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The Impact of Economic Policies and Sectoral Patterns of Growth upon the Income Distribution of the Egyptian Economy

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This study aims to determine the impact of economic policies and sectoral patterns of growth upon the level of equity in income distribution of the Egyptian economy. The study utilised the autoregressive distributed lag model (ARDL) to formulate the main elements of development policy in the Egyptian economy that work to reduce the degree of inequality in income. The study concluded the importance of developing education, health, and human capital in general, and the need to stimulate agricultural growth, in addition to focusing on a package of policies, which includes improving the level of infrastructure and achieving economic stability.

Keywords: *Equity of income distribution, Autoregressive distributed LAG model, Economic policies, Sectoral patterns of growth, Human capital.*

1. Introduction

The success of any development strategy for poverty reduction requires the achievement of sustainable economic growth and the successful distribution of its fruits. There is no doubt that macroeconomic policies have an impact on economic growth and income distribution. In general, the policies that lead to an increase in economic growth and achieve equity in income distribution, will lead to a significant reduction in the level of poverty. As for the impact of policies that support growth and are linked to a deterioration in income distribution upon rates, poverty is indefinite. If a package of policies leads to rapid growth and a slight deterioration in the distribution of income, it is possible to expect a decrease in the level of poverty. Such policies can be accepted, even if they lead to a degree of inequality in the distribution of income. However, if the policy package leads to limited growth and a significant deterioration in income distribution, then an increase in the level of poverty that is associated with these policies can be expected.

The sectoral composition of growth has the same importance as the role of economic policies in achieving equitable growth. In this context, economic policymakers must be aware of the factors and reasons behind the different results of the growth of the different economic sectors at the level of poverty. Knowing the conditions and characteristics of each country, which vary according to the stage of development, is one of the main conditions necessary for choosing the main elements to implement any strategy of income redistribution.

The rest of the article is organised as follows. The section two describes the general trends of the role of growth and income distribution in the evolution of poverty indicators in Egypt. It is followed by section three, which reviews the literature. The section four presents the methodology and empirical results, and section five outlines a conclusion.

2. Growth and Income Distribution Trends and Economic policies in The Egyptian Economy

Despite the success of the monetary and financial reform program at the beginning of the nineties in reducing the internal and external imbalances, the Egyptian economy suffered at the beginning of that period from a significant decline in economic growth rates, as a result of applying the contractionary policies accompanying that program. This occurred before the rate of economic growth took an increasing trend during the period forom 1993 to 1998. Regarding income distribution, various indicators have shown a tendency towards an improvement in income distribution. As there has been a clear decrease in the Gini index, and the relative time gap for wages has tended to decline, the rate of property rights returns to gross domestic product (GDP) has stabilised at a higher level than in the eighties (Human Development Report, 1996).

This fluctuation in the indicators of growth and income distribution was accompanied by imbalances in the Egyptian economy, in addition to the existence of clear procedures in the direction of modifying monetary, financial, and trade policies towards economic stability (Touny, 2017).

As for the beginning of the period from 1999 to 2005, the Egyptian economy suffered from many negative internal and external factors, such as the decline in revenues from the export of oil, as a result of the decline in its global prices; the decline in tourism revenues following the Luxor terrorist attack; the transmission of money outbreaks from Asian stock exchanges that have moved to the Egyptian market; and in addition to the loan crisis that the banking system has witnessed since 1998. This pushed the Egyptian economy to enter a slow growth phase after the growth rate was high at the beginning of the stage. Despite this, economic activity began to recover at the end of the stage, after the recovery of the tourism sector and the increase in exports of goods and services. This was in addition to the Government's implementation of many new economic policies that were aimed at focussing on the role of the private sector to revitalise the economy. These policies included influencing the pricing system by using tax instruments, trade liberalisation, customs reform, and taxes on personal income, as well as taking several steps to improve the investment climate (Khair al-Din & Laithi, 2006).

Regarding the distribution of income during the same period, the various indicators showed a tendency towards deterioration during the beginning of that stage, and a trend towards slow improvement at the end of the stage. As the Gini index tended to increase during the first years, as shown by the Income, Expenditure, and Consumption Survey for 1999/2000, and although the results of that survey in 2004/2005 showed some improvement, the stability of the ratio of property rights returns to the GDP was at levels less than the previous period and in most of the years of the stage, which reflected an improvement in the functional distribution of income. On the other hand, the time-relative wage gap index tended to widen during most of the years of the period (Egyptian Human Development Report, 2005).

During the periods from 2005 to 2011, the growth rate achieved an average of 5.5 per cent, which is the highest compared to the corresponding rates in the other sub-periods, as well as compared to the average growth rate for the total period under study of 4.8 per cent. The high growth rates achieved by the economy, specifically until the 2007/2008 fiscal year, occurred because of the positive effects of the implementation of reform measures in 2004 (El-Essawy, 2007). However, the Egyptian economy was unable to achieve sustainable growth, as economic growth began to decline with the conclusion of the stage. This decline is a result of the global economic recession that began at the end

of 2008 due to the global financial crisis, in addition to the repercussions of the 25 January 2011 revolution.

The pattern of economic growth during that period was accompanied by a deterioration in income distribution. What is evidenced by this, is the development of the three income distribution indicators. This period was characterised by stable returns to property rights to GDP at higher levels than the previous period and within most of the years of the period, which reflected a clear deterioration in the functional distribution of income. Likewise, the relative time gap index for wages tended to widen during most of the years of this period. Moreover, the Gini coefficient tended to increase between the Income, Expenditure, and Consumption Surveys for the years 2008/2009, and 2010/2011, although it stabilised at a level slightly lower than that recorded in the survey results for the year 2004/2005 (Radwan & Elshinawy, 2019).

Thus, the Egyptian economy's achievement of high economic growth rates during most of that stage was accompanied by many policies and developments at the sector level, which had a negative impact on the distribution of national income and related economic variables.

Generally, it is extremely difficult to identify the changes in trends in personal income distribution in developing countries, including in the case of Egypt. The "Income, Expenditure, and Consumption Survey", or what was previously called the "Family Budget Survey", is characterized by being divergent and irregular, in addition to its inability to represent society with different spending segments. It may not include the poorest groups due to the absence of a fixed place of residence, and it may not succeed in expressing the consumption of the wealthiest groups, due to their unwillingness to announce their consumption pattern. Its use of spending instead of the income, as an indicator to measure the standard of living, is one of the most important criticisms directed at it, as the pattern of distribution of consumption spending among different income groups is usually fairer and more equal than the income distribution pattern itself (El-Essawy, 2007).

In light of those reservations, the results obtained from the surveys depict only general trends. As for the true and accurate picture, it requires the availability of data of a high degree of accuracy and reliability. However, we must use the available data to identify the general features of the distribution of income, while trying to consider many other indicators of income distribution trends, such as the functional distribution of gross domestic income among wages and property returns, as well as the development of average wages at the level of economic sectors. This is done to reach a measure that is more reliable.

3. Literature Review

Many studies have unanimously concluded that countries will grow faster if they have more physical and human capital, a developed financial sector, a good institutional structure, openness to the outside world, less government intervention, better infrastructure, and better macroeconomic management. However, on the other hand, many studies have indicated that the effects of these policies differ on the level of equity in income distribution. While we find that some of the policies supporting growth have a positive effect on the level of equity in income distribution, we find that others have conflicting effects on growth and the degree of equity in income distribution.

The first set of studies dealt with policies that have a positive impact on income distribution. We found that education comes first, and in this context, Papanek and Kyn (1986) found that enrollment in primary and secondary education has a significant quantitative effect on the share of income received by the poorest 40 per cent. Bourguignon and Morrisson's (1990) study also found that a one per cent increase in the percentage of the workforce educated up to the secondary school level would increase the share of income earned by the poorest 40 per cent or 60 per cent of the population by six per cent and 15 per cent. The Sylwester (2002) study, which was conducted on 50 countries, examined the impact of public spending on education upon income distribution and found that increasing public spending on education could reduce the disparity in income distribution if the poor are able to obtain a public education.

There are few studies that have explored the simultaneous effect of education upon both economic growth, and income distribution. Lopez (2004) indicated that countries with better education, which is measured by enrollment rates in secondary education, are the lowest in the level of inequality and are the fastest growing. This result is consistent with the study of Datt and Ravallion (2002), which used 20 household surveys at the level of 15 Indian states. The study concluded that the deterioration in the level of basic education is the main obstacle for the poor to participate in opportunities for economic growth, as Lundberg and Squire (2003) also indicated that education — as measured by the average number of years of educational attainment for adult individuals — is related strongly with a rapid growth rate and a lower level of inequality.

Raising the quality of infrastructure is one of the effective policies in reducing inequality in income distribution. In this context, Estache (2003) indicated that developing the infrastructure will help poor and underdeveloped individuals to reach basic economic activities and obtain better productive opportunities. In the same vein, the study by Estache and Fay (1995) indicated that the ease of access to roads and enhanced access to water and sanitation services were the main determinants of the convergence of incomes in the poor regions of Argentina, and Brazil. The Jacoby study (2000) also noted that the

value of the assets of the poor in agricultural areas, where the net present value of the profits from marketing agricultural crops to these farmers was used as a proxy indicator, is linked to the distance to agricultural markets, as the improvement in means of communication and road services will increase the earnings and incomes of farmers.

The Lopez (2004) study was one of the first to assess the extent of the contribution of development in infrastructure to economic growth and income distribution, which was expressed by the number of telephone lines per thousand individuals. The study highlighted that an improved level of infrastructure would raise the rate of economic growth and reduce the degree of inequality in income distribution. In the same context, the Calderon and Serven study (2004) provided an empirical assessment of the impact of infrastructure development upon economic growth and income distribution by using data from more than 100 countries covering the period of 1960–2000. The study used a composite index to reflect the evolution of the size and quality of the infrastructure, including three major components: telecommunications, energy, and the road sector. The results of the simulation of Latin American countries in that study indicated an acceleration in growth and a reduction in income inequality, with an increase in the stock and quality of infrastructure.

In the context of studying the effect of economic stability on the level of equity in income distribution, many theoretical studies, such as Eastery and Fisher (2001); Beherman, Birdsall and Szekely (2001); Lundberg and Squire (2003); and Lopez (2010), have unanimously agreed upon the negative impact of macroeconomic instability on the level of equity in income distribution, This is due to the fact that the rise in the general level of prices will erode the financial assets of the poor more than others, given that the poor retain most of their income in the form of cash and not real assets or assets that can be adapted to the rise in prices.

Empirically, the Romer and Romer Study (1998) noted the need to distinguish between the impact of inflation on the distribution of income in the short and long terms. While the high level of short-term prices is associated with lower unemployment, which benefits the poor more than the rich, in the long term, the impact of higher inflation on unemployment will not continue, and therefore, the impact of inflation on the income of the poorest individuals will be negative.

Eastery and Fisher (2000), using a survey of 31,869 individuals from 38 countries, found that higher rates of inflation would reduce the share of the poorest 20 per cent of the population. Similar results were also reached in Bulir's study (2001) of a sample of 75 countries, which indicated that achieving moderate inflation rates would reduce the degree of income inequality.

Within the second group of studies, they dealt with a policy that has a conflicting impact on income distribution, which included the development of the financial sector, and the degree of openness to foreign trade.

In this context, many theoretical models, including those by Banerjee and Newman (1993), Galor and Zeira (1993), Aghion and Bolton (1997), and Jahan and McDonald (2011), indicated that the imperfection and distortion of financial markets increase the inequality in the distribution of wealth. The poor who do not own loan guarantees, credit history or personal relationships will be strongly affected by the imperfection of credit markets, which will make it difficult for them to gain access to high-return projects. More generally, there is a fear that limited groups will have control over sources of finance under financial liberalisation, thereby reducing the access of less-income individuals to financial services.

However, the financial development, according to numerous other literature (Haber, Maurer & Razo (2003); Morck, Wolfen, Zon, and Yeung (2005), will achieve a higher level of equity in income distribution by moving towards completing credit markets by reducing the costs of obtaining information and transactions. Thus, more poor regulators have access to credit markets

Similarly, at the level of empirical studies, there is no specific impact of financial development on the level of inequity. The Beck and Levine study (2007), which used sectional data for 72 countries during the period of 1960–2005, noted a negative impact on financial development (the ratio of credit granted to the private sector to domestic output) upon the level of inequity (the Gini coefficient). It also found that about 40 per cent of the long-term impacts of financial development on income growth of the poorest 20 per cent of the population could be attributed to a decline in inequality, while another 60 per cent could be attributed to the impact of financial development upon economic growth. Using data based on 91 countries, Clarke, Xu and Zou (2003) also noted that financial development (stock market sophistication) will reduce the degree of inequity, and this effect will be magnified with the possibility of individuals working in agriculture gaining access to credit.

However, the Dehjia, Rajeev and Gatti (2002) study indicated high rates of child labour in low-income countries with a lower level of funding development. Moreover, the International Monetary Fund (IMF) study (2007) noted that the benefits of stock liberalisation would be primarily for the rich compared to middle-income individuals, and financial liberalisation, especially when it comes to foreign direct investment (FDI), has been linked to an increase in income distribution.

In examining the impact of openness of the foreign world on income distribution, empirical studies have not indicated a specific impact of trade openness on the level of inequality. In this context, the Dollar and Kraay (2004) study used the average income of the poorest 20 per cent of the population, as a dependent variable, as an indicator of the degree of injustice against many explanatory variables. These variables included average income, and several indicators of economic openness. The results showed that apart from the index of restrictions on capital movements, none of the indicators of economic openness that were used had a statistically significant effect. In the same context, Milanovic (2005) found that an increase in the degree of economic openness i.e. exports and imports as a percentage of GDP led to a higher concentration of income in favour of the richer classes, against a decrease in the shares of the poor and middle-income groups.

Regarding the role of sectoral patterns of growth in achieving equitable growth, many studies have suggested that stimulating growth in sectors in high-poverty areas plays a strong role in poverty reduction. In this context, the Ravallion and Datt study (1996), which tracked the development of poverty across 3,500 households between 1951–1991, confirmed that agricultural growth is more important than industrial growth to reduce poverty in India. However, the Ferranti et al. (2005) study concluded that the expansion of agricultural activities in Caribbean countries has contributed less to poverty reduction than to the expansion of non-agricultural activities. The previous conclusion, however, may be related to the lower relative size of the agricultural sector than other sectors in those countries.

Another set of studies focussed on the role of labour density for growth across different sectors in explaining the relative disparity in the impact of sector growth on the degree of inequality and the level of poverty. The study by Mellor (1999) indicated that despite the role of the industrial sector in stimulating growth, agricultural growth is more important for employment growth and thus reducing the level of inequality and poverty. In this context, the study by Loyaza and Raddatz (2006) indicated that the degree of elasticity of poverty to sectoral growth is proportional to the intensity of the use of the labour. This means that the increase in the intensity of work in one sector that is relative to another, makes the growth in this sector contribute to an increase in the income of a greater number of lower-income individuals. The most important sectors contributing to poverty reduction are the agriculture sector, the construction sector, and the industrial sector. Meanwhile, the impact of the mining sector's growth on poverty is positive, and this result is consistent with numerous observations that show that agriculture and construction are among the most labour-intensive sectors, followed by industry and services.

The Siami and Hudson (2019) study aimed to determine the impact of economic growth in various economic sectors on the inequality of income distribution, which was based on balanced panel data in 92 developing countries. Using a panel, and granger causality analysis based on the Vector Error Correction Model (VECM) approach, the study concluded that the agricultural sector comes to the fore. Subsequently, the industrial sector followed in the work to reduce the degree of inequality in income distribution, while the services sector had a positive impact on the inequality of income distribution.

The previous literature did not reach a specific effect of economic policies and sectoral patterns of growth on the level of inequality in income distribution, and there was no study that empirically tested this relationship on the Egyptian economy. Consequently, this study fills this gap by researching the effect of the determinants of economic policies and sectoral patterns of growth on the level of inequality in income distribution in the Egyptian economy, and specifically during a time range of data covering the period of 1982–2018.

4. Methodology and Empirical Results

This part of the study aims to estimate the effect of the components of economic policy and related economic indicators on the degree of inequality in income distribution in the periods of 1991, 1992–2017, and 2018, upon the Egyptian economy. The study is based on the autoregressive distributed lag framework (ARDL) methodology, which was developed by Pesaran (1997), Shinand and Sun (1998), and Pesaran et al. (2001). The first part deals with introducing the general framework of the econometric model and the study variables. The second part deals with the estimation steps. The third part analyses the estimated results to identify the nature and direction of the relationship between the economic variables on the one hand, and the degree of inequality in income distribution on the other hand, both in the short and long terms.

4.1 General Framework and Data Sources

The standard model in this study is based on a set of economic variables and policies related to the degree of inequality in income distribution that has been established in many academic studies. The studies provided by Easterly (1993), Barro (2000), Loayza, Fajnzylber and Calderon (2005), and Lundberg and Squire (2003) serve as a guiding framework for these variables, and many attempts have been made to arrive at a formula of the estimated model, whether in terms of stability for the most important variables or in terms of the shape of the proposed model. Annual data was used for the period from 1992–2018, and we will explain how each variable is calculated and its data source:

- ***The Composite Index of Income Distribution (Indistr):*** this variable was calculated based on the methodology used in constructing the Human Development Index (HDI), as it was based on income distribution indicators, including the Gini coefficient, functional distribution of income, and the relative wage gap between sectors. The World Development Indicators (WDI) data was used to obtain the Gini coefficient in the years during which the Income, Expenditure, and Consumption Surveys were conducted. The trend line equation was used to supplement the missing Gini coefficient data. The data on the ratio of property returns to GDP (a proxy of the functional distribution of income) and the relative wage gap between sectors were obtained from the Central Agency for Public Mobilisation and Statistics (CAMPS). Consequently, the value of this indicator will be between zero and one, and the closer the value of this indicator to the correct one, this indicates the increasing degree of inequality in the distribution of income.
- ***The extent of Economic Outward Orientation (Oppennes):*** the outward economic trend was expressed in (x+m)/y), which represents the ratio of international trade (exports + imports) to GDP. This variable was calculated from the International Financial Statistics Data (IFS).
- ***Financial Depth (Fdepthg):*** the growth rate in domestic credit to the private sector (percentage of GDP) has been used as an indicator of financial development or what some call, the financial depth. The data was obtained from the WDI.
- ***Human Capital Investment (Hiexy):*** the ratio of investment spending on education and health to GDP was used as an approximate variable on investment in human capital. This variable was calculated from the Ministry of Economic Planning data.
- ***Spending on Subsidies (Subexy):*** the ratio of spending on subsidies to GDP was used as an indicator of the social dimension of public policy. This data was obtained from the WDI.
- ***Agriculture, Value-Added (percentage of GDP) (Agricy):*** the value-added of the agricultural sector has been used as a percentage of GDP, as an indicator of the change in the sectoral structure of the national economy. This data has been obtained from the WDI.
- ***The Growth Rate of Money Supply (M2) (Moneyg):*** the growth rate of the money supply has been used as a proxy variable of monetary policy. This data has been obtained from the WDI.

The study will rely on the ARDL model to determine the effect of the independent variables (policies and economic variables) on the composite index of income distribution during the period of 1992–2018, which enables us to study the relationship in the long term, as well as the short-term changes. To implement the ARDL method, the following steps are taken:

4.2 Unit Root Test

The Augmented Dickey-Fuller test was applied for the purpose of determining the stationary of variables and determining the order of their integration. The optimal lag periods were determined by the Eviews9. By applying this test to the variables, the results were as follows:

Table 1: Augmented Dickey-Fuller for Unit Root

Variable	Level		1st difference		Order of Integration
	t statistic	P-value	T statistic	P-value	
Indistr	-2.761	0.0768	3.412-	0.0191(*)	I(1)
Oppennes	-3.794	0.0082 (*)			I(0)
Fdepthg	-4.119	0.0034 (*)			I(0)
Hiexy	- 0.879	0.7805	-5.576	0.0001 (*)	I(1)
Subexy	- 1.882	0.3354	-5.413	0.0001 (*)	I(1)
Agricy	- 2.675	0.0905	-3.714	0.0094 (*)	I(1)
Moneyg	- 3.127	0.0355 (*)			I(0)

(*)Rejecting the null hypothesis

Source: researchers' calculations based on the data set.

From the results of the Augmented Dickey-Fuller test, we can deduce that the variables Indistr, Hiexy, Subexy, and Agricy are integrated into the first order (1), as the level of significance (0.05), and the rest of the variables are integrated in the level I (0), which indicates that it is stationary in the level. Thus, all the variables under study were characterised as being integral of the order I (0), and I (1), and there are no integrated variables of the second order I (2) or more, which is a prerequisite for applying the ARDL approach.

4.3 Estimating the Composite Index Income Distribution (Indistr)

The implementation of the cointegration between the variables, according to the ARDL method, is achieved by estimating the unrestricted error correction model (UECM). It can be formulated, as follows:

$$\Delta \text{Indistr}_t = c + \alpha_1 \text{Indistr}_{t-1} + \alpha_2 \text{Oppennes}_{t-1} + \alpha_3 \text{Fdepthg}_{t-1} + \alpha_4 \text{Hiexy}_{t-1} + \alpha_5 \text{Subexy}_{t-1} + \alpha_6 \text{Agricy}_{t-1} + \alpha_7 \text{Moneyg}_{t-1} + \sum_{i=1}^{n} \varphi_{1i} \Delta \text{Indistr}_{t-1} + \sum_{i=1}^{n} \varphi_{2i} \Delta \text{Oppennes}_{t-i} + \sum_{i=1}^{n} \varphi_{3i} \Delta \text{Fdepthg}_{t-i} + \sum_{i=1}^{n} \varphi_{4i} \Delta \text{Hiexy}_{t-i} + \sum_{i=1}^{n} \varphi_{5i} \Delta \text{Subexy}_{t-i} + \sum_{i=1}^{n} \varphi_{6i} \Delta \text{Agricy}_{t-i} + \sum_{i=1}^{n} \varphi_{7i} \Delta$$

Whereas $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7$: represent lag period coefficients for the variables: Indistr, Oppennes, Fdepthg, Hiexy, Subexy, Agricy, and Moneyg, respectively.

Δ: represent the differences for the variables, $\in$ represent the random error.

The long-term effect coefficient of the dependent variables (Oppennes**,** Fdepthg**,** Hiexy, Subexy, Agricy, and Moneyg) can be determined by dividing the negative coefficient of lag of these variables for one period by the coefficient of the lag dependent variable (Indistr) for one period ($-\frac{\alpha_2}{\alpha_1}, -\frac{\alpha_3}{\alpha_1}, -\frac{\alpha_4}{\alpha_1}, -\frac{\alpha_5}{\alpha_1}, -\frac{\alpha_6}{\alpha_1}, -\frac{\alpha_7}{\alpha_1}$). The short-term effect coefficients of this equation can be determined by the first difference coefficients for the independent variables: $\varphi_2, \varphi_3, \varphi_4, \varphi_5, \varphi_6, \varphi_7$

To implement the cointegration test by using the boundary test, four procedures are required:

First Step: Choose the Optimal Lag Period for the Model

The first procedure is to test the optimal lag of the first differences of the variables' values using an AMUV with a fixed and general trend. By using the Eviews11, and after applying the lag length criteria, the model that meets the best selection criteria (LR, FPE, AIC, SC, HQ) is chosen. By applying that test, the estimation results that were obtained are provided in Table 2.

Table 2: The Optimal Lag Period for the model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	33.76612	NA	0.008843	-1.908601	-1.524650	-1.794432
1	42.67105	11.87325	0.004964	-2.494152	-2.062206	-2.365712
2	47.34358	5.883928*	0.003822*	-2.766191*	-2.286252*	-2.623480*
3	47.76058	0.494225	0.004043	-2.723006	-2.195073	-2.566024

(*)Indicates the lag period selected by the criteria.
Source: researchers' calculations based on the data set.

According to the different criteria, the results indicate that the appropriate lag period for the model is two periods (Lag = 2).

Second Step: Estimation of the ARDL-UECM Model

Based on the estimated optimal lags (two lags), the estimation of the parameters of the ARDL model are provided in Table 3.

Table 3: Results of Estimation of the ARDL-UECM Model

Variable	Coefficient	Std. Error	T-test	P-value
C	2.114	0.927	2.282	0.071
$Indistr_{t-1}$	- 0.858	0.311	-2.755	0.04
$Oppennes_{t-1}$	0.005	0.005	-1.047	0.343
$Fdepthg_{t-1}$	0.005	0.01	0.515	0.628
$Hiexy_{t-1}$	- 0.172	0.184	- 0.932	0.394
$Subexy_{t-1}$	- 0.033	0.023	-1.395	0.222
$Agricy_{t-1}$	- 0.077	0.047	-1.655	0.159
$Moneyg_{t-1}$	0.009	0.012	0.755	0.484
$\Delta Indistr_{t-1}$	0.697	0.417	1.672	0.155
$\Delta Indistr_{t-2}$	0.433	0.431	1.003	0.362
$\Delta Oppennes_{t-1}$	- 0.004	0.005	- 0.73	0.498
$\Delta Oppennes_{t-2}$	- 0.002	0.004	-0.476	0.654
$\Delta Fdepthg_{t-1}$	0.001	0.004	0.223	0.833
$\Delta Fdepthg_{t-2}$	- 0.002	0.005	- 0.42	0.692

Δ Hiexy $_{t-1}$	0.36	0.29	1.239	0.27
Δ Hiexy $_{t-2}$	0.084	0.224	0.377	0.722
Δ Subexy $_{t-1}$	0.039	0.021	1.88	0.119
Δ Subexy $_{t-2}$	0.045	0.02	2.21	0.078
Δ Agricy $_{t-1}$	- 0.216	0.178	-1.213	0.279
Δ Agricy $_{t-2}$	0.204	0.165	1.236	0.271
Δ Moneyg $_{t-1}$	-0.014	0.011	-1.235	0.272
Δ Moneyg $_{t-2}$	0.004	0.008	0.451	0.671
Indicators and statistical tests				
F	1.5897	**P-value**	0.3204	
R square	0.87	**D.W**	2.148	

Source: researchers' calculations based on the data set.

It is noted from the results that this model does not have an autocorrelation problem, as the value of Durban Watson was 2.148. On the other hand, despite the rise in the R square value (0.87), the value of F was 1.5897, with a significant level of 0.3204, which indicates that the mode is insignificant at the level of five per cent. Thus, the lack of significance of the estimated parameters is the reason for the problem of multicollinearity. In order to solve this problem, the differences where T is less than one will be eliminated. The Table 4 indicates the estimation of the parameters of the ARDL model after re-estimation.

Table 4: ARDL-UECM after Re-Estimation

Variable	Coefficient	Std. Error	T-test	P-value
C	1.946	0.454	4.283	0.001
Indistr$_{t-1}$	-0.83	0.207	-4.019	0.002
Oppennes $_{t-1}$	-0.005	0.002	-2.124	0.057
Fdepthg $_{t-1}$	0.001	0.003	0.392	0.703
Hiexy $_{t-1}$	-0.109	0.087	- 1.251	0.237
Subexy $_{t-1}$	-0.025	0.011	- 2.346	0.039
Agricy $_{t-1}$	- 0.074	0.026	- 2.836	0.016
Moneyg $_{t-1}$	0.009	0.005	1.71	0.115
ΔIndistr$_{t-1}$	0.515	0.212	2.434	0.033
ΔIndistr$_{t-2}$	0.344	0.283	1.214	0.25
Δ Hiexy $_{t-1}$	0.222	0.108	2.046	0.066
Δ Subexy $_{t-1}$	0.028	0.01	2.81	0.017
Δ Subexy $_{t-2}$	0.034	0.009	3.963	0.002
Δ Agricy $_{t-1}$	- 0.122	0.088	- 1.397	0.19

Δ Agricy $_{t-2}$	0.128	0.097	1.32	0.214
Δ Moneyg $_{t-1}$	- 0.01	0.004	- 2.396	0.036
Statistical tests				
F	3.843	**P-value**	0.015	
R square	0.84	**D.W**	1.97	
Diagnostic tests				
Lagrange Multiplier Test of Residual Breush-Godfrey			**F-Statistic**	2.161
			P-value	0.171
Jarque-Bera			**(JB)**	0.123
			P-value	0.94

Source: researchers' calculations based on the data set.

The value of F was 3.843, with a significant level of 0.015, which indicates the significance of the model at the level of five per cent. The value of R square was 0.84, indicating that the explained variables explain about 84 per cent of the changes that occur in the dependent variable. The value of Durban Watson was 1.97, and the value of lagrange multiplier for the autocorrelation was 2.161, with the significance level of 0.171, indicating that the model does not suffer from the problem of autocorrelation. The Jarque-Bera value also reached 0.123, with a significant level of 0.940, which indicates that the residual does not differ significantly from the normal distribution. That is, the condition of the normal distribution of the residual is achieved.

Third Step: Cointegration Test (Wald's Test)

To conduct this test, the null hypothesis that there is no co-integration between the variables can be formulated, as follows:

$$H0: \alpha1 = \alpha2 = \alpha3 = \alpha4 = \alpha5 = \alpha6 = \alpha7 = 0$$

Against the alternative hypothesis, the existence of co-integration:

$$H1: \alpha1 \neq \alpha2 \neq \alpha3 \neq \alpha4 \neq \alpha5 \neq \alpha6 \neq \alpha7 \neq 0$$

Table 5: The Results of The Co-Integration Test (Wald Test)

Test statistic	Value	Df	P-value
F-statistic	5.44	(8 ،11)	0.0059
Chi-square	43.53	8	0.000

Source: researchers' calculations based on the data set.

The calculated value of the F-test is compared with the values in the table (Pesaran et al., 2001) and those found in the statistical appendix. In the case of a constant term only, we find that the calculated value is 5.44, and the tabular value is between 2.86–4.57, when K equals seven (the number of explanatory variables), and at the level of significance of 0.05. Since the computed value is greater than the upper limit of the tabular value, we therefore reject the null hypothesis, that there is no co-integration between the variables, and we accept the alternative hypothesis, that there is a co-integration.

Fourth Step: Estimation of The Long-Term and Short-Term Effects

After the model has passed the previous tests, it is possible from the previous estimation results in Table 4 to calculate the long-term effects and the short-term effects, as in the following Table 6.

Table 6: The Long-Term and Short-Term Effects

Variable	Short term effect	effect Long-term
Oppennes	0	-(-0.005/-0.830) = -0.006
Fdepthg	0	-(0.001/-0.830) = 0.0012
Hiexy	0.222	-(-0.109/-0.830) = -0.131
Subexy	0.028	-(-0.025/-0.830) = -0.030
Agricy	-0.122	-(-0.074/-0.830) = -0.089
Moneyg	-0.010	-(0.009/-0.830) = 0.011

Source: calculated by the author.

As shown in Table 6, the results of the estimation of the effect of the independent variables on the composite index of the income distribution indicate the following:

The Oppennes variable has a positive effect on the composite index of the income distribution (Indistr) in the long term (that is, an increase in the degree of openness to the outside world led to an increase in the degree of inequality in the distribution of income), while it has no significant effect in the short term.

The Fdepthg variable has no significant effect on the distribution of income (Indistr) in the short term, while its effect was negative in the long run, albeit in a small amount. The high rate of growth in domestic credit to the private sector, as a percentage of GDP, will reduce the degree of inequality in income distribution.

The results indicate that the variable Hiexy has a positive effect in the short term on the variable Indistr, as increasing the proportion of public investment spending on education and health to the GDP will lead to an increase in the level of inequality in the distribution

of income, while the matter will differ in the long term. An increase in the variable Hiexy, in the long run, will lead to a decrease in the level of inequality in the distribution of income.

The results also indicate that the variable Subexy has a positive effect in the short term on the variable Indistr, while its impact is negative in the long run. That is, increasing subsidies or GDP will reduce the level of inequality in income distribution in the long run.

The Agricy variable has a negative effect on the Indistr variable in both the short and long terms. That is, an increase in the agricultural sector's contribution to economic activity will result in a decrease in the degree of inequality in the distribution of income, and this may be due to the fact that a large proportion of low-income people work in the agricultural sector. Consequently, an improvement in this sector will lead to a redistribution of incomes and in favour of these poor classes.

The variable Moneyg has a negative effect on the Indistr variable in the short term, while its effect in the long term was positive, as the increase in the rate of growth of the money supply (M2) will increase the degree of inequality in the income distribution. This may be due to the inflationary effect of the expansionary monetary policy in the long term.

5. Conclusions

With the aim of determining the impact of economic policies and sectoral patterns of growth on the level of inequity in the income distribution of the Egyptian economy for the periods 1991, 1992–2017, and 2018, this study used the ARDL model to formulate the main elements of development policy in the Egyptian economy that work to reduce the degree of inequality in income. The main results of this study indicate to the importance of developing education, health, and human capital in general, and the need to stimulate agricultural growth, in addition to focussing on a package of policies, which includes improving the level of infrastructure and achieving economic stability.

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