Financial Development, Globalization and Income Inequality: Evidence from Selected MENA Countries

Passant Selim

Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Economics

Eastern Mediterranean University
August 2020
Gazimağusa, North Cyprus

Approval of the Institute of Graduate Studies and Research

Prof. Dr. Ali Hakan Ulusoy
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Doctor of Philosophy in Economics.

Prof. Dr. Mehmet Balcılar
Chair, Department of Economics

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Doctor of Philosophy in Economics.

Prof. Dr. Hasan Güngör
Supervisor

Examining Committee

1. Prof. Dr. Mehmet Balcılar
2. Prof. Dr. Mustafa Besim
3. Prof. Dr. Murat Çokgezen
4. Prof. Dr. Hasan Güngör
5. Prof. Dr. Raziye Selim

ABSTRACT

This thesis investigates the impact of financial development on income inequality for the 11 selected Middle East and North Africa (MENA) countries during the period from 1990 to 2015. A pooled mean group estimation (PMGE) of the dynamic heterogeneous panels is implemented in order to inspect the relationship between the studied variables. Furthermore, we employed panel cointegration to test for the existence of a long-run relationship between the variables. Our findings show the presence of a significant linear long-term negative relationship between financial development and income inequality. The outcomes are hence consistent with the inequality-narrowing hypothesis offered by Galor and Zeria (1993), Mookherjee and Ray (2003), and Banerjee and Newman (1993). Hence, we conclude that financial development is an important determinant of inequality reduction for these countries. Furthermore, there is a long-run negative relationship between trade openness, political globalization, financial development, government expenditure, real GDP, and income inequality; while a positive relationship exists between economic globalization and income inequality.

Keywords: Income inequality, Financial development, Globalization, MENA region, Pooled mean group estimation.

ÖZ

Bu tez, seçilmiş 11 Orta Doğu ve Kuzey Afrika (MENA) bölgesi ülkelerinin 1990-2015 yılları arasındaki finansal gelişimin gelir eşitsizliği üzerindeki etkisini araştırmaktadır. Bu ilişkiyi incelemek için dinamik heterojen bir yaklaşım olan Havuzlanmış Ortalama Grup (PMG) tahmincisi yöntemi uygulanmıştır. Ayrıca, değişkenler arasında uzun dönemli bir ilişkinin varlığı panel eş bütünleşme testi kullanılarak test edilmiştir. Ampirik bulgular, finansal gelişme ile gelir eşitsizliği arasında uzun vadeli doğrusal negatif bir ilişki olduğunu göstermektedir. Dolayısıyla sonuçlar; Galor ve Zeria (1993), Mookherjee ve Ray (2003) ve Banerjee ve Newman (1993) tarafından önerilen gelir dağılımı adaletsizliğini azaltıcı hipotez ile tutarlıdır. Elde edilen sonuçlara göre, bu ülkelerde eşitsizliğin azaltılmasında finansal kalkınmanın önemli bir belirleyici olduğu sonucuna varılmaktadır. Dahası, ticari açıklık, politik küreselleşme, finansal gelişim, devlet harcamaları, reel GSYİH ve gelir eşitsizliği arasında uzun vadeli negatif bir ilişki vardır; ekonomik küreselleşme ile gelir eşitsizliği arasında da pozitif bir ilişki mevcuttur.

Anahtar Kelimeler: Gelir eşitsizliği, Finansal gelişme, MENA bölgesi, Havuzlanmış ortalama grup tahmincisi.

DEDICATION

I dedicate this thesis to Allah Almighty, my family and to everyone who supported me throughout my way to achieve such a degree.

ACKNOWLEDGMENTS

This thesis is devoted with gratitude to Allah Almighty who helped me throughout my life; and to all people who gave me strength, wisdom, encouragement and support by offering their words, prayers, time and joy.

I would like to make use of this opportunity to express my deep gratitude for my family that has supported me and patiently bared with me throughout my life; my father the stunning idol whom I have always looked up to, my mum the kindest and warmest heart ever, my brothers Mohammed and Youssef, my sisters Mona and Mariam, my best friend and life partner Sara, my supervisor Prof. Dr. Hasan Güngör who directed and incessantly advised me through my research, and friends who made me feel home when I was far away; Salah, Salim, Victor, Gizem, Mehdi, Saint, Leila, George and Pejman. Special thanks to each and every one of them.

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LIST OF ABBREVIATIONS

ADF	Augment Dickey Fuller
AIC	Akaike Information Criterion
ARDL	Auto Regressive Distributed Lag
CPI	Consumer Price Index
ECM	Error Correction Model
ECT	Error Correction Term
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GMM	Generalized Methods of Moments
HDR	Human Development Report
IMF	International Monetary Fund
IPR	Intellectual Property Rights
IPS	IM, Pesaran and Shin
KPSS	Kwiatkowski Phillips Schmidt and Shins
LAC	Latin America and the Caribbean
LL	Levin, Lin and Chu
LM	Lagrange Multiplier
MENA	Middle East and North Africa Region
NGOS	Non-governmental organizations
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
PMGE	Pooled Mean Group Estimation.
POLS	Pooled Ordinary Least Squares

PP	Phillip-Peron
SWIID	Standardized World Income Inequality Database
UN	United Nations
VAR	Vector Autoregressive Model
VECM	Vector Error Correction Model
WDI	World Bank Development Indicators
WTO	World Trade Organization

Chapter 1

INTRODUCTION

1.1 Research Background

Poverty reduction and egalitarian distribution of income are among the most important issues any government and policy makers try to tackle. Various tools are used to achieve a better income distribution and reduce inequality. Most governments focus on implementing distinct fiscal policies to reduce inequality levels. Progressive taxes, public transfers and public spending are some of those policies utilized to help ease the problem of inequality. According to Piketty, Suez and Stantcheva (2014); progressive taxes are considered the most dominant factor which brings out a better egalitarian distribution of income. Public transfers are considered to have a substantial role in reducing income inequality in the OECD (Organization for Economic Cooperation and Development) countries by an average of 75% (Kim and Lin, 2011). Moreover, Goldin and Katz (2007) showed that labor income inequality diminishes as education increases.

On the other hand, in this study, we focused on the aspect of mitigating income inequality through financial development rather than different fiscal policies. According to Beck *et al*. (2007) and Claessens and Perotti (2007), financial development is a critical aspect of economic growth, and it also helps in reducing poverty rates. We are interested in writing this thesis since achieving a fair level of income distribution is considered to be a vital function for all governments. Examining

if financial development acts as an income equalizer for the selected Middle East and North Africa (MENA) countries will help decision makers to arrive at the right decisions in terms of investing and subsidizing more financial institutions to achieve more appropriate long-term income distribution. The MENA region is considered one of the most rapidly changing regions over the last few decades in all aspects; including economic, financial, environmental, and demographic factors.

Theories studying the finance-inequality nexus provide us with paradoxical predictions. When explaining the effect of financial development on unequal distribution of income, an extensive number of previous studies examined the impact of financial development on economic growth, while only a minor amount of them considered the distributional effects of such development. Several theories offer distinct predictions on the effect of financial development on income inequality. The relevant theories can be classified into two groups: The first group holds that there is a linear interrelation between financial development and income inequality which would be categorized into two major hypotheses; namely the inequality-widening hypothesis and inequality-narrowing hypothesis.

The inequality-widening hypothesis offered by Rajan and Zingales (2003) claims that only the rich can benefit and make profit from the financial development process, since the poor cannot afford the collateral needed to access the credit market. However; Galor and Zeria (1993), Mookherjee and Ray (2003), and Banerjee and Newman (1993) support the inequality-narrowing hypothesis, arguing that as the financial sector develops, the poor might gain access to loans. In contrast, Greenwood and Jovanovic (1990) suggest that there is a nonlinear interrelation between financial development and income inequality.

The results of this study indicate that financial development and trade openness are considerable factors in diminishing income inequality in the long-run for the selected MENA countries. This study adds value to the literature by expanding the time period to include recent years covering the period 1990-2015 and by employing pooled mean group estimation (PMGE) offered and suggested by Pesaran *et al*. (1999) in measuring the interrelation between financial development and income inequality. Examining the type of interrelation between financial development and income inequality is crucial for all policy makers. Our study shows that financial development is an essential aspect of the long-run sustainable inequality reduction for the MENA countries in question.

This study also contributes to the literature in offering evidence that financial development acts as an income equalizer for the selected MENA countries. This sheds light for policy makers and governments on the fact that building a substantial developed financial sector - by investing and subsidizing banks and non-banks financial institutions and making finance accessible to all investors - will reduce inequality rates in the region. The main obstacle before poor people blocking their access to finance is the lack of collateral. In the selected MENA countries, Pierce (2011) found that banks and financial institutions in the area were not able to reach various segments of the population. Cumming et al. (2014) showed the impact of access to finance for entrepreneurs in stimulating them to bear the risk and invest; resulting a boost in the economic growth. Governments have to facilitate procedures for borrowing money from different financial institutions by offering efficient microfinance policies which will lead to a better financial inclusion in the region (Westly, 2001). Effective policies aiming to create a substantial financial sector result in reducing the cost of borrowing credit for investors. Additionally, it cuts down

unemployment rates and improves the living standards of the poor by giving them credit to invest in healthcare schemes and education. Furthermore, education boosts human capital formation resulting in a better egalitarian distribution of income (Shahbaz and Islam, 2011).

1.2 Problem Statement

The major problems of income inequality are:

- Economic aspects; high unemployment and poverty rates and increases in tax evasion.
- Social aspects; increasing crime rates and corruption.
- Political perspective; increased strikes and youth protests.

1.3 The Objective of the Study

The reason behind and the motivation of this study is to investigate the effect of financial development on income inequality for the MENA region over the period of 1990 - 2015. The research questions which this thesis aims to investigate are:

a. Is financial development a vital determinant for income inequality in the MENA region?
b. What is the type of interrelation between financial development and income inequality in the MENA region?
c. Does the outcome of financial development on income inequality vary in the short and long run?

1.4 Research Methodology

This thesis employs time series analysis to measure the effect of financial development on income inequality for the MENA region. The time span of this study covers the period from 1990 to 2015. We employed Breusch and Pagan (1980), and Pesaran

(2004) to test for cross sectional dependency and to check for stationarity of the variables we implemented.

IPS panel unit root method was initiated by Im, Pesaran and Shin (2003). Our study utilizes Westerlund (2007) panel unit root co-integration test. Furthermore, for robustness check, we employed Kao's (1990) and Maddala and Wu's (1999) co-integration tests. Pooled Mean Group Estimation of dynamic heterogeneous panels Pesaran *et al*. (1999) is utilized to evaluate the interrelation between our concerned variables. Moreover, Dumitrescu and Hurlin's (2012) panel dynamic causality test is employed to examine the causality directions between the variables.

1.5 The Structure of the Study

Our study consists of seven chapters. The first chapter is the introduction and it includes the research background, problem statement, objective of the research, research methodology, and the structure of the study.

Chapter two presents a literature review, an introduction on income inequality providing as well a historical view on financial development, and the theories linking financial development and income inequality. Two groups of theories, which defend a linear or a non-linear interrelation between financial development and income are respectively evaluated. Chapter two includes the empirical literature.

Chapter three covers the data and methodologies utilized in our research. Chapter four reveals the results of the estimations and includes further interpretations; while chapter five studies the globalization income inequality nexus in a case study of Egypt. Chapter six covers the discussion and policy implications. Finally, chapter seven delivers conclusions.

Chapter 2

LITERATURE REVIEW

This chapter focuses on the egalitarian distribution of income in the studied MENA countries. It gives a brief historical background for financial development explaining the theories linking financial development and income inequality. Both theories claiming either a linear or a non-linear interrelation between financial development and income inequality are respectively explained in detail. Moreover, this chapter provides an overview of the previous findings in the empirical literature.

2.1 An Overview on Income Inequality in the MENA Region

The Lorenz curve is a graphical presentation which measures the income inequality within a nation or the wealth distribution among a specified population. It was proposed by Max Lorenz an American Economist in the early 1900's. The figure assumed by Lorenz presents the percentages of population versus the cumulative wealth or income of the whole nation on the horizontal and vertical axis respectively.

The graphical presentation of the Lorenz curve includes a diagonal straightforward line with a slope of one revealing the full equality of wealth distribution position within the plotted specified population. Furthermore, the Lorenz curve usually deceits down below the 45-degree line of full income equality. The area between the full equality straight line and the Lorenz curve shows the Gini coefficient of the Gini index. The wider the area between the Lorenz curve and the 45-degree line of full wealth equality, the larger the income inequality dispensation between the specified population;

indicating a poor equality scheme in a country or region. On the other hand, the smaller the area between the 45-degree line of full income equality and the Lorenz curve, the better the income inequality dispensation between the specified population.

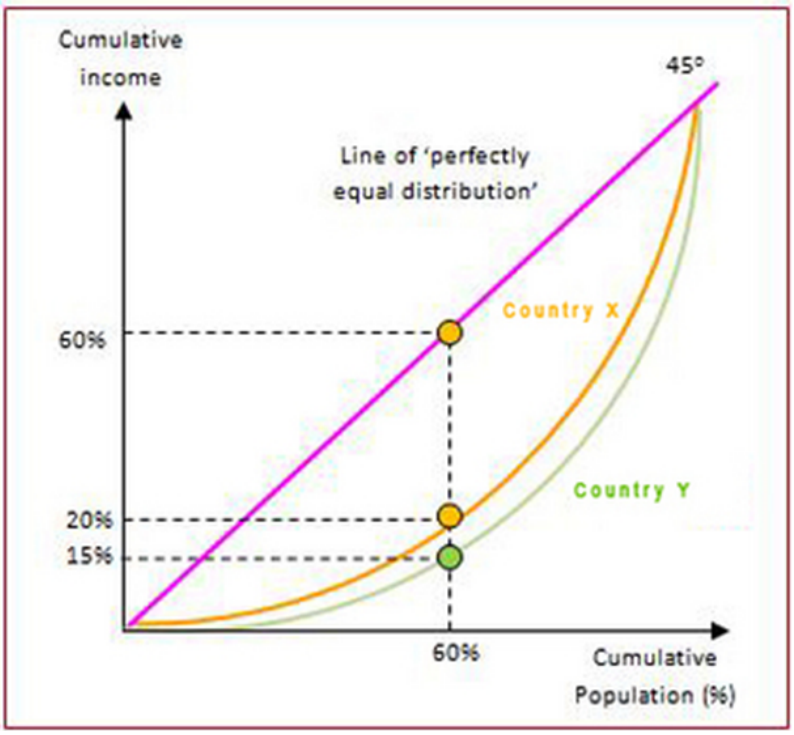

Figure 1: The Lorenz curve

Figure 1 reveals an illustrative example of the Lorenz curve and the income distribution among two nations named as countries X and Y. The graph shows that the country X has a better income distribution than the country Y. In the country X, 60% of the population shares 20% of the total wealth or income of the nation. On the other hand, the country Y shows a worse income distribution; where 60% of the population own only 15% of the total nation wealth or income. The area under the curve of country X is smaller than the area under the curve of country Y. Furthermore, in a perfect hypothetical economy, 60% of the population will own 60% of the income or wealth of the nation lying on the 45-degree line of perfect income inequality.

To measure income inequality, we usually employ the Gini index as a proxy variable. The Gini index estimates to what extent the dispensation of income on individual basis between a specified population and usually between a country or region varies or diverges far away from an entirely equivalent distribution.

The Gini coefficient calculates the area between the Lorenz curve and the assumed 45-degree line of full income equality distribution among the whole population. The Gini coefficient is represented as the percentage of the area shown graphically under the Lorenz curve. The Gini index lies in between zero percent and 100%. Full income inequality between the specified or studied population is equal to zero, while simple income inequality between the suited population is equal to 100 %.

