

**THE IMPACT OF INFORMAL ECONOMY ON THE
EMPLOYMENT IN EGYPT: Evidence from ARDL Model**

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Abstract

This study analyzes the impact of informal economy on the employment in Egypt using ARDL model to test the long run relationship between the two variables. Data is collected from World Bank and ILO for the variables in estimation from (1991 – 2021), the results show that there is a long run relationship between the two variables, depending on the available data, therefore the study recommends fostering the process of integrating informal economy into formal economy to enhance the employment sector directly and to enhance the macroeconomic indicators indirectly, as the Egyptian economy has a special nature regarding its demographic characteristics, and its workforce.

Keywords: Informal economy, Employment, Egypt, Workforce.

JEL: E26, E24, J21.

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أثر الاقتصاد غير الرسمي على التوظيف في مصر: باستخدام نموذج

الانحدار الذاتي للإبطاء الموزع

الملخص

تبحث الدراسة في أثر الاقتصاد غير الرسمي على التوظيف في مصر باستخدام نموذج الانحدار الذاتي للإبطاء الموزع (ARDL)، لاختبار العلاقة طويلة الأجل بين المتغيرين محل الدراسة، وقد تم تجميع البيانات من خلال تقديرات البنك الدولي وتقديرات منظمة العمل الدولية للفترة (1991-2021)، وقد أظهرت النتائج وجود علاقة طويلة الأجل بين المتغيرين، وذلك اعتماداً على البيانات المتاحة، حيث أوصت الدراسة بعدد من التوصيات والتي قد تسهم في تسريع عملية دمج الاقتصاد غير الرسمي في الاقتصاد الرسمي لتحسين مؤشرات التوظيف في مصر بشكل مباشر، وتحسين مؤشرات الاقتصاد الكلي كحصيلة الضرائب ومعدلات الأمان الوظيفي والنتاج المحلي الإجمالي، بشكل غير مباشر، حيث يتسم الاقتصاد المصري بطبيعته الخاصة من حيث خصائصه الديمغرافية، والقوى العاملة فيه والتي تحتم على صانع السياسة العمل على دمج الأنشطة غير الرسمية داخل منظومة الدولة الاقتصادية الرسمية.

الكلمات المفتاحية: الاقتصاد غير الرسمي، التوظيف، مصر، القوة العاملة.

1. INTRODUCTION

Informal economy is a major phenomenon in the economies of all countries around the world, no matter the country is developing or developed one, the informal economy exists. The difference between countries is just in the size of the informal economy, which depends on many factors, such as, the market size, the skills of the labor force, the gap between labor demand and labor supply, and stability and reliability of the economic institutions or the state's governance.

It is important for policy makers to understand the nature and the size of informal economy to be able to understand the unemployment trends and whether it is actual unemployment, or just the employees are working in the underground economy, which harden the tasks of economic policies aimed to increase the measured employment in the formal economy, and the consequent problems related to the expected tax revenues. (Krakowski, 2005)

However, it cannot be considered that the informal economy represents net losses to the economy, as a large part of the informal economy earnings is spent in the formal economy, which increases the debate about the impact of the informal economy on the different economic activities. (Schneider and Ernste, 2000)

The importance of informal economy emerges because of the income it provides for individuals who cannot obtain a proper job in the formal economy, or whose income from the formal economy is not sufficient for them, especially in times of recession, where the official figures for unemployment become exaggerated due to the non-recording of informal employment in unemployment rates. (OECD, 2009)

In Egypt, a developing country with large population in the working age, informal economy represents a last resort for both employers and workers of all qualifications and capabilities, as the economic units or employers try to avoid paying registration fees, evade tax burdens, avoid administrative and bureaucratic procedures, and the long time required to register those economic activities, while workers tries to find another job to raise their income or can't find a job in the formal economy in the first place. (Mamdouh, 2017)

Based on the foregoing, the study will consist of two main parts, the first one is about the literature review and the previous studies related to informal economy and its impact on different economic activities, and the second part is about an empirical study to measure the impact of informal economy on the employment in Egypt.

2. THEORETICAL FRAMEWORK

The informal economy has a rich record of theoretical debate, whether at the conceptual level, or at the level of the factors included in these concepts, also there is a debate between different economic schools about the existence of informal economy and its impact on the formal economy and on the economic development. Another source of debate about the nature of informal economy arises from the perspective from which the informal economy is analyzed whether it is economic, statistical, social, or demographic perspective.

One of the major contributions that tried to resolve or at least reconcile these conceptual debates was (Fiege, 2016) who stated that informal economy or shadow economy is linked to two main features, non-compliance and unobservability, which are common in all informal economy activities, through tax evasion, production, or distribution of illegal products such as drugs, or non-compliance with government rules regarding minimum wages or proper working conditions.

(Portes, Blitzer, and Curtis, 1986) define informal economy as the sum of all income-generating activities outside modern contractual relationships of production. While (Smith, 1994) defines informal economy as the production of goods and

services for the market, whether through legal or illegal transactions, so that it is not included in the official estimates of GDP.

In 2002, a new concept of informal economy was adopted, as that phenomenon started to be recognized as “informal economy” instead of “informal sector”, so that the informal economy is not limited to unregistered firms only, but also includes informal employment, in addition to formal businesses that involve some informal activities. (ILO, 2013-A)

(Dell’Anno, 2021) determines the main six determinants of informal economy which consist of: the tax system, the regulatory system, labor force structure, law enforcement system, state’s institutions, and media and economic freedom.

(Agarwal and Dhakal, 2010) define the characteristics of informal economy as economic activities accompanied by low investments, bad working conditions, low productivity, no social protection, and no organizational or institutional support.

Regardless of the concept or characteristics, the informal economy represents a large percentage of the world economy, whether in developing or developed countries, as it represents about (30% - 70%) of the official estimates of GDP in the developing countries, and that percentage increases in African

countries to reach about 80%. And as for the developed countries the percentage is between (10% - 20%). (Benjamin et al., 2014)

(UN, 2015) found that the informal economy includes about 60% of the global workforce, and that percentage reaches about 90% in small and medium enterprises. These high percentages regarding the ratio of the informal economy to GDP, and the labor force employed in the informal economy raise many questions about the methods and means of estimating the informal economy, and how accurate are these estimates?

The process of estimating the size of the informal economy is difficult because of the multiplicity of informal activities and their nature of secrecy and evasion, with no agreement on a consistent and unified concept of the informal economy. However, there are a few methods and approaches that are used to measure the size of the informal economy, among those contributions the methods presented by Frey and (Pommerehne, 1984) who tried to estimate the size of the informal economy through direct and indirect methods, direct methods depend on voluntary surveys whether of firms or households, and the process of tax revision and auditing, while the indirect

estimates depend on calculating the residuals of income and expenditure in the money and labor market.

The multiple indicators multiple causes model (MIMIC) is one of the newest and most comprehensive measure of the informal economy, because it takes into consideration the multiple causes of informal activities using several indicators of those activities across countries and over years. (Elgin et al., 2019)

However, the model has been subject to several criticisms, such as its reliance on GDP as both cause and indicator variables, also the estimation process depends on another independent study's base year estimates on the informal economy to calibrate the size of informal economy, these criticisms could manipulate the results and estimates of the MIMIC model. (Breusch, 2005)

For Egypt, as a developing country with major structural economic problems, informal economy could be a problem and a solution at the same time, as it absorb a huge percentage of the employment and could be considered as a back door for the Egyptian citizens to increase their income specially in time of economic crisis, but in the same time it represents a lost tax revenue for the country, if it was collected it would have contributed to solