National College of Ireland

Ethnic Diversity and Economic Growth in Ireland

Capstone Project

Maya Schmidt Waldemar (x16125061)

7-20-2019

Submission of Thesis and Dissertation

National College of Ireland

Research Students Declaration Form

(Thesis/Author Declaration Form)

Name: Maya Schmidt Waldemar

Student Number: x16125061

Degree for which thesis is submitted: Bachelor of Arts (Honours) in Business

Material submitted for award

(a) I declare that the work has been composed by myself.

(b) I declare that all verbatim extracts contained in the thesis have been distinguished by quotation marks and the sources of information specifically acknowledged.

(c) My thesis will be included in electronic format in the College Institutional Repository TRAP (thesis reports and projects)

(d) ***Either*** *I declare that no material contained in the thesis has been used in any other submission for an academic award.

Or *I declare that the following material contained in the thesis formed part of a submission for the award of

Bachelor of Arts (Honours) in Business – National College of Ireland

(State the award and the awarding body and list the material below)

Signature of research student: Maya Waldemar

Date: 20th of July 2019

Submission of Thesis to Norma Smurfit Library, National College of Ireland

Student name: Maya Schmidt Waldemar Student number: x16125061

School: School of Business Course: Bachelor of Arts (Honours) in Business

Degree to be awarded: Bachelor of Arts (Honours) in Business

Title of Thesis: Ethnic Diversity and Economic Growth in Ireland

One hard bound copy of your thesis will be lodged in the Norma Smurfit Library and will be available for consultation. The electronic copy will be accessible in TRAP (http://trap.ncirl.ie/), the National College of Ireland's Institutional Repository. In accordance with normal academic library practice all theses lodged in the National College of Ireland Institutional Repository (TRAP) are made available on open access.

I agree to a hard bound copy of my thesis being available for consultation in the library. I also agree to an electronic copy of my thesis being made publicly available on the National College of Ireland's Institutional Repository TRAP.

Signature of Candidate: Maya Waldemar

For completion by the School:
The aforementioned thesis was received by _____
Date: _____

This signed form must be appended to all hard bound and electronic copies of your thesis submitted to your school

LIST OF FIGURES

FIGURE 1 – GDP OUTLIERS 25
FIGURE 2 – MODIFIED GNI OUTLIERS 27
FIGURE 3 – FRACTIONALIZATION OUTLIERS 29
FIGURE 4 – INVESTMENT OUTLIERS 31
FIGURE 5 – GOVERNMENT EXPENDITURE OUTLIERS 33
FIGURE 6 – TRADE OUTLIERS 35
FIGURE 7 – GDP VS. FRACTIONALIZATION 36
FIGURE 8 – GDP VS. INVESTMENT 37
FIGURE 9 – GDP VS. GOVERNMENT EXPENDITURE 38
FIGURE 10 – GDP VS. TRADE 39
FIGURE 11 – MODIFIED GNI VS. FRACTIONALIZATION 42
FIGURE 12 – MODIFIED GNI VS. INVESTMENT 43
FIGURE 13 – MODIFIED GNI VS. GOVERNMENT EXPENDITURE 44
FIGURE 14 – MODIFIED GNI VS. TRADE 45

TABLE OF CONTENTS

Section A 1
INTRODUCTION 1
Research Question and Hypothesis 1
Ethnic Diversity and Economic Growth 1
Irish Economy and Ethnic Diversity 2
Structure 2
Section B 4
LITERATURE REVIEW 4
Ethnic diversity and Economic Growth 4
Migration and Movement of Workers 6
Ethnic Diversity and Labour Market 8
Ethno-Linguistic Fractionalization Index 9
Polarization Index 13
Fractionalization and Polarization Indices 15
Section C 17
METHODOLOGY 17
Methodological Approach 17
Limitations of Fractionalization Index 19
Data Collection 20
Methods of Analysis 21
Multiple Regression Assumptions 23
Section D 24
RESULTS 24
Descriptive Statistics 24
GDP 24
Modified GNI 25
Fractionalization 27
Investment 29
Government Expenditure 31
Trade 33
MODEL 1 35
Linearity and interaction between variables 35
Model 1: Summary of linearity and interaction between variables 40
Model 1: Multiple Regression 41

MODEL 2 42
Linearity and interaction between variables 42
Model 2: Summary of linearity and interaction between variables 46
Model 2: Multiple Regression 47
Section E 48
DISCUSSION 48
Model 1 48
Model 2 48
Model 1 and 2 49
CONCLUSION 51
BIBLIOGRAPHY 53
APPENDIX 59
APPENDIX 1: Multiple Regression Assumptions 59
1A - Correlations Model 1 59
1B - Correlations Model 2 61
1C - Linearity Model 1 63
1D - Linearity Model 2 65
1E - Multicollinearity Model 1 67
1F - Multicollinearity Model 2 68
1G - Normality Model 1 and 2 69
1H - Residuals Model 1 71
1I - Residuals Model 2 72
1J - Outliers Model 1 and 2 73
APPENDIX 2: Model 1 - Multiple Regression Output 76
2A – Model Summary 76
2B – Homoscedasticity 77
2C – Multicollinearity 78
APPENDIX 3- Model 2: Multiple Regression Output 79
3A- Model Summary 79
3B – Homoscedasticity 80
3C – Multicollinearity 81
APPENDIX 4: Normality Multiple Regression - Model 1 and 2 82

Section A
INTRODUCTION

Section A of this research paper provides an introduction to, and rationale for the research topic. It details the theory at the foundation of the study and highlights links to the conceptual framework used to measure and investigate to what extent ethnic diversity in the workforce impacts the Irish economy. In addition, it gives a brief contextual analysis of the Irish economy. Lastly, it presents an overall outline of the content of the research paper and how it is structured.

Research Question and Hypothesis

One of the less investigated components of ethnic diversity is its capacity to impact economic growth. This paper will focus specifically on the following research question: "*Does ethnic diversity in the workforce impact the Irish economy"* This research examines the hypothesis that ethnic diversity in the workforce positively impacts economic growth in Ireland.

Following an initial desk research, it is clear that considerable research on ethnic diversity and its impact on economic growth focus predominately on negative rather than positive impacts. Furthermore, there looks to be minimal research that focuses directly on the Irish context. Secondary data, both quantitative and qualitative, was attained through academic literature online based on relevant studies, articles and journals, and emerging research.

Ethnic Diversity and Economic Growth

The United Nations defines ethnic diversity as the identity or cultural association of individuals in a society and it may refer to ethnicity, language, religion or place of birth. For nations that present one or more of these variables, language, religion, national and/or ethnic groups represent the main evidence for ethnic diversity configuration (United Nations, 2003). A leading theory of economic growth from Mankiw and Taylor (2017, p.9) is defined as "the increase in the amount of goods and services in an economy over a period of time".

Numerous studies that have analysed ethnic diversity highlight that issues usually arise from ethnic groups' boundaries, as a result of a person's identification with groups being varied according to political, economic or social dynamics (Alesina et al. 2003; Fearon, 2003; Posner, 2004; Montalvo and Reynal-Querol, 2005a). Numerous studies have also pointed to the importance of ethnic diversity and its impact on economic growth (Easterly and Levine, 1997; Montalvo and Reynal-Querol, 2005b; Alesina, 2016b; Bove and Elia, 2017). Research on this topic have focused on the use of fractionalization and polarization indices to measure ethnic diversity and its relationship with economic growth. While, the fractionalization index examines the probability of two individuals randomly selected from the population to belong to different ethnic groups, the polarization index measures ethnic groups' distribution distance from a bipolar distribution with two groups of equal size (Bove and Elia, 2017).

Irish Economy and Ethnic Diversity

The population of Ireland currently stands at 4.86 million. Results from the 2016 national census shows that the population of Ireland grew at 0.8% per annum since the last census while those with Irish ethnicity increased by just 0.2% (CSO, 2018). In 2016, the largest ethnic group in Ireland was "White Irish" totalling 3,854,226 (82.2%) residents. This was followed by "Any other White background" (9.5%), non-Chinese Asian (1.7%) and "Other incl. mixed background" (1.5%) (ibid).

A central focus of the economy in Ireland is the financial and technological industries. Ireland ranks 19th overall in the 2018 Foreign Direct Investment Confidence Index (Taylor, 2018). GDP is expected to grow by 4.2 percent in 2019. Recent estimates showed that employment was set to reach 2.2 million people in 2018, and unemployment was set to average 5.7% (The Economic and Social Research Institute, 2018).

Structure

This research is divided into five sections. Section A has provided an introduction to, and rationale for the research topic. It has also referenced relevant

literature specific to the research topic and the conceptual framework employed to measure and investigate to what extent ethnic diversity in the workforce impacts the Irish economy. Section B discusses the key concepts supporting this research. Section C outlines the methodology used to undertake the research, including methodological approach, data collection, limitations, methods of analysis and assumptions. Section D outlines the results of the research, while Section E serves to discuss these results before moving to the conclusion in Section F.

Section B
LITERATURE REVIEW

Ethnic diversity and Economic Growth

Ethnic diversity has significant importance for economic growth, particularly regarding individual choices and actions (Tajfel et al., 1971; cited in Alesina and La Ferrara, 2005). Although individuals might endorse heterogeneity, economically it would be more advantageous to be part of a homogenous setup, mainly due to ineffective distribution of goods and services in the market (Alesina, Spolaore and Wacziarg, 2000; cited in Alesina and La Ferrara, 2005). Past research on group characteristics considers that social conduct can benefit intra-group members and damage inter-group dynamics (Tajfel et al., 1971; cited in Alesina and La Ferrara, 2005). Ethnic diversity can be disadvantageous to group performance in the presence of conflict and miscommunication. However, importantly, group diversity can result in greater productivity and economic growth when monitoring for communication (O' Reilly Williams and Barsade, 1997; cited in Alesina and La Ferrara, 2005).

The disadvantages of ethnic diversity arise from the increasing prospects of conflict, inferior provision of public goods, and unfair public strategies (Mauro, 1995; Easterly and Levine, 1997; Montalvo and Reynal-Querol, 2005a, Alesina et al., 2016a). Ethnic diversity can justify the difference in public policies and economic indicators, such as political stability, in a range of countries. The change from an ethnically homogeneous society to an ethnically heterogeneous society corresponds to more than 2 percent decrease in annual economic growth rates (Easterly and Levine, 1997). For instance, Asian countries reveal 28 percent greater economic growth when compared to countries in Africa. Ethnic diversity in Africa restricts public goods availability and discourages growth strategies (ibid). Furthermore, ethnically diverse countries can encounter stagnant growth and weak income reallocation as ethnic diversity is associated with vulnerable public policies and government inefficiency (Alesina et al., 2003).

In relation to social dynamics, ethnically diverse societies may also present a lack of community involvement and income redistribution restrictions (Bove and Elia, 2017). Income redistribution policies are strongly related to racial politics, and in

racially heterogeneous environments, individuals that are opposed to racial integration are also against government intervention on income redistribution. In this manner, ethnic diversity generates greater production of private goods, but less taxation, income redistribution, and public goods (Alesina and La Ferrara, 2002; cited in Alesina and La Ferrara 2005).

In opposition to negative economic effects, ethnic diversity benefits to the economy emerge from production diversification by making use of the workforce talent pool, generating higher output and economic prosperity. Ethnic diversity presents a strong relationship with productivity, as the range of personal competences rises, production increases consequently (Alesina, Spolaore and Wacziarg, 2000; cited in Alesina and La Ferrara, 2005).

Globalisation, measured through Foreign Direct Investment (FDI) and trade, is an important factor for the relationship between ethnic diversity and economic growth. The presence of cross-country networks, trade openness and high foreign investment may positively influence economic growth (Lee et al., 2019).

Ethnic diversity can also increase economic development with the arrival of immigrants. The increase in ethnic diversity through immigration makes new competences and expertise available to the labour market and increments economic growth (Alesina et al., 2016b). Furthermore, ethnic diversity through immigration can provide group achievement in the workplace by diversifying personal experiences and capabilities, which nurtures team's dynamics and success (Bove and Elia, 2017).

In regards to immigration diversity, Alesina et al. (2016b) formulated a cross-country index considering individual's birthplace organised by skills. Unlike the majority of past research, this technique highlights ethnic diversity economic benefits and recognise immigrants that come from the same country of origin as equals. The study illustrates that ethnic diversity arising from immigration is beneficial to economic growth and complements the local labour market. This method allows the differentiation between high-skill and low-skill diversity, and as result, the authors found that diversity of immigration generates positive effects on economic growth, particularly for skilled immigrants in richer countries. Birthplace diversity presents a positive relationship with income in the long run, which is the opposite of ethno-linguistic fractionalization outcomes, and is especially robust for third level educated migrants in developed countries (e.g. a 1 percent increase in the diversity of immigrants increases output in the long run by 2 percent). Individuals born in different

countries may present other skills and abilities since they experience different education and value structures, forming different attitudes and mind-set when they come across issues (ibid).

Research undertaken by Qadri and Waheed (2013) explores the impact of human capital on long-term economic growth in 106 countries. The authors conclude that human capital presents a positive relationship with economic growth through education, investment and technological development. In this manner, investments in education and technology explain why developed countries present a greater economic growth in comparison to developing countries. Additionally, the authors highlight the importance for low and middle-income countries to invest in human capital in order to achieve greater economic growth rates (ibid).

Migration and Movement of Workers

When deciding between remaining in their country of birthplace or migration to another country, workers of different skills and education levels have to assess the utility or earnings they are forecasting to receive in the country of destination in comparison to their current situation (Artuc et al., 2015).

From the perspective of cross-country migration, the most popular matter is the movement of high skilled workers. Developed countries make use of immigration policies to welcome the most talented individuals in an extremely competitive environment. In opposition, developing countries experiencing low rates of human capital, engage in efforts to contain mass emigration of high skilled workers to developed countries, which is known as ‘brain drain’ (ibid).

Using gender-specific and educational data on worldwide bilateral migration stock, Artuc et. al (2015) report that high-income countries, including countries that are members of the Organisation for Economic Co-operation and Development (OECD), present negative levels of brain drain, which means these countries are able to overcome the possible costs involved when their high skilled citizens emigrate to other countries. For most developing countries, the native workforce is more highly educated when compared to the workforce it attracts from other countries, meaning that high skilled workers that immigrate to developing countries cannot overcome the costs generated from the loss of native mass emigration.

The impact of high skilled workers migration depend on the destination country's labour market setup and on the presence of human capital in the specific workforce sector (Skeldon, 2005; cited in Lacroix, 2008).

In general, cross-country migration of high skilled workers represents a small percentage of total international migration and is the result of economic growth stagnation and not its cause (Lacroix, 2008).

In some cases, the migration of high skilled workers may generate advantages such as unemployment mitigation and support for skilled transfers (Skeldon, 2005; cited in Lacroix, 2008). In addition, the migration of high skilled workers may lead to a brain gain, if the remaining workers are encouraged to study and grow professionally (Lacroix, 2008).

Migration may produce social and political improvements in the destination country through communal participation, democratization, fairness and rights movements (ibid).

The migration of high skilled workers is often associated with a search for better income, life circumstances and labour opportunities (Massey et al 1993; cited in Lacroix, 2008). However, it can also be linked with colonialism, conflict, and environmental conditions (Lacroix, 2008).

While economic development and migration are normally considered as substitutes, empirically it has been demonstrated that economic development can accelerate migration, especially in developing countries, if social and economic improvements represent capital gains and encouragement to migrate (ibid).

While international migration may happens for a wide range of reasons, some authors argue that when a certain threshold of migrants have reallocated, migration will increase as new social and economic structures will be formed, making the phenomena self-propagating by facilitating the process and mitigating the risks for the next flux of migrants (ibid).

It is important to note that low-income individuals are less inclined to migrate as a result of evident risks and expenses associated with international migration. Instead, they are more likely to engage in in-country migration (Zohry, 2005; cited in Lacroix, 2008).

Since immigrants bring different skills and expertise, in the long term, ethnic diversity contributes to the local workforce through innovation in the production

variety of goods and services, prompting local production, consumption and native workforce skills' improvement (Ottaviano and Peri, 2006).

Conversely, if the local community is not in favour of immigration policies, native workers may view immigration as a risk to their jobs security. In this case, ethnic diversity would diminish native workers utility and disincentive production (ibid).

Ottaviano and Peri (2006), argue that ethnic diversity presents a positive relationship with productivity for the local workforce in the US contributing to higher wages and rent paid for native workers by increasing demand for labour and decreasing unemployment. Additionally, immigrants may engage in jobs and services that are not common within native workers (ibid).

Ethnic Diversity and Labour Market

As globalisation intensifies and competitive rivalry increases, companies have increased the diversity of their teams in an attempt to create competitive advantage in their operations. This has led to teams benefitting from a greater variety of skills and talent generating benefits for production and performance. However, team diversity may also create negative outcomes if team performance is affected by communication, organisation and disagreements. According to Horwitz and Horwitz (2007), teams that are more homogeneous may experience greater integration and rapport.

With respect to the relationship between team diversity and team outcomes, Horwitz and Horwitz (2007) distinguish team diversity in two ways: Bio-demographic diversity (innate aspects that are instantly detectable and classified such as age, gender, race, and ethnicity) and Task-related diversity (individual aspects such as skills, education level, and professional knowledge). Regarding the relationship between team diversity and team outcomes, the authors found that task-related diversity positively impacts upon team performance. As such, team diversity is not significantly associated to team performance (ibid).

Furthermore, Horwitz and Horwitz (2007) argue that bio-demographic diversity is not significantly associated with team performance, indicating that relying exclusively on demographic aspects would not increase team performance. When creating diverse teams, the authors suggest concentrating less on bio-demographic

aspects, prioritising high performance task-related aspects, shifting from individual aspects to group configuration and social cohesion (ibid).

According to Lee et al. (2019), communication is a key aspect in understanding the relationship between ethnic diversity and economic growth. The ability to communicate nurtures creativity and productivity, which may increase economic growth.

For example, ethnically diverse teams may benefit from a greater range of viewpoints and analytical scrutiny generating improved outcomes when compared to more ethnically homogeneous teams (ibid).

At a corporate level, ethnic diversity generates production benefits for both companies and teams. A higher number of foreign-born employees increases innovation though greater availability of problem-solving options and greater decision-making (Ottaviano and Peri, 2006). For this reason, ethnically diverse countries tend to achieve better outcomes in the private sector when compared to the outcomes in ethnically homogeneous countries (Collier, 2001; cited in Ottaviano and Peri, 2006).

Ethno-Linguistic Fractionalization Index

Previous studies on ethnic diversity and economic growth adopt two models to quantify ethnic diversity: fractionalization and polarization.

The Ethno-Linguistic Fractionalization Index, also known as Fractionalization index, is used to analyse the relationship of ethnic diversity with topics such as economic growth, government performance, and ethnic conflict. The fractionalization index is based on the Herfindahl concentration index, using worldwide data on ethnic groups. The data was later published as the Atlas Narodov Mira, featuring ethnolinguistic structures around the world and recognises historical language roots, disregarding both political and economic factors (Mauro, 1995).

Ethno-linguistic fractionalization presents a positive relationship with corruption and political instability, and a negative relationship with institutional efficiency. For instance, Mauro (1995) argues that ethnic diversity negatively affects economic growth when policymakers use their privileged position to benefit their own ethnic group. In a heterogeneous society with several ethnolinguistic groups,

politicians tend to favour their own group, increasing corruption, reducing private investment and, consequently, contributing to economic stagnation (ibid).

When using the ethnolinguistic fractionalization index, research shows that the presence of ethnic divisions in African countries, for example, is strongly connected to poor financial systems, high public deficits, low schooling levels, political instability, and lack of infrastructure (Easterly and Levine, 1997). In this case, ethnic diversity associated with the absence of political freedom lowers social cooperation, public good provision and arrangements for economic growth (Collier and Gunning, 1999; cited in Alesina and La Ferrara, 2005).

Alesina and Zhuravskaya (2018) argue that poor governance tends to be present in ethnically segregated countries, due to ethnic groups being geographically distributed in different regions. When considering two countries with the same level of fractionalization, quality of government is worse in the more ethnically segregated country. As ethnic segregation increases, disagreements over public policies increases and quality of government decreases. In addition, developing countries are more ethnically segregated than developed countries, as institutional development and government quality are highly correlated with GDP per capita (ibid).

The fractionalization index presents a direct negative impact on the economic growth of countries that experience communication issues, which corresponds to countries with high illiteracy levels and disperse ethnic groups' geographical distribution (Campos and Kuzeyev, 2007).

In a cross-country study, researchers determined that public governance aspects, such as corruption, affect economic growth. The author used the ethnolinguistic fractionalization index to address the endogeneity around the fact that state institutions can affect economic performance, and vice-versa (Mauro, 1995). According to Collier (2000; cited in Alesina and La Ferrara, 2005) fractionalization is harmful to economic growth only in the existence of oppressive regimes, since in democracies ethnic diversity is expected to be dealt in a superior manner because of the effort of several organisations guarding social fairness and basic constitutional rights (ibid). The presence of an integrated system that preserves individual freedom is the reason why Western countries that have encountered social tensions due to ethnic divisions have succeeded better in comparison to the rest of the world (Scully, 1995). Accordingly, GDP per capita presents a positive relationship with democracy rates, with developed countries being more democratic (Alesina and La Ferrara, 2005).

Gisselquist et al (2016) highlight that ethnic diversity presents a negative relationship with the provision of public goods, as ethnic groups' preferences may differ. Public goods utility in a country diminishes as society becomes more ethnically diverse. When comparing countries, members of ethnically diverse societies enjoy fewer benefits from public goods and as a result discourage their provision. Additionally, if ethnic groups agree internally on preferences, but discriminate other ethnic groups, provision of public goods decreases as intra-group dynamics favours segregation (ibid).

Fearon (2003) used the fractionalization index to create a new set of data, which resulted in a list of 822 ethnic groups in 160 countries. The author criticizes previous studies that made use of the previous fractionalization index, because it adopts native language to define ethnic groups, which sometimes classifies them by concepts of race or country of origin rather than language. Examples include Hutus and Tutsis in Rwanda, belonging to the same ethnic group as both speak Kirundi, and Anglo-Canadians who are catalogued in the United States. By using the new list to measure ethnic fractionalization, the author shows that around 70 percent of the world's nations contain an ethnic group that represents the majority of the population. The new list proves to be a more accurate parameter for cross-country studies in comparison to the Atlas Narodov Mira, as it identifies the appropriate ethnic groups that are relevant to each country (ibid). This approach was later criticized by Alesina and La Ferrara (2005) who argued that the method relies on specific judgment calls.

Alesina et al. (2003) formulated a new fractionalization index measure for 190 countries based on a wider diversity classification accounting not only for language, but also for ethnicity and religious differences, resulting in three new indices. The original ethnolinguistic fractionalization index focuses primarily on language classification and neglects other ethnic factors such as racial origin and skin colour. For instance, Latin American countries are homogeneous in regards to commonly spoken language, but less homogeneous in relation to skin colour or racial origin. Ethnic and linguistic fractionalization are related to negative effects in regards to government efficiency. In contrast, Alesina et al. (2003) argue that religious fractionalization presents a positive relationship with government efficiency, resulting in higher religious tolerance and freedom. From the different indices studied, religious fractionalization is the least controversial as religions circumstances are more defined and constant. The new ethnic fractionalization index presents higher fractionalization

in comparison to the Soviet index (except for East and South East Asia), due to ethnic groups being defined not only by linguistic characteristics but also by other differences, such as skin colour (ibid). The new measure of fractionalization presents a negative relationship with per capita growth, schooling, financial depth, fiscal surplus, and telephones per worker. While linguistic fractionalization is negatively related to growth, religious fractionalization is not. While a person can easily change religion, a change in race or language is less probable. As such, religious fractionalization index is higher in more tolerant and open nations. As religious fractionalization rises, there is a reduction in corruption, bureaucratic, infant mortality, illiteracy and a rise in income redistribution, infrastructure efficiency, school completion, equality, and political rights (ibid).

Posner (2004) assembled a new ethnic fractionalization index named 'politically relevant ethnic groups' (PREG) for 42 countries in Africa that reiterates that ethnic fractionalization presents a negative relationship with economic prosperity in Africa. The author claims that the results produced by the new index are based on much more reliable theory and methodology than those produced by the original ethnic fractionalization index. For example, the results are produced by assessing existing ethnic groups that participate directly or indirectly in the political environment leading to stagnating macroeconomic policies. The author highlights the importance of identifying the ethnic groups that are essentially influencing macroeconomic policies rather than identifying all the ethnic groups that exist in a certain country. The PREG index seems to be a better measure to explain the impacts of ethnic diversity through policies on economic growth (ibid).

Alesina et al. (2016a) examine economic inequality within ethnic groups across countries and find a robust negative relationship between ethnic inequality and economic growth. They also highlight a negative association between ethnolinguistic fractionalization and economic prosperity, suggesting that income inequality differences at a national level may explain cross-country economic differences rather than ethnic diversity by itself. Local income distribution discrepancies within ethnic groups can generate political conflict driven by ethnic affinity producing poor public policies, resource allocation and economic growth (ibid).

By adopting sub-national data on public goods indicators in Zambia, Gisselquist et al. (2016) show that the fractionalization index is positively related to

the provision of public goods and welfare components such as health, immunization, and education levels.

Lee et al. (2019) affirm that ethnic diversity measured through the fractionalization index, combined with high levels of education or high foreign investment, generates greater economic performance in China, because education improves communication abilities and FDI builds appropriate conditions for ethnic groups outcomes.

Polarization Index

Ethnic diversity and social conflict became relevant topics for economic studies when exploring the relationship between economic growth and inequality, with the assumption that inequality is a driver of social conflict and economic stagnation. The occurrence of conflict depends on the ethnic groups' distribution, intensity of conflict and type of political system in place (Esteban and Ray, 2008).

Ethnic diversity can generate community tensions such as violence, separatism, and discrimination that diminish cooperation and increase costs (Scully, 1995). Alesina and La Ferrara (2005) affirm that although socially diverse countries present a greater ethnic diversity, their economies might experience a more constant and substantial growth in comparison to better ethnically homogeneous countries, where conflict occurs in a bilateral manner as two ethnicities enrol in conflict.

Criticism arises from the fact that fractionalization does not reflect possible in-country social factors and conflict as the index is unable to interpret important differences in the composition of ethnic groups (Fearon, 2003; cited in Montalvo and Reyna-Querol, 2005a). In this manner, the fractionalization index would be unsuitable to measure the most common type of ethnic conflict, which occurs between an ethnic majority and a large ethnic minority (Horowitz, 1985, cited in Montalvo and Reynal-Querol, 2005a).

The Polarization index was first proposed by Esteban and Ray (1994) based on the distribution of income groups applied to ethnicity. Their method was later adapted by Reynal-Querol (2002) considering the distribution of ethnic groups from a bipolar structure, which is a discrete polarization method also known as the Q index

(Chakravarty and Maharaj, 2011). This method is mainly used to demonstrate ethnic diversity as a driver of social conflict and civil war.

According to Montalvo and Reynal-Querol (2005a), in order to examine the probable manifestation of conflict encouraged by ethnic divisions, it is recommended to use the polarization index to establish "how far the distribution of the groups is from a bipolar distribution where there are only two groups of equal size" (Bove and Elia, 2017, p.230). That is to say, prospects of social conflict and hostility would be remarkably higher in a country composed by two equally sized ethnic groups when compared with a country with a greater degree of homogeneity (ibid).

Montalvo and Reynal-Querol (2005a) construct a polarization index with a discrete metric and show that polarization, rather than fractionalization, is a more appropriate index to measure ethnic conflicts and meaningfully explains the incidence of civil wars, which can negatively impact economic growth in the long term. Polarization is quantified between 0 and 1, starting from 0 where ethnic distribution follows a non-bipolar format and 1 where ethnic distribution follows a bipolar format (ibid).

The Polarization index is commonly linked with ethnically diverse societies characterised by "intra-group homogeneity and inter-group heterogeneity", which are prone to social strife, disorder, hostility, and conflict (Esteban and Ray, 1994, p.820). Ethnic group arrangements in a polarized configuration produce "a high degree of homogeneity within each group, a high degree of heterogeneity across groups, and a small number of significantly sized groups" (Esteban and Ray, 1994, pg. 824).

As such, the Polarization index is a key method in this field to demonstrate tension and conflict arising from ethnic diversity (Chakravarty and Maharaj, 2011). Historically, as language and culture vary mostly because of geographical distribution, ethnic groups' tend to be regionally concentrated (Bleaney and Dimico, 2017).

Ethnic polarized societies fail to reach an agreement on public goods and policies, generating conflict of interests and discrimination, leading to low social interaction, negligent treatment of minorities, fragile public policies, and in some cases, civil wars (Collier and Gunning, 1999, cited in Alesina and La Ferrara, 2005). By examining ethnic diversity effects on economic growth, ethnic polarization acts as a damaging factor for economic growth due to limited investment and larger public consumption (Montalvo and Reynal-Querol, 2005a). As a consequence, products and

services might be confined within ethnic divisions, as State arrangements and capital allocation favours certain ethnic groups (ibid).

In relation to types of political systems in place, oppressive and authoritarian countries generate highly unequal opportunities for ethnic groups, increasing the probability of social conflict even if it means to take risks and pay high costs. On the other hand, democratic and fair countries generate equal opportunities for ethnic groups, decreasing the probability of social conflict, because ethnic groups are not willing to take risks and pay high costs involved in the conflict (Esteban and Ray, 2008).

Fractionalization and Polarization Indices

As the world becomes more globalized, not only is there is an increase in the movement of goods, capital, information, but also in the movement of people. In this manner, due to migration dynamics, countries are experiencing a greater exposure to diverse ethnicities, which boosts interest and examination of ethnic diversity (Chakravarty and Maharaj, 2011).

Considering a given society was formed by two ethnic groups, fractionalization and polarization indices would carry the same value. When the number of ethnic groups rises from two to three or more ethnic groups, the relationship between both indices disappears. Given this information, by increasing the number of ethnic groups fractionalization rises and polarization declines (Bove and Elia, 2017).

Using fractionalization and polarization indices to measure religious and ethnic diversity impact on economic growth, Montalvo and Reynal-Querol (2005b) found that both indices generate a negative effect on economic growth. When society is divided by ethnic differences, tensions arise generating economic vulnerability that deteriorates GDP in the long-run. The results show that the fractionalization index directly affects economic growth and the polarization index presents an indirect negative effect on economic growth by reducing the level of investment, increasing public consumption and the occurrence of civil wars (ibid).

Esteban and Ray (2012), for instance, explored the relation between measures of ethnic diversity and social tensions. They showed that polarization had a significant role in explaining conflict over public goods, such as trade or labour involvement, and

political influence and ethnic supremacy; and that fractionalization had a significant role in explaining conflict over private goods and that capital is an important factor when these private goods involve natural resources (ibid).

When considering that the nature of the outcome for being the winner in a conflict influences resource investment and ethnic diversity, ethnic polarization encourages conflict if the outcome for the winner represents a public good, whereas ethnic fractionalization encourages conflict if the outcome for the winner represents a private good. Fractionalized societies tend to experience conflict in local polarized regions, because of ethnic groups' distribution and concentration (Bleaney and Dimico, 2017).

When using data on bilateral migration stocks to calculate both fractionalization and polarization indices, Bove and Elia (2017), noted when countries are divided according to their per capita income level, developing nations demonstrate a more significant rise in GDP growth rate after changes in diversity levels. When developing countries innovate, they move closer to the technological frontier and this change has a greater impact in developing countries when compared to developed countries that were already close to the technological frontier (Vandenbussche, 2004, cited in Bove and Elia, 2017).

Alesina and La Ferrara (2005) emphasize that ethnic diversity can be advantageous for developed countries because productivity in these countries is more diverse and specialised, making it easier to observe. In addition, the presence of policies and institutional frameworks in developed countries assists in dealing with ethnic diversity issues (Lee et al., 2019).

Regarding the distribution of ethnic groups and the intensity of conflict, Esteban and Ray (2008) argue that although highly fractionalized countries may present greater probability for social conflict, the intensity of conflict is moderate. For highly polarized countries, the probability for social conflict is lower and the intensity of conflict is strong.

Section C
METHODOLOGY

Methodological Approach

The methods undertaken in this study encompass the positivist paradigm with a quantitative approach to better observe, calculate, and determine patterns. The methodological approach aims to answer the research question: "*Does ethnic diversity in the workforce impact the Irish economy?*" and assumes the hypothesis that ethnic diversity in the workforce positively impacts economic growth in Ireland.

Numerous authors report ethnic diversity generating negative effects on economic growth caused by ethnically oriented public policies, inferior public goods provision, political uncertainty, inadequate investment, inefficiency of institutions, and social conflict (Esteban and Ray, 1994; Mauro, 1995; Easterly and Levine, 1997; Alesina and La Ferrara, 2005; Montalvo and Reynal-Querol, 2005a and 2005b; Esteban and Ray, 2012; Alesina et al., 2016a). Conversely, the latest studies on this topic report ethnic diversity generating positive effects on economic growth, particularly in relation to the contribution of immigrants (Alesina et al., 2016b; Bove and Elia, 2017). Therefore, motivated by these two recent studies, this research tests the hypothesis that ethnic diversity arising from immigration generates positive effects on the Irish economy.

Alesina et al. (2016b) used data of birthplace diversity to measure the relationship between ethnic diversity and economic growth in a cross-country data set. This approach measured immigration by skills levels and showed that ethnic diversity arising from immigration produces positive impacts on the economy, especially regarding third level educated immigrants in developed countries.

Bove and Elia (2017) used data of bilateral migration stocks to evaluate the effects of immigration on the economy of different countries. They identified that fractionalization and polarization indices generate positive effects on a country's gross domestic product (GDP) when accounting for immigrant's diversity. Immigrants can carry a different set of skills and abilities that may improve team performance in the workplace, problem solving, production efficiency, and innovation (Hong and Page, 2001; cited in Bove and Elia, 2017).

In order to answer the research question, it was necessary to first define and measure ethnic diversity in the Irish workforce. Thereafter, ethnic diversity in the Irish workforce were combined with key economic indicators to predict economic growth.

Ethnic diversity incorporates both social and cultural perspectives and can carry different meanings depending on individual experiences, sociocultural environment, and set of values. For the purpose of this research, ethnic diversity is analysed by the perspective of nationality and it follows the perspective used in the Quarterly National Household Survey (QNHS): "Nationality should be interpreted as citizenship. Citizenship is defined as the particular legal bond between an individual and his/her State acquired by birth or naturalisation, whether by declaration, option, marriage or other means according to national legislation. It corresponds to the country issuing the passport" (CSO, 2007, p. 28).

It is important to note that data on movement of people around the world is not accurate, thus imposing a challenge for estimates on human capital, migration and development. While birthplace origin is the most preferable perspective to analyse ethnic diversity through immigration, as it does not change overtime and is not dependent on legal and governmental policies, citizenship may change with naturalisation (Artuc et al., 2015). Thus, analysing ethnic diversity by the perspective of nationality is relevant, but limitations exist.

In relation to time analysis, census of population is the most adopted and relevant material to construct a fractionalization index. However, because it is usually conduced every 5 to 10 years, the lack of data for the remaining years interferes if a research is focused on a time series analysis, which is the case for this research (Campos and Kuzeyev, 2007). With this in mind, nationality data from the QNHS was preferred. The advantage of using quarterly data is that quarters represent smaller intervals, which contributes to a greater time analysis when compared to yearly data sets.

To measure ethnic diversity in the Irish workforce, I utilised data on nationality to construct a fractionalization index, which captures the possibility that two arbitrarily individuals from a given population are part of different nationalities. Fractionalization is quantified between 0 and 1. While a fractionalization index of 0 exemplifies a country with absolute homogeneity where all individuals are part of the same nationality, a fractionalization index of 1 exemplifies a country with absolute heterogeneity where every individual is part of a different nationality. Likewise, a

country that is formed by various nationalities that are equal in size would indicate a greater fractionalization value in contrast to a country that is formed exclusively by two nationalities that are equal in size (Alesina and La Ferrara, 2005).

Once constructed, the fractionalization index was analysed against secondary data on key economic indicators such as gross domestic product (GDP), investment, government expenditure and trade, with the intention to understand the relationship between variables.

Limitations of Fractionalization Index

Although highly adopted by academic sources, the Fractionalization Index does not contemplate the constructivist aspects of ethnic diversity (Laitin and Posner, 2001). Taking into consideration a constructivist analysis, the Fractionalization index would be questionable for four main reasons:

1) Fractionalization is assumed to remain the same overtime. On the contrary, constructivism presumes that ethnic diversity vary with time due to assimilation, conflict, group formation, or movement of people (ibid).

2) Fractionalization assumes an overall value for each country. In opposition, a constructivist outlook would consider numerous aspects of ethnicity in a country, and fractionalization would vary according to which aspect it is related. Additionally, this would mean considering all ethnicity aspects without placing any emphasis or preference (ibid).

3) In order to analyse the relationship between ethnic diversity and economic growth, government performance or ethnic conflict, a country's Fractionalization Index should consider the ethnic groups that are relevant to each of the topics, including group dynamic and its impact on the respective areas (ibid).

4) Fractionalization is considered exogenous to the effects it creates. However, constructivism would assume the probability of endogeneity (ibid).

Another limitation of the fractionalization index is the fact that even if two countries present the same fractionalization value, they might present different ethnic groups' distribution (Fearon, 2003).

In this research, the polarization index was excluded due to low levels of ethnic diversity, fractionalization and polarization indices being "highly positively correlated and therefore, statically indistinguishable" (Bleaney and Dimico, 2017, p. 358). Therefore, the distinction between polarization and fractionalization is only relevant for societies with high levels of ethnic diversity. Additionally, the polarization index assumes the presence of social conflict, thus, the polarization index would not serve the purpose of this research and would not answer the research question.

Data Collection

All the secondary data utilised in this study was sourced from the Central Statistics Office (CSO). The fractionalization index for persons in employment in Ireland is the only primary data in this study.

This study uses secondary data between 2007 and 2016 to compute a fractionalization index for persons in employment in Ireland. Data on worker's nationality is taken from the Quarterly National Household Survey (QNHS). The QNHS uses a two-staged sample to guarantee equal opportunity of selection and a quarterly sample equal to 26,000 households. The data is also adjusted to population estimates and nationality controls (CSO, 2018c).

A fractionalization index for persons in employment in Ireland was constructed by gathering secondary data on the configuration of the Irish workforce from the QNHS. In the QNHS, nationalities are categorised as follows: Group 1 - Irish, Group 2 - UK, Group 3 - other nationalities, Group 4 - EU15 to EU28 states and Group 5 - EU15 excluding Irish and UK (CSO, 2019).

Secondary data on gross domestic product (GDP), investment, government expenditure and trade were used following Bove and Elia (2017), which identify these economic indicators to influence a country's economic growth.

Quarterly data on GDP, investment and government expenditure are sourced from the National Accounts, a key publication of the performance of the Irish economy. Data collection is based on direct statistical surveys undertaken by the CSO, government departments and the Central Bank of Ireland, following the European System of National and Regional Accounts framework (CSO, 2018b). Yearly data on modified gross national income (*GNI) is sourced from the National Income and Expenditure Annual Results, a part of the National Accounts publication that is released on a yearly basis (CSO, 2019).

Yearly data on trade surplus (exports minus imports), which is a proxy for trade, is sourced from the Value of Merchandise Trade table, available in the Balance of Payments publication, which compile surveys on economic transactions of Irish residents with other countries (CSO, 2018a).

The majority of economic indicators utilised in this study are at constant market prices and seasonally adjusted, as the objective is to analyse any overtime patterns independent of seasonal aspects. Modified GNI and data on trade are the only variables presented in years. Additionally, Modified GNI is presented at current market prices.

Methods of Analysis

Before analysis, secondary data from the CSO website was downloaded, compiled and a fractionalization index for Ireland was calculated on Excel for a 10 year period organised by quarters, generating in total 40 observations. The fractionalization index takes the following form:

$$1 - \sum_{i=1}^{n} \pi_i^2 = \sum_{i=1}^{n} \pi_i \, (1 - \pi_i)$$

For the purpose of this study, fractionalization is equal to one minus the sum of squared group shares, where π_i represents the population share of a nationality *i* and *n* is total number of nationalities.

Data on the number of persons in employment and trade are presented in thousands. As the rest of the variables are presented in million, data on number of persons in employment and trade were converter from thousand to million.

The secondary data and the fractionalization index were later coded and entered into IBM SPSS Statistics Software for data analysis and statistical test.

In order to investigate the hypothesis that ethnic diversity positively impacts economic growth in Ireland, GDP was defined as the dependent variable (y axis) and fractionalization index, investment, government expenditure and trade were defined as independent variables (x axis).

Using IBM SPSS Statistics Software, I have generated descriptive statistics to analyse minimum, maximum, mean and standard deviation for all variables. I have also generated correlation, multiple linear regression, scatterplot graphs, correlation, multicollinearity, normality and residuals tests to examine the form and strength of the relationship between variables.

The two multiple linear regression models investigated are as follows:

Model 1:

$GDP = \alpha + \beta_1 Fractionalization + \beta_2 Investment + \beta_3 Government\ Expenditure + \beta_4 Trade$

Model 2:

$*GNI = \alpha + \beta_1 Fractionalization + \beta_2 Investment + \beta_3 Government\ Expenditure + \beta_4 Trade$

Model 1 defines the following indicators to be explanatory variables driving economic growth: fractionalization, gross domestic fixed capital formation as proxy for investment, net expenditure by central and local government as a proxy for government expenditure, and trade surplus (exports minus imports) as a proxy for trade. These are the most similar variables to those adopted by Bove and Elia (2017, p. 230): “fractionalization, investment share of GDP, government consumption share of GDP and trade to GDP ratio”.

In Model 2, the explanatory variables are all the same as Model 1, but I extend this model by replacing the dependent variable GDP for modified GNI, following recommendations by the Economic Statistics Review Group and the CSO. Modified

GNI is understood to be a more compatible and suitable indicator for the size of the Irish economy as it excludes globalisation effects that overestimate economic performance in Ireland (CSO, 2017).

In order to facilitate comparison and present the multiple regression results in APA style, the data was indexed with the first quarter of 2007 used as the base for data presented in quarters and 2007 as the base for data presented in years.

Multiple Regression Assumptions

For the purpose of this study, certain assumptions were considered when running the multiple regression analysis: correlation, linearity, multicollinearity, normality, residuals, and outliers. Correlation was tested between each independent variable against the dependent variable through a Bivariate Pearson Correlation (See Appendix 1A and 1B). Linearity was tested between each independent variable against the dependent variable through scatterplots (See Appendix 1C and 1D). Multicollinearity was assessed through tolerance values (See Appendix 1E and 1F). Normality was verified through Shapiro-Wilk test (See Appendix 1G). Residuals were analysed through inspection of the residuals statistics table (See Appendix 1H and 1I). Outliers were verified by visual inspection of whiskers plots (See Appendix 1J).

Section D
RESULTS

Descriptive Statistics

The following results include descriptive statistics for the mean, minimum, maximum, skewness, kurtosis, distribution and outliers of each of the dependent and independent variables.

GDP

The average GDP output was 51,281 million (SD = 127.510). The lowest GDP output was 44,086 million and the highest GDP output was 72,857 million. GDP presented skewness of 1.421 (SE = .374) and kurtosis of .565 (SE = .733) (See Table 1). GDP was non-normally distributed (Sig. = .000) (See Table 2) and whiskers plots showed the presence of outliers (See Figure 1).

Table 1 - GDP Descriptive Statistics

Descriptives

			Statistic	Std. Error
GDP	Mean		51281.03	1275.510
	95% Confidence Interval for Mean	Lower Bound	48701.06	
		Upper Bound	53860.99	
	5% Trimmed Mean		50640.72	
	Median		47512.50	
	Variance		65077046.025	
	Std. Deviation		8067.035	
	Minimum		44086	
	Maximum		72857	
	Range		28771	
	Interquartile Range		5914	
	Skewness		1.421	0.374
	Kurtosis		0.565	0.733

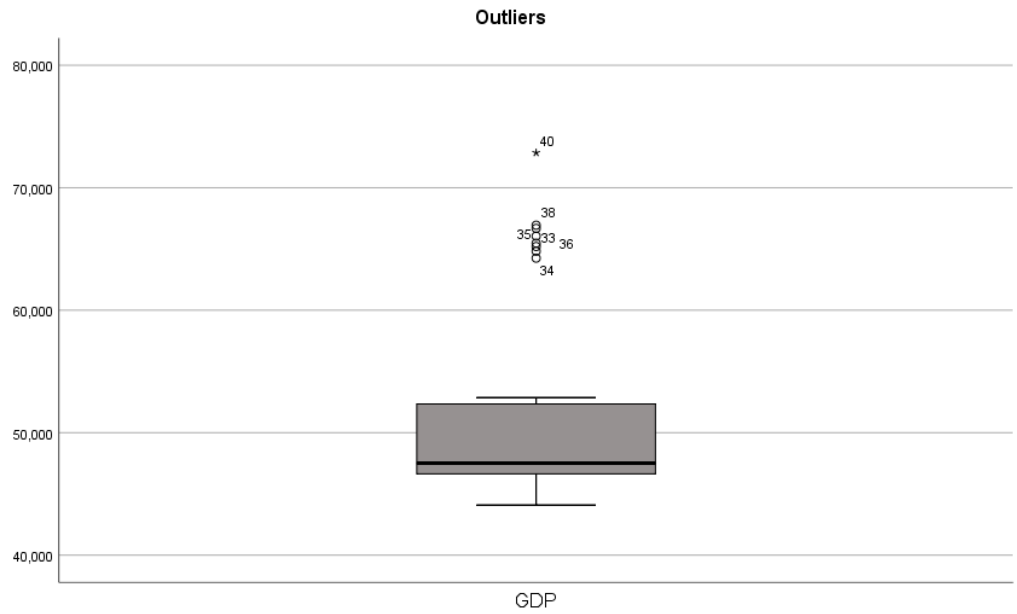
Table 2 – GDP Test of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
GDP	0.278	40	0.000	0.732	40	0.000

a. Lilliefors Significance Correction

Figure 1 – GDP Outliers



Modified GNI

The average Modified GNI output was 146,206 million (SD = 5666.877). The lowest Modified GNI output was 126,444 million and the highest Modified GNI output was 175,827 million. Modified GNI presented skewness of .370 (SE = .687) and kurtosis of -1,400 (SE = 1.334) (See Table 3). Modified GNI was normally distributed (Sig. = .278) (See Table 4) and whiskers plots showed no presence of outliers (See Figure 2).

Table 3 – Modified GNI Descriptive Statistics

Descriptives

			Statistic	Std. Error
Modified_GNI	Mean		146206.40	5666.877
	95% Confidence Interval for Mean	Lower Bound	133387.03	
		Upper Bound	159025.77	
	5% Trimmed Mean		145658.72	
	Median		142767.00	
	Variance		321134906.489	
	Std. Deviation		17920.237	
	Minimum		126444	
	Maximum		175827	
	Range		49383	
	Interquartile Range		34060	
	Skewness		0.370	0.687
	Kurtosis		-1.400	1.334

Table 4 – Modified GNI Test of Normality

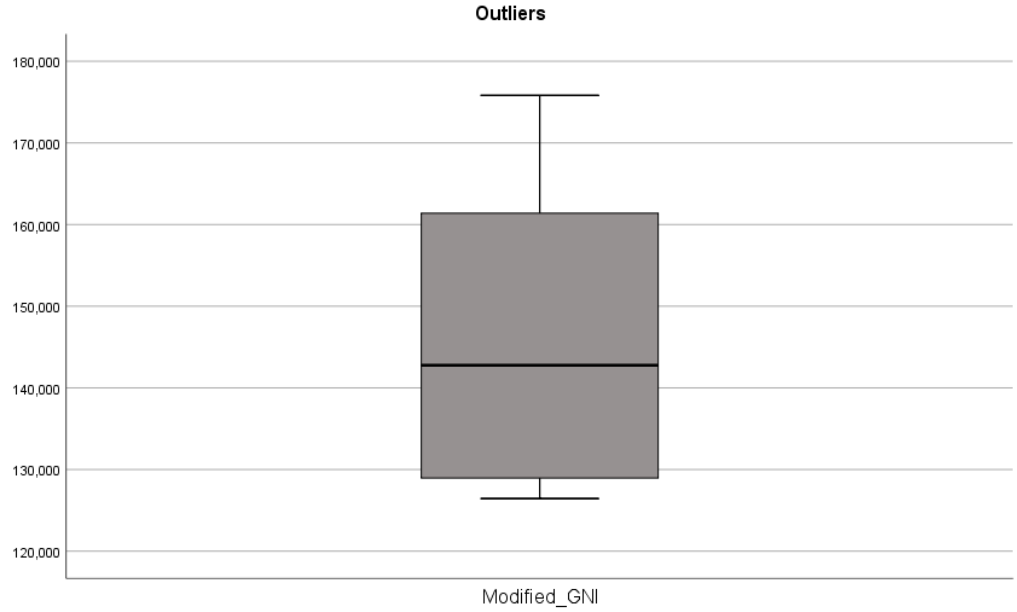
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Modified_GNI	0.198	10	.200*	0.910	10	0.278

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 2 – Modified GNI Outliers



Fractionalization

The average fractionalization was .2712 (SD = .0011). The lowest fractionalization was .2604 and the highest fractionalization was .2885. Fractionalization presented skewness of .594 (SE = .374) and kurtosis of -.581 (SE = .733) (See Table 5). Fractionalization was non-normally distributed (Sig. = .042) (See Table 6) and whiskers plots showed no presence of outliers (See Figure 3).

Table 5 – Fractionalization Descriptive Statistics

Descriptives

			Statistic	Std. Error
Fractionalization	Mean		0.271210	0.0011669
	95% Confidence Interval for Mean	Lower Bound	0.268850	
		Upper Bound	0.273571	
	5% Trimmed Mean		0.270886	
	Median		0.268943	
	Variance		0.000	
	Std. Deviation		0.0073804	
	Minimum		0.2604	
	Maximum		0.2885	
	Range		0.0280	
	Interquartile Range		0.0114	
	Skewness		0.594	0.374
	Kurtosis		-0.581	0.733

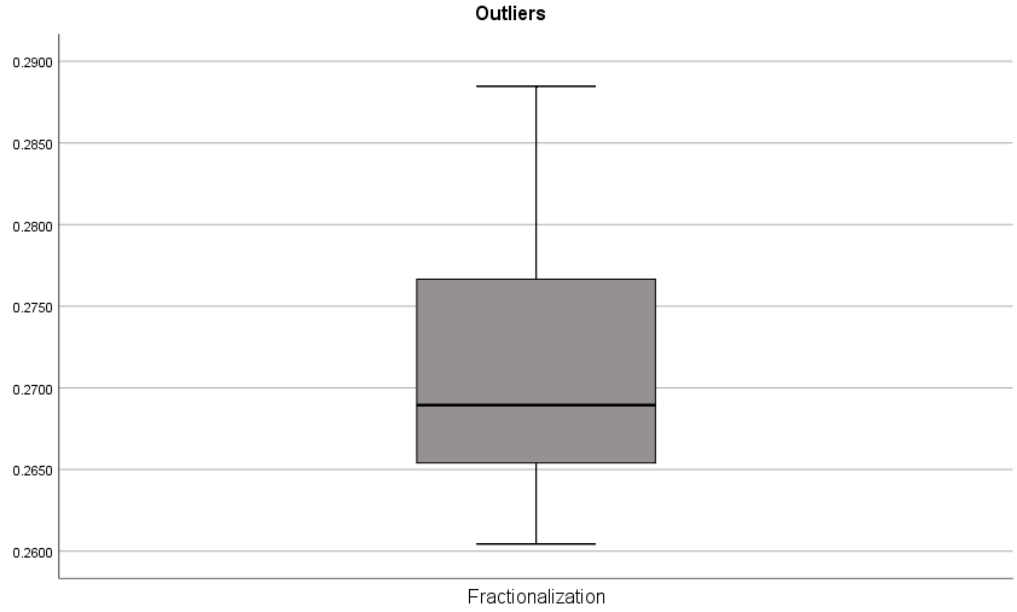
Table 6 – Fractionalization Test of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Fractionalization	0.134	40	0.068	0.942	40	0.042

a. Lilliefors Significance Correction

Figure 3 – Fractionalization Outliers



Investment

The average investment was 11,880 million (SD = 787,389). The lowest investment was 7,459 million and the highest investment was 27,444 million. Investment presented skewness of 1.890 (SE = .374) and kurtosis of 2.990 (SE = .733) (See Table 7). Investment was non-normally distributed (Sig. = .000) (See Table 8) and whiskers plots showed the presence of outliers (See Figure 4).

Table 7 – Investment Descriptive Statistics

Descriptives

			Statistic	Std. Error
Investment	Mean		11880.43	787.389
	95% Confidence Interval for Mean	Lower Bound	10287.78	
		Upper Bound	13473.07	
	5% Trimmed Mean		11324.14	
	Median		9964.00	
	Variance		24799249.687	
	Std. Deviation		4979.885	
	Minimum		7459	
	Maximum		27444	
	Range		19985	
	Interquartile Range		4383	
	Skewness		1.890	0.374
	Kurtosis		2.990	0.733

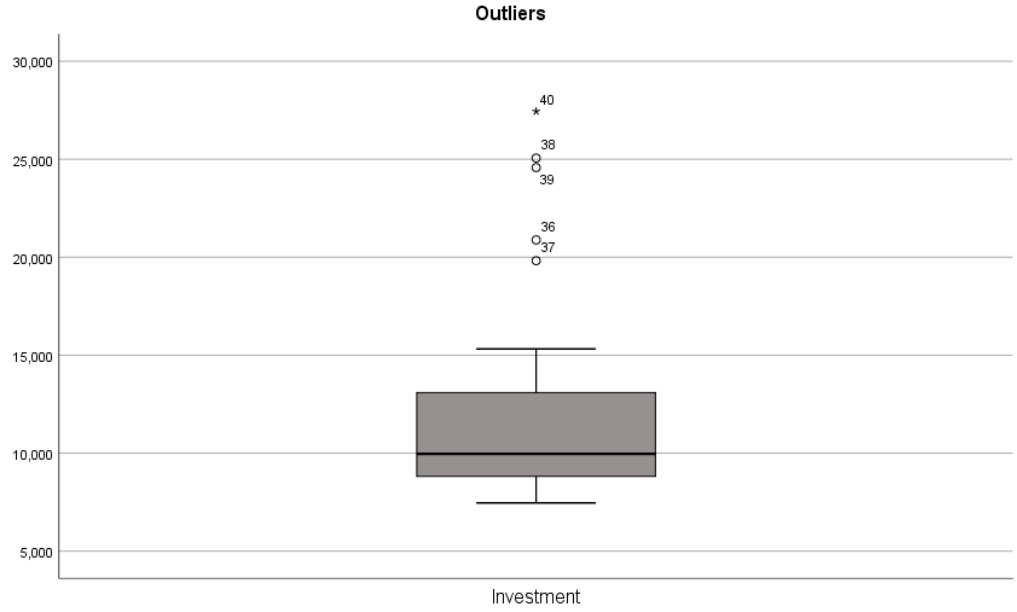
Table 8 – Investment Test of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Investment	0.216	40	0.000	0.750	40	0.000

a. Lilliefors Significance Correction

Figure 4 – Investment Outliers



Government Expenditure

The average government expenditure was 6,801 million (SD = 61.211). The lowest government expenditure was 6,180 million and the highest government expenditure was 7,593 million. Government expenditure presented skewness of .412 (SE = .374) and kurtosis of -.882 (SE = .733) (See Table 9). Government expenditure was non-normally distributed (Sig. = .049) (See Table 10) and whiskers plots showed no presence of outliers (See Figure 5).

Table 9 – Government Expenditure Descriptive Statistics

Descriptives

			Statistic	Std. Error
Government_ Expenditure	Mean		6801.38	61.211
	95% Confidence Interval for Mean	Lower Bound	6677.56	
		Upper Bound	6925.19	
	5% Trimmed Mean		6794.92	
	Median		6705.00	
	Variance		149872.804	
	Std. Deviation		387.134	
	Minimum		6180	
	Maximum		7593	
	Range		1413	
	Interquartile Range		525	
	Skewness		0.412	0.374
	Kurtosis		-0.882	0.733

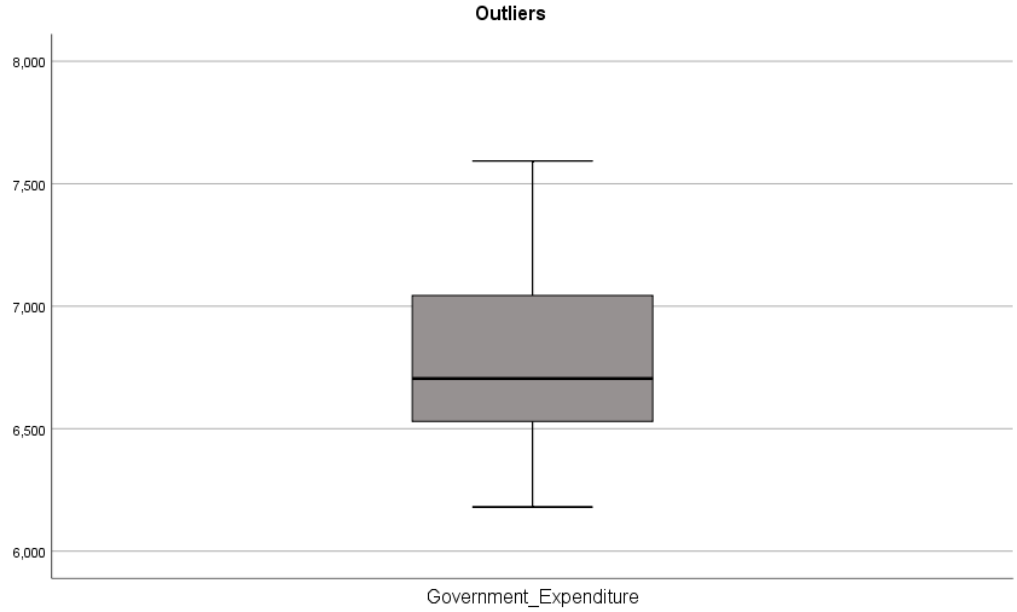
Table 10 – Government Expenditure Test of Normality

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Government_ Expenditure	0.117	40	0.178	0.944	40	0.049

a. Lilliefors Significance Correction

Figure 5 – Government Expenditure Outliers



Trade

The average trade was 36,410 thousand (SD = 2114.617). The lowest trade was 24,640 thousand and the highest trade was 45,055 thousand. Trade presented skewness of -.521 (SE = .687) and kurtosis of -.902 (SE = 1.334) (See Table 11). Trade was normally distributed (Sig. = .571) (See Table 12) and whiskers plots showed no presence of outliers (See Figure 6).

Table 11 – Trade Descriptive Statistics

Descriptives

			Statistic	Std. Error
Trade	Mean		36410.50	2114.617
	95% Confidence Interval for Mean	Lower Bound	31626.90	
		Upper Bound	41194.10	
	5% Trimmed Mean		36584.17	
	Median		38355.00	
	Variance		44716037.389	
	Std. Deviation		6687.005	
	Minimum		24640	
	Maximum		45055	
	Range		20415	
	Interquartile Range		12110	
	Skewness		-0.521	0.687
	Kurtosis		-0.902	1.334

Table 12 – Trade Test of Normality

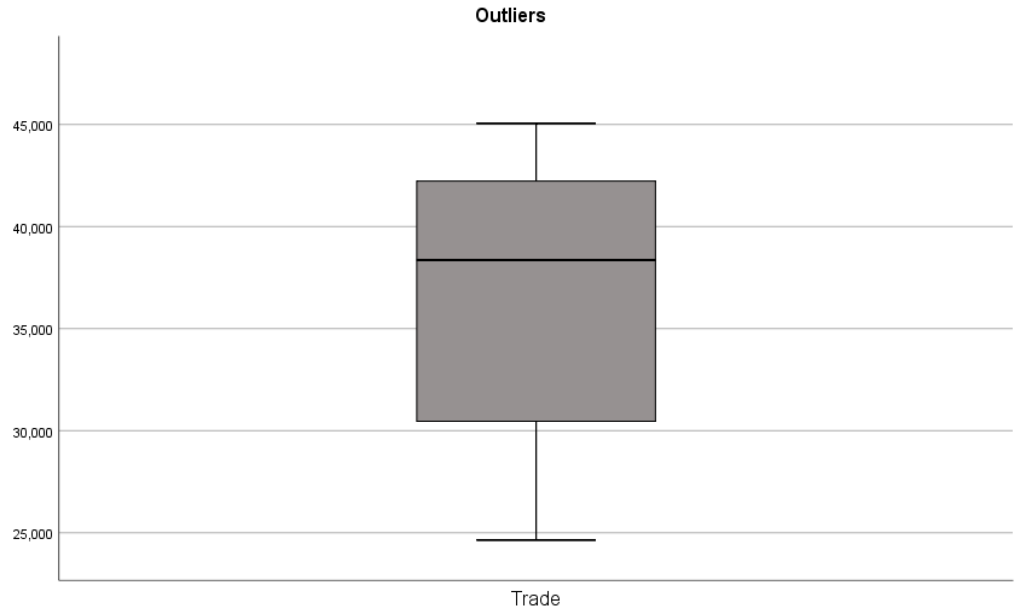
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Trade	0.172	10	.200*	0.942	10	0.571

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Figure 6 – Trade Outliers



MODEL 1

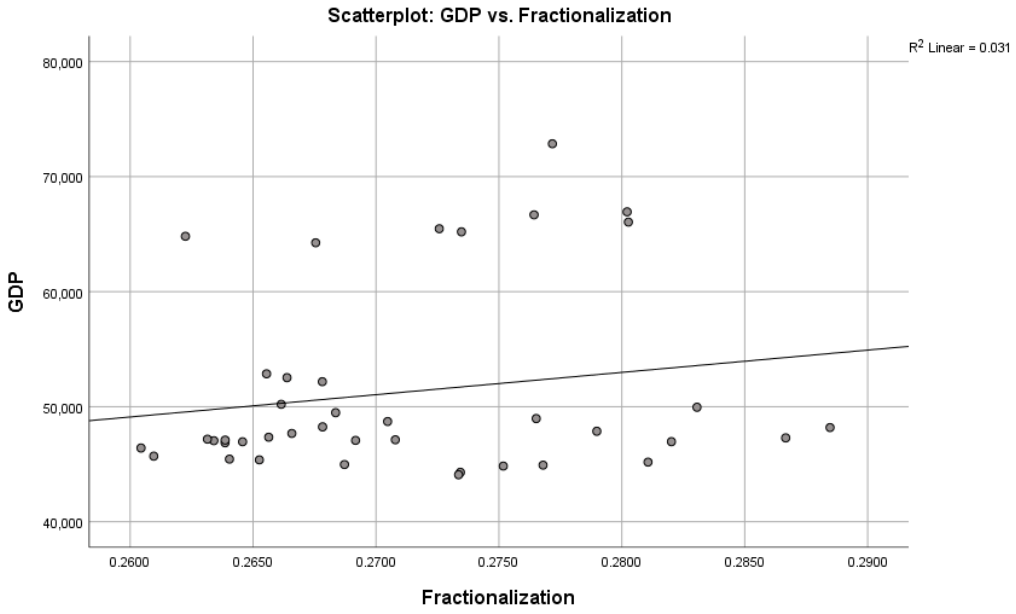
The following section includes the results for linearity, interactions between each independent variable and the dependent variable in Model 1, followed by a summary and results for model 1 multiple regression.

Linearity and interaction between variables

GDP vs Fractionalization

A graphical representation suggests the presence of a weak, elusive, non-linear relationship between GDP and fractionalization (See Figure 7).

Figure 7 – GDP vs. Fractionalization



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a no statistically significant correlation between GDP and fractionalization, r (38), = .17, p = .274 (See Table 13).

Table 13 – GDP and Fractionalization Correlation

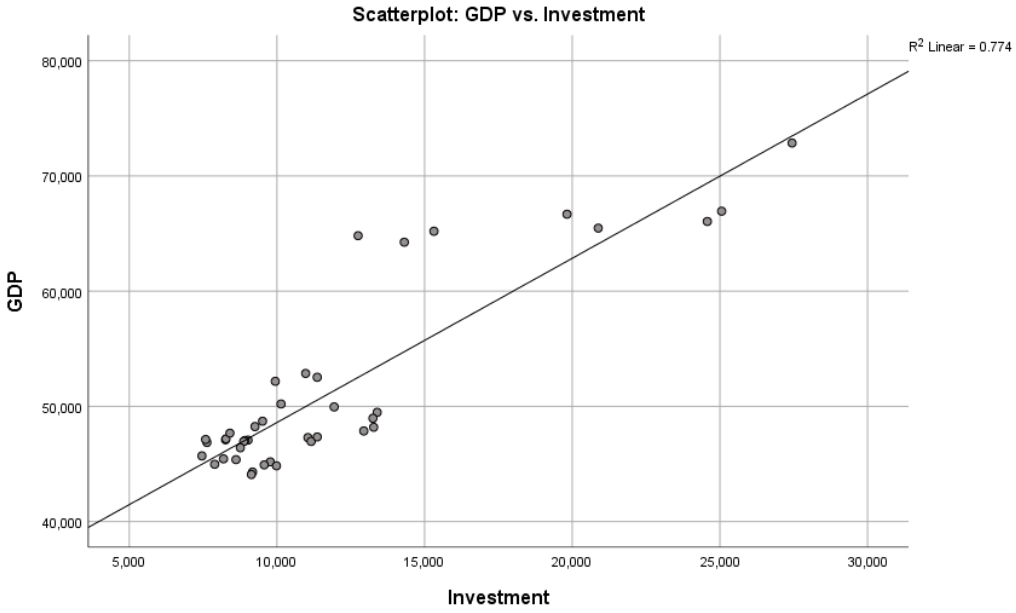
Correlations

		GDP	Fractionalization
GDP	Pearson Correlation	1	0.177
	Sig. (2-tailed)		0.274
	N	40	40
Fractionalization	Pearson Correlation	0.177	1
	Sig. (2-tailed)	0.274	
	N	40	40

GDP vs Investment

A graphical representation suggests the presence of a strong, positive, linear association between GDP and investment (See Figure 8).

Figure 8 – GDP vs. Investment



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a statistically significant, strong positive correlation between GDP and investment, r (38), = .88, p < .0005 (See Table 14).

Table 14 – GDP and Investment Correlation

Correlations

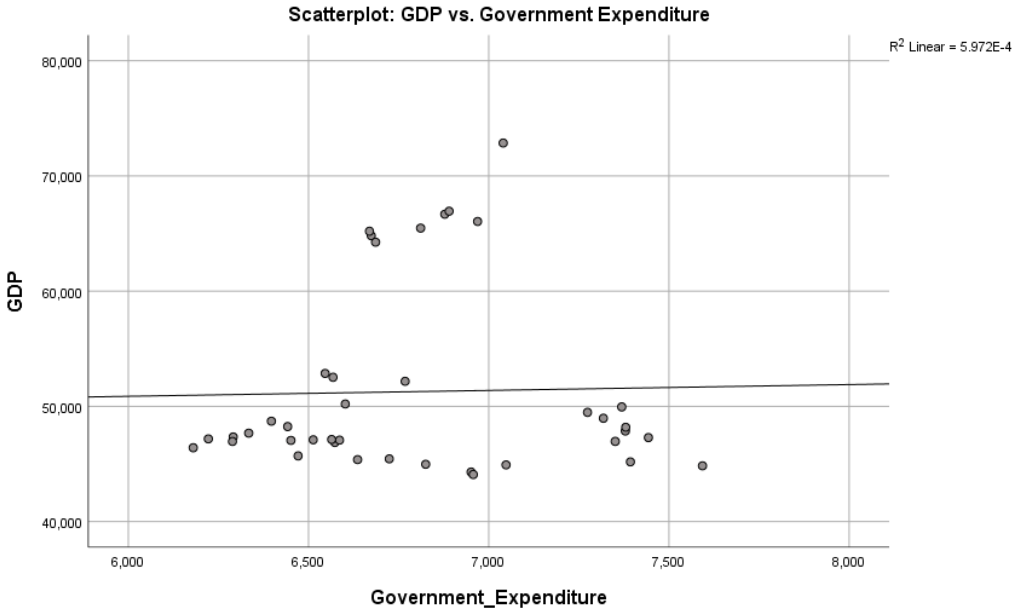
		GDP	Investment
GDP	Pearson Correlation	1	.880**
	Sig. (2-tailed)		0.000
	N	40	40
Investment	Pearson Correlation	.880**	1
	Sig. (2-tailed)	0.000	
	N	40	40

**. Correlation is significant at the 0.01 level (2-tailed).

GDP vs Government Expenditure

A graphical representation suggests the presence of a weak, flat, non-linear relationship between GDP and government expenditure (See Figure 9).

Figure 9 – GDP vs. Government Expenditure



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a no statistically significant correlation between GDP and government expenditure, r (38), = .02, p = .881 (See Table 15).

Table 15 – GDP and Government Expenditure Correlation

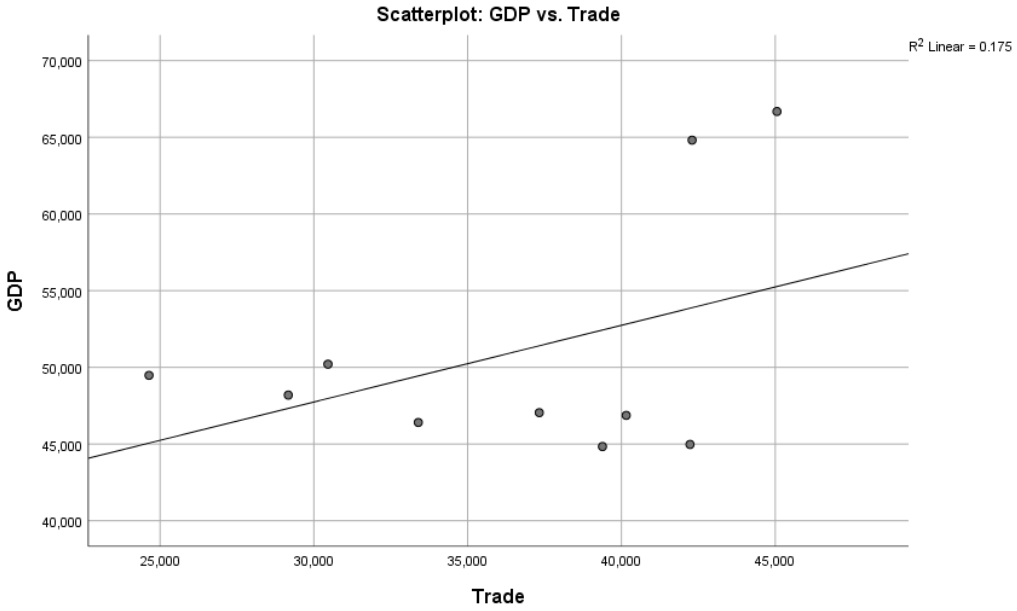
Correlations

		GDP	Government_ Expenditure
GDP	Pearson Correlation	1	0.024
	Sig. (2-tailed)		0.881
	N	40	40
Government_ Expenditure	Pearson Correlation	0.024	1
	Sig. (2-tailed)	0.881	
	N	40	40

GDP vs Trade

A graphical representation suggests the presence of a weak, elusive, non-linear relationship between GDP and trade (See Figure 10).

Figure 10 – GDP vs. Trade



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a no statistically significant correlation between GDP and trade, r (38), = .41, p = .229 (See Table 16).

Table 16 – GDP and Trade Correlation

Correlations

		GDP	Trade
GDP	Pearson Correlation	1	0.418
	Sig. (2-tailed)		0.229
	N	40	10
Trade	Pearson Correlation	0.418	1
	Sig. (2-tailed)	0.229	
	N	10	10

Model 1: Summary of linearity and interaction between variables

Linearity and bivariate correlation results fail to report the expected significant positive linear association between GDP and fractionalization. Instead, results indicate a weak, elusive, non-linear relationship between GDP and fractionalization.

Linearity and bivariate correlation results indicate a strong, positive, linear association between GDP and investment. As investment increases, GDP also increases.

Linearity and bivariate correlation results indicate a weak, flat, non-linear relationship between GDP and government expenditure. This result implies no correlation between GDP and government expenditure. The presence of outliers and the fact that GDP is an overestimated indicator of the Irish economy due to globalization effects, could have contributed to this result.

Linearity and bivariate correlation results fail to report the expected significant positive linear association between GDP and trade. Instead, results indicate a weak, elusive, non-linear relationship between GDP and trade. This result implies no correlation between GDP and trade, however the presence of outliers possibly affected the overall data distribution.

Model 1: Multiple Regression

A multiple regression was run to predict GDP from fractionalization, investment, government expenditure, and trade. Linearity was assessed through correlation coefficients (See Appendix 1A) and scatterplots (See Appendix 1C). Independence of residuals was identified by a Durbin-Watson statistic of 2,146 (See Appendix 2A). Homoscedasticity was evaluated by visual inspection of a plot of studentized residuals versus unstandardized predicted values (See Appendix 2B). No evidence of multicollinearity was found, as tolerance values are greater than 0.1(See Appendix 2C). The assumption of normality was verified by a Q-Q Plot (See Appendix 4) (Laerd Statistics, 2019). A significant regression equation was found F (4, 5) = 8.857, p < .017, with an R^2 of .876. Model 1 predicted that GDP is equal to 228.690 – 1.750 (Fractionalization) + .567 (Investment) – .230 (Government Expenditure) + .161 (Trade), where Fractionalization is measured in units (between 0 and 1), Investment is measured in millions (Euro), Government Expenditure is measured in millions (Euro), and Trade is measured in millions (Euro). GDP decreased 1750 thousand for every unit of Fractionalization, increased 567 thousand for every million of Investment, decreased 230 thousand for every million of Government Expenditure, and increased 161 thousand for every million of Trade. Only investment was a significant predictor of GDP, t = 5.257 and p = .003 (See Appendix 2C) (Cronk, 2012). For regression coefficients and standard errors, see Table 17.

Table 17 – Multiple Regression Model 1

Model 1: Summary of Multiple Regression Analysis

Variable	B	SE_B	β
GDP	228,690	99,734	
Fractionalization	-1.750	1.344	-0.345
Investment	0.567	0.108	0.969
Government Expenditure	-0.230	0.649	-0.087
Trade	0.161	0.097	0.270

Note: *p < .05; *B* = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficient.

MODEL 2

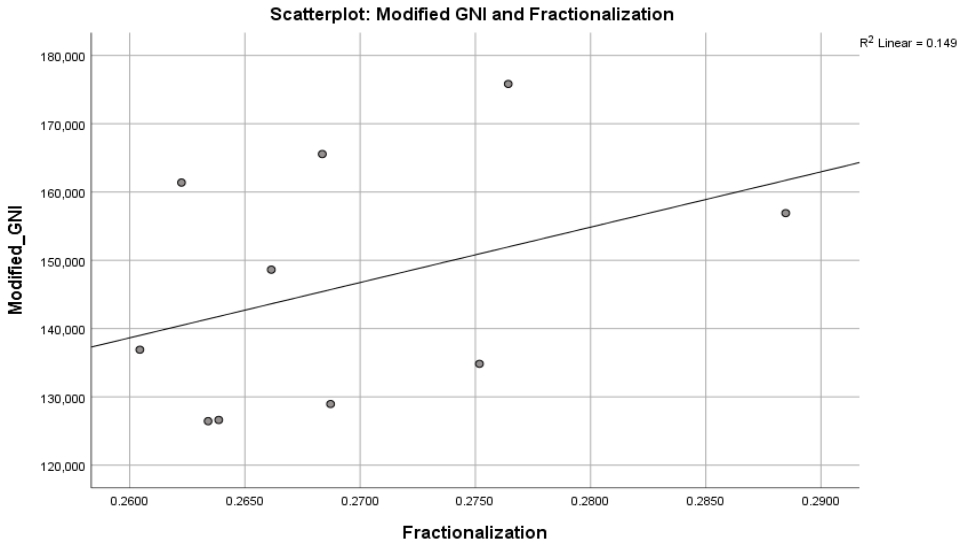
The following section includes the results for linearity, interactions between each independent variable and the dependent variable in Model 2, followed by a summary and results for model 2 multiple regression.

Linearity and interaction between variables

Modified GNI vs Fractionalization

A graphical representation suggests the presence of a weak, elusive, non-linear relationship between Modified GNI and fractionalization (See Figure 11).

Figure 11 – Modified GNI vs. Fractionalization



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a no statistically significant correlation between Modified GNI and fractionalization, r (38), = .38, p = .270 (See Table 18).

Table 18 – Modified GNI and Fractionalization Correlation

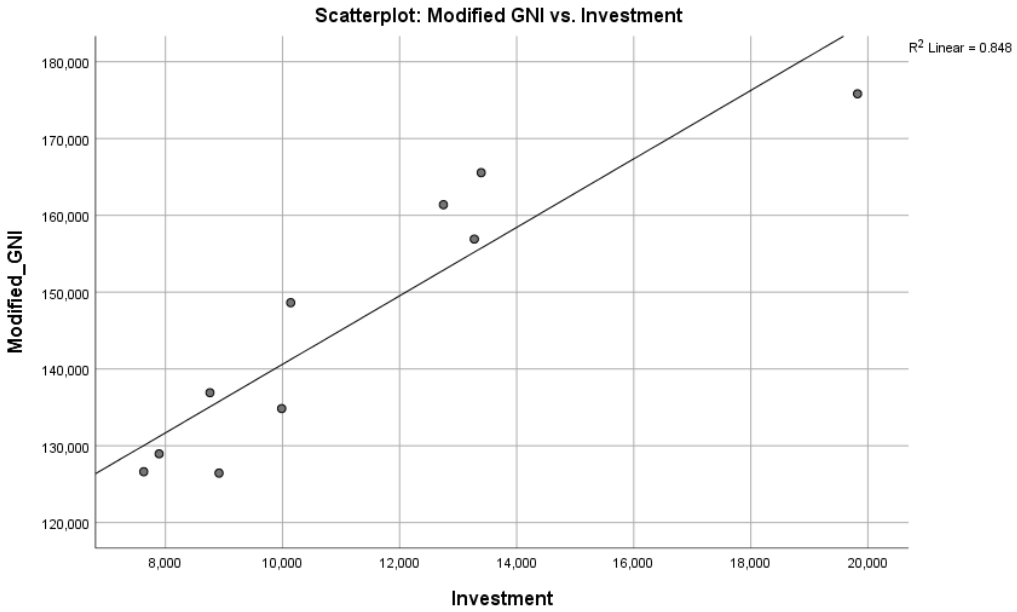
Correlations

		Modified_GNI	Fractionalization
Modified_GNI	Pearson Correlation	1	0.386
	Sig. (2-tailed)		0.270
	N	10	10
Fractionalization	Pearson Correlation	0.386	1
	Sig. (2-tailed)	0.270	
	N	10	40

Modified GNI vs Investment

A graphical representation suggests the presence of a very strong, positive, linear association between Modified GNI and investment (See Figure 12).

Figure 12 – Modified GNI vs. Investment



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a statistically significant, very strong positive correlation between Modified GNI and investment, r (38), = .92, p < .0005 (See Table 19).

Table 19 – Modified GNI and Investment Correlation

Correlations

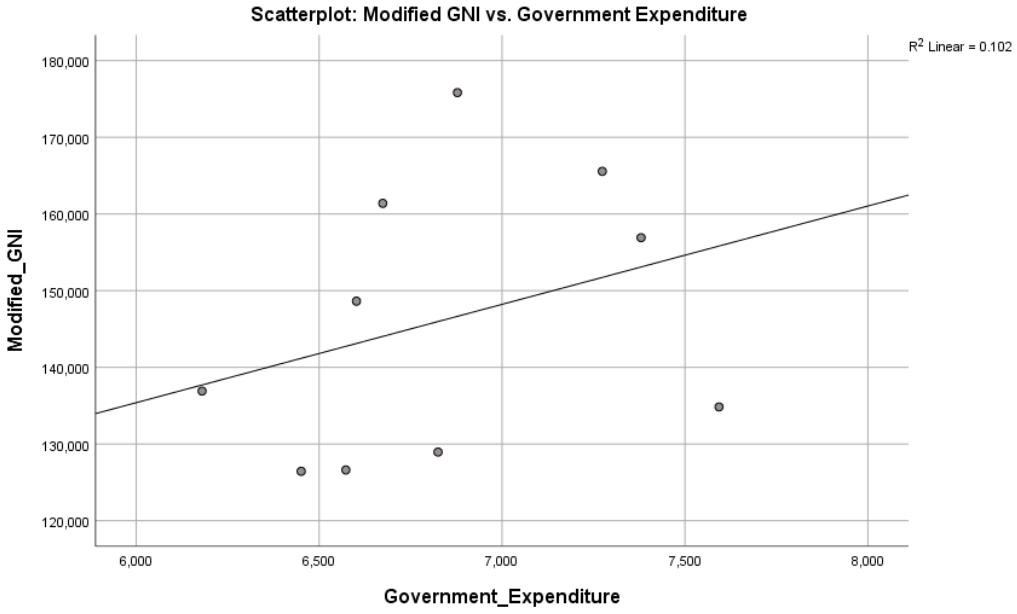
		Modified_GNI	Investment
Modified_GNI	Pearson Correlation	1	.921**
	Sig. (2-tailed)		0.000
	N	10	10
Investment	Pearson Correlation	.921**	1
	Sig. (2-tailed)	0.000	
	N	10	40

**. Correlation is significant at the 0.01 level (2-tailed).

Modified GNI vs Government Expenditure

A graphical representation suggests the presence of a weak, elusive, non-linear relationship between Modified GNI and government expenditure (See Figure 13).

Figure 13 – Modified GNI vs. Government Expenditure



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a no statistically significant

correlation between Modified GNI and government expenditure, r (38), = .31, p = .369 (See Table 20).

Table 20 - Modified GNI and Government Expenditure Correlation

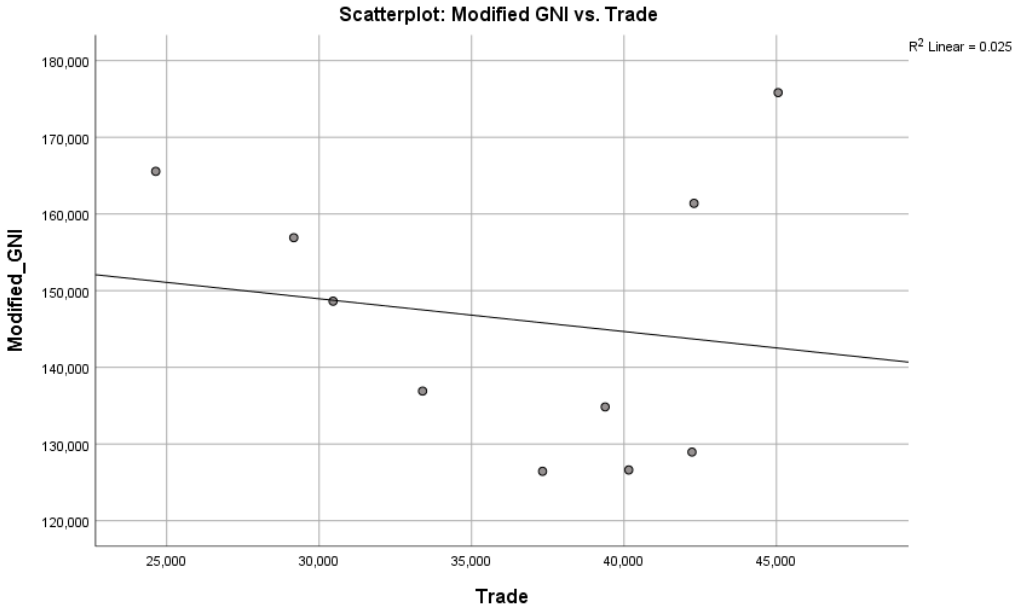
Correlations

		Modified_GNI	Government_Expenditure
Modified_GNI	Pearson Correlation	1	0.319
	Sig. (2-tailed)		0.369
	N	10	10
Government_Expenditure	Pearson Correlation	0.319	1
	Sig. (2-tailed)	0.369	
	N	10	40

Modified GNI vs Trade

A graphical representation suggests the presence of a weak, albeit negative, non-linear relationship between Modified GNI and trade (See Figure 14).

Figure 14 – Modified GNI vs. Trade



A Bivariate Person Correlation was run to assess the strength and direction of the relationship between the two variables. There was a no statistically significant correlation between Modified GNI and trade, r (38), = -.15, p = .660 (See Table 21).

Table 21 – Modified GNI and Trade Correlation

Correlations

		Modified_GNI	Trade
Modified_GNI	Pearson Correlation	1	-0.159
	Sig. (2-tailed)		0.660
	N	10	10
Trade	Pearson Correlation	-0.159	1
	Sig. (2-tailed)	0.660	
	N	10	10

Model 2: Summary of linearity and interaction between variables

Linearity and bivariate correlation results indicate a weak, elusive, non-linear relationship between Modified GNI and fractionalization. This result is contrary to the expected positive linear relationship outlined by this study's hypothesis. This result implies no correlation between Modified GNI and fractionalization.

Linearity and bivariate correlation results indicate a very strong, positive, linear association between Modified GNI and investment. As investment increases, Modified GNI also increases.

Linearity and bivariate correlation results indicate a weak, elusive, non-linear relationship between Modified GNI and government expenditure. This result implies no correlation between GDP and government expenditure. Just like in Model 1, the presence of outliers and the overestimation of the size of the Irish economy, which is reflected on GDP data, might have influenced the relationship between the two variables.

Linearity and bivariate correlation results indicate a weak, albeit negative, non-linear relationship between Modified GNI and trade. This implies no correlation between GDP and trade, due to the presence of outliers combined with small data observations to infer on the relationship between the two variables.

Model 2: Multiple Regression

A multiple regression was run to predict Modified GNI from fractionalization, investment, government expenditure, and trade. Linearity was assessed through correlation coefficients (See Appendix 1B) and scatterplots (See Appendix 1D). Independence of residuals was identified by a Durbin-Watson statistic result of 2,121 (See Appendix 3A). Homoscedasticity was evaluated by visual inspection of a plot of studentized residuals versus unstandardized predicted values (See Appendix 3B). No evidence of multicollinearity was found, as tolerance values are greater than 0.1(See Appendix 3C). The assumption of normality was verified by a Q-Q Plot (See Appendix 4) (Laerd Statistics, 2019). A significant regression equation was found F (4, 5) = 15.466, p < .005, with an R^2 of .925. Model 2 predicted that Modified GNI is equal to 133.798 – .811 (Fractionalization) + .401 (Investment) + .184 (Government Expenditure) - .103 (Trade), where Fractionalization is measured in units (between 0 and 1), Investment is measured in millions (Euro), Government Expenditure is measured in millions (Euro), and Trade is measured in millions (Euro). Modified GNI decreased 811 thousand for every unit of Fractionalization, increased 401 thousand for every million of Investment, increased 184 thousand for every million of Government Expenditure, and decreased 103 thousand for every million of Trade. Only investment was a significant predictor of Modified GNI, t = 7.149 and p = .001 (See Appendix 3C) (Cronk, 2012). For regression coefficients and standard errors, see Table 22.

Table 22 - Multiple Regression Model 2

Model 2: Summary of Multiple Regression Analysis

Variable	B	SE_B	β
Modified GNI	133,798	51,904	
Fractionalization	-0.811	0.699	-0.239
Investment	0.401	0.056	1.025
Government Expenditure	0.184	0.338	0.104
Trade	-0.103	0.051	-0.257

Note: *p < .05; *B* = unstandardized regression coefficient; SE_B = standard error of the coefficient; β = standardized coefficient.

Section E
DISCUSSION

Model 1

In model 1, the multiple regression coefficients show that investment and trade are positively correlated with GDP, whereas fractionalization and government expenditure are negatively correlated with GDP. All the explanatory variables together account for 88 percent of the variation in GDP and it is statistically significant, and represents how good model 1 is in totality.

Results for model 1 do not support the hypothesis set out for this study, as fractionalization revealed a negative relationship with economic growth. Although results for model 1 did not meet the hypothesis for this study, it is consistent with past literature.

The positive relationship between GDP with investment and trade is in line with a previous study by Lee et al (2019), who showed that investment, trade openness and cross-country relations positively contribute to economic growth. In relation to the negative relationship between GDP with fractionalization, results for this study are in line with Mauro (1995), Alesina et al. (2003), and Reynal-Querol (2005b), who showed that ethnic diversity negatively affects economic growth.

From a standardize perspective, changing investment and trade by 1 standard deviation will increase GDP by .96 and .27, respectively. Whereas, changing fractionalization and government expenditure by 1 standard deviation will reduce GDP by .34 and .08, respectively.

Event though, in totality the variables significantly contribute to the model, individually some of them perform better. When analysing the multiple regression coefficients individually, which is the individual contribution of each variable to the model, only trade was considered a statistically significant predictor of GDP.

Model 2

In model 2, the multiple regression coefficients show that investment and government expenditure are positively correlated with Modified GNI, whereas

fractionalization and trade are negatively correlated with Modified GNI. All the explanatory variables together account for 93 percent of the variation in Modified GNI and it is statistically significant. Therefore, this proves that model 2 is statistically superior than model 1.

Like model 1, results for model 2 also fail to report the expected positive association expected between ethnic diversity and economic growth. As this is likely to be the first time that Modified GNI was used to analyse ethnic diversity effects on economic growth, results are not comparable with past literature. However, Modified GNI proved to be a better measure to analyse economic growth in Ireland, as together the explanatory variables account for 93 percent of the variation in Modified GNI, whereas in model 1 the same explanatory variables account for 88 percent of the variation in GDP.

From a standardize perspective, changing investment and government expenditure by 1 standard deviation will increase Modified GNI by 1.02 and .10, respectively. Whereas, changing fractionalization and trade by 1 standard deviation will reduce Modified GNI by .23 and .25, respectively.

Even though, in totality the variables significantly contribute to the model, individually a number of them perform better. When analysing the multiple regression coefficients individually, which is the individual contribution of each variable to the model, only trade was considered a statistically significant predictor of Modified GNI.

Model 1 and 2

As previously identified by Vandenbussche (2004; cited in Bove and Elia, 2017) after changes in diversity levels, GDP growth in developed countries is less noticeable, due to developed countries being already closer to the technological frontier. This is in line with results for this study, as the relationship between fractionalization and economic growth (measured though GDP and Modified GNI) is negative. The fact that average fractionalization between 2007 and 2016 was .2712 and it did not change much may prove that for ethnic diversity levels to produce a significant impact in the Irish economy, changes in diversity levels should be higher.

Results for both models are affected by the small number of observations, which underpowered the multiple regression results. Data on movement of people and

nationality that satisfied the multiple regression assumptions proved to be difficult to find. Additionally, fractionalization in the long term did not changed much, with a minimum of .2604 and maximum of .2885 (measured between 0 and 1).

Section F
CONCLUSION

The role and impact of ethnic diversity on a country's economic outcomes has shown to be an important and constant topic of interest. Past research has highlighted the positives and negatives impacts of ethnic diversity on personal, group, societal, organisational, national, cross-country and global outcomes. In this study, ethnic diversity in the Irish workforce was measured by the fractionalization index and later combined with key economic indicators, such as investment, government expenditure and trade, which serve as explanatory variables to predict economic growth in Ireland, measured by GDP and Modified GNI.

Results suggest that in Ireland ethnic diversity has a negative impact on economic growth, when accounting for fractionalization levels in the workforce. Even though results are not aligned with the hypothesis initially set out for this research, the combination of the independent variables (fractionalization, investment, government expenditure and trade) explains the variation in GDP (Model 1) and Modified GNI (Model 2) by 88 percent and 93 percent, respectively. Both models are significant. Instead of limiting this study to the analysis of impacts on GDP, this research introduced a model that substitutes GDP by Modified GNI, an approach that is more compatible to the size of the Irish economy. This approach was proven effective, as the percentage of the variance in economic growth increased from 88 percent to 93 percent, and significance also improved from .017 to less than .005.

In relation to ethnic diversity, results for both models suggest that fractionalization alone has a negative impact on the Irish economy. These results imply that as ethnic diversity in the workforce increases, economic growth in Ireland decreases, and vice versa. However, it is important to note that the small number of observations in this study and small changes in the levels of fractionalization in the workforce between 2007 and 2016, may have contributed to the negative outcome.

This research has also revealed important gaps in knowledge that require additional investigation. For future research on this topic, it is recommended that analysis include data on human capital to better understand the effects of ethnic diversity in the workforce. Additionally, a larger sample and more explanatory variables would make a stronger multiple regression analysis. Lastly, given that this

study has shown that long-term fractionalization did not contribute significantly to positive economic outcomes for the Irish economy as a whole, future research should have a more narrow focus on the economic outcomes for a specific sector of the economy.

BIBLIOGRAPHY

Alesina, A. Devleeschauwer, A. Easterly, W. Kurlat, S. and Wacziarg, R. (2003) 'Fractionalization', Journal of Economic Growth, 8(2), pp. 155-194. doi: 10.1023/A:1024471506938.

Alesina, A. and La Ferrara, E. (2005) 'Ethnic diversity and economic performance', *Journal of Economic Literature*, 43(3), pp. 762-800. doi: 10.1257/002205105774431243.

Alesina, A. Michalopoulos, S. and Papaioannou, E. (2016a) *Ethnic inequality*. Available at: https://scholar.harvard.edu/files/alesina/files/ethnic_inequality_dec_2014.pdf [Accessed 25 November 2018].

Alesina, A., Harnoss, J. and Rapoport, H. (2016b) 'Birthplace diversity and economic prosperity', *Journal of Economic Growth*, 21(2), pp. 101-138, Springer Science. doi: 10.1007/s10887-016-9127-6.

Alesina, A. and Zhuravskaya, E. (2018) *Segregation and the quality of government in a cross-section of countries*. Available at: https://www.nber.org/papers/w14316 [Accessed 11 February 2019].

Artuc, E., Docquier, F., Caglar, O. and Parsons, C. (2015) 'A Global Assessment of Human Capital Mobility: The role of Non-OECD Destinations', *World Development*, 65, pp. 6-26, Science Direct. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0305750X1400103X?via%3Dihub [Accessed 11 January 2019].

Bleaney, M and Dimico, A. (2017) 'Ethnic diversity and conflict', *Journal of Institutional Economics*, 13(2), pp. 357-378, Cambridge University Press. doi: 10.1017/S1744137416000369.

Bove, V. and Elia, L. (2017) 'Migration, Diversity, and Economic Growth', *World Development*, vol. 89, pp. 227-239, Science Direct. doi: 10.1016/j.worlddev.2016.08.012.

Campos, N. and Kuzeyev, V. (2007) 'On the Dynamics of Ethnic Fractionalization', *American Journal of Political Science*, 51(3), pp. 620-639, Wiley. doi: 10.1111/j.1540-5907.2007.00271.x.

Chakravarty, S. and Maharaj, B. (2011) 'Measuring ethnic polarization', *Social Choice and Welfare*, 37, pp. 431-452, Springer. doi: 10.1007/s00355-010-0498-x.

Cronk, B. C. (2012) *How to use SPSS: a Step-by-step Guide to Analysis and Interpretation.* 7th edn. Los Angeles: Pyrczak Publishing.

CSO (2007) *Quarterly National Household Survey: Questionnaire Manual*. Available at: https://www.cso.ie/en/media/csoie/qnhs/documents/QNHS_Manual_2007.pdf [Accessed 23 June 2019].

CSO (2017) *National Income and Expenditure 2017*. Available at: https://www.cso.ie/en/releasesandpublications/ep/p-nie/nie2017/mgni/ [Accessed 23 June 2019].

CSO (2018) *Census of population 2016 – Profile 8 Irish Travellers, Ethnicity and Religion.* Available at: https://www.cso.ie/en/releasesandpublications/ep/p-cp8iter/p8iter/p8e/ [Accessed 24 November 2018].

CSO (2018a) *Balance of payments.* Available at: https://www.cso.ie/indicators/default.aspx?id=3BPQ15 [Accessed 26 April 2019].

CSO (2018b) *Standard Report on Methods and Quality for National Accounts results compilation*. Available at: https://www.cso.ie/en/media/csoie/methods/nationalincomeandexpenditureannualresults/National_Accounts_Standard_Report_on_Quality_July_2018.pdf [Accessed 28 April 2019].

CSO (2018c) *Quarterly National Household Survey.* Available at: https://www.cso.ie/en/methods/surveybackgroundnotes/quarterlynationalhouseholdsurvey/ [Accessed 29 April 2019].

CSO (2019) *Information Notice – Modified Gross National Income at Current and Constant Prices.* Available at: https://www.cso.ie/en/releasesandpublications/in/nie/in-mgnicp/ [Accessed 26 April 2019].

Easterly, W. and Levine, R. (1997) 'Africa's Growth Tragedy: Policies and Ethnic Divisions', Quarterly Journal of Economics, 112(4), pp. 1203-1250. doi: https://doi.org/10.1162/003355300555466.

Esteban, J. M. and Ray, D. (1994) 'On the Measurement of Polarization', *Econometrica,* 62(4), pp. 819 – 851. Available at: http://www.jstor.org/stable/2951734 [Accessed 23 November 2018].

Esteban, J. M. and Ray, D. (2008) 'Polarization, Fractionalization and Conflict', *Journal of Peace Research,* 45(2), pp. 163-182, Sage. doi: 10.1177/0022343307087175.

Esteban, J. M. and Ray, D. (2012) 'Ethnicity and Conflict: An Empirical Study', *American Economic Review,* 102(4), pp. 1310 – 1342, American Economic Association. doi: 10.1257/aer.102.4.1310.

Fearon, J. D. (2003) 'Ethnic and Cultural Diversity by Country', *Journal of Economic Growth,* 8(2), pp. 195-222, Springer. Available at: https://www.jstor.org/stable/40215943 [Accessed 24 November 2018].

Gisselquist, R. Leiderer, S. and Nino-Zarazua, M. (2016) 'Ethnic Heterogeneity and Public Goods Provision in Zambia: Evidence of a Subnational Diversity Dividend', *World Development,* 78, pp. 308-323, Science Direct. Available at:

https://www.sciencedirect.com/science/article/pii/S0305750X15002405 [Accessed 11 February 2019].

Horwitz, S. and Horwitz, I (2007) 'The Effects of Team Diversity on Team Outcomes: A Meta-Analytical Review of Team Demography', *Journal of Management*, 33(6), pp. 987-1015, Sage. doi: 10.1177/0149206307308587.

Lacroix, T. (2008) *Migration and Development Research Scoping Study*. Available at: https://halshs.archives-ouvertes.fr/halshs-00820370/document [Accessed 01 November 2018].

Laerd Statistics (2019) *Multiple Regression in SPSS Statistics.* Available at: https://statistics.laerd.com/premium/spss/mr/multiple-regression-in-spss.php [Accessed 05 May 2019].

Laitin, D. Posner, D. (2001) *The Implications of Constructivism for Constructing Ethnic Fractionalization Indices*. Available at: http://comparativenewsletter.com/files/archived_newsletters/2001_winter.pdf [Accessed 13 February 2019].

Lee, S., Lim, E. and Meng, Q. (2019) 'Ethnic Diversity and Economic Performance in China: The role of Education, FDI, and Trade', *Emerging Markets Finance & Trade*, 55(2), pp. 337-350, Routledge. doi: 10.1080/1540496X.2018.1429906.

Mankiw, N. G. and Taylor, M. P. (2017) *Economics.* 4th ed. London: Cengage Learning.

Mauro, P. (1995) 'Corruption and Growth', *The Quarterly Journal of Economics, 110*(3), pp. 681-712. Available at: https://www.jstor.org/stable/2946696 [Accessed 15 October 2018].

Montalvo, J. G. and Reynal-Querol, M. (2005a) 'Ethnic Polarization, Potential Conflict and Civil War', *American Economic Review*, 95(3), pp. 796 – 816, American Economic Association. doi: 10.1257/0002828054201468.

Montalvo, J. G. and Reynal-Querol, M. (2005b) 'Ethnic Diversity and Economic Development', *Journal of Development Economics*, 76(2), pp. 293 – 323, Elsevier. doi: https://doi.org/10.1016/j.jdeveco.2004.01.002.

Ottaviano, G and Peri, G. (2006) 'The economic value of cultural diversity: evidence from US cities', *Journal of Economic Geography*, 6(1), pp. 9-44, Oxford University Press. doi: 10.3386/w10904.

Posner, D. N. (2004) 'Measuring Ethnic Fractionalization in Africa', *American Journal of Political Science,* 48(4), pp. 849-863. doi: 10.1111/j.0092-5853.2004.00105.x.

Qadri, F. and Waheed, A. (2013) 'Human capital and economic growth: cross-country evidence from low-, middle- and high-income countries', *Progress in Development Studies,* 13(2), pp. 89-104, Sage. doi: 10.1177/1464993412466503.

Reynal-Querol, M (2012). 'Ethnicity, Political Systems, and Civil Wars', *Journal of Conflict Resolution,* 46(1), pp. 29-54, Sage. doi: 10.1177/0022002702046001003.

Scully, G. (1995) *Multiculturalism and Economic Growth*, National Center for Policy Analysis. Available at: http://www.ncpathinktank.org/pdfs/st196.pdf [Accessed 28 October 2018].

Taylor, C. (2018) 'Ireland still popular for FDI as investors set to increase global spend', *The Irish Times*, 2nd May. Available at: https://www.irishtimes.com/business/economy/ireland-still-popular-for-fdi-as-investors-set-to-increase-global-spend-1.3481583 [Accessed 14 December 2018].

The Economic and Social Research Institute (2018) *Economic growth strong in 2018 and 2019*. Available at: https://www.esri.ie/news/economic-growth-strong-in-2018-and-2019/ [Accessed 14 December2018].

United Nations (2003) *Ethnicity: A Review of Data Collection and Dissemination.* Available at: https://unstats.un.org/unsd/demographic/sconcerns/popchar/ethnicitypaper.pdf [Accessed 20 November 2018].

APPENDIX

APPENDIX 1: Multiple Regression Assumptions

1A - Correlations Model 1

Correlations

		GDP	Fractionalization
GDP	Pearson Correlation	1	0.177
	Sig. (2-tailed)		0.274
	N	40	40
Fractionalization	Pearson Correlation	0.177	1
	Sig. (2-tailed)	0.274	
	N	40	40

Correlations

		GDP	Investment
GDP	Pearson Correlation	1	.880**
	Sig. (2-tailed)		0.000
	N	40	40
Investment	Pearson Correlation	.880**	1
	Sig. (2-tailed)	0.000	
	N	40	40

**. Correlation is significant at the 0.01 level (2-tailed).

Correlations

		GDP	Government_Expenditure
GDP	Pearson Correlation	1	0.024
	Sig. (2-tailed)		0.881
	N	40	40
Government_Expenditure	Pearson Correlation	0.024	1
	Sig. (2-tailed)	0.881	
	N	40	40

Correlations

		GDP	Trade
GDP	Pearson Correlation	1	0.418
	Sig. (2-tailed)		0.229
	N	40	10
Trade	Pearson Correlation	0.418	1
	Sig. (2-tailed)	0.229	
	N	10	10

1B - Correlations Model 2

Correlations

		Modified_GNI	Fractionalization
Modified_GNI	Pearson Correlation	1	0.386
	Sig. (2-tailed)		0.270
	N	10	10
Fractionalization	Pearson Correlation	0.386	1
	Sig. (2-tailed)	0.270	
	N	10	40

Correlations

		Modified_GNI	Investment
Modified_GNI	Pearson Correlation	1	.921**
	Sig. (2-tailed)		0.000
	N	10	10
Investment	Pearson Correlation	.921**	1
	Sig. (2-tailed)	0.000	
	N	10	40

**. Correlation is significant at the 0.01 level (2-tailed).

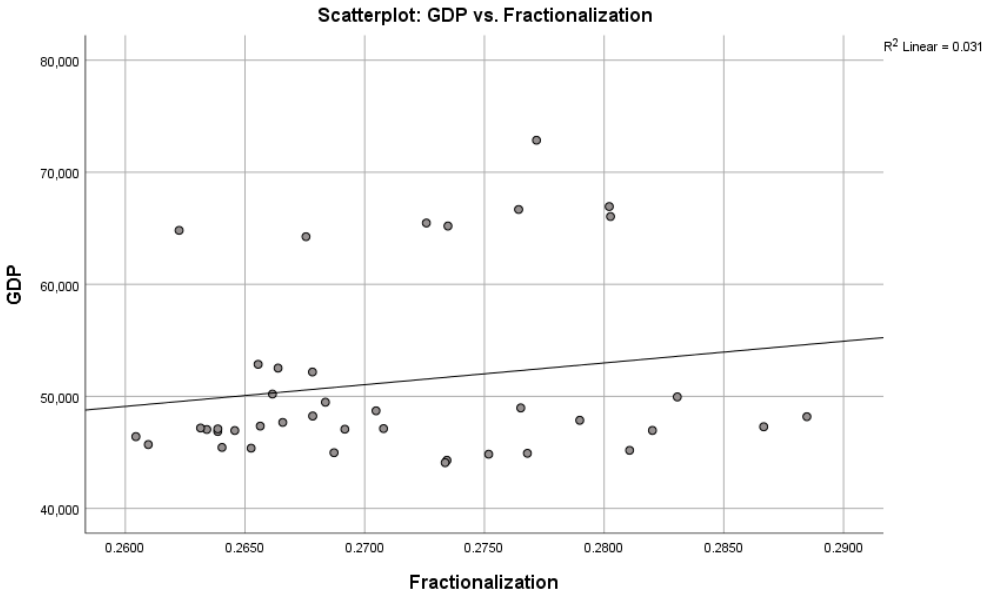
Correlations

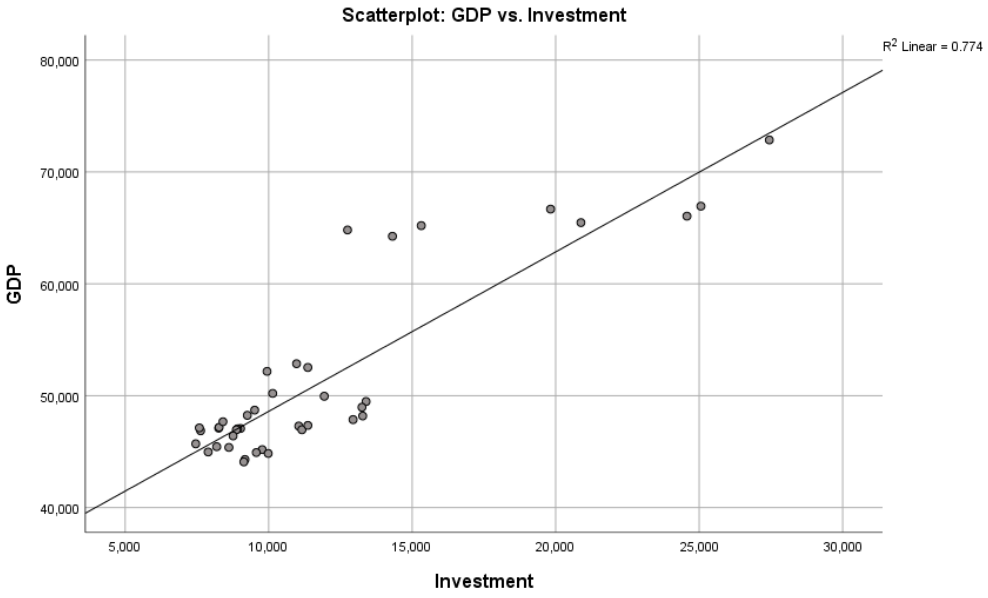
		Modified_GNI	Government_Expenditure
Modified_GNI	Pearson Correlation	1	0.319
	Sig. (2-tailed)		0.369
	N	10	10
Government_Expenditure	Pearson Correlation	0.319	1
	Sig. (2-tailed)	0.369	
	N	10	40

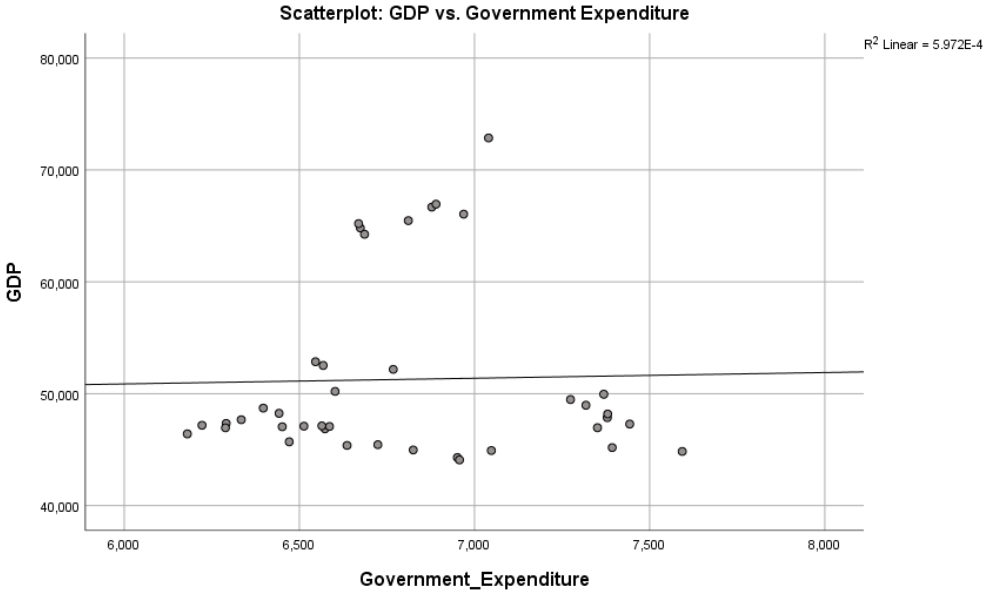
Correlations

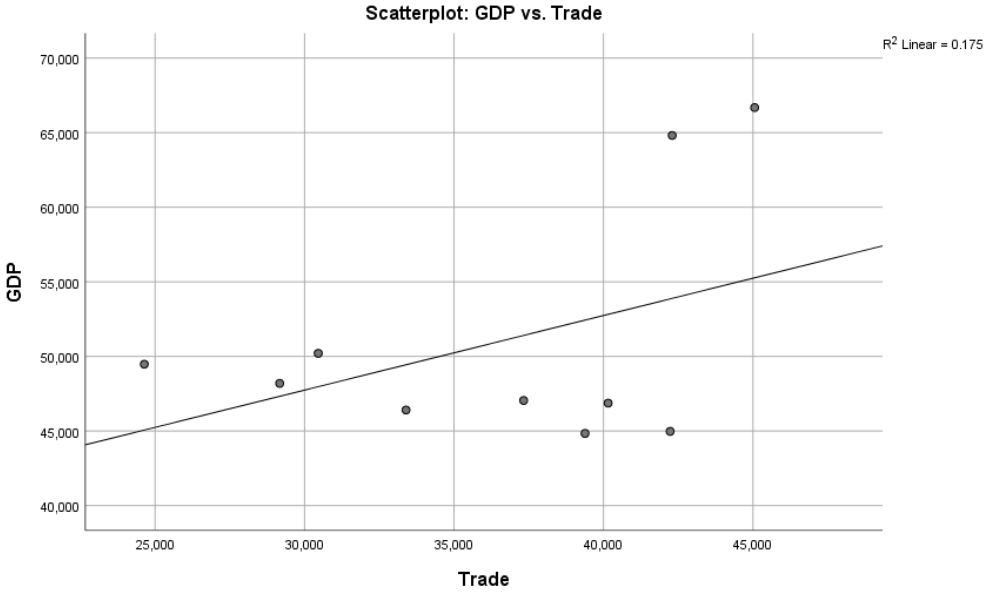
		Modified_GNI	Trade
Modified_GNI	Pearson Correlation	1	-0.159
	Sig. (2-tailed)		0.660
	N	10	10
Trade	Pearson Correlation	-0.159	1
	Sig. (2-tailed)	0.660	
	N	10	10

1C - Linearity Model 1

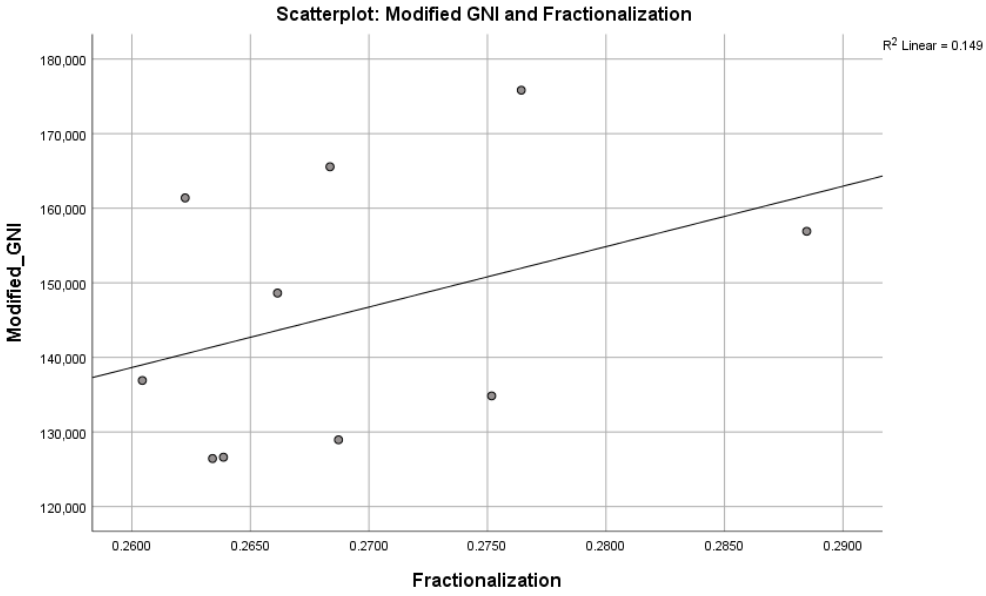


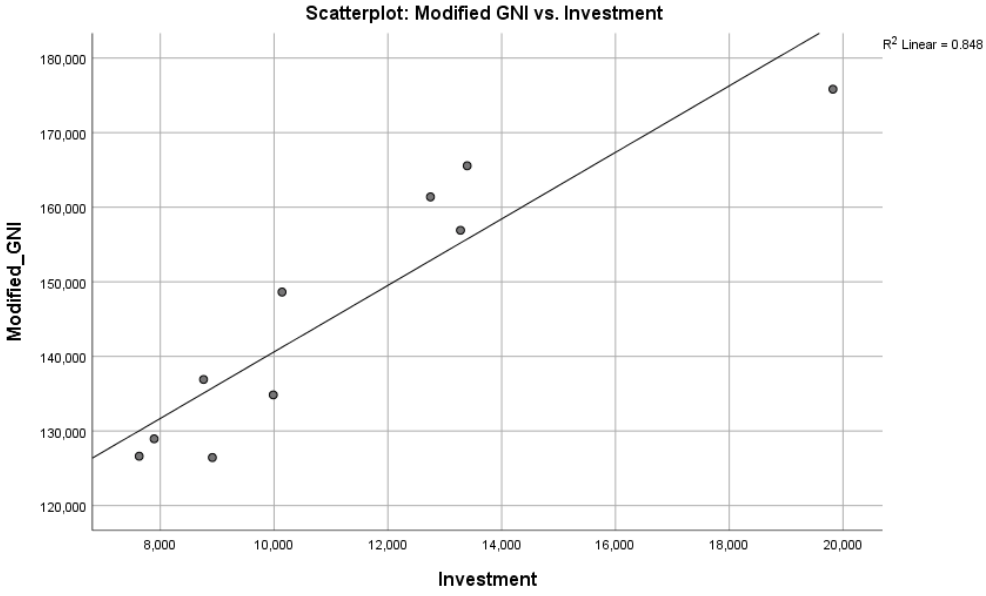


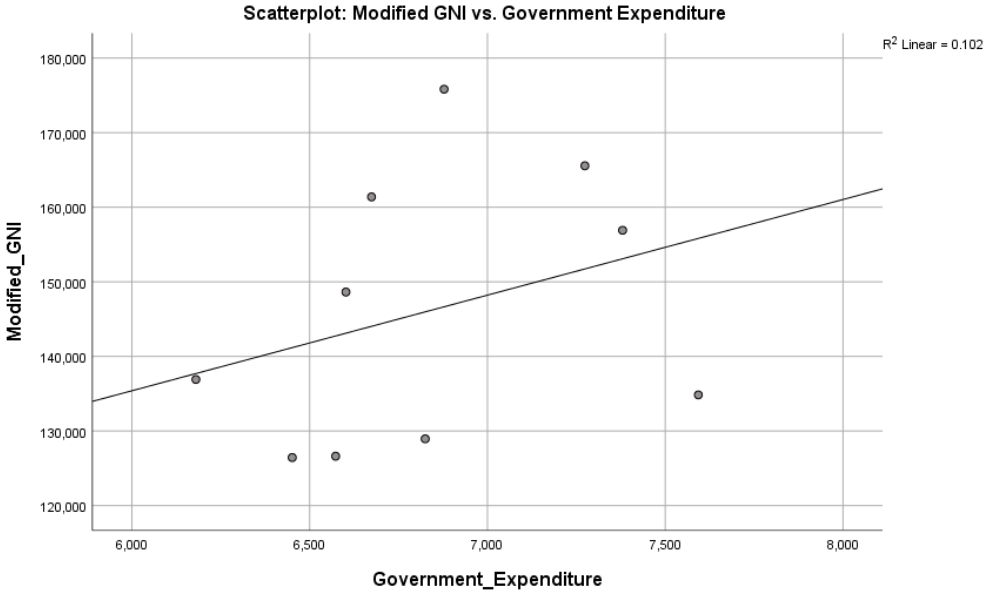

Scatterplot: GDP vs. Government Expenditure
R² Linear = 5.972E-4
GDP
80,000
70,000
60,000
50,000
40,000
6,000
6,500
7,000
7,500
8,000
Government_Expenditure

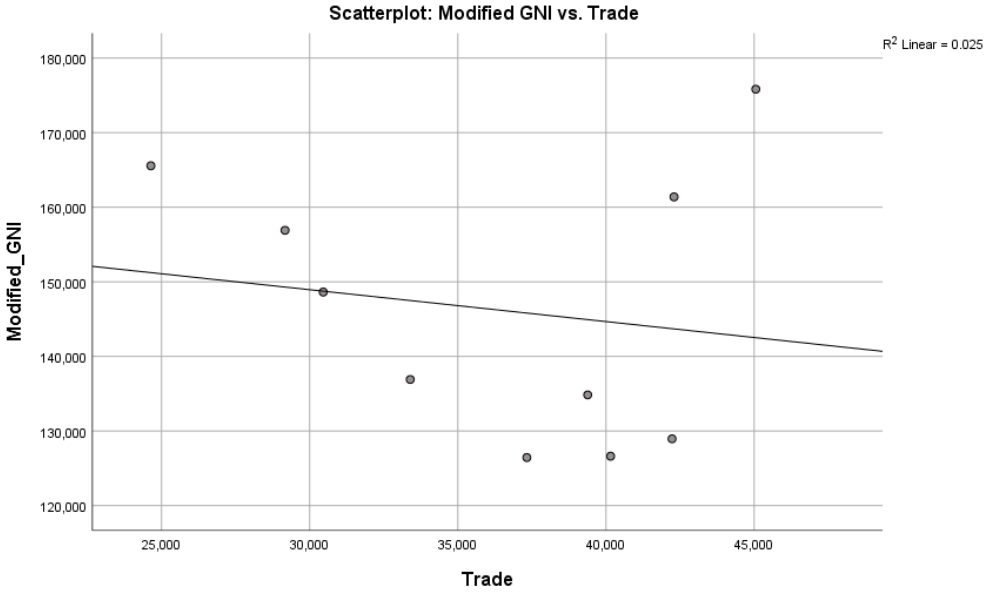

Scatterplot: GDP vs. Trade
R² Linear = 0.175
GDP
70,000
65,000
60,000
55,000
50,000
45,000
40,000
25,000
30,000
35,000
40,000
45,000
Trade

1D - Linearity Model 2






Scatterplot: Modified GNI vs. Government Expenditure
R² Linear = 0.102
Modified_GNI
180,000
170,000
160,000
150,000
140,000
130,000
120,000
6,000
6,500
7,000
7,500
8,000
Government_Expenditure


Scatterplot: Modified GNI vs. Trade
R² Linear = 0.025
Modified_GNI
180,000
170,000
160,000
150,000
140,000
130,000
120,000
25,000
30,000
35,000
40,000
45,000
Trade

1E - Multicollinearity Model 1

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	228.690	99.734		2.293	0.070	-27.684	485.064					
	Fractionalization	-1.750	1.344	-0.345	-1.302	0.250	-5.204	1.704	0.030	-0.503	-0.205	0.353	2.833
	Investment	0.567	0.108	0.969	5.257	0.003	0.290	0.845	0.791	0.920	0.827	0.728	1.374
	Goverment_Expediture	-0.230	0.649	-0.087	-0.354	0.738	-1.898	1.439	-0.078	-0.156	-0.056	0.409	2.446
	Trade	0.161	0.097	0.270	1.658	0.158	-0.089	0.411	0.418	0.596	0.261	0.930	1.075

1F - Multicollinearity Model 2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	133.798	51.904		2.578	0.050	0.374	267.223					
	Fractionalization	-0.811	0.699	-0.239	-1.159	0.299	-2.608	0.987	0.387	-0.460	-0.142	0.353	2.833
	Investment	0.401	0.056	1.025	7.149	0.001	0.257	0.546	0.920	0.954	0.874	0.728	1.374
	Governent_Expediture	0.184	0.338	0.104	0.543	0.610	-0.685	1.052	0.320	0.236	0.066	0.409	2.446
	Trade	-0.103	0.051	-0.257	-2.029	0.098	-0.233	0.027	-0.159	-0.672	-0.248	0.930	1.075

1G - Normality Model 1 and 2

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
GDP	0.278	40	0.000	0.732	40	0.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Modified_GNI	0.198	10	.200*	0.910	10	0.278

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Fractionalization	0.134	40	0.068	0.942	40	0.042

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Investment	0.216	40	0.000	0.750	40	0.000

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Government_Expenditure	0.117	40	0.178	0.944	40	0.049

a. Lilliefors Significance Correction

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Trade	0.172	10	.200*	0.942	10	0.571

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

1H - Residuals Model 1

Residuals Statistics [a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	45797.52	69336.25	50949.60	7487.017	10
Std. Predicted Value	-0.688	2.456	0.000	1.000	10
Standard Error of Predicted Value	1693.400	3513.652	2579.173	714.851	10
Adjusted Predicted Value	32132.19	86795.03	52215.14	13997.175	10
Residual	--2656.254	6273.326	0.000	2811.097	10
Std. Residual	-0.704	1.663	0.000	0.745	10
Stud. Residual	-1.938	2.062	-0.092	1.231	10
Deleted Residual	--20115.033	16057.813	--1265.538	9869.768	10
Stud. Deleted Residual	-3.476	4.771	0.086	2.168	10
Mahal. Distance	0.914	6.912	3.600	2.416	10
Cook's Distance	0.000	4.938	0.981	1.687	10
Centered Leverage Value	0.102	0.768	0.400	0.268	10

a. Dependent Variable: GDP

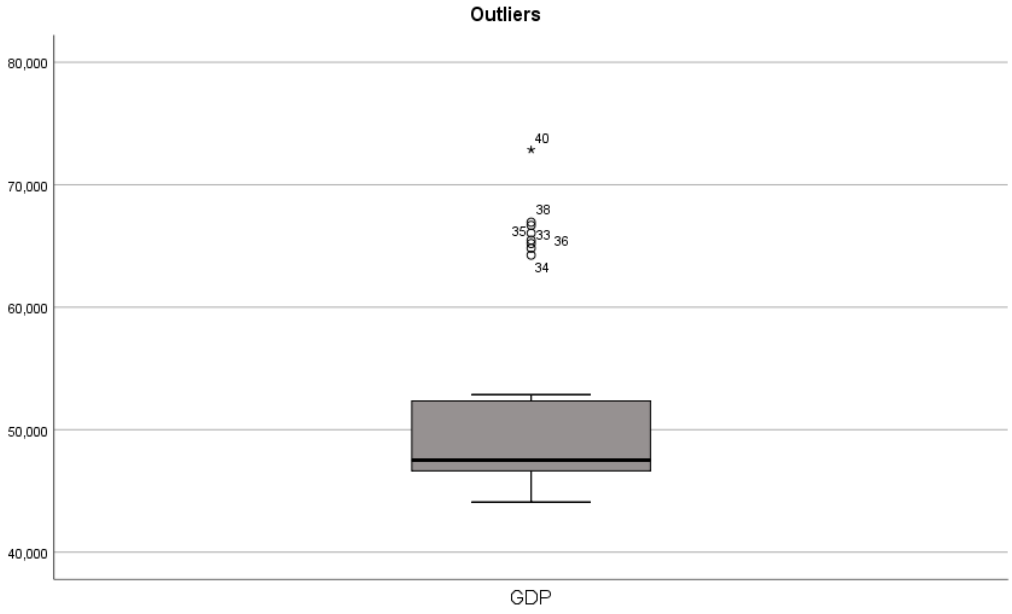
1I - Residuals Model 2

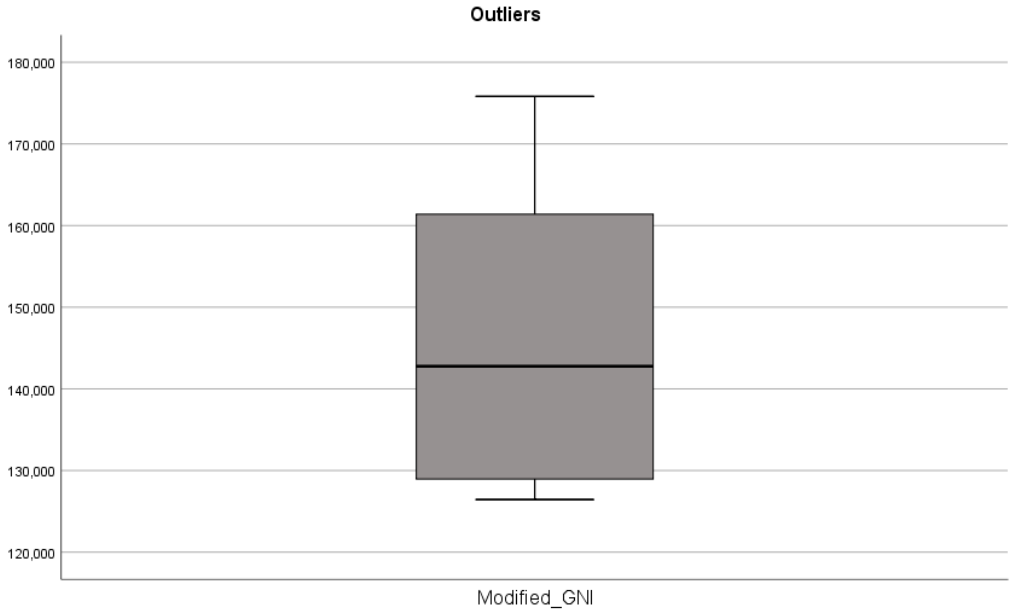
Residuals Statistics [a]

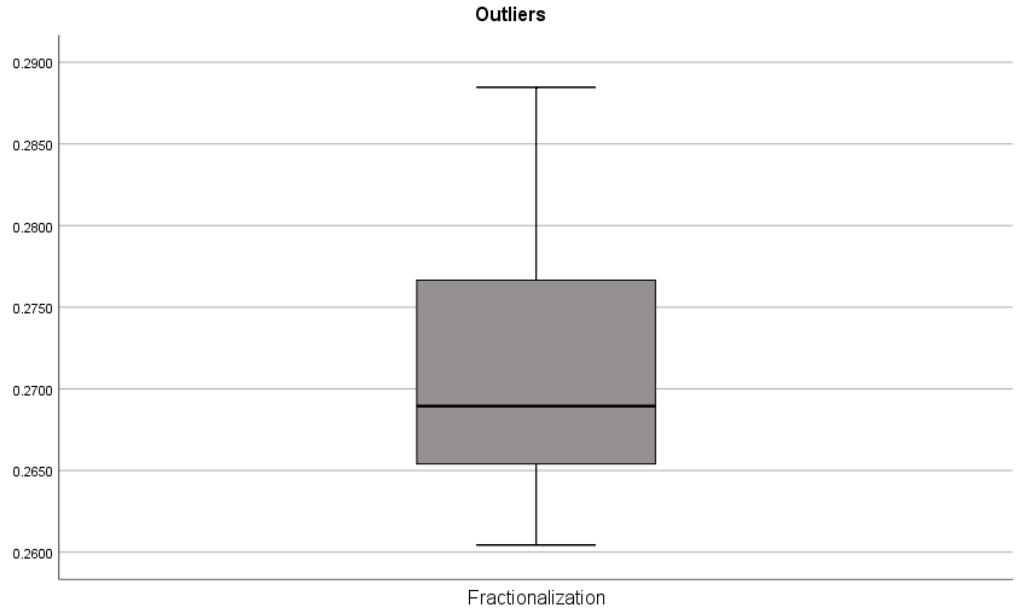
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	125764.99	179360.50	146206.40	17239.248	10
Std. Predicted Value	-1.186	1.923	0.000	1.000	10
Standard Error of Predicted Value	2947.646	6116.097	4489.480	1244.317	10
Adjusted Predicted Value	124126.63	202585.16	147672.03	23631.708	10
Residual	--8825.014	8986.895	0.000	4893.184	10
Std. Residual	-1.344	1.369	0.000	0.745	10
Stud. Residual	-1.504	1.697	-0.058	1.080	10
Deleted Residual	--26758.160	20217.496	--1465.635	13445.533	10
Stud. Deleted Residual	-1.819	2.331	-0.047	1.291	10
Mahal. Distance	0.914	6.912	3.600	2.416	10
Cook's Distance	0.001	2.884	0.555	0.950	10
Centered Leverage Value	0.102	0.768	0.400	0.268	10

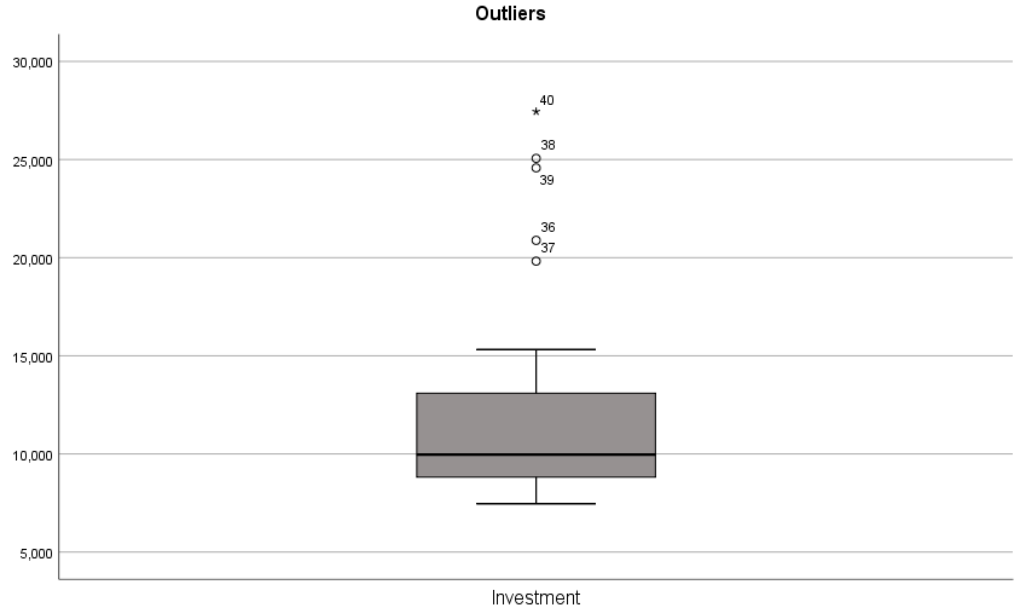
a. Dependent Variable: Modified_GNI

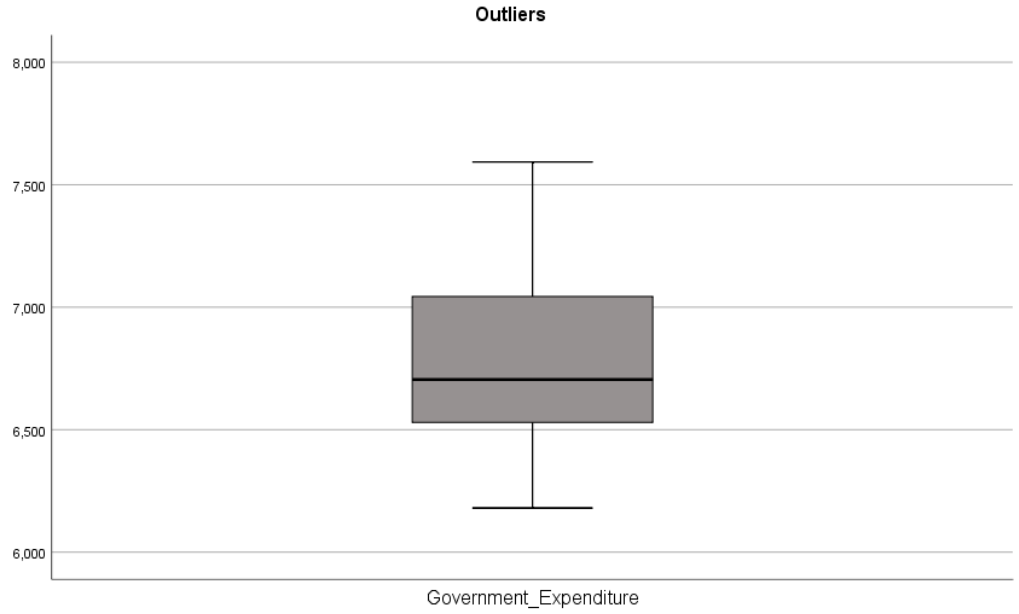
1J - Outliers Model 1 and 2

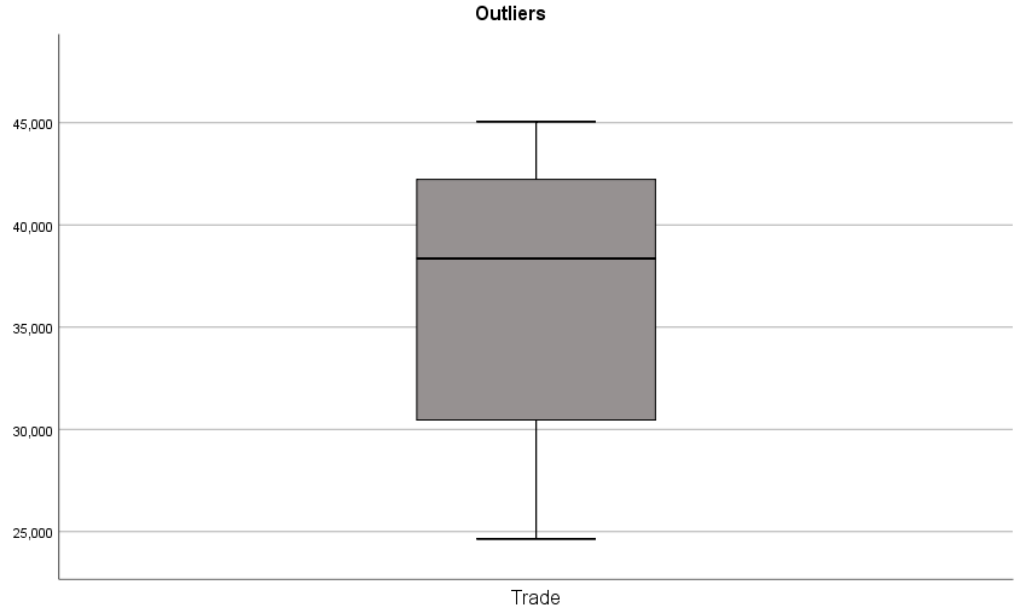





Outliers
0.2900
0.2850
0.2800
0.2750
0.2700
0.2650
0.2600
Fractionalization


Outliers
30,000
25,000
20,000
15,000
10,000
5,000
40
38
39
36
37
Investment


Outliers
8,000
7,500
7,000
6,500
6,000
Government_Expenditure


Outliers
45,000
40,000
35,000
30,000
25,000
Trade

APPENDIX 2: Model 1 - Multiple Regression Output

2A – Model Summary

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.936[a]	0.876	0.777	7.6304	2.146

a. Predictors: (Constant), Trade, Investment,

b. Dependent Variable: GDP

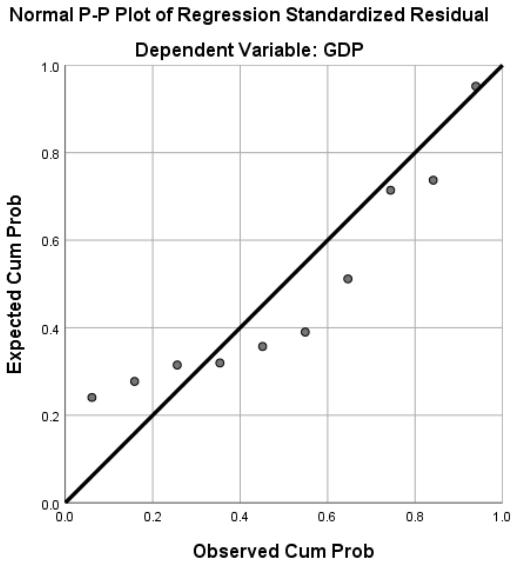
ANOVA [a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2062.840	4	515.710	8.857	.017[b]
	Residual	291.116	5	58.223		
	Total	2353.956	9			

a. Dependent Variable: GDP

b. Predictors: (Constant), Trade, Investment, Governent_Expediture,

2B – Homoscedasticity



2C – Multicollinearity

Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	228.690	99.734		2.293	0.070	-27.684	485.064					
	Fractionalization	-1.750	1.344	-0.345	-1.302	0.250	-5.204	1.704	0.030	-0.503	-0.205	0.353	2.833
	Investment	0.567	0.108	0.969	5.257	0.003	0.290	0.845	0.791	0.920	0.827	0.728	1.374
	Governent_Expediture	-0.230	0.649	-0.087	-0.354	0.738	-1.898	1.439	-0.078	-0.156	-0.056	0.409	2.446
	Trade	0.161	0.097	0.270	1.658	0.158	-0.089	0.411	0.418	0.596	0.261	0.930	1.075

APPENDIX 3- Model 2: Multiple Regression Output

3A- Model Summary

Model Summary [b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.962[a]	0.925	0.865	3.9711	2.121

a. Predictors: (Constant), Trade, Investment,

b. Dependent Variable: Modified_GNI

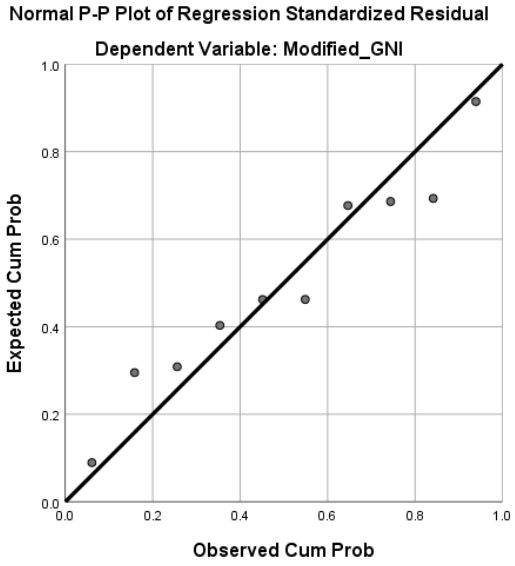
ANOVA [a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	975.568	4	243.892	15.466	.005[b]
	Residual	78.848	5	15.770		
	Total	1054.416	9			

a. Dependent Variable: Modified_GNI

b. Predictors: (Constant), Trade, Investment, Governent_Expediture,

3B – Homoscedasticity

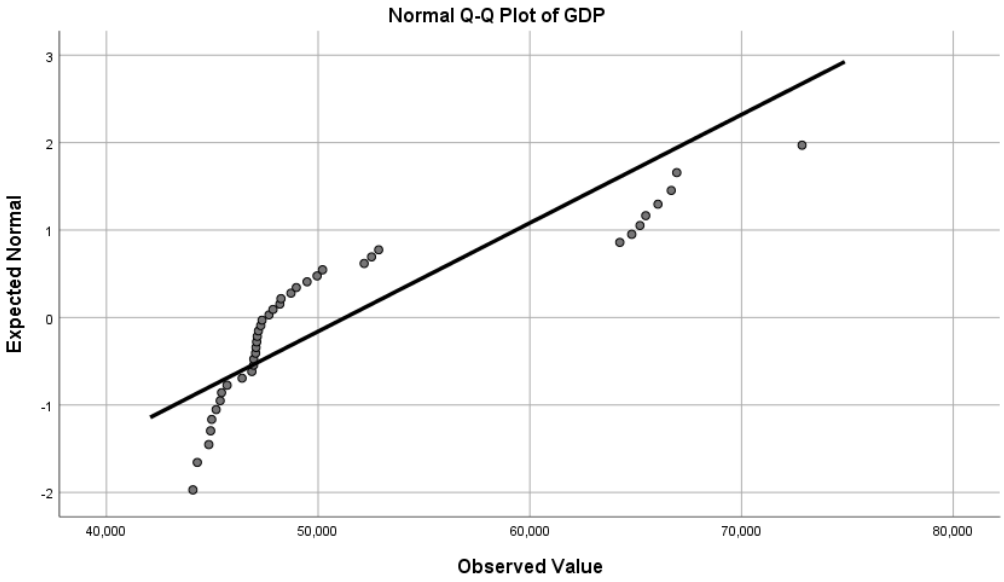


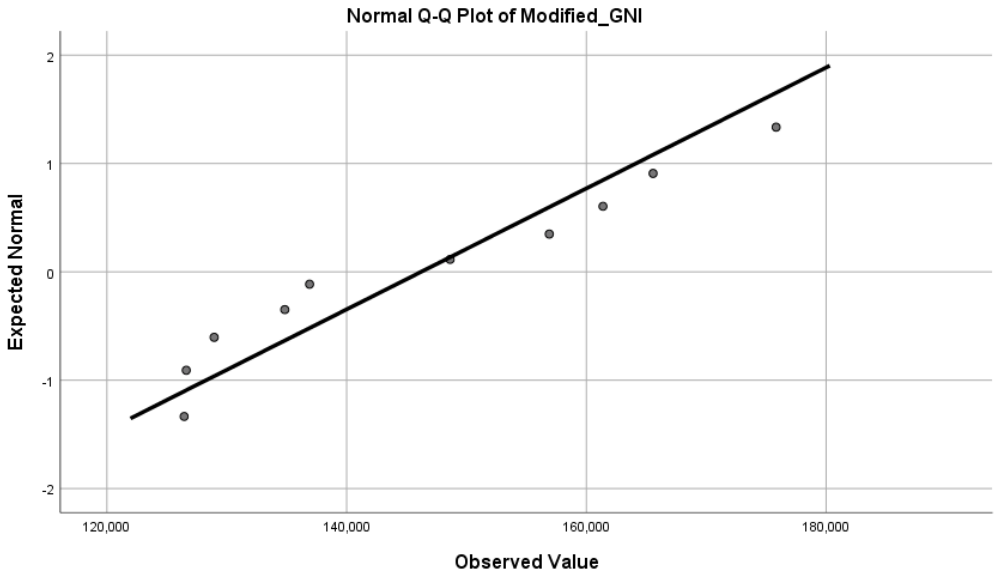
3C – Multicollinearity

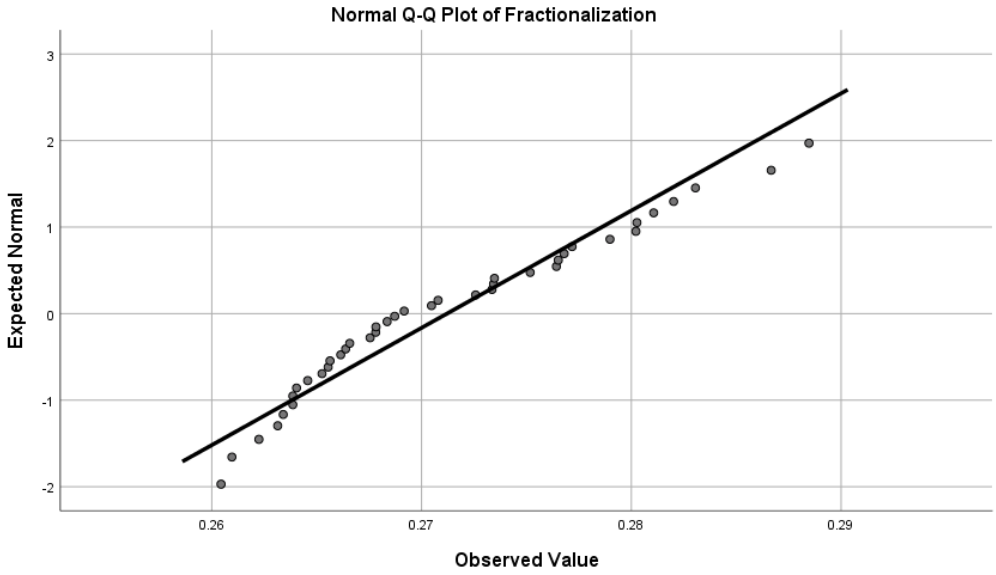
Coefficients [a]

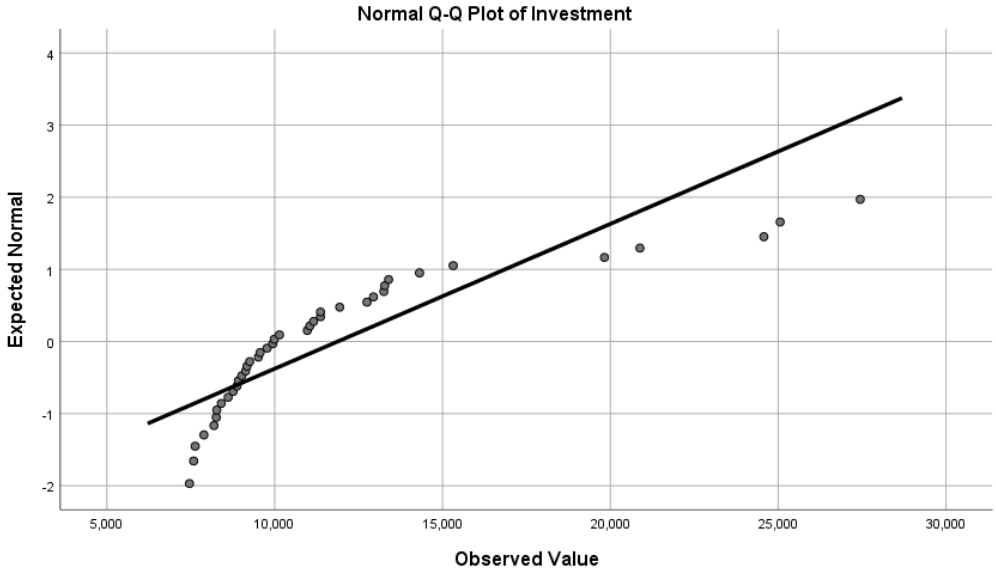
Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	133.798	51.904		2.578	0.050	0.374	267.223					
	Fractionalization	-0.811	0.699	-0.239	-1.159	0.299	-2.608	0.987	0.387	-0.460	-0.142	0.353	2.833
	Investment	0.401	0.056	1.025	7.149	0.001	0.257	0.546	0.920	0.954	0.874	0.728	1.374
	Goverment_Expediture	0.184	0.338	0.104	0.543	0.610	-0.685	1.052	0.320	0.236	0.066	0.409	2.446
	Trade	-0.103	0.051	-0.257	-2.029	0.098	-0.233	0.027	-0.159	-0.672	-0.248	0.930	1.075

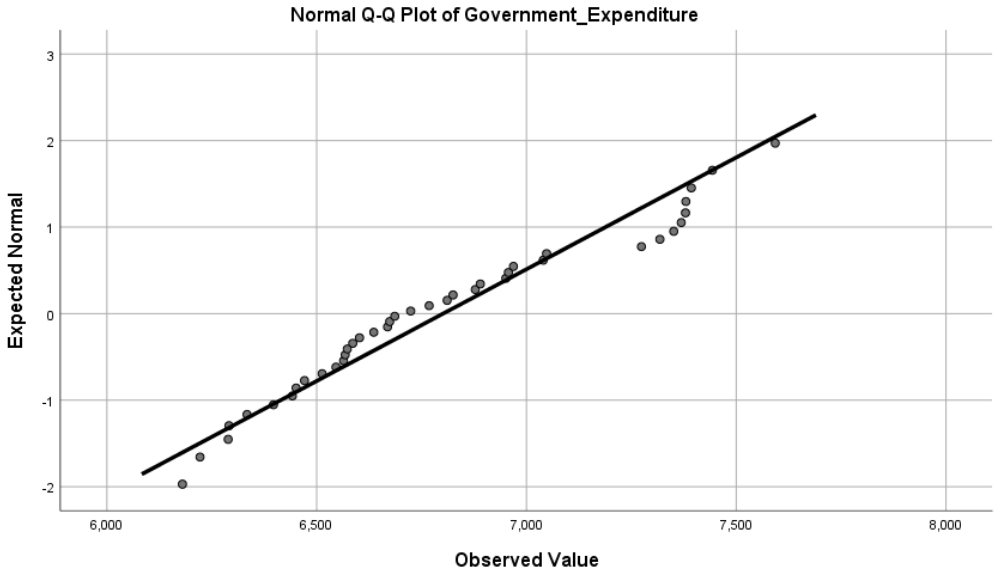
APPENDIX 4: Normality Multiple Regression - Model 1 and 2

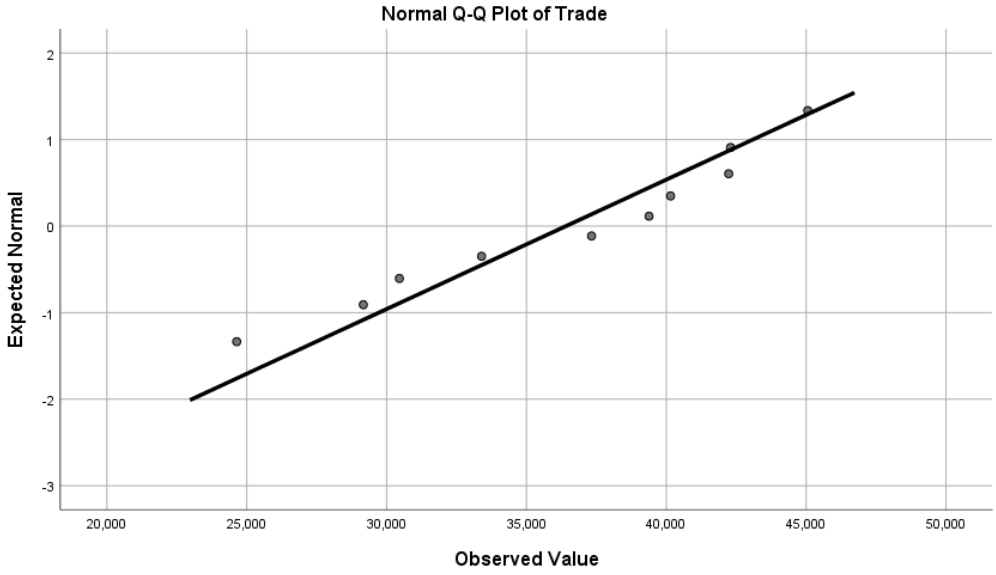





Normal Q-Q Plot of Fractionalization
Expected Normal
Observed Value
3
2
1
0
-1
-2
0.26
0.27
0.28
0.29


Normal Q-Q Plot of Investment
Expected Normal
Observed Value
4
3
2
1
0
-1
-2
5,000
10,000
15,000
20,000
25,000
30,000


Normal Q-Q Plot of Government_Expenditure
Expected Normal
3
2
1
0
-1
-2
6,000
6,500
7,000
7,500
8,000
Observed Value


Normal Q-Q Plot of Trade
Expected Normal
2
1
0
-1
-2
-3
20,000
25,000
30,000
35,000
40,000
45,000
50,000
Observed Value