The research is scarce on the financial development and income inequality nexus in the MENA region. In our knowledge, there is only one paper which studies this topic. Therefore, we aim to fill this gap and extend the research on the MENA region. Elmi and Ariani (2011) studied the effect of financial development on income inequality in the MENA region. Our study differs from their work in several respects: Firstly, they employed data for ten MENA countries; including Iran, Sudan, Algeria, Oman, Bahrain, Tunisia, Jordan, Egypt, Morocco, United Arab Emirates and Yemen. Additionally, they used the generalized method of moments (GMM) estimator to investigate the financial development and income inequality nexus. Our study on the other hand employs PMGE method for capturing this nexus. Furthermore, they used data for the period of 2004-2008 (5 years) whereas the time span of our data is between 1990 -2015 (26 years) for 11 countries.

Figure 2 shows the gap between the Gross Domestic Product (GDP) and the GDP per capita growth for the MENA region over the studied period. Although economic growth rates have been recorded in the MENA region in the last few decades, this increase was not demonstrated in the GDP per capita growth. Economic growth rates average is almost double the GDP per growth rates average. Despite the fact that GDP in the MENA region during the period 1990-2015 has averaged 4.34 percent; GDP per capita growth for 1990-2015 has averaged 2.17 percent.

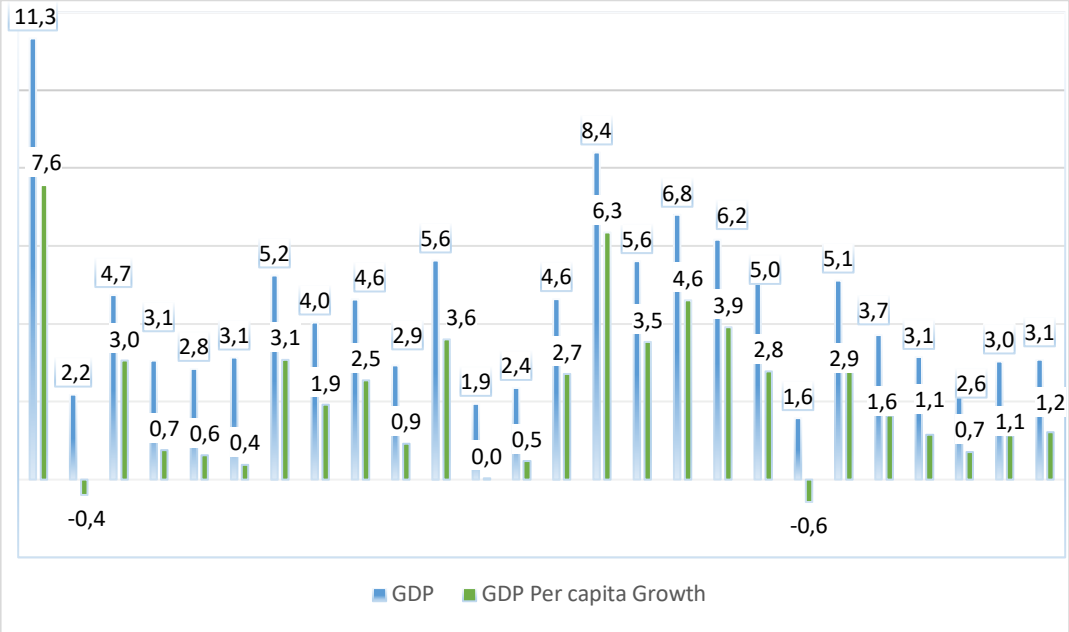

Figure 2: The GDP and GDP growth per capita in the MENA region, 1990-2015. (The World Bank; World Development Indicators (WDI), 2017)

The first estimates for inequality rates was brought out in the early 1980's by Grosh and Nafziger (1986) as well as by Berry, Bourguignon and Morrisson (1983) and the MENA countries are characterized by huge differences in the per capita gross domestic product GDP due to the fact that some countries have oil-rich dependent economies like Bahrain, Kuwait, United Arab Emirates, Oman, Saudi Arabia and Qatar. According to Sarangi *et al.* (2013), the average per capita expenditure of the rich

people in Egypt in 2011 was higher than the per capita expenditure of the middle class by 7 times and by 16 times for the poor.

Unfortunately, as displayed in Figure 3, most MENA countries suffer from high inequality rates. Bahrain, Saudi Arabia and Kuwait showed the highest GINI coefficient with 0.79, 0.77 and 0.76 respectively; while Sudan showed a better income distribution with a GINI coefficient of 0.41.

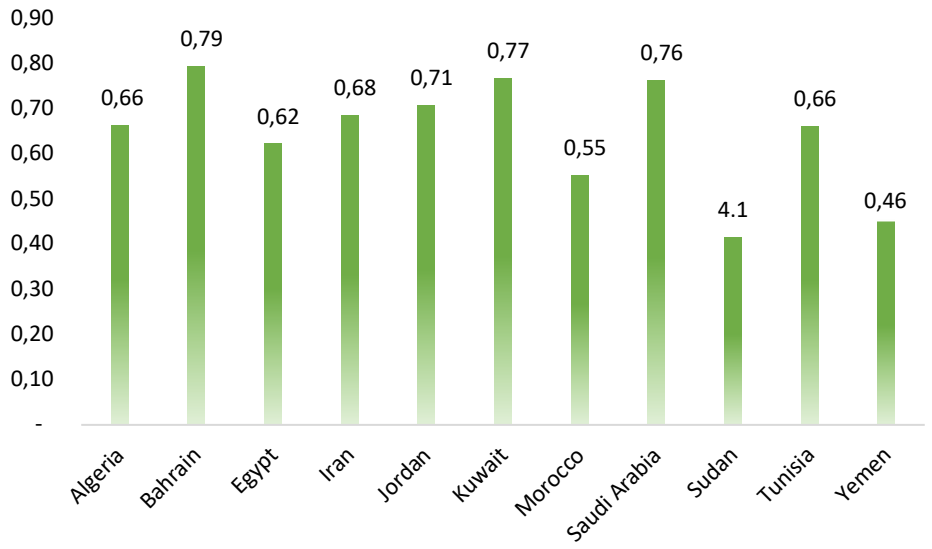

Figure 3: The Average GINI coefficients, 1990-2015. (Human Development Report (HDR), 2016.)

2.2 Financial Development in the MENA Region

Financial development indicates enhancement in the quality and quantity of financial intermediation process through minimum transaction costs. Rajan and Zingales (2003) demonstrated financial development as the easiness by which investors or companies can access finance and assurance where entrepreneurs can obtain sufficient profitable reruns. Moreover; accessing, segregation, mitigation of various types of risks and engaging them to the parties that can borne them at minimum cost. On the other hand, Levine (1997) defined financial development based on its functions; assuming that

financial development leads to a better purification of information about investors and projects, accelerates savings, mitigates trade and contracts, facilitates corporate control, ameliorates allocation of resources and controls for risk (Balcilar et al. 2016).

Ben Naceur et al. (2008) claims that the MENA region experienced two consecutive decades of liberalization in the financial sector. However, according to O'Sullivan et al. (2011), the unemployment rates in the MENA region in the last decade are relatively high, ranging from 10 to 25 percent. This study focuses on the MENA region to test whether conducting comprehensive developed financial markets will result in reducing inequality rates in the region or not.

A lack of collateral is the major issue in the MENA region. Lack of developed financial institutions which can offer affordable access to finance is a great obstacle for the formation of new firms in the MENA region. According to Cherif and Dreger (2016); for a manufacturer firm in Jordan, Morocco, Yemen, Algeria and Egypt to get access to finance; more or less than three quarters of the capital are from internal sources rather than credit lending from various financial institutions or banks.

In the MENA region, Cherif and Dreger (2016) reached results suggesting that institutional conditions and quality are crucial in interpreting the level of financial development, while holding all macroeconomic factors. Furthermore, they proposed that trade openness is considered to be a main driver for financial development, specifically in the stock markets of the MENA region. Considering the previewed researchers' studies; we can conclude that better qualified institutions, controlling of corruption and a superior rule of law implementation could lead to a better financial development in the MENA region.

The financial scheme in the MENA countries is monopolized by banks - and specifically, in various countries, by national state banks - despite the efforts of privatization have been elevated in the region since almost three decades. A clearly specified example for this could be the case of Egypt. Up until today mainly the major financial lenders are presented in the state owned banks like Al-Ahly Bank and Egypt Bank. Cihak et al. (2012) found evidence that the magnitude of the banking sector is overly weighted in the MENA countries, in comparison to Eastern Europe as well as to Latin America and finally to Eastern Asia. Nonetheless, banks in the MENA region showed a very low credit to deposit percentages as well as inconvincible and unaffordable collateral requirements for credit access. Financial institutions and banks in the MENA region were found to be more interested in offering finance to substantial corporations, governmental development programs and deep-rooted large firms rather than to new entrepreneurs or small and medium enterprises.

According to Schaefer et al. (2010), more or less than 40% of the entrepreneurs in the MENA region define finance shortage and the lack of real credit finance as the dominant obstacles interrupting their businesses to flourish and develop. Furthermore, researchers found data from the World Bank stating that almost 20% or less of the new medium and small scale entrepreneurs in the MENA region were offered credit accesses from their credit proposals. As proposed by Panzar and Rosse (1987), the banking industry is characterized by a lack of clarified, transparent and efficient market competition.

Similarly, Anzoategui et al. (2010) found that about five dominant financial institutions in the MENA region own and dominate approximately 90% of the capital budget owned by the commercial banks. Furthermore, consequential obstacles in

accessing the financial markets include a substantial amount of capital and fragile credit reporting schemes which evaluate borrowers by mistaken methods.

2.3 Theories Linking Financial Development and Income Inequality

Various studies have been conducted on a single country basis, as well as in a cross-country framework, using different models and methodologies. The theories which have been developed so far in this field fall into two main categories; namely those claiming that the interrelation between financial development and income inequality is linear (Banerjee and Newman 1993, Galor and Zeria 1993), and the ones claiming that the interrelation is non-linear (Jovanovic 1990). Furthermore, those who argue that the interrelation is linear have constructed two associated hypotheses; the inequality-narrowing hypothesis and the inequality-widening hypothesis.

2.3.1 The Linear Interrelation Between Financial Development and Income Inequality

Researchers who advocate that the relationship is linear constructed two hypotheses as inequality-narrowing hypothesis (negative) and inequality-widening hypothesis (positive). The theories which are developed so far in studying the finance-inequality nexus are classified as follows:

a. **The Inequality-Widening Hypothesis (positive)**

The inequality-widening hypothesis was proposed by Rajan and Zingales (2003), who claimed that an increase in financial development comes along with an increase in income inequality. This hypothesis assumes that only the rich can offer the collateral which is necessary to gain access to finances and afford the repayment of loans. The poor cannot do so; thus, bankers and lenders exclude the poor from the market. As the markets become more developed, it becomes even more challenging for the poor to obtain access to finances.

b. The Inequality-Narrowing Hypothesis (negative)

Galor and Zeria (1993), Mookherjee and Ray (2003), and Banerjee and Newman (1993) all support the inequality-narrowing hypothesis; arguing that as the financial sector grows and becomes more developed, poor people who used to have difficulty accessing the market due to their lack of collateral now can obtain entrance to it. They state that financial development can therefore acts as an equalizer for the determined and hardworking people. Therefore, to control and decrease the income inequality rates, we can promote developed, efficient and adequate financial markets.

2.3.2 The Non-Linear Interrelation Between Financial Development and Income Inequality

The second approach, on the contrary, claims the existence of a non-linear (quadratic) link between financial development and income inequality.

For instance, Jovanovic (1990) proclaimed that there is a non-linear type of the interrelation between financial development and income inequality. The hypothesis assumes an inverted U-shaped link between income inequality and financial development. The proportional distribution of financial development depends on the extent of economic development. Moreover, the hypothesis suggests that there is a certain economic development threshold for a positive impact to exist. Originally, at the initial stages of financial development only the wealthy citizens can manage entrance to the financial markets and hence can make profits. As time passes and the development process continues, more people can have access to and benefit from the financial markets.

2.4 Empirical Literature

Previous studies have found evidence concerning the linear inequality-narrowing hypothesis, including Liange (2006), who implemented the GMM over the period 1986–2000 for China, thereby studying the interrelation between financial development and income inequality. Furthermore, Clarke et al. (2006) estimated the ordinary least square (OLS) and two-stage OLS methods, thereby identifying an inverse interrelation between financial development and income inequality for 83 countries covering the period 1960–1995. Beck et al. (2007) implemented a GMM technique over a various number of countries for the period 1960–2005 to test for the interrelation between financial development, inequality, and poverty. Their findings showed that financial development helps to enlarge the income levels of the poorest quantile as well as to reduce income inequality. They further found that almost 40% of the increase in the income levels of the poorest quantile resulted from a fall in income inequality levels; unlike the 60% which was caused by the effect of financial development on economic growth. Finally, they discovered that financial development helped to mitigate the percentage of people living below the benchmark of 1$ daily.

Rehman et al. (2008) found that financial development helped to minimize income inequality based on the level of financial development, which suggested an inverted U-shaped interrelation between the two for the 51 studied countries over the period 1975–2002 adopting the Pooled Ordinary Least Squares (POLS) method. Canavire-Bacarreza and Rioja (2008) studied the effect of financial development on various levels of income in Latin America and the Caribbean (LAC) over the period 1965–2005. Their results showed that the income level of the poorest was unchanged by an

improved (i.e., more developed) financial system. Additionally, the second, third, and fourth poverty levels were positively affected, resulting in lower income inequality.

Bittencourt (2009) implemented the POLS method and fixed effects to test for the outcome of financial development on inequality in Brazil during the period 1980–1995, finding a consequential inverse interrelation between the two variables. Moreover; Batuo, Guidi, and Malmbo (2010) studied 26 African countries over the period 1990–2004, and they confirmed that financial development helps to mitigate inequality. However, Ang (2010) found a contrary interrelation between income inequality and financial development, as well as a positive interrelation between financial liberalization and income inequality in India during the period 1951–2004.

In addition, Elmi and Ariani (2011) studied 10 countries in the MENA region from 2004–2008, while Shahbaz and Islam (2011a) studied the situation in Pakistan for the period between 1971 and 2005, and they also found supportive outcomes. Baligh and Piraee (2012) studied Iran over the period 1973–2010, and they showed a linear negative interrelation between financial development and income inequality, which suggested that financial development mitigates income inequality levels. Agnello, Mallick, and Sousa (2012) used a panel data set for 62 countries over the period 1973–2005 to estimate the impact of financial reforms on the minimization of income inequality, and they found that such financial reforms assist in dwindling income inequality.

Furthermore, Hamori and Hashiguchi (2012) employed unbalanced panel data approach for 126 countries for the period of 1963–2002 to find out that financial development helps to alleviate income inequality. Fixed effects and random effects

model were implemented by Hoi and Hoi (2013), who revealed an inverse linear interrelation between financial development and inequality during the period 2004–2008 for Vietnam. The autoregressive distributed lag bounds testing approach (ARDL) employed by Shahbaz et al. (2014) for Iran over the period 1965–2011 arrived at similar results. However, Park and Shin (2017) proved that financial development has a substantial positive outcome on income inequality alleviation only up to an exact point; after that point, financial development growth results in a wider arbitrary income inequality distribution.

The literature providing evidence concerning the linear inequality-widening hypothesis includes works by researchers such as Law and Tan (2009). They employed ARDL bounds testing and found financial development to be statistically insignificant in terms of reducing income inequality for Malaysia during the period of 1980–2000. Wahid et al. (2012) used the same methodology for Bangladesh for the period of 1985–2006 and reached the same results. In addition, Johansson and Wang (2014) used the GMM technique for 90 countries over the period 1981–2005 to investigate the interrelation between financial repression and income inequality. Their study confirmed the presence of a positive link between the stated variables. Jauch and Watzka (2015) utilized the largest unbalanced data set for up to 138 countries over the years 1960 to 2008, and they derived that financial development had a significantly positive effect on income inequality.

Furthermore, Coskun and Seven (2016) used a GMM technique for 45 countries over the period 1987–2011 to check whether banks and stock market development helps to narrow inequality. They concluded that despite the fact that financial development helps to stimulate economic growth, it does not always benefit low income citizens.

Their findings also showed that neither banks nor stock markets helped to reduce poverty levels. Moreover, Haan and Sturm (2017) reached results compatible to the inequality-widening hypothesis through a dynamic fixed effects panel model for 121 countries over the period 1975–2005. For the purpose of capturing the effect of financial development over income inequality; financial development, financial liberalization, and the banking sector were all used as explanatory variables for income inequality. Hence, the majority of the findings reported in the literature can be seen compatible to the inequality-narrowing hypothesis when linear models were used.

The advocates of a non-linear interrelation between financial development and income inequality include Kim and Lin (2011), who used panel data for 72 countries during the time span 1960–2005 to determine a benchmark level for financial development to be effective in terms of reducing income inequality. Financial development has to reach a minimum level before it is considered to be a crucial factor in reducing income inequality, which supports Jovanovic's (1990) hypothesis.

Furthermore, Gimet and Lagoarde-Segot (2011) used a Bayesian panel vector autoregressive model (VAR) model for 46 countries over the period 1994–2001, finding that financial development has a considerable effect on income distribution holding the reciprocal causality controlled. Baiardi and Morana (2015) initiated new characteristics for the Kuznets curve whereby the milestone for per capita income is influenced by the extent of financial development. Their findings illustrated the emphasis of financial stability in alleviating income inequality in the Eurozone. Tita and Aziakpono (2016) derived the interrelation between financial development and income inequality using an augmented mean group estimator. They employed balanced panel data for 15 African countries to experiment the threshold level of

financial development and income inequality as linked to the sectorial composition of the economy. Their results suggested a non-linear relationship ranging from an inverted U shape to a U shape based on the level of financial development.

Table 1: Summary of the Literature

Proposed Theories

	Author	*Year of Publication*	*Concerned Countries*	*Time period*	*Methodology*	*Findings*
a. Linear ***a.1 Positive Hypothesis*** *initiated by Rajan and Zingales (2003) claiming that as financial development increases, income inequality increases.*	Law and Tan	2009	Malaysia	1980-200	ARDL bounds testing	Financial development is insignificant in reducing inequality
	Wahid et al.	2012	Bangladesh	1985-2006	ARDL bounds Testing	Financial development is insignificant in reducing inequality
	Johansson and Wang	2014	90 countries	1981-2005	GMM method	Evidence for inequality-widening hypothesis
	Jauch and Watzka	2015	138 countries	1960-2008	2OLS and GMM methods	Evidence for inequality-widening hypothesis
	Coskun and Seven	2016	45 countries	1987-2011	GMM Method Techniques	Banks and stock markets didn't help in reducing poverty levels.

	Haan and Strum	2017	121 countries	1975-2005	Dynamic Fixed Effects Panel Model	Evidence for inequality-widening hypothesis
a.2Linear Negative Hypothesis *initiated by Galor and Zeria (1993), Mookherjee and Ray (2003) and Banerjee and Newman (1993), arguing that through the process of financial development the poor will have entrance smoothly to market. Financial development helps in alleviation of*	Liange	2006	China	1986-2000	GMM Method Techniques	Evidence for inequality-narrowing hypothesis
	Clarke et al.	2006	83 countries	1960-1995	OLS and Two stage OLS Methods	Financial development reduces inequality
	Beck et al.	2007	72 countries	1960-2005	GMM Methods techniques	Financial development reduces inequality
	Rehman et al.	2008	51 countries	1975-2002	POLS Method	Financial development minimizes income inequality based on the extend of financial development.(U-shaped relation)
	Canavire-Bacarreza and Rioja	2008	Various Latin America and the Caribbean countries	1965-2005	Cross sectional Regressions	Last level of poverty remained unchanged by better financial system.

income inequality.						Moreover, the second, third and fourth levels of poverty is reduced as financial sector is developed.
	Bittencourt	2009	Brazil	1980-1995	POLS and Fixed effects methods	Evidence for inequality-narrowing hypothesis
	Batuo, Guidi and Malmbo	2010	22 African countries	1990-2004	GMM method	Financial development mitigates income inequality
	Ang	2010	India	1951-2004		Financial development reduces inequality, while liberalization boosts inequality
	Elmi and Ariani	2011	10 MENA region countries	2004-2008	GMM estimator	Compatible outcomes for inequality-narrowing hypothesis
	Shahbaz and Islam	2011	Pakistan	1971-2005	ARDL bounds tests and ECM	Financial development mitigates income inequality

	Baligh and piraee	2012	Iran	1973-2010	Unrestricted Error Correction Model	Evidence for inequality-narrowing hypothesis
	Angnello, Mallick and Sousa	2012	62 countries	1973-2005	Panel regressions	Financial reforms helps in reducing inequality
	Hamori and Hashiguchi	2012	126 countries	1963-2002	Unbalanced panel data analysis	Financial deepening reduces inequality
	Hoi and Hoi	2013	Vietnam	2004-2008	Random effects in addition to fixed effects	Evidence for inequality-narrowing hypothesis
	Shahbaz et al.	2014	Iran	1965-2011	ARDL bounds tests approach	Financial development reduces inequality
	Park and Shin	2017	Asian development bank	-	Panel Regressions with fixed effects	Financial development reduces income inequality to a threshold then it boots income inequality.
2.Quadratic *Jovanovic (1990) claimed that there is a*	Kim and Lin	2011	65 countries	1960-2005	Least square	Threshold level for financial development to reduce inequality

quadratic interrelation betwixt financial development and income inequality. Suggesting a certain economic development threshold for the positive impact to exist.	Gimet and Lagoarde-Segot	2011	46 countries	1994-2001	Panel Bayesian SVAR	Financial development has a substantial impact on income distribution holding the reciprocal causality hold
	Baiardi and Morana	2015	19 Euro counties Area	1985-2013	Cross sectional Regressions	Financial stability in reducing income inequality
	Tita and Aziakpono	2016	15 African countries	1985-2007	Augmented Mean Group estimator	A non-liner relationship ranging from inverted U shape to a U-shape based on the financial development level.

Chapter 3

DATA AND ECONOMETRIC MODEL

3.1 Model Specification and Variables

This chapter aims to explain the methodologies used to test for the interrelation between financial development and income inequality. Our model specification will be as displayed below:

GINI= f (DCFS, CPI, TRADE, GEXP)

$$GINI = \alpha_0 + \alpha_1 DCFS_t + \alpha_2 CPI_t + \alpha_3 TRADE_t + \alpha_4 GEXP_t + \varepsilon_t \quad (1)$$

where,

GINI = Gini coefficients as a proxy for income inequality,

$DCFS_t$ = Domestic Credit Provided by the Financial Sector

CPI_t = Consumer Price Index,

$TRADE_t$ = Trade Openness,

$GEXP_t$ = Government Expenditure,

ε_t = Stochastic error term.

This study employs yearly panel data from 1990 to 2015 for the selected MENA countries. The investigated countries are Iran, Sudan, Algeria, Oman, Bahrain, Tunisia, Jordan, Egypt, Morocco, United Arab Emirates, and Yemen. The utilized time period and countries are selected taking into account the data accessibility concerning the required variables. The model's dependent variable is the Gini coefficient (GINI), which is used as a proxy for income inequality. The independent variables are domestic

credit (DCFS), which is provided by the financial sector as a percentage of the GDP, the consumer price index (CPI), trade openness as a percentage of the GDP (TRADE) and government expenditure as a percentage of the GDP (GEXP). The Gini coefficients are generated from the data contained in the HDR (2016), while the rest of the variables are sourced from the WDI (2017) database.

According to the World Bank, the DCFS accounts for the aggregate gross of credit provided by various financial intermediaries to all sectors excluding the net credit by the development banks as well as central banks. Financial institutions and corporations included in this variable are banks, leasing corporations, insurance and financial companies, foreign exchange associations, money lenders, monetary authorities and allowances funds. We choose this proxy for financial development due to the fact that it accounts for private credit offered by non-banks and banks financial corporations in a microfinance scale excluding the credit issued by the central bank of the government. This is more adequate for intermediate and low-income households. A drawback for this proxy is that it doesn't account for the efficiency, stability and quality of the financial sector and the services offered.

As a result of this deficiency, new indicators were developed by the World Bank under the name of "Global Financial Development Indicators". However, the most frequent acceptable instrument for measuring financial development in the previous literature is the ratio of the private credit to GDP. In addition, it captures the opportunities for brand-new investors and entrepreneurs. (Beck et al., 2007; Sigot and Gimet, 2011; Elmi and Ariani, 2011; and Tita and Aziakpono, 2016).

Our PMGE model includes the consumer price index (CPI), thereby considering inflation and its impact on other variables. Furthermore, trade openness as an important channel in which globalization can impact inequality (Kim and Lin, 2011). Trade openness represents the sum of imports including all goods and services obtained from other countries worldwide as well as the sum of exports including all goods and services originated by the home country to other countries worldwide. We believe that trade openness is a considerable determinant of both inequality and financial development, while including them both in the same model is helpful in terms of capturing a better picture of distributional income variations.

The Stolper-Samuelson theorem derived from the Heckscher-Ohlin model was the first to provide an explanation for the channel through which trade openness can influence inequality. The theory assumes that there are only two countries in the world and only two factors of production. If trade openness is increased by reducing the tariff on imports in a developing country where low-skilled labor is excessive, the wages for low-skilled labor will expand and the repayment for high-skilled labor will diminish; thus, income inequality will reduce. Another impact of tariff reduction would be a fall in the price of importable goods which are characterized by high-skilled labor-intensive products. However, the price of exportable goods which are characterized by low-skilled labor will increase. For a developed country where high- skilled labor is abundant, the opposite will be true; thus, trade liberalization would boost the inequality levels (Stolper and Samuelson 1941). Aside from the Heckscher-Ohlin model, other studies, including those by Egger and Kreickemeir (2009), Verhoogen (2008), and Yeaple (2005), have investigated the effect of trade openness on inequality in the light of the heterogeneous firm.

3.2 Cross-sectional Dependency

Phillips and Sul (2003) argue that if there is considerable cross-sectional dependency in the data used for a dynamic panel estimation and the researcher fails to consider it, then the output efficiency of the estimation will be dramatically reduced to the extent that the pooled mean group least squares estimator will not demonstrate enough efficiency over the single OLS equation. Pesaran (2006) shows that if the time dimension (T) for the panel data is larger than the cross-sectional dimension (N), then the Lagrange Multiplier (LM) test initiated by Breusch and Pagan (1980) can be employed. The LM statistics are, when valid for a fixed N as T approaches infinite, given by:

$$\text{LM}= T \sum_{I=1}^{N-1} * \sum_{J=i+1}^{N-1} \hat{\theta}_{IJ}^2 \quad (2)$$

Moreover, if the T is less than the N, then the LM test is not valid. Furthermore, Pesaran's (2004) cross-sectional dependency test would hence be more efficient as follows:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{I=1}^{N-1} * \sum_{J=i+1}^{N-1} \hat{\theta}_{IJ}^2\right) \quad (3)$$

3.3 Panel Unit Root Test

Considering the assumption of the presence of cross-sectional dependency within our panel data, we employed the approach of Im, Pesaran, and Shin (2003), which is denoted as the IPS test. Contrary to the approaches of Levin and Lin (1993) and Levin, Lin and Chu (2002), which is denoted as the LL test, and Breitung (2001), the IPS test accounts for heterogeneity in the autoregressive coefficient. The IPS test defines an augmented Dickey-Fuller (ADF) regression that includes the trend and intercept for each observation, which is revealed in equation 4;

$$\Delta \boldsymbol{y_{it}} = \boldsymbol{\tau_i} + \boldsymbol{\alpha_i y_{i,t-1}} + \sum_{\boldsymbol{x=1}}^{\boldsymbol{\varphi_i}} \boldsymbol{\theta_{ix}}\ \Delta \boldsymbol{y_{i,t-x}} + \boldsymbol{\mu_{it}} \quad (4)$$

where y_{it} is the chosen variable for country *i* for year t, τ_i shows the individual fixed effects, and α_i ensures that the residuals are uncorrelated through time. The null hypothesis is $H_0: \tau_i = 0$ for all i, where i =1, 2,3,….N and t = 1, 2, 3,…..T, while the alternative hypothesis is $H_1: \tau_i < 0$ for i =1, 2,….N_1 and $\tau_i = 0$ for i =N_1 + 1,…., N with 0 <N_1 < N. The alternative hypothesis allows for some individual countries or series to have a unit root problem; so rather than pooling the data, the IPS test splits the unit root tests for N cross-section units. The IPS standardized test is based on averaging the groups' ADF statistics, as follows;

$$\bar{t} = \frac{1}{N}\sum_{I=1}^{N} t_{iT} \quad (5)$$

where t_iT is the t-statistic, which is normally distributed for the ADF for country i as shown in Equation (3). Im, Pesaran, and Shin (2003) initiated the critical values of both N and T.

3.4 Panel Cointegration Test

The null hypothesis for Westerlund's (2007) ECM panel cointegration test is no cointegration among the variables. If the error correction term in the ECM is equal to zero, then we don't accept the null hypothesis of no cointegration. Four statistics are suggested by Westerlund (2007) for use in testing the existence of panel cointegration. Two such statistics are group mean statistics, while the other two are panel statistics. The panel statistics depend on pooling the data for the ECM's cross-sectional dimension. Furthermore, the group mean statistics do not provide this data. The null hypothesis for both the group mean statistics, denoted by G_t and G_a, and the pooled mean statistics, denoted by P_t and P_a, also assumes no cointegration. Moreover, the alternative hypothesis for the panel statistics test is that all the panel variables are cointegrated ($H_1: \alpha_1 = \alpha < 0$ for all i's), while the alternative hypothesis for the

group mean statistics is that cointegration exists for at least one cross-section ($H_1: \alpha_1 = \alpha < 0$ for at least one *i*).

For the robustness check we implemented Kao's (1990) cointegration test and Maddala and Wu (1999) Fisher type Johansson cointegration test based on Johanson (1991). According to Engel and Granger (1987), if two variables are not stationary at level and cointegrated, there must be at least a one-way causal relationship between them. Granger (1987) and Engle and Yoo (1987) argued that a prior cointegration test is a must to prevent any "spurious regression" and to perceive the trivial trend for the variables' series. Based on Dickey, Jansen and Fuller (1991), a cointegration test inspects whether a long run equilibrium interrelation arises between the variables or not. If cointegration doesn't exist, variables lack a long run equilibrium interrelation; therefore, they move distant from each other.

According to Gonzales (1994), Johansen and Jeselius (1990) procedure is superior to Engel and Granger two - step procedure. This cointegration was chosen over Engel and Granger (1987) due the various drawbacks of the other method. First, inconsistent results are derived if we changed the direction of the regression; this means that the output of regressing Z on Y will be distinct to the output from regressing Y on Z. Second, in multivariate analysis, the methodology doesn't work if there is more than two cointegrating vectors. Finally, it is a two-step procedure; thus, if an error term that is generated by mistake in the first step, then it will be carried out to the second step and will not be dropped. We implemented Johansen (1988) test that reveals the maximum eigenvalue statistics and trace statistics initiated by Johansen and Jeselius (1990) as follows:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} \log * \left(1 - \hat{\lambda}_i\right) \quad (6)$$

$$\lambda_{max} = -T \log * (1 - \hat{\lambda}_{r+1}) \quad (7)$$

3.5 Panel Dynamic Causality Test

A well-established model specification for a bivariate (W, Z) Granger causality test can be shown as below:

$$W_t = \sigma_0 + \sigma_i W_{t-i} + \beta_i Z_{t-i} + \varepsilon_t \quad (8)$$

$$Z_t = \sigma_0 + \sigma_i Z_{t-i} + \beta_i W_{t-i} + \varepsilon_t \quad (9)$$

Equation 8 tests the null hypothesis that Z doesn't granger cause W, while Equation 9 tests the null hypothesis that W doesn't granger cause Z. A bidirectional causality exists between Z and W if we reject the null hypothesis of both equations. On the other hand, a unidirectional causality occurs if we didn't accept the null hypothesis for only one equation.

Granger causality can be estimated in three ways. First, there is simple Granger causality, wherein only two variables and their lags are included. Second, there is multivariate Granger causality, whereby we test whether two or more independent variables have an impact on the dependent variable. Finally, Granger causality can be investigated using VAR system. This study employs Dumitrescu and Hurlin's (2012) panel Granger causality test. The chosen test is reliable if we have cross-sectional dependency in our data, as well as when the time dimension is greater than the cross-sectional dimension. Two distributions are available for the test; the first being the asymptotic distribution when T > N, while the semi-asymptotic distribution is used when T < N. The specification of the model is given as follows:

$$x_{it} = \delta_i + \sum_{j=1}^{J} \rho_j^j x_{i,t-j} + \sum_{j=1}^{J} \pi_j^j \ T_{i,t-j} + \epsilon_{it} \quad (10)$$

x_{it} are scalar coefficients of the independent variable, which is the Gini coefficient. $T_{i,t-j}$ is a vector that includes all the explanatory variables, namely the consumer price index, trade openness, and domestic credit as provided by the financial sector. According to the assumption of Dumitrescu and Hurlin (2012), the panel Granger causality test is normally distributed.

3.6 Pooled Mean Group Estimation

This study employs the methodology of the pooled mean group estimation of dynamic heterogeneous panels introduced by Pesaran et al. (1999b) to test the outcome of financial development on income inequality. Our data cover the time periods t =1, 2, .. , T, while the number of groups *i*= 1, 2,…., N. The model specification is the ARDL. The dependent variable x is given by the following equation;

$$Z_{it} = \sum_{j=1}^{p} \alpha_{ij} Z_{i,t-j} + \sum_{j=0}^{q} \acute{\delta}_{ij} x_{i,t-j} + \beta_i + \mu_{it} \quad (11)$$

where Z_{it} is the scalar of the dependent variable (Gini), x_{it} is K × 1 vector of the explanatory variables (domestic credit by financial sector, consumer price index, trade openness and government expenditure) for group i, β_i shows the fixed effects, α_{ij} shows the scalar coefficients for the lags of the independent variables, and $\acute{\delta}_{ij}$ are K × 1 vector coefficient vectors.

Re-parameterizing Equation (11) results in the following:

$$\Delta Z_{it} = \pi_i Z_{i,t-j} + \acute{\gamma}_i x_{i,t-j} + \sum_{j=1}^{p-1} \alpha_{ij} \Delta Z_{i,t-j} + \sum_{j=0}^{q-1} \acute{\delta}_{ij} \Delta x_{i,t-j} + \beta_i + \mu_{it} \quad (12)$$

The model assumes that the error terms (μ_{it}) are independently distributed among i and t with zero variance ($\sigma_i^2 < 0$) and mean. Furthermore, assuming that $\pi_i < 0$ for all *i*'s, it defines a long-term interrelation between Z_{it} and X_{it} as follows;

$$Z_{it} = \acute{o}_i x_{it} + \omega_{it} \quad (13)$$

where i= 1, .., N , t = 1,.., T, $\acute{\sigma}_i = {}^{-\acute{\gamma}_i}/_{\acute{\sigma}_i}$ is K × 1 long-term vector coefficient and ω_{it} are time invariant and hold the fixed effects. We can now rewrite Equation (12) as follows:

$$\Delta Z_{it} = \pi_i \varphi_{i,t-1} + \sum_{j=1}^{p-1} \alpha_{ij} \Delta Z_{i,t-j} + \sum_{j=0}^{q-1} \acute{\delta}_{ij} \Delta x_{i,t-j} + \beta_i + \mu_{it} \quad (14)$$

The error correction term is given by $\varphi_{i,t-1}$, while π_i is the coefficient of the error correction term that accounts for the speed of adjustment toward long-term equilibrium. If π_i is negative and statistically significant, then it implies that the variables will return to long-term equilibrium with the magnitude of the coefficient.

The pooled mean group estimation requires the long-term coefficients to be equal; however, it permits the variability of the short-term coefficients, error variances, and intercepts across sections. This means that σ_i will be equal to zero for all *i*'s. Pesaran et al. (1999) created the pooled maximum likelihood estimation by considering that the error terms (μ_{it}) are normally distributed. The estimators are given by

$$\hat{\pi}_{PMG} = \frac{\sum_{I=1}^{N} \tilde{\pi}_i}{N}, \quad (15)$$

$$\hat{\gamma}_{PMG} = \frac{\sum_{I=1}^{N} \tilde{\gamma}_i}{N}, \quad (16)$$

$$\hat{\alpha}_{JPMG} = \frac{\sum_{I=1}^{N} \tilde{\alpha}_i}{N}, \text{ where j=1,2,…, p-1,,} \quad (17)$$

$$\hat{\delta}_{jPMG} = \frac{\sum_{I=1}^{N} \tilde{\delta}_i}{N}, \text{ where j= 0,1,….,q-1} \quad (18)$$

and $\hat{\sigma}_{PMG} = \tilde{\sigma}$ (19)

Chapter 4

EMPIRICAL RESULTS AND DISCUSSIONS

4.1 Cross-sectional Dependency Results

This chapter aims at explaining the methodologies used to inspect the interrelation between financial development and income inequality. Our first procedure involved inspecting the presence of cross-sectional dependency in our panel data using two methods: Breusch and Pagan (1980), and Pesaran (2004). The null hypothesis for both tests suggests that there is no cross-sectional dependency among the panel variables. The results given in Table 2 allow us not to accept the null hypothesis. Thus, we can conclude that there is cross-sectional dependency between our variables.

Table 2: Cross-sectional Dependency Results

Test	Statistic	Degree of freedom	Probability
Breusch-pagan Chi-square	537.8104***	55	0.0000
Pearson LM Normal	44.98536***		0.0000

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

Table 2 reveals that both the utilized tests show cross-sectional dependency at the 1% level of significance.

4.2 Panel Unit Root Results

The second procedure involved checking for the stationarity level of our variables. We need to assure that our variables are order one I (1) integrated in order to proceed with the panel cointegration test. We employed the IPS panel unit root method initiated by Im, Pesaran, and Shin (2003). The variables are given as GINI for the Gini coefficient, DCFS for domestic credit provided by the financial sector, CPI for the consumer price index, and TRADE for trade openness. The null hypothesis for the IPS test presumes the non-stationarity of the variables.

Table 3: IPS Panel Unit Root Test

Variables	Level	First Difference
GINI	-1.9706	-2.6898***
DCFS	-1.3366	-4.3985***
CPI	3.2619	-2.1468**
TRADE	-1.8366	-5.3575***
GEXP	-1.5149	-5.3468***

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

Table 3 shows the test statistics for the IPS panel unit root test for all the variables. The test statistics demonstrate that none of the variables are stationary at level. However, they are stationary at the first difference at a 1% level of significance.

Table 4: Statistics Summary for the Variables

	DGINI	DDCFS	DCPI	DTRADE	GEXP
Mean	0.005571	0.41873	5.007018	-0.433904	1.19E+11
Median	0.006	0.535425	2.976663	-0.383473	6.45E+10
Maximum	0.029	74.52058	80.47247	39.60195	6.72E+11
Minimum	-0.04	78.08693	1.096083	-47.92489	8.69E+09
Std. Dev.	0.005463	9.869746	8.79801	7.977113	1.37E+11
Skewness	-1.521624	-0.290115	5.069099	-0.767323	1.824325
Kurtosis	23.09096	27.84445	34.04367	10.53496	5.991910
Jarque-Bera	4731.239	7076.478	12220.23	677.5391	263.4594

Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	1.532	115.1509	1376.93	-119.3237	3.38E+13
Sum Sq. Dev.	0.008177	26690.86	21208.97	17435.81	5.29E+24
Observations	275	275	275	275	275

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

Table 4 sums up the statistics determined for the model variables at the first difference. The Jarque-Bera normality tests show that all the variables are normal at the first difference.

4.3 Panel Cointegration Tests Results

Granger (1981) was the first to propose the idea of cointegration, although Engel and Granger (1987) and Phillips and Ouliaris (1990) later developed it. The concept of cointegration concerns testing if there is a long-term interrelation between the variables. Since we found from the IPS panel unit root tests that all our variables are cointegrated of order one I (1), we can proceed with the panel cointegration test. This study utilizes Westerlund's (2007) panel unit root cointegration test. The null hypothesis for the test assumes no cointegration between the variables, which is similar to the approaches of Kao (1999) and Pedroni (1999). We enrolled the Akaike information criterion (AIC) to choose the optimal lag and lengths of the data.

Table 5: Westerlund (2007) Panel Cointegration Test

Statistic	Value	Z-value	p-Value
G_t	-0.495**	6.775	1.000
G_a	-1.631***	4.902	1.000
p_t	-3.584***	3.269	1.000
p_a	-2.663**	2.906	0.998

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level. The results are using 300 iterations. G_t and G_a donates group mean statistics, while $P_t$and P_a donates panel statistics.

Table 5 shows Westerlund's panel cointegration results. The four test statistic results reject the null hypothesis of no cointegration between the variables. Thus, we can terminate that there is a long-run interrelation between income inequality, financial development, inflation, and trade openness for the selected MENA countries at a 5% level of significance.

Table 6: Kao's Residual Cointegration Test Results

	t-Statistic	Probability
ADF	-0.463807***	0.3214

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

Table 7: Fisher-type Johansen (2002) Panel Cointegration Test

Model	Fisher statistic λ_{trace}	Probability	Fisher statistic λ_{Max}	probability
None	290.2***	0.0000	188.5	0.0000
At most 1	137.5***	0.0000	101.3	0.0000
At most 2	58.34**	0.0000	39.95	0.0110
At most 3	36.56**	0.0264	31.51	0.0861
At most 4	35.77**	0.0321	35.77	0.0321

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level. P-value for rejecting the null is based on Mackinnon, Haug, and Michelis (1999).

As a robustness check, we employed Kao's (1990) cointegration test and Maddala and Wu's (1999) Fisher-type Johansen cointegration test, which is based on the work of Johansen (1991). Table 6 presents the Kao's test results, which reject the null hypothesis that there is no cointegration between the variables at the 1% level of significance. The Fisher-type Johansen results presented in Table 7 show that there is a long-term cointegration for, at most, four cointegrating equations. We therefore conclude that both Kao's (1990) and Maddala and Wu's (1999) tests revealed consistent results similar to those obtained using Westerlund's panel cointegration test.

4.4 Panel Granger Causality Results

This study employed the methodology of pooled mean group estimation of dynamic heterogeneous panels by Pesaran et al. (1999) to test for the directional impacts for all of our model variables. The results for panel Granger causality is demonstrated in Table 8.

Table 8: Dumitrescu and Hurlin's (2012) Panel Dynamic Causality Test

Null hypothesis (H_0)	W-Statistics	Zbar-statistics	p-Value	Granger Causality
GINI → DCFS	4.94601	7.59148	3.E-14	*NO*
DCFS → GINI	3.52830	4.79311	2.E-06	*NO*
GINI → CPI	2.66482***	3.08872	0.0000	***YES***
CPI → GINI	3.89431	5.51557	3.E-08	*NO*
GINI → TRADE	2.29260**	2.35402	0.0186	***YES***
TRADE → GINI	4.24594	6.20963	5.E-10	*NO*
GINI → GEXP	2.85875***	3.46395	0.0005	***YES***
GEXP → GINI	2.59918***	2.95242	0.0032	***YES***
DCFS → CPI	3.23304	4.21031	3.E-05	*NO*
CPI → DCFS	6.60800***	10.8720	0.0000	***YES***
DCFS → TRADE	3.09896	3.94565	8.E-05	*NO*
TRADE → DCFS	7.46654***	12.5666	0.0000	***YES***
CPI → TRADE	2.55061***	2.86330	0.0042	***YES***
TRADE → CPI	5.87109***	9.41744	0.0000	***YES***
GEXP → DCFS	3.28205	4.29810	2.E-05	*NO*
DCFS → GEXP	2.67249***	3.09690	0.0000	***YES***

GEXP → CPI	2.40592**	2.57158	0.0101	***YES***
CPI → GEXP	1.49934	0.78506	0.4324	*NO*
GEXP → TRADE	3.11880	3.97641	7.E-05	*NO*
TRADE → GEXP	2.63186***	3.01683	0.0026	***YES***

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

The results of the panel Granger causality testing are given in Table 8. From Table 8, we can conclude that there are three bidirectional causalities: First, between income inequality and government expenditure; second, between trade openness and inflation; and third, between inflation and government expenditure. In other words, inequality has prominent forecasting power over government expenditure, and the other way around. Furthermore, trade openness has prominent forecasting power over inflation, and the other way around.

In addition, inflation has prominent forecasting power over government expenditure, and the other way around. From those results, we can claim that inflation induces by both financial development and income inequality and vice versa. Therefore, finance-inequality have a predictive power over each other through the channel of inflation.

Moreover, there are four other unidirectional causalities: First, from income inequality to inflation; second, from income inequality to trade openness; third, from inflation to financial development; and finally, from trade openness to government expenditure.

4.5 Pooled Mean Group Estimation Results

Table 9: The Long-run Coefficients of the Pooled Mean Group Estimation

Coefficient	PMGE	P-Value
π_i	-0.456194 (0.182581)**	0.0136
ΔDCFS	-0.000103 (3.46E-05)***	0.0034
ΔCPI	-0.000240 (3.99E-05)***	0.0000
ΔTRADE	-0.000303 (5.06E-05)***	0.0000
ΔGEXP	-0.001405 (0.000397)***	0.0005

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

Table 9 shows the long-run PMGE regression results. The dependent variable for the regression is income inequality, which is regressed on financial development in addition to two other explanatory variables; namely the CPI, TRADE, and government expenditure. The coefficient of the error correction term which measures the speed of adjustment required for the variables to return to their market equilibrium, which is donated by π_i, is inverse and statistically significant. Thus, financial development, income inequality, trade openness, and inflation will converge toward their long-run equilibrium by a rate of 45% annually.

Furthermore, as financial development increases by 1%, income inequality decreases by 0.000103. Our findings hence support the linear inequality-narrowing hypothesis initiated by Galor and Zeria (1993), Mookherjee and Ray (2003), and Banerjee and Newman (1993). In addition, a 1% increase in the CPI leads to a fall in income inequality by 0.000240, which is statistically significant. The sign of the CPI coefficient is opposite to the theory. However, the tiny magnitude of the coefficient almost approximates to zero. Furthermore, a 1% increase in trade openness leads to a reduction in income inequality by 0.000303, which is statistically significant. Finally,

a 1% increase in government expenditure leads to a decrease in income inequality by 0.001405. Our findings are similar to those of Reuveny and Li (2003) for 69 countries over the period 1960 to 1996, although they are contrary to the findings of Shabaz et al. (2007) in Pakistan from 1971–2006. Moreover, Dollar and Kraay (2001) argue that for selected developing countries, trade openness stimulates economic growth, reduces poverty levels, and alleviate the income disparity between the poor and rich individuals.

Table 10: The Short-run PMGE Results

Group	Variables	Coefficients	P-value	SR DCFS Impact
Algeria	π_i	0.202955 (0.024729)	0.0038	*Negative*
	ΔDCFS	-5.76E-05*** (3.17E-09)	0.0000	
	ΔCPI	1.24E-05 (3.60E-08)	0.0000	
	ΔTRADE	-0.000113(7.15E-09)	0.0000	
	ΔGEXP	0.000285 (8.05E-08)	0.0000	
Bahrain	π_i	-0.870370 (0.070582)	0.0011	*Positive*
	ΔDCFS	7.62E-06 *** (8.26E-09)	0.0000	
	ΔCPI	0.000967 (1.83E-07)	0.0000	
	ΔTRADE	0.000182 (4.63E-09)	0.0000	
	ΔGEXP	0.000288 (2.71E-070)	0.0000	
Egypt	π_i	-1.724475 (0.035313)	0.0000	*Negative*
	ΔDCFS	-0.000274*** (4.99E-09)	0.0000	
	ΔCPI	0.000712 (3.57E-08)	0.0000	
	ΔTRADE	-5.06E-06 (5.48E-09)	0.0000	
	ΔGEXP	0.001384 (6.51E-07)	0.0000	
Iran	π_i	-0.464909 (0.049451)	0.0025	*Positive*
	ΔDCFS	0.000192*** (2.04E-08)	0.0000	
	ΔCPI	0.000220 (2.20E-08)	0.0000	
	ΔTRADE	-0.000110 (2.71E-08)	0.0000	
	ΔGEXP	-0.000178 (1.68E-07)	0.0000	
Jordan	π_i	-0.439724 (0.008242)	0.0003	*Positive*

	ΔDCFS	0.000275*** (1.03E-08)	0.0000	
	ΔCPI	0.000466 (3.79E-08)	0.0000	
	ΔTRADE	0.000162 (2.90E-09)	0.0000	
	ΔGEXP	-0.000178 (1.68E-07)	0.0000	
Kuwait	π_i	-0.556120 (0.039673)	0.0000	*Negative*
	ΔDCFS	-0.000146*** (8.72E-08)	0.0000	
	ΔCPI	0.000574 (9.12E-07)	0.0000	
	ΔTRADE	0.000167 (8.11E-08)	0.0000	
	ΔGEXP	0.001275 (2.10E-06)	0.0000	
Morocco	π_i	-0.434500 (0.045043)	0.0024	*Positive*
	ΔDCFS	4.34E-05*** (5.03E-09)	0.0000	
	ΔCPI	-0.000723 (2.35E-07)	0.0000	
	ΔTRADE	0.000176 (5.80E-09)	0.0000	
	ΔGEXP	-0.000368 (3.32E-07)	0.0000	
Saudi Arabia	π_i	-0.277935 (0.016723)	0.0005	*Positive*
	ΔDCFS	6.11E-05*** (1.28E-08)	0.0000	
	ΔCPI	0.000345 (1.06E-07)	0.0000	
	ΔTRADE	0.000168 (8.81E-09)	0.0000	
	ΔGEXP	0.000153 (2.36E-07)	0.0000	
Sudan	π_i	-0.513672 (0.032531)	0.0006	*Negative*
	ΔDCFS	-6.08E-05*** (8.35E-09)	0.0000	
	ΔCPI	0.000137 (3.87E-09)	0.0000	
	ΔTRADE	7.18E-05 (1.09E-08)	0.0000	
	ΔGEXP	-0.000157(1.74E-07)	0.0000	
Tunisia	π_i	-0.409446 (0.014273)	0.0001	*Positive*
	ΔDCFS	8.60E-05*** (8.20E-09)	0.0000	
	ΔCPI	-0.000734 (1.50E-07)	0.0000	
	ΔTRADE	0.000131 (1.76E-09)	0.0000	
	ΔGEXP	-0.001982 (4.05E-07)	0.0000	
Yemen	π_i	0.875969 (0.140268)	0.0083	*Negative*
	ΔDCFS	-0.000281*** (2.79E-08)	0.0000	
	ΔCPI	2.68E-05 (4.20E-08)	0.0000	
	ΔTRADE	-0.000409 (1.84E-08)	0.0000	

ΔGEXP	-0.001556 (4.34E-07)	0.0000

Note: Asterisks *** show statistical significance at one percent, ** at five percent and * at ten percent level.

The short-run results for the PMGE cross country regressions, showed in Table 10, reveal a negative interrelation between financial development and income inequality that is significant at 1 % for 5 countries including Yemen, Algeria, Kuwait, Sudan and Egypt. On the contrary, a positive interrelation was derived between financial development and income inequality for 6 countries; Iran, Jordan, Saudi Arabia, Morocco, Bahrain, and Tunisia; at 1 % level of significance. The positive interrelation between financial development and inequality showed that at the initial levels of financial development, inequality increases due to the fact that only the rich people or entrepreneurs can manage to enter various financial institutions and markets, while the poor are deprived of the opportunity. In time, financial development enroots and poor citizens start to capture the benefits of this development. Thus, inequality diminishes.

Results are compatible with the theory of inequality-narrowing hypothesis by Galor and Zeria (1993), Mookherjee and Ray (2003), and Banerjee and Newman (1993). The prominent benefaction of this study is that financial development is a considerable determinant alleviating and mitigating income inequality in the MENA region. The implications for these results are discussed further in the following section.

Chapter 5

GLOBALIZATION AND INCOME INEQUALITY: THE CASE STUDY OF EGYPT

5.1 Globalization and Income Inequality

Over the past half century, globalization has accelerated as new technologies and ideas helped in changing almost everything in our lives. According to Houck (2005), globalization is the assimilation of ideas, people, technology, capital and services. Globalization helped in minimizing transaction and transportation barriers. In time; tariffs, quotas and trade restrictions between different nations have been removed. The impact of globalization on the world economies has been extraordinary. According to Spence (2018), 13 developing countries have experienced sustainable growth rates between 7 to 10 % annually. An outstanding example would be China being able to attain continuous growth rates by at least 7 % annually for the last 25 years.

Starting from the 1990's, multinational companies or corporations began to emerge and dominate the world economies and trade. Free trade zone areas were created to facilitate international trade. Those companies and organizations benefited a lot from this economic integration. They were able to decrease their costs of production by having access to economies that offer them resources with lower prices compared to their domestic country's prices.

In the last two decades, globalization has reached to have a boundless impact on people's choices, wages, prices of goods and services, and employment rates. Countries can hardly get completely isolated from international markets by one way or another. Globalization breaks those barriers and penetrates into domestic markets. Various aspects of globalization include economic, social, financial and political. Measuring the real effect of globalization on income distributions for different nations became an inevitable requirement hence.

Many studies have tested the effect of globalization expressed in terms of trade openness and foreign direct investment on income inequality and economic growth. However, Adams (2008) questioned the effect of globalization, in terms of the intellectual property rights (IPR), on inequality for 62 developing countries covering the period 1985-2001. He argues that globalization has both advantages and drawbacks; and to maximize the benefits of the economy, the environment needs to encourage education, technology and creditable institutions. Few studies focused on the political aspects of globalization, which is considered in our study like Nilsson and Bergh (2010). A critical point for previous studies is that they didn't account for other aspects which can influence the countries' trade and financial globalization, like trade regulations and the countries' international debt.

The purpose of this chapter is to measure the outcome of economic and political globalization on income inequality for Egypt over the period of economic liberalization under Al-Sadat's regime. This study utilizes the KOF Index of Globalization and the Standardized World Income Inequality Database (SWIID) to measure income inequality. The economic KOF globalization index includes two major aspects. The first is trade globalization and it measures trade in goods, trade in

services, trade partner diversification, trade regulations, trade taxes and tariffs. The second is financial globalization and it measures foreign direct investment (FDI), portfolio investment, international debt, international reserves, international income payment, investment restrictions and capital account openness. The political KOF globalization index accounts for the absolute number of embassies, the personnel contributed to the United Nations (UN) Security Council per capita, the number of international non-governmental organizations (NGOs), international treaties, and the number of partners in investment treaties.

The rest of this chapter is ordered as follows: Section two previews the relevant previous literature which studies the globalization and income inequality nexus. Sections three and four explain the data and methodology which is utilized in our study; while section five presents the findings.

5.2 Literature Review

Lots of theories and explanations were developed as to how the distribution of income is affected by global integration. Such theories are classified into two major groups: The first group predicts convergence in income between nations when countries globalize more. Thus, globalization leads to income inequality reduction. The second group of theories on the other hand suggests divergence in income between nations when countries globalize more. Thus, globalization leads to expansion of income inequality;

1. **Globalization-Inequality Convergence**

The modernization theory explains the process which a country goes through to transfer from a developing to a modern country. It argues that developing countries can grow in the same way the developed countries have done. Thus, if globalization in

terms of FDI, trade and technology transfers were implemented in the poorly developed countries, poverty can be reduced. Beer (1999) supported the modernization context suggesting that continuous growth widens the middle class, boosts savings of the poor and increases employment rates, thus it helps in inequality reduction. In addition, Wade (2001) and Heshtmati (2007) explained how the neoliberal paradigm and the neoclassical theory suggest that globalization through FDI and trade leads to a fall in the distribution of income inequality between different countries.

2. Globalization-Inequality Divergence

On the contrary, the endogenous growth theory suggests divergence in distribution of income among countries. The theory explains that economic growth is tied to technology and innovation, which are scarce in developing countries and dominant in developed countries. It assumes that technology and knowledge result in an increasing return to scale. The advocates of anti-globalization approaches argue that globalization leads to divergence of incomes among various economies. Giovanni (1999) claimed that implementation of free trade liberalization and removing trade barriers between nations and international markets and shifting to intensive technologies lead to higher income inequality.

The dependency theory (Ferraro V. 2008) assumes that globalization and free trade impoverish the poor developing countries and enrich the developed countries. It argues that the developed countries are able to extract the raw materials from the poor developing countries to interchange for fewer manufactured goods and services. As a result of globalization, huge disparities occur in benefits of the economic assimilation of the developing and developed countries. Thus, inequality expands more in poor developing nations. In addition, Bornschier and Chase-Dunn (1985) argued that FDI

leads to the dominance of monopoly in the industrial sector, thus underutilization in all aspects of the economy occurs. Therefore, nations which completely depend on FDI suffer from stagnation, an increase in unemployment rates and income inequalities.

Similar to theoretical studies, empirical studies show inconsistent results measuring the impact of globalization on income inequality.

Lee (2000) studied 14 European countries covering the period 1951-1992, finding a proof for Kuznets hypotheses and FDI increasing income inequality. Mahler et al. (2001) using cross country data argued that FDI as a proxy for globalization is not statistically significant in explaining variation in income inequality. Thus, globalization is not correlated to income inequality. Likely, Mah (2002) studied Korea from 1975 to 1995 and concluded that globalization didn't have a significant impact on income inequality. Dollar and Kray (2002) derived that trade openness is not significantly interrelated to the income share of the poorest quintile for 92 counties covering the period 1960-1999. In contrast, Milanovic (2005) employed data from household surveys for 77 countries over the period 1988-1998 and established evidence for divergence of income due to globalization. In addition, globalization's effect was harsher for poorer countries which had a GDP per capita below $8000.

Bussmann et al. (2005) used panel data for 72 countries over the period 1970-1990. They found that globalization doesn't increase income inequality. Furthermore, FDI is uncorrelated to inequality for both developed and developing countries, while trade openness increases inequality. Choi (2006) questioned the effect of FDI on inequality for 119 countries over the period 1993-2002 and found a globalization pro inequality.

According to Figini and Görg (2006), there is a non-linear interrelation between inward FDI and wage inequality for 103 countries. The coefficient showed a positive relationship in early stages, however later it turns out to be negative. Benar (2007) argued that globalization elevated income inequality for 10 countries in the MENA region over the period 1960-2004.

Wan and Chen (2007) researched the effect of globalization on regional income inequality in China. They found that globalization increases inequality and its share increases over time. Moreover, domestic capital represents the greatest contributor to this regional inequality. In addition, the economic reform exhibits a progressively significant impact on inequality. Inconsonance with Dreher and Gaston (2008), globalization increases inequality for OECD countries covering the period 1970-2000. Babones and Vonada (2009) studied the interrelation between trade globalization and inequality for 210 countries over the period 1975-1995. Accordingly, they didn't find a significant correlation between trade globalization and income inequality. Meschi and Vivarelli (2009) studied 70 developing countries during the period 1980-1999, showing that the aggregate trade flows have a weak impact on inequality levels. However, disaggregate total trade flows relative to their origin increases income inequality.

On the other hand, Bergh and Nilsson (2010) employed SWIID, KOF globalization index, and economic freedom index for 80 countries over the period 1970-2005. Results showed that freedom to trade and social globalization increases inequality; while political globalization, legal reform and monetary reforms don't boost inequality. Basdas and Çelik (2010) found that FDI inflow hinders income inequality

for various developed and developing countries, while it increases inequality for other miracle countries (Thailand, India, Malaysia, China, Singapore, and Korea).

Faustino and Vali (2011) implemented static and dynamic panel methods for Organization for Economic Cooperation and Development (OECD) countries for the period 1995-2007. Results suggest that trade openness helps in reducing inequality, while adversely FDI boosts income inequality. Atif et al. (2012) employed static and dynamic panel models for 68 developing countries covering the period 1990-2010, finding that globalization helps in increasing income inequality. Asteriou, Dimelis and Moudatsou (2014) employed panel regression models for the 27 European Union countries over the period 1995-2009. They concluded that trade acts as an equalizer; while FDI, capital account openness and stock market capitalization increase income inequality. Khyareh (2018) employed panel cointegration and fully modified OLS method to investigate the interrelation between globalization index, income inequality, FDI and income inequality index. The findings suggested that globalization expands gross wage inequalities. Furthermore, FDI and trade increase gross income inequality. In addition, as globalization increases, income redistribution by the government increases.

Dorn, Fuest and Potrafke (2018) utilized OLS and two-stage Ordinary Least Squares methods for 140 countries during the period 1970-2014. The findings showed that the outcome of globalization on income inequality varies across countries. Overall a positive significant interrelation was found between globalization and income inequality for transition and Middle and Eastern Europe countries. Furthermore, advanced economies revealed no significant interrelation between globalization and inequality.

5.3 Econometric Model

5.3.1 Data and Model Specification

This study employs annual time series data for Egypt during the liberalization period of the economy under Al-Sadat's regime. The chosen time period is to see the impact of the open-door policy[1], implemented by the Egyptian president Al-Sadat in 1972, on income inequality. That is, to capture all economic episodes for the case study. The study ends at 2010 to exclude the era after January 2011 Egyptian revolution. Usually the economy takes time to stabilize after such political shocks, thus we preferred not to expand our data. Our dependent variable is Gini coefficient, symbolized by GINI, as a proxy for income inequality. While the study independent variables are economic globalization index, symbolized by ECOGLB, political globalization index, symbolized by POLGLB, government expenditure as a percentage of GDP, symbolized by GEXP, domestic credit provided by the financial sector, symbolized by DCFS, trade openness which is exports minus imports, symbolized by TRADE, and finally the real gross domestic product, symbolized by RGDP. SWIID is used to generate our Gini coefficients. Economic, political and social globalization indexes are obtained from the KOF Index of Globalization.

Examining the outcome of globalization on income inequality, our model specification is provided as;

GINI= f (ECOGLB, POLGLB,DCPFS,TRADE,RGDP,GEXP)

$$GINI = \alpha_0 + \alpha_1 ECOGLB_t + \alpha_2 POLGLB_t + \alpha_3 DCFS_t + \alpha_4 TRADE_t + \alpha_5 RGDP_t + \alpha_6 GEXP + \varepsilon_t \quad (20)$$

[1] For more information, please see the references for McLaughlin (1978) and Waterbury (1985).

where,

GINI = Gini coefficients as a proxy for income inequality,

$ECOGLB_t$ = Economic globalization,

$POLGLB_t$ = Political globalization,

$DCFS_t$ = Domestic credit provided by the financial sector,

$TRADE_t$ = Trade Openness,

$RGDP_t$ = Real GDP,

$GEXP_t$ = Government expenditure,

ε_t = Stochastic error term.

5.3.2 Unit Root and Cointegration Tests

Before estimating the relationship in our model, a prior stationarity check has to be implemented for our series. Nelson and Plosser (1982) argued that most of the macroeconomic time series suffer from unit root with stochastic trends. According to Stock and Watson (1989), Granger causality test (Granger, 1988) is considered to be ultimately sensitive to the stationarity of the series. The stability condition for the VAR will be violated if the output of the unit root tests shows that the variables are not stationary at level, but are rather integrated of order one I (1).

The VECM model is more pertinent in investigating the interrelation among our variables. We implemented ADF test by Dickey and Fuller (1981) as well as Phillips-Perron (PP) test by Phillips and Perron (1988). For the robustness check we employed Kwiatkowski Phillips Schmidt and Shin's (KPSS) by Kwiatkowski et al. (1992). The general equation form is as follows;

$$\Delta Z_t = \theta_1 + \theta_2 t + \theta_3 Z_{t-1} + \sum_{i=1}^{P} \omega_i \Delta Z_{t-1} + \mu_t \quad (21)$$

where Z_t is the variables that we are testing, the ADF test accounts for serial correlation by including the lags differences of the dependent variable Z_t. The null hypothesis for the test is H_0:$\theta_3 = 0$, while the alternative hypothesis is H_1:$\theta_3 \neq 0$. Z_t is considered to be non-stationary if we failed to reject the alternative hypothesis.

According to Engel and Granger (1987), if two variables are not stationary at level and cointegrated, there must be at least a one-way causal relationship between them. Granger (1987) and Engle and Yoo (1987) argued that a prior cointegration test is a must to prevent any "spurious regression" and to perceive the trivial trend for the variables' series. Based on Dickey, Jansen and Fuller (1991), a cointegration test examines whether a long-run equilibrium interrelation occurs between the variables or not. If cointegration doesn't exist, variables lack a long-run equilibrium interrelation; therefore, they move distant from each other.

According to Gonzales (1994), Johansen and Juselius (1990) procedure is superior over Engel and Granger two - step procedure. This cointegration was chosen over Engel and Granger (1987) due the various drawbacks of the other method. First, inconsistent results are derived if we changed the direction of the regression; meaning that the output of regressing Z on Y will be distinct to the output from regressing Y on Z. Second, in multivariate analysis, the methodology doesn't work if there are more than two cointegrating vectors. Finally, it is a two-step procedure. This implies that if an error term was generated by mistake in the first step, it will be automatically included in the next step. We implemented the Johansen (1988) test which reveals the maximum eigenvalue statistics and trace statistics demonstrated by Johansen and Juselius (1990) as follows:

$$\lambda_{trace} = -T \sum_{i=r+1}^{n} log * (1 - \hat{\lambda}_i) \quad (22)$$

$$\lambda_{max} = -T \log * (1 - \hat{\lambda}_{r+1}) \quad (23)$$

The Null hypothesis of r cointegrating vectors assumes no cointegration. Contrary the alternative hypothesis of r + 1 cointegrating vectors assumes that cointegration exists. The JJ is based on the VAR model below:

$$\Delta z_t = \urcorner_1 \Delta y_{t-1} + \cdots + \urcorner_{k-1} \Delta y_{t-r+1} + \prod y_{t-r} + \delta + \mu_t \quad (24)$$

5.4 Vector Error Correction Model

As mentioned before, the results of the stationarity and cointegration tests will suggest either we estimate VAR or Vector Error Correction (VECM) models. Since the variables are found to be non-stationary at level and cointegrated, then the following VECM models will be estimated;

$$\begin{aligned} \Delta GINI = \varphi_1 &+ \sum_{I=1}^{P} \omega_{11,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta ECOGLOB_{t-1} \\ &+ \sum_{I=1}^{P} \gamma_{13,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{14,I} \Delta DCPFS_{t-1} \\ &+ \sum_{I=1}^{P} \alpha_{15,I} \Delta TRADE_{t-1} \\ &+ \sum_{I=1}^{P} \alpha_{16,I} \Delta RGDP_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta GEXP_{t-1} + \theta_1 EC_{t-1} \\ &+ \varepsilon_t \end{aligned} \quad (25)$$

$$\Delta ECOGLOB = \varphi_1 + \sum_{I=1}^{P} \omega_{11,I} \Delta ECOGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \gamma_{13,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{14,I} \Delta DCPFS_{t-1} + \sum_{I=1}^{P} \alpha_{15,I} \Delta TRADE_{t-1} + \sum_{I=1}^{P} \alpha_{16,I} \Delta RGDP_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta GEXP_{t-1} + \theta_2 EC_{t-1} + \varepsilon_t \quad (26)$$

$$\Delta POLGLOB = \varphi_1 + \sum_{I=1}^{P} \omega_{11,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \gamma_{13,I} \Delta ECOGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{14,I} \Delta DCPFS_{t-1} + \sum_{I=1}^{P} \alpha_{15,I} \Delta TRADE_{t-1} + \sum_{I=1}^{P} \alpha_{16,I} \Delta RGDP_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta GEXP_{t-1} + \theta_3 EC_{t-1} + \varepsilon_t \quad (27)$$

$$\Delta DCPFS = \varphi_1 + \sum_{I=1}^{P} \omega_{11,I} \Delta DCPFS_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \gamma_{13,I} \Delta ECOGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{14,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{15,I} \Delta TRADE_{t-1} + \sum_{I=1}^{P} \alpha_{16,I} \Delta RGDP_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta GEXP_{t-1} + \theta_4 EC_{t-1} + \varepsilon_t \quad (28)$$

$$\Delta TRADE = \varphi_1 + \sum_{I=1}^{P} \omega_{11,I} \Delta TRADE_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \gamma_{13,I} \Delta ECOGLOB_{t-1} + + \sum_{I=1}^{P} \alpha_{14,I} \Delta DCPFS_{t-1} + \sum_{I=1}^{P} \alpha_{15,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{16,I} \Delta RGDP_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta GEXP_{t-1} + \theta_5 EC_{t-1} + \varepsilon_t \quad (29)$$

$$\Delta RGDP = \varphi_1 + \sum_{I=1}^{P} \omega_{11,I} \Delta RGDP_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \gamma_{13,I} \Delta ECOGLOB_{t-1} + + \sum_{I=1}^{P} \alpha_{14,I} \Delta DCPFS_{t-1} + \sum_{I=1}^{P} \alpha_{15,I} \Delta TRADE_{t-1} + \sum_{I=1}^{P} \alpha_{16,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta GEXP_{t-1} + \theta_6 EC_{t-1} + \varepsilon_t \quad (30)$$

$$\Delta GEXP = \varphi_1 + \sum_{I=1}^{P} \omega_{11,I} \Delta GEXP_{t-1} + \sum_{I=1}^{P} \alpha_{12,I} \Delta GINI_{t-1} + \sum_{I=1}^{P} \gamma_{13,I} \Delta ECOGLOB_{t-1} + + \sum_{I=1}^{P} \alpha_{14,I} \Delta DCPFS_{t-1} + \sum_{I=1}^{P} \alpha_{15,I} \Delta TRADE_{t-1} + \sum_{I=1}^{P} \alpha_{16,I} \Delta POLGLOB_{t-1} + \sum_{I=1}^{P} \alpha_{17,I} \Delta RGDP_{t-1} + \theta_7 EC_{t-1} + \varepsilon_t \quad (31)$$

where EC represents the error correction term. The short-run changes are shown by the difference of the individual coefficients. A significant coefficient for the error correction term means that the previous equilibrium error terms has an impact on current outcomes.

5.5 Model Output

5.5.1 Stationarity Results

Prior testing for stationarity, Table 11 reveals the summary statistics for the variables: Gini coefficient, economic globalization, political globalization, domestic credit provided by the financial sector, trade openness, real GDP, and government expenditure.

Table 11: Summary Statistics

	GINI	DCFS	TRADE	ECOGLOB	POLGLOB	RGDP	GEXP
Mean	37.80314	83.80740	52.88190	52.38406	79.19026	9.69E+10	15.47506
Median	37.60944	83.73997	52.76088	50.64415	77.70441	8.96E+10	12.73909
Maximum	42.85407	110.9254	82.17668	66.08327	93.23964	2.19E+11	28.22164
Minimum	33.41227	49.11562	32.48178	36.67147	53.48062	2.78E+10	10.28571
Std. Dev.	3.121387	17.59644	12.65964	8.332449	11.66385	5.42E+10	5.342794
Skewness	0.076160	-0.383513	0.198180	-0.106955	-0.552017	0.567823	0.977788
Kurtosis	1.441419	2.163924	2.488301	2.115028	2.214746	2.364478	2.721849
JarqueBera	4.189477	2.199226	0.715684	1.416095	3.135674	2.893201	6.665316
Probability	0.123102	0.333000	0.699184	0.492605	0.208496	0.235369	0.035698
Sum	1549.929	3436.103	2168.158	2147.746	3246.801	3.97E+12	634.4773
Sum Sq. Dev.	389.7222	12385.38	6410.660	2777.188	5441.820	1.18E+23	1141.818
Observations	41	41	41	41	41	41	41

Table 12 shows the Pearson correlation coefficient estimation results for our studied variables. The results of the Pearson correlation coefficient indicate a statistically

inverse interrelation between income inequality, economic globalization, political globalization, the real GDP, and government spending at 1 % level of significance.

Table 12: Pearson Correlation Results

	GINI	ECOGLB	POLGLB	RGDP	TRADE	DCFS	GEXP
GINI	1.000000						

ECOGLB	-0.872377	1.000000					
	-11.14487	-----					
	0.0000	-----					
POLGLB	-0.869632	0.975234	1.000000				
	-11.00030	27.53614	-----				
	0.0000	0.0000	-----				
RGDP	-0.833253	0.960273	0.899161	1.000000			
	-9.411730	21.48950	12.83142	-----			
	0.0000	0.0000	0.0000	-----			
TRADE	-0.101187	0.158701	0.123163	0.051669	1.000000		
	-0.635172	1.003808	0.775054	0.323103	-----		
	0.5290	0.3217	0.4430	0.7483	-----		
DCFS	-0.258470	0.405441	0.451785	0.305953	0.263800	1.000000	
	-1.670922	2.769847	3.162549	2.006911	1.707927	-----	
	0.1027	0.0085	0.0030	0.0517	0.0956	-----	
GEXP	0.839093	-0.859380	-0.909529	-0.761169	-0.147209	-0.498602	1.000000
	9.632827	-10.49564	-13.66566	-7.329394	-0.929443	-3.592126	-----
	0.0000	0.0000	0.0000	0.0000	0.3584	0.0009	-----

Note: *** indicates a 1 % level of significance

In addition, economic globalization is positively and significantly correlated with political globalization, the real GDP, government spending, and the domestic credit provided by the financial sector at 1% level of significance.

Furthermore, political globalization is positively and significantly correlated with the real GDP, government spending, and the domestic credit at 1% level of significance.

On the other hand, domestic credit provided by the financial sector is negatively correlated with the government spending at 1% level of significance.

Table 13: ADF and PP Tests

	ADF TEST		PP TEST	
Variables	Level	First Difference	Level	First Difference
GINI	-1.6864 p.value(0.4301)	-3.1014** (0.0347)	-1.3072 P.value(0.6169)	-3.2498 0.0245 **
ECOGLB	-1.1861 p.value(0.6711)	-4.4907*** 0.0010	-1.1861 p.value(0.6711)	-5.0672*** 0.0002
POLGLB	-3.0918 p.value(0.1227	-2.0864** (0.0370)	-2.8239 p.value(0.0639)	-5.1145** 0.0001
DCPFS	-2.4961 p.value(0.3280)	-4.9522*** (0.0002)	-1.9963 p.value(0.5855)	-5.0755*** 0.0002
GEXP	-1.5951 p.value(0.4747	-2.6831*** (0.0087)	-1.6153 p.value(0.4656)	-9.2016*** 0.0000
RGDP	2.7623 p.value(1.0000)	-2.8011** (0.2057)	6.1891 p.value(1.0000)	-2.1312** 0.0333
TRADE	-2.4326 p.value(0.1396)	-5.4788*** 0.0000	-2.5315 p.value(0.1158)	-5.4788*** 0.0000

Note: *** indicates a 1 % level of significance and ** indicates a 5% level of significance

Stationarity results are shown in Table 13 above. According to Maddala (1998), the null hypothesis for both ADF and PP assumes the existence of a unit root in other words series non-stationary. As shown in Table 3, all variables are non-stationary at level using ADF and PP tests; thus all variables are integrated of order one I (1).

5.5.2 Cointegration Results

As a second procedure after investigating the stationarity of the variables to determine whether we will estimate the VAR or VECM model, we employed the Johansen and

Juselius (1990) multivariate cointegration method to test for the presence of a long-run interrelation between our variables.

Table 14: Cointegration Test Results

Model	λ_{trace} statistics	5% critical value	λ_{Max} statistics	5% critical value
None	0.820484	185.3493	125.6154	0.0000
At most 1	0.666631	118.3673	95.75366	0.0006
At most 2	0.519200	75.52561	69.81889	0.0163
At most 3	0.399985	46.96578	47.85613	0.0605
At most 4	0.306362	27.04454	29.79707	0.1005
At most 5	0.189555	12.77812	15.49471	0.1232
At most 6	0.110834	4.581394	3.841466	0.0323

Note: Based on MacKinnon-Haug-Michelis (1999) p-values, *** denotes the rejection of the hypothesis at the 1 % level of significance and ** indicates 5% level of significance.

Table 14 displays the cointegration outcomes for both trace test indicates three cointegrating equations that are statistically significant at 5%. Thus, a long-run interrelation occurs between our variables which represents income inequality and globalization nexus.

5.5.3 VECM Results

The third procedure now after examining the stationarity of the variables and finding a long-run interrelation among our variables using Johansen and Juselius multivariate cointegration test is to proceed for VECM estimation. The output of the VECM model is shown below in Table 15.

Table 15: VECM Results

Regressors	coefficient	S.E	t-stat
Long-run Coefficients			
ΔGINI	1	-	-
ΔECOGLB	2.606767***	0.38916	6.69839
ΔPOLGLB	-1.041952***	0.15379	-6.77504
ΔDCFS	-0.041999***	0.00970	-4.32916
ΔRGDP	-1.11E-10 ***	2.5E-11	-4.43636
ΔGEXP	-0.346489***	0.07239	-4.78645
ΔTRADE	-0.052669***	0.01251	-4.21168
Short-run Coefficients			
ΔGINI	1	-	-
ΔECOGLB	-0.469760***	0.19067	-2.46372
ΔPOLGLB	0.067044	0.26887	0.24935
ΔDCFS	0.654740	1.32618	0.49370
ΔRGDP	3.66E+08	3.3E+08	1.11186
ΔGEXP	0.356171	0.43753	0.81404
ΔTRADE	1.167812	2.03392	0.57417

Note: The error correction term ECT is -0.220363.

The VECM model allows for the short-run coefficient and long-run coefficients to vary. The results of the VECM model shown above in Table 15 reveal that there is a long-run relationship between economic globalization and income inequality; as economic globalization increases by 1%, income inequality increases by a statistically positive coefficient equal to 2.606767 at 1 % level of significance. However, as trade openness increases by 1%, income inequality falls by -0.052669. In addition, a fall occurs in income inequality with the greatest coefficient by-1.041952 due to an increase in political globalization by 1%.

Furthermore, domestic credit provided by the financial sector reduces income inequality by 0.041999. Moreover, as the real GDP increases by 1%, income inequality diminishes by a very low coefficient that is equal to -1.11E-10. Finally, the government expenditure leads to a reduction in income inequality rates by a statistically negative coefficient equal to -0.346489 at 1 % level of significance. The ECT shows the speed

of adjustment. The ECT is -0.220363, is negative and statistically significant at 5 % level of significance. In other words; income inequality, economic and political globalizations will converge to their log-run equilibrium path by 22 % annually.

5.5.4 Granger Causality Results

Table 16: Granger Causality Results

Null Hypothesis:	Obs	F-Statistic	Prob.
ECOGLOB does not Granger Cause GINI	40	0.01610	0.8997
GINI does not Granger Cause ECOGLOB		6.63281**	0.0141
POLGLOB does not Granger Cause GINI	40	0.38560	0.5384
GINI does not Granger Cause POLGLOB		22.0653	4.E-05
RGDP does not Granger Cause GINI	40	0.67646	0.4161
GINI does not Granger Cause RGDP		0.49033	0.4882
TRADE does not Granger Cause GINI	40	0.96294	0.3328
GINI does not Granger Cause TRADE		0.23627	0.6298
DCFS does not Granger Cause GINI	40	4.76348**	0.0355
GINI does not Granger Cause DCFS		5.72124**	0.0220
GEXP does not Granger Cause GINI	40	0.54344	0.4657
GINI does not Granger Cause GEXP		3.10550	0.0863
POLGLOB does not Granger Cause ECOGLOB	40	0.35865	0.5529
ECOGLOB does not Granger Cause POLGLOB		0.78823	0.3804
RGDP does not Granger Cause ECOGLOB	40	0.94031	0.3385
ECOGLOB does not Granger Cause RGDP		1.79073	0.1890
TRADE does not Granger Cause ECOGLOB	40	0.01116	0.9164
ECOGLOB does not Granger Cause TRADE		0.65230	0.4245
DCFS does not Granger Cause ECOGLOB	40	0.14201	0.7084
ECOGLOB does not Granger Cause DCFS		1.39121	0.2457
GEXP does not Granger Cause ECOGLOB	40	0.04838	0.8271
ECOGLOB does not Granger Cause GEXP		2.54709	0.1190

RGDP does not Granger Cause POLGLOB	40	0.44723	0.5078
POLGLOB does not Granger Cause RGDP		0.31429	0.5784
TRADE does not Granger Cause POLGLOB	40	0.44358	0.5095
POLGLOB does not Granger Cause TRADE		0.69531	0.4097
DCFS does not Granger Cause POLGLOB	40	0.53419	0.4695
POLGLOB does not Granger Cause DCFS		0.57071	0.4548
GEXP does not Granger Cause POLGLOB	40	0.78859	0.3803
POLGLOB does not Granger Cause GEXP		5.27034**	0.0275
TRADE does not Granger Cause RGDP	40	13.0161**	0.0009
RGDP does not Granger Cause TRADE		0.59934	0.4437
DCFS does not Granger Cause RGDP	40	0.26157	0.6121
RGDP does not Granger Cause DCFS		2.12070	0.1538
GEXP does not Granger Cause RGDP	40	2.77547	0.1042
RGDP does not Granger Cause GEXP		0.74426	0.3939
DCFS does not Granger Cause TRADE	40	0.09323	0.7618
TRADE does not Granger Cause DCFS		0.02509	0.8750
GEXP does not Granger Cause TRADE	40	0.75289	0.3912
TRADE does not Granger Cause GEXP		0.00356	0.9528
GEXP does not Granger Cause DCFS	40	0.01100	0.9170
DCFS does not Granger Cause GEXP		1.71514	0.1984

Note: ** indicates 5% level of significance.

Table 16 above shows the results of the Granger causality test. There is a uni-directional causality interrelation running from economic globalization to income inequality, from political globalization to government expenditure, and finally from trade openness to the real GDP. Furthermore, a bi-directional causality exists between domestic credit provided by the financial sector and income inequality. In other words, credit provided by the financial sector has a prominent forecast power over income inequality and vice versa.

Chapter 6

DISCUSSIONS AND POLICY IMPLICATIONS

In this chapter, we thoroughly discuss the results of this study and how a particular economic policy would affect the interrelation between financial development and income inequality. We advocate that if economic policies in those countries would focus on developing a sustainable efficient financial sector and promoting various stable modern financial institutions, it will result in better income distribution among people. Moreover, to enlarge the real outcome of finance on the egalitarian distribution of income adequately in the MENA region, auxiliary procedures need to be implemented to boost those countries' financial development. Furthermore, competent policy measures should be implemented to augment stable and effective financial systems and institutions.

Our findings suggest that liberalization helps in reducing income inequality for those countries and that financial and trade liberalization minimizes the issue of unfair income distribution. We suggest that those countries should go further in liberalizing their capital and current accounts and stop isolating their economies from the rest of the world since this will not help, but rather will just make the problem worse. Financial and trade liberalization minimizes the issue of unfair income distribution. This implies that the governments should encourage the trade of goods and services as well as liberalizing their financial markets. Governments could participate in free trade bilateral agreements, free trade multilateral agreements, trade organizations, WTO and

IMF. This will help these countries to integrate their domestic financial markets and their economies with other countries worldwide by reducing subsidies, quotas and tariffs. Furthermore, it will encourage Foreign Direct investment and portfolio investments. It is crucial to ease finance access to all entrepreneurs and poor people.

A favorable remedy for the studied countries' economies would be an expansion of their capital markets. There are different channels and ways to bring to light chances for the poor people to access a better life. Moreover, we suggest providing easily accessible finance through the opening of efficient capital markets, redistribution of resources, technological modernization and evolution of human capital. We advise that economic and micro finance policies should be driven by developing vigorous financial institutions to rebuild and reform the financial sector in those countries. In addition, easing access to finance for the poor will result in helping them to progress their entrepreneurial skills, as well as in encouraging them to participate in effective valuable projects and activities. Furthermore, this will provide them with an advanced level of education increasing the levels of technological innovations as well as human capital formation in those economies. In conclusion, reforming and developing the financial sectors in the studied MENA countries is anticipated to have a comprehensive positive substantial outcome on their economies and the overall society.

Finally, regarding the study of globalization and income inequality in Egypt, we concluded that during the studied period for Egypt, trade openness and political globalization were important determinants for income inequality reduction. This implies that the Egyptian government should encourage trade of goods and services as well as liberalizing their financial markets. The government needs to participate in free trade bilateral agreements, free trade multilateral agreements, trade organizations,

WTO and IMF. This will help Egypt to integrate its financial and economic markets to the world by reducing subsidies, quotas and tariffs. Furthermore, this will encourage Foreign Direct Investment and portfolio investments.

Chapter 7

CONCLUSION

This study analytically questioned the result of financial development on the income inequality in the 11 selected MENA countries between 1990 and 2015. The study employed the PMGE to investigate the consequential outcome of financial development on income inequality; and it further analyzed the long- and short-run outcome of financial development on income inequality for the selected countries.

The findings of this study indicate that financial development, trade openness and government spending help in alleviating income inequality levels in the long-run for the selected MENA countries. However, in the short-run, six countries - namely Iran, Jordan, Saudi Arabia, Morocco, Bahrain, and Tunisia - showed a positive interrelation between financial development and income inequality. This study extends the current literature by expanding the time period to include more recent years (covering, as it does, the period 1990–2015), as well as by employing the PMGE initiated by Pesaran et al. (1999) for the measurement of the interrelation between financial development and income inequality. Examining the type of interrelation which exists between financial development and income inequality is crucial for all policy makers. This study shows that financial development is a prominent determinant of the long-run and sustainable minimization of income inequality for the investigated MENA countries.

Our study inspected the interrelation between financial development and income inequality for 11 selected MENA countries covering the period of 1990-2015, using PMGE method. Our model regressed Gini coefficient upon domestic credit provided by the financial sector as a percentage of GDP and three other explanatory variables: inflation, trade openness and government spending. Our PMGE model revealed a significant negative linear interrelation between financial development and income inequality reduction in the long-run. Evidence for narrowing-inequality hypothesis for the studied MENA countries showed that investing in developing a stable financial sector will definitely lead to a better egalitarian distribution of income.

Nonetheless, considering the limitations, scarce and incomplete data for all of the MENA countries, our study is narrowed down to those countries and this time period.

We recommend and encourage future advanced studies that would go deeper with a broader dataset covering more countries in the MENA region as well as longer time periods. Correspondingly, further studies can account for other factors capturing the financial development in terms of quality; including the financial sector size, efficiency, stability, volatility and the level of finance access. In conclusion, a deeper understanding of the finance inequality nexus will boost economic development not only in the MENA countries, but also in various other developing countries.

Additionally, in chapter five, we examined the interrelation between economic globalization, political globalization, trade openness, real GDP, government expenditure and income inequality for Egypt during the period of economic liberalization under Al-Sadat's regime. Our estimation procedures were based on three steps. First, we inspected for the stationarity of our variables. The results showed a

unit root problem for all variables. Thus, we proceeded with testing for the stationarity of our variables at first difference using ADF and PP unit root tests. Since all of our variables were integrated of order one I (1), this qualified us to proceed further and test if a cointegration exists between our model variables or not. Johansen and Juselius (1990) multivariate cointegration test indicated three cointegrating equations which are statistically significant at 5%. Hence we concluded that there is a long-run interrelation between globalization and income inequality.

Our third step was to estimate our VECM model rather than the VAR, since our variables are not stationary at level and are integrated of order one I (1). The long-run outcomes of the VECM model showed that economic globalization increases income inequality by 2.606767. On the other hand, trade openness minimizes income inequality by -0.052669 and leads to a better egalitarian income distribution. Moreover, political globalization diminishes income inequality with the largest magnitude of -1.041952.

Furthermore, the error correction term (ECT) was negative and statistically significant. The ECT revealed that income inequality, economic globalization, political globalization, trade openness, real GDP, government expenditure and domestic credit, provided by the financial sector, will converge to their log-run equilibrium by 22 % yearly. Finally, we employed the Granger causality test to check for the direction of causality between globalization indices and inequality. The results revealed the presence of three uni-directional causalities as well as one bi-directional causality.

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APPENDICES

Appendix A: Unit Root Test Results

1) GINI

Im-Pesaran-Shin unit-root test for gini

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 11
Number of periods = 26

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-1.9706		-2.050	-1.900	-1.820
t-tilde-bar	-1.5193				
Z-t-tilde-bar	-0.3947	0.3465			

Im-Pesaran-Shin unit-root test for D.gini

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 11
Number of periods = 25

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

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ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-2.6898		-2.070	-1.900	-1.820
t-tilde-bar	-2.1766				
Z-t-tilde-bar	-3.2029	0.0007			

2) DCPFS

Im-Pesaran-Shin unit-root test for dcfs

```
Ho: All panels contain unit roots        Number of panels =     11
Ha: Some panels are stationary           Number of periods =     26

AR parameter: Panel-specific             Asymptotics: T,N -> Infinity
Panel means:  Included                                sequentially
Time trend:   Not included

ADF regressions: No lags included
```

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-1.3366		-2.050	-1.900	-1.820
t-tilde-bar	-1.2678				
Z-t-tilde-bar	0.6718	0.7492			

Im-Pesaran-Shin unit-root test for D.dcfs

```
Ho: All panels contain unit roots        Number of panels =     11
Ha: Some panels are stationary           Number of periods =     25

AR parameter: Panel-specific             Asymptotics: T,N -> Infinity
Panel means:  Included                                sequentially
Time trend:   Not included

ADF regressions: No lags included
```

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-4.3985		-2.070	-1.900	-1.820
t-tilde-bar	-3.1228				
Z-t-tilde-bar	-7.2242	0.0000			

3) GEXP

Im-Pesaran-Shin unit-root test for gexp

Ho: All panels contain unit roots
Ha: Some panels are stationary

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Number of panels = 11
Avg. number of periods = 25.82

Asymptotics: T,N -> Infinity sequentially

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ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-1.5149		(Not available)		
t-tilde-bar	-1.4340				
Z-t-tilde-bar	-0.0358	0.4857			

Im-Pesaran-Shin unit-root test for D.dcfs

Ho: All panels contain unit roots
Ha: Some panels are stationary

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Number of panels = 11
Number of periods = 25

Asymptotics: T,N -> Infinity sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-4.3985		-2.070	-1.900	-1.820
t-tilde-bar	-3.1228				
Z-t-tilde-bar	-7.2242	0.0000			

4) CPI

Im-Pesaran-Shin unit-root test for cpi

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 11
Number of periods = 26

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	3.2619		-2.050	-1.900	-1.820
t-tilde-bar	2.0218				
Z-t-tilde-bar	14.6203	1.0000			

Im-Pesaran-Shin unit-root test for D.cpi

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 11
Number of periods = 25

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-2.1468		-2.070	-1.900	-1.820
t-tilde-bar	-1.8734				
Z-t-tilde-bar	-1.9142	0.0278			

5) TRADE

Im-Pesaran-Shin unit-root test for trade

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 11
Number of periods = 26

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-1.8366		-2.050	-1.900	-1.820
t-tilde-bar	-1.6952				
Z-t-tilde-bar	-1.1408	0.1270			

Im-Pesaran-Shin unit-root test for D.trade

Ho: All panels contain unit roots
Ha: Some panels are stationary

Number of panels = 11
Number of periods = 25

AR parameter: Panel-specific
Panel means: Included
Time trend: Not included

Asymptotics: T,N -> Infinity sequentially

ADF regressions: No lags included

	Statistic	p-value	Fixed-N exact critical values 1%	5%	10%
t-bar	-5.3575		-2.070	-1.900	-1.820
t-tilde-bar	-3.4856				
Z-t-tilde-bar	-8.7661	0.0000			

Appendix B: Westerlund Cointegration Test Results

Westerlund Cointegration Results with 300 Integrations

Results for H0: no cointegration
With 11 series and 4 covariates

Statistic	Value	Z-value	P-value	Robust P-value
Gt	-0.495	6.775	1.000	0.043
Ga	-1.631	4.902	1.000	0.003
Pt	-3.584	3.269	1.000	0.000
Pa	-2.663	2.906	0.998	0.047

Appendix C: PMGE Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
D(DCFS)	-0.000103	3.46E-05	-2.976057	0.0034
D(GEXP)	-0.001405	0.000397	-3.541047	0.0005
D(CPI)	-0.000240	3.99E-05	-6.009622	0.0000
D(TRADE)	-0.000303	5.06E-05	-5.993450	0.0000
Short Run Equation				
COINTEQ01	-0.456194	0.182581	-2.498589	0.0136
D(GINI(-1),2)	0.038506	0.068590	0.561396	0.5754
D(DCFS,2)	-1.41E-05	5.28E-05	-0.266418	0.7903
D(DCFS(-1),2)	-3.71E-05	3.59E-05	-1.034629	0.3025
D(GEXP,2)	7.39E-05	0.000344	0.215074	0.8300
D(GEXP(-1),2)	0.000161	0.000261	0.617512	0.5378
D(CPI,2)	0.000182	0.000162	1.127257	0.2615
D(CPI(-1),2)	0.000143	0.000155	0.922879	0.3576
D(TRADE,2)	3.83E-05	5.60E-05	0.683116	0.4956
D(TRADE(-1),2)	7.00E-06	5.47E-05	0.128122	0.8982
C	0.002635	0.001291	2.040275	0.0431
Mean dependent var	-0.000275	S.D. dependent var		0.004482
S.E. of regression	0.003411	Akaike info criterion		-7.914765
Sum squared resid	0.001722	Schwarz criterion		-6.262076
Log likelihood	1205.365	Hannan-Quinn criter.		-7.251343

Appendix D: Cross Section Short-run Coefficient Results

1) Algeria

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.202955	0.024729	-8.207321	0.0038
D(GINI(-1),2)	0.264515	0.066639	3.969357	0.0286
D(DCFS,2)	-5.76E-05	3.17E-09	-18194.34	0.0000
D(DCFS(-1),2)	3.26E-05	3.72E-09	8782.674	0.0000
D(GEXP,2)	0.000285	8.05E-08	3544.533	0.0000
D(GEXP(-1),2)	0.000352	1.30E-07	2719.151	0.0000
D(CPI,2)	1.24E-05	3.60E-08	343.2755	0.0000
D(CPI(-1),2)	0.000161	1.79E-08	8976.440	0.0000
D(TRADE,2)	-0.000113	7.15E-09	-15812.31	0.0000
D(TRADE(-1),2)	6.60E-05	1.13E-08	5845.215	0.0000
C	0.001587	1.93E-06	820.9423	0.0000

2) Bahrain

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.870370	0.070582	-12.33141	0.0011
D(GINI(-1),2)	0.202131	0.078970	2.559607	0.0832
D(DCFS,2)	7.62E-06	8.26E-09	922.6888	0.0000
D(DCFS(-1),2)	6.79E-05	9.59E-09	7079.147	0.0000
D(GEXP,2)	0.000288	2.71E-07	1063.126	0.0000
D(GEXP(-1),2)	0.000165	1.68E-07	978.3253	0.0000
D(CPI,2)	0.000967	1.83E-07	5292.699	0.0000
D(CPI(-1),2)	0.000437	1.44E-07	3045.054	0.0000
D(TRADE,2)	0.000182	4.63E-09	39275.30	0.0000
D(TRADE(-1),2)	8.40E-05	1.79E-09	46969.98	0.0000
C	0.001639	5.13E-07	3195.306	0.0000

3) Egypt

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-1.724475	0.035313	-48.83363	0.0000
D(GINI(-1),2)	0.315044	0.008621	36.54463	0.0000
D(DCFS,2)	-0.000274	4.99E-09	-55033.53	0.0000
D(DCFS(-1),2)	-4.12E-05	6.77E-09	-6090.655	0.0000
D(GEXP,2)	0.001384	6.51E-07	2126.563	0.0000
D(GEXP(-1),2)	-0.001442	4.34E-07	-3323.436	0.0000
D(CPI,2)	0.000712	3.57E-08	19932.23	0.0000
D(CPI(-1),2)	-0.000246	2.12E-08	-11618.22	0.0000
D(TRADE,2)	-5.06E-06	5.48E-09	-924.0670	0.0000
D(TRADE(-1),2)	0.000161	3.15E-09	50999.18	0.0000
C	0.012392	2.01E-06	6177.667	0.0000

4) Iran

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.464909	0.049451	-9.401388	0.0025
D(GINI(-1),2)	-0.375556	0.051385	-7.308637	0.0053
D(DCFS,2)	0.000192	4.41E-08	4361.379	0.0000
D(DCFS(-1),2)	-0.000123	5.65E-08	-2183.801	0.0000
D(GEXP,2)	-0.000178	1.68E-07	-1061.904	0.0000
D(GEXP(-1),2)	-0.000428	1.61E-07	-2662.516	0.0000
D(CPI,2)	0.000220	2.20E-08	10019.68	0.0000
D(CPI(-1),2)	-2.48E-05	3.08E-08	-803.1903	0.0000
D(TRADE,2)	-0.000110	2.71E-08	-4053.938	0.0000
D(TRADE(-1),2)	-0.000230	2.52E-08	-9114.913	0.0000
C	0.004052	4.45E-06	911.2109	0.0000

5) Jordan

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.439724	0.008242	-53.35146	0.0000
D(GINI(-1),2)	-0.149443	0.014444	-10.34620	0.0019
D(DCFS,2)	0.000275	1.03E-08	26667.50	0.0000
D(DCFS(-1),2)	0.000180	7.09E-09	25372.80	0.0000
D(GEXP,2)	0.001669	3.27E-07	5107.018	0.0000
D(GEXP(-1),2)	0.001265	1.85E-07	6842.428	0.0000
D(CPI,2)	0.000466	3.79E-08	12289.45	0.0000
D(CPI(-1),2)	0.000526	3.85E-08	13648.89	0.0000
D(TRADE,2)	0.000162	2.90E-09	55880.74	0.0000
D(TRADE(-1),2)	-0.000101	3.01E-09	-33656.43	0.0000
C	0.001175	3.75E-07	3130.625	0.0000

6) Kuwait

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.556120	0.039673	-14.01754	0.0008
D(GINI(-1),2)	0.007768	0.030858	0.251739	0.8175
D(DCFS,2)	-0.000146	8.72E-08	-1675.971	0.0000
D(DCFS(-1),2)	8.97E-06	4.18E-08	214.8981	0.0000
D(GEXP,2)	0.001275	2.10E-06	606.0928	0.0000
D(GEXP(-1),2)	0.000240	4.49E-07	533.9764	0.0000
D(CPI,2)	0.000574	9.12E-07	629.0597	0.0000
D(CPI(-1),2)	4.45E-05	1.15E-06	38.74753	0.0000
D(TRADE,2)	0.000167	8.11E-08	2056.366	0.0000
D(TRADE(-1),2)	-0.000276	4.78E-08	-5780.810	0.0000
C	0.001301	2.45E-06	531.0935	0.0000

7) Morocco

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.434500	0.045043	-9.646362	0.0024
D(GINI(-1),2)	0.331869	0.046363	7.157993	0.0056
D(DCFS,2)	4.34E-05	5.03E-09	8618.723	0.0000
D(DCFS(-1),2)	-0.000157	3.98E-09	-39604.92	0.0000
D(GEXP,2)	-0.000368	3.32E-07	-1109.498	0.0000
D(GEXP(-1),2)	0.001880	3.06E-07	6151.583	0.0000
D(CPI,2)	-0.000723	2.35E-07	-3071.114	0.0000
D(CPI(-1),2)	0.000960	3.20E-07	2996.546	0.0000
D(TRADE,2)	0.000176	5.80E-09	30423.32	0.0000
D(TRADE(-1),2)	0.000219	3.37E-09	65009.97	0.0000
C	0.003938	4.33E-06	910.2882	0.0000

8) Saudi Arabia

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.277935	0.016723	-16.62035	0.0005
D(GINI(-1),2)	0.025588	0.042475	0.602419	0.5894
D(DCFS,2)	6.11E-05	1.28E-08	4783.303	0.0000
D(DCFS(-1),2)	5.00E-05	1.93E-08	2595.647	0.0000
D(GEXP,2)	0.000153	2.36E-07	651.0731	0.0000
D(GEXP(-1),2)	0.000152	3.55E-08	4284.540	0.0000
D(CPI,2)	0.000345	1.06E-07	3245.355	0.0000
D(CPI(-1),2)	-0.000165	9.98E-08	-1647.765	0.0000
D(TRADE,2)	0.000168	8.81E-09	19065.15	0.0000
D(TRADE(-1),2)	0.000188	9.47E-09	19848.13	0.0000
C	0.001626	8.48E-07	1917.121	0.0000

9) Sudan

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.513672	0.032531	-15.79047	0.0006
D(GINI(-1),2)	-0.179069	0.035265	-5.077763	0.0148
D(DCFS,2)	-6.08E-05	8.35E-09	-7282.518	0.0000
D(DCFS(-1),2)	-7.00E-05	5.36E-09	-13065.72	0.0000
D(GEXP,2)	-0.000157	1.74E-07	-897.6739	0.0000
D(GEXP(-1),2)	-0.000308	1.63E-07	-1888.662	0.0000
D(CPI,2)	0.000137	3.87E-09	35299.88	0.0000
D(CPI(-1),2)	0.000150	8.66E-09	17380.04	0.0000
D(TRADE,2)	7.18E-05	1.09E-08	6562.278	0.0000
D(TRADE(-1),2)	5.84E-05	9.36E-09	6237.470	0.0000
C	0.004135	2.73E-06	1516.873	0.0000

10) Tunisia

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	-0.409446	0.014273	-28.68774	0.0001
D(GINI(-1),2)	-0.102549	0.030354	-3.378400	0.0431
D(DCFS,2)	8.60E-05	8.20E-09	10495.38	0.0000
D(DCFS(-1),2)	-0.000121	5.05E-09	-24044.84	0.0000
D(GEXP,2)	-0.001982	4.05E-07	-4895.964	0.0000
D(GEXP(-1),2)	-0.000227	3.41E-07	-663.8634	0.0000
D(CPI,2)	-0.000734	1.50E-07	-4906.961	0.0000
D(CPI(-1),2)	-0.000940	1.61E-07	-5836.302	0.0000
D(TRADE,2)	0.000131	1.76E-09	74709.28	0.0000
D(TRADE(-1),2)	0.000130	1.32E-09	98141.68	0.0000
C	0.003166	9.47E-07	3343.578	0.0000

11) Yemen

Variable	Coefficient	Std. Error	t-Statistic	Prob. *
COINTEQ01	0.875969	0.140268	6.244961	0.0083
D(GINI(-1),2)	0.083272	0.225073	0.369979	0.7360
D(DCFS,2)	-0.000281	2.79E-08	-10091.40	0.0000
D(DCFS(-1),2)	-0.000234	1.62E-08	-14482.60	0.0000
D(GEXP,2)	-0.001556	4.34E-07	-3580.894	0.0000
D(GEXP(-1),2)	0.000124	2.01E-07	617.8878	0.0000
D(CPI,2)	2.68E-05	4.20E-08	637.1899	0.0000
D(CPI(-1),2)	0.000666	5.14E-08	12954.92	0.0000
D(TRADE,2)	-0.000409	1.84E-08	-22229.43	0.0000
D(TRADE(-1),2)	-0.000222	1.17E-08	-19007.53	0.0000
C	-0.006026	4.32E-06	-1394.982	0.0000

Appendix E: VECM Model Output

Cointegrating Eq:	CointEq1
GINI (-1)	1.000000
DCFS(-1)	-0.041999 (0.00970) [-4.32916]
TRADE(-1)	-0.052669 (0.01251) [-4.21168]
ECOGLOB(-1)	2.606767 (0.38916) [6.69839]
POLGLOB(-1)	-1.041952 (0.15379) [-6.77504]
GEXP(-1)	-0.346489 (0.07239) [-4.78645]
RGDP(-1)	-1.11E-10 (2.5E-11) [-4.43636]
C	-69.41565

Error Correction:	D(GINI)	D(DCFS)	D(TRADE)	D(ECOGLOB)	D(POLGLOB)	D(GEXP)	D(RGDP)
CointEq1	-0.220363 (0.10499) [-2.09897]	0.654740 (1.32618) [0.49370]	1.167812 (2.03392) [0.57417]	-0.469760 (0.19067) [-2.46372]	0.067044 (0.26887) [0.24935]	0.356171 (0.43753) [0.81404]	3.66E+08 (3.3E+08) [1.11186]
D(GINI (-1))	0.680405 (0.16729) [4.06724]	-1.274504 (2.11319) [-0.60312]	-1.840059 (3.24092) [-0.56776]	-0.015186 (0.30382) [-0.04998]	-0.428184 (0.42843) [-0.99942]	-0.037281 (0.69718) [-0.05347]	7.41E+08 (5.2E+08) [1.41337]
D(GINI (-2))	0.058409 (0.18984) [0.30768]	4.047693 (2.39806) [1.68791]	-1.913328 (3.67781) [-0.52024]	0.177875 (0.34478) [0.51591]	-0.499704 (0.48619) [-1.02781]	-0.078293 (0.79117) [-0.09896]	-1.04E+09 (5.9E+08) [-1.74460]
D(DCFS(-1))	0.023049 (0.01519) [1.51771]	0.442223 (0.19184) [2.30515]	-0.099857 (0.29422) [-0.33940]	-0.012675 (0.02758) [-0.45954]	0.023573 (0.03889) [0.60608]	0.055574 (0.06329) [0.87805]	-46454118 (4.8E+07) [-0.97615]
D(DCFS(-2))	-0.008920 (0.01535) [-0.58091]	-0.233967 (0.19396) [-1.20629]	0.086093 (0.29746) [0.28942]	-0.019902 (0.02789) [-0.71368]	-0.062003 (0.03932) [-1.57675]	-0.046213 (0.06399) [-0.72219]	6445842. (4.8E+07) [0.13397]
D(TRADE(-1))	-0.001760 (0.01343) [-0.13101]	0.091995 (0.16970) [0.54211]	-0.004854 (0.26026) [-0.01865]	-0.010156 (0.02440) [-0.41628]	0.062256 (0.03440) [1.80952]	0.013697 (0.05599) [0.24464]	27496536 (4.2E+07) [0.65318]

D(TRADE(-2))	-0.014439	0.029724	0.067012	0.021746	0.038085	0.055871	58184676
	(0.01414)	(0.17868)	(0.27403)	(0.02569)	(0.03623)	(0.05895)	(4.4E+07)
	[-1.02083]	[0.16636]	[0.24454]	[0.84651]	[1.05134]	[0.94779]	[1.31273]
D(ECOGLOB(-1))	0.176637	-2.589664	-0.372637	0.802757	-0.157984	-0.523408	2.71E+08
	(0.19491)	(2.46204)	(3.77594)	(0.35398)	(0.49916)	(0.81228)	(6.1E+08)
	[0.90627]	[-1.05184]	[-0.09869]	[2.26781]	[-0.31650]	[-0.64437]	[0.44400]
D(ECOGLOB(-2))	0.313599	-2.294129	-4.060907	0.025951	-0.495517	-0.705080	6.83E+08
	(0.16593)	(2.09606)	(3.21466)	(0.30136)	(0.42496)	(0.69153)	(5.2E+08)
	[1.88990]	[-1.09449]	[-1.26325]	[0.08611]	[-1.16604]	[-1.01959]	[1.31379]
D(POLGLOB(-1))	-0.162654	1.957658	0.171933	-0.406322	0.114748	0.261633	-2.15E+08
	(0.13287)	(1.67846)	(2.57419)	(0.24132)	(0.34029)	(0.55376)	(4.2E+08)
	[-1.22412]	[1.16634]	[0.06679]	[-1.68375]	[0.33720]	[0.47247]	[-0.51575]
D(POLGLOB(-2))	0.044887	0.282165	2.300189	-0.167491	0.564657	0.194478	-3.17E+08
	(0.10422)	(1.31645)	(2.01899)	(0.18927)	(0.26690)	(0.43432)	(3.3E+08)
	[0.43071]	[0.21434]	[1.13928]	[-0.88492]	[2.11562]	[0.44777]	[-0.97212]
D(GEXP(-1))	0.011865	-1.468291	-0.267564	-0.094629	0.204619	-0.420291	2.54E+08
	(0.05880)	(0.74281)	(1.13922)	(0.10680)	(0.15060)	(0.24507)	(1.8E+08)
	[0.20178]	[-1.97667]	[-0.23487]	[-0.88607]	[1.35871]	[-1.71500]	[1.37693]
D(GEXP(-2))	-0.019418	0.936348	-0.505928	0.116689	0.268821	-0.088990	1.61E+08
	(0.06140)	(0.77555)	(1.18944)	(0.11150)	(0.15724)	(0.25587)	(1.9E+08)
	[-0.31627]	[1.20733]	[-0.42535]	[1.04649]	[1.70966]	[-0.34779]	[0.83754]
D(RGDP(-1))	1.82E-10	5.49E-10	-4.28E-10	2.32E-10	1.30E-10	4.00E-12	0.150896
	(7.6E-11)	(9.6E-10)	(1.5E-09)	(1.4E-10)	(1.9E-10)	(3.2E-10)	(0.23855)
	[2.39324]	[0.57107]	[-0.29008]	[1.67862]	[0.66439]	[0.01261]	[0.63257]
D(RGDP(-2))	4.92E-11	-1.37E-09	-9.70E-10	5.44E-11	-2.40E-10	-1.91E-10	0.245550
	(7.3E-11)	(9.3E-10)	(1.4E-09)	(1.3E-10)	(1.9E-10)	(3.1E-10)	(0.22980)
	[0.67081]	[-1.47642]	[-0.68256]	[0.40811]	[-1.28031]	[-0.62488]	[1.06852]
C	-1.374500	5.728278	6.421124	-0.587916	1.128971	0.608094	3.00E+09
	(0.46064)	(5.81876)	(8.92403)	(0.83659)	(1.17970)	(1.91973)	(1.4E+09)
	[-2.98390]	[0.98445]	[0.71953]	[-0.70275]	[0.95700]	[0.31676]	[2.07969]
R-squared	0.720130	0.574117	0.257611	0.567831	0.600432	0.361685	0.851601
Adj. R-squared	0.529309	0.283742	-0.248563	0.273171	0.327999	-0.073529	0.750419
Sum sq. resids	5.181333	826.7644	1944.654	17.09019	33.98336	89.99117	5.09E+19
S.E. equation	0.485299	6.130269	9.401775	0.881378	1.242859	2.022500	1.52E+09
F-statistic	3.773860	1.977160	0.508939	1.927068	2.203964	0.831051	8.416582
Log likelihood	-16.06171	-112.4384	-128.6895	-38.73711	-51.79707	-70.30005	-846.9481
Akaike AIC	1.687459	6.759916	7.615236	2.880901	3.568267	4.542108	45.41832
Schwarz SC	2.376968	7.449426	8.304746	3.570410	4.257777	5.231618	46.10783
Mean dependent	-0.215623	0.447164	0.406699	0.725402	0.946708	-0.411878	4.99E+09
S.D. dependent	0.707362	7.243441	8.414042	1.033822	1.516132	1.952009	3.04E+09
Determinant resid covariance (dof adj.)		9.81E+20					
Determinant resid covariance		2.14E+19					
Log likelihood		-1223.113					

Akaike information criterion	70.63751
Schwarz criterion	75.76574