation for why religious tension matters more than ethnic tension or fractionalization is through the “intensity” of conflict. In some cases, when different racial, language, and nationality groups in a country share a common religion, it may lessen the impact on income inequality. On the other hand, there are intense conflicts not based on religion but on ethnic differences (e.g., Rwanda).

4.2.4. *Ethnic and Religious Tension by Level*

To test the statistical significance by the level of religious and ethnic tension, the researchers create indicator variables from (0) high tension to (6) low tension. The ethnic and religious tension variables are rounded to the closest number for each country. The test determines if certain tension levels are more statistically significant than others. See Table 4.

In the highest tension conditions (0) to (2), ethnic tension does not meet statistical significance. In the lowest tension conditions (4) to (6), ethnic tension is significant in the full and non-OECD panels. In each case of statistical significance, decreases in ethnic tension correlate to lower income inequality.

**Table 4.** Ethnic and Religious Tension by Level

|                          | Full Panel  | OECD  | Non-OECD  |
|--------------------------|---|---|---|
| <b>Ethnic Tension</b>    |   |   |   |
| Highest Tension - 0-2    | Observations:323<br>Groups:33<br>-.377 (.356)     | Observations:59<br>Groups:5<br>-.634 (.582)   | Observations:264<br>Groups:28<br>-.673* (.378)    |
| Lowest Tension - 4-6     | Observations:1997<br>Groups:87<br>-.363*** (.113) | Observations:827<br>Groups:32<br>.042 (.096)  | Observations:1170<br>Groups:55<br>-.730*** (.165) |
| <b>Religious Tension</b> |   |   |   |
| Highest Tension - 0-2    | Observations:247<br>Groups:20<br>-.696*** (.238)  | No observations.                              | Observations:237<br>Groups:19<br>-.864*** (.258)  |
| Lowest Tension - 4-6     | Observations:2310<br>Groups:95<br>-.525*** (.134) | Observations:956<br>Groups:34<br>-.064 (.117) | Observations:1354<br>Groups:61<br>-.617** (.252)  |

Note: \*\*\*p<0.01, \*\*p<0.05, \*p<0.10. Dependent variable is Gini coefficient. Standard Errors are in parenthesis.

Religious tension is significant in the full and non-OECD panels in the highest tension conditions (0) to (2). Religious tension is significant in the full and non-OECD panels in the lowest tension conditions (4) to (6). In each case of statistical significance, decreases in religious tension correlate to lower income inequality.

The findings show that ethnic tension can matter and is significant in some cases when the level is considered. Also, religious tension matters more and continues to be more significant in a greater number of panels and situations than ethnic tension. Finally, the results show religious and ethnic tension are not significant for OECD countries. Potential explanations are better institutions, stability mechanisms, and policies that prevent increases or decreases in tension from significantly altering income distribution.

#### *4.2.5. Interactions with Government Stability and Economic Conditions*

A question arising from the research is how changes in ethnic fractionalization, ethnic tension, and religious tension lead to changes in the net Gini coefficient. The literature review discussed how government policy or even the failure to enact policy changes may influence income distribution (Casey and Owen, 2014; Alesina and Glaser, 2004). The study also tests the channels of government stability and economic conditions. Worsening tension levels could lead to decreases in government stability and economic conditions. The outcomes of decreases in stability and economic conditions could increase the Gini coefficient. Instability and deterioration of the economic climate could decrease economic and educational opportunities, increase unemployment, and lower foreign investment. The lower-income group may have their labor income affected disproportionately. The researchers test government stability and economic conditions with ICRG variables. The study interacts religious tension with government stability and economic conditions variables. The study finds a significant relationship between religious tension, government stability, and economic conditions when testing the interactions through testparm. The study then adds covariates and runs regressions testing the interaction of religious tension, economic conditions, and government stability on the net Gini dependent variable. The researchers find the interaction between religious tension and economic conditions is statistically significant in more cases (7 versus 0) than the interaction between religious tension and government stability. The study finds more cases of statistical significance when there are high levels of religious tension. Therefore, it is possible the channel depends on the country and interacts differently based on the characteristics of country groups.

## 5. CONCLUSION

The findings suggest religious tension is significant in more cases than either ethnic fractionalization or ethnic tension. In each case of significance, decreases in religious tension correlate to a smaller Gini coefficient. Ethnic tension is not significant in any

panel. Ethnic tension is significant in the lowest tension categories in the full panel and non-OECD countries. In these cases, decreases in ethnic tension correlate to a smaller Gini coefficient. Ethnic fractionalization is significant in the low-income, America, Asia, and Europe panels. An increase in ethnic fractionalization correlates to larger Gini coefficients in the America and Asia panels. Increases in ethnic fractionalization correlate to smaller Gini coefficients in the low-income and European panels. Finally, the study finds religious tension has a statistically significant interaction with government stability and economic conditions. The interaction between religious tension and economic conditions has more cases of statistical significance than government stability. There may be cases where increases in religious tension lead to changes in the net Gini through deterioration of economic conditions.

The results support Alesina et al. (2003) claim that polarization matters more than fractionalization. There is greater support for Alesina et al. (2003) claim when considering religious tension results from the study. The results support the literature, which indicates increases in ethnic fractionalization or tension can lead to greater income inequality (Alesina et al., 2003; Light and Gold, 2000; Borjas, 1999; Easterly, 1999; Lundberg and Startz, 1998). There is also some support for Page (2007) and Ashraf and Galor (2011), which claim greater diversity can lead to increased productivity through idea generation, leading to lower income inequality if productivity increases are shared with lower income groups. In the European panel, greater ethnic fractionalization correlates to lower income inequality.

This study extends and advances the literature. The proposed model corrects model misspecifications in some studies in the field. Many of the previous studies fail to correct for cross-sectional dependence. The econometric model uses a fixed effect with Driscoll and Kraay standard errors that control for heteroscedasticity, autocorrelation, and cross-sectional dependence. The research uses more recent data.

The researchers note limitations of the study. First, omitted-variable bias is possible, but panel data analysis helps mitigate that potential problem (Baltagi, 2001). There is a lack of consensus on the significance, magnitude, and direction of many income inequality determinants. Second, although the research tests for endogeneity and uses an error term lag, it cannot be ruled out completely. Cultural tension and the net Gini coefficient may have a bidirectional relationship. In other words, increases in income inequality lead to more ethnic and religious tension. This outcome is likelier the greater the variation in income among ethnic and religious groups. The error term lag does lessen the risk of reverse causality. Third, missing data may bias the results if omitted data is not random. The research drops missing information from the regressions and uses missing flag indicators. The researchers recommend future research on the relationship between specific religious tensions and income inequality.

## APPENDIX

**Table A1. Panel List by Country**

|              |  |
|--------------|--|
| High Income  | Australia, Austria, Belgium, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Panama, Poland, Portugal, Singapore, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, United Kingdom, United States, Uruguay   |
| Low Income   | Ethiopia, Gambia, Madagascar, Malawi, Mozambique, Niger, Sierra Leone, Tanzania, Uganda, Yemen, Zimbabwe   |
| Lower Middle | Angola, Bangladesh, Bolivia, Cameroon, Cote d'Ivoire, Egypt, El Salvador, Ghana, Honduras, India, Indonesia, Kenya, Moldova, Mongolia, Morocco, Nicaragua, Nigeria, Pakistan, Philippines, Senegal, Sri Lanka, Sudan, Tunisia, Ukraine, Vietnam, Zambia  |
| Upper Middle | Albania, Algeria, Argentina, Armenia, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Iran, Jamaica, Jordan, Kazakhstan, Malaysia, Mexico, Namibia, Paraguay, Peru, Romania, Russia, Serbia, South Africa, Thailand, Turkey, Venezuela   |
| OECD         | Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States  |
| Non-OECD     | Albania, Algeria, Angola, Argentina, Armenia, Bangladesh, Bolivia, Botswana, Brazil, Bulgaria, Burkina Faso, Cameroon, China, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Gambia, Ghana, Honduras, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Madagascar, Malawi, Malaysia, Moldova, Mongolia, Morocco, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Romania, Russia, Senegal, Serbia, Sierra Leone, Singapore, South Africa, Sri Lanka, Sudan, Tanzania, Thailand, Tunisia, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe |
| Africa       | Algeria, Angola, Botswana, Burkina Faso, Cote d'Ivoire, Egypt, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Malawi, Morocco, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, South Africa, Sudan, Tanzania, Tunisia, Uganda, Yemen, Zambia, Zimbabwe  |
| Americas     | Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, United States, Uruguay, Venezuela  |
| Asia         | Armenia, Bangladesh, China, Cyprus, India, Indonesia, Iran, Israel, Japan, Jordan, Kazakhstan, Malaysia, Mongolia, Pakistan, Philippines, Singapore, South Korea, Sri Lanka, Thailand, Turkey, Vietnam   |
| Europe       | Albania, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom   |

**Table A2.** Descriptive Statistics

| <b>Variable</b>             | <b>Description</b>   | <b>Obs</b> | <b>Mean</b> | <b>St. Dev.</b> | <b>Min</b> | <b>Max</b> |
|-----------------------------|--|------------|-------------|-----------------|------------|------------|
| GiniNet                     | Dependent Variable – net Gini (pre-tax and pre-transfer)   | 2880       | 38.12       | 8.81            | 19.5       | 66.5       |
| Ethnic Fractionalization    | The Historical Index of Ethnic Fractionalization (HIEF) dataset to measures the probability that two randomly drawn individuals from a country are not from the same group (Drazanova and Lenka, 2019).                    | 2,392      | 0.408       | 0.259           | 0.003      | 0.885      |
| Ethnic Tension              | The ICRG measure of ethnic tension is on a scale of (0) high tension to (6) low tension and is based on levels of racial, nationality, or language divisions.  | 2,827      | 4.11        | 1.32            | 0          | 6          |
| Religious Tension           | The ICRG measure of religious tension is on a scale of (0) low tension to (6) high tension. It is based on the suppression of religious freedom and excluding one or more religions from the political and social process. | 2,827      | 4.70        | 1.33            | 0          | 6          |
| Imports + Exports % GDP     | Imports plus Exports as a percentage of GDP.   | 2,829      | 77.8        | 50.74           | 11.1       | 437.3      |
| Bureaucracy Quality         | The ICRG measure of institutional strength and quality of bureaucracy is on a scale of (0) low institutional strength and bureaucracy quality to (4) high bureaucracy quality and institutional strength                   | 2827       | 2.41        | 1.10            | 0          | 4          |
| Dependency Ratio            | Percentage of the population in the working-age category   | 2,880      | 61.9        | 18.1            | 27.0       | 117        |
| Unemployment Rate           | Percentage of the labor force unemployed   | 2,880      | 7.94        | 5.25            | 0.317      | 33.5       |
| Employment in Manufacturing | Percentage of workforce employment in manufacturing.   | 2,880      | 21.6        | 7.85            | 2.54       | 46.0       |
| Inflation                   | GDP Deflator   | 2,879      | 26.5        | 207             | -27.05     | 6261       |
| GDP Per Capita              | Natural logarithm of per capita GDP  | 2,880      | 8.68        | 1.49            | 5.21       | 11.6       |
| Human Capital Index         | Average schooling years and returns to education   | 2,880      | 2.52        | 0.700           | 1.05       | 3.97       |

Table A3. Correlation Matrix

|                   | Ethnic Frac. | GDP Per Capita | Depend. Ratio | Unempl. | Employ. Ind% | Imp + Exp % GDP | Human Capital | Bur. Qual | Inflation | Ethnic Tension | Religious Tension |
|-------------------|--------------|----------------|---------------|---------|--------------|-----------------|---------------|-----------|-----------|----------------|-------------------|
| Ethnic Frac.      | 1.00         |                |               |         |              |                 |               |           |           |                |                   |
| GDP Per Capita    | -.437*       | 1.00           |               |         |              |                 |               |           |           |                |                   |
| Depend. Ratio     | .492*        | -.730*         | 1.00          |         |              |                 |               |           |           |                |                   |
| Unempl.           | -.047*       | .103*          | -.078*        | 1.00    |              |                 |               |           |           |                |                   |
| Employ. Ind%      | -.473*       | .603*          | -.686*        | .207*   | 1.00         |                 |               |           |           |                |                   |
| Imp + Exp         | -.107*       | .295*          | -.323*        | -.055*  | .172*        | 1.00            |               |           |           |                |                   |
| Human Capital     | -.450*       | .817*          | -.793*        | .054*   | .532*        | .276*           | 1.00          |           |           |                |                   |
| Bur. Qual         | -.337*       | .791*          | -.537*        | -.003   | .469*        | .255*           | .656*         | 1.00      |           |                |                   |
| Inflation         | .022         | -.045*         | .023          | -.028*  | .010         | -.052*          | -.031         | -.052*    | 1.00      |                |                   |
| Ethnic Tension    | -.459*       | .339*          | -.287*        | .040*   | .246*        | .161*           | .256*         | .270*     | -.021     | 1.00           |                   |
| Religious Tension | -.300*       | .402*          | -.338*        | -.003*  | .199*        | .141*           | .427*         | .305*     | .008      | .485*          | 1.00              |



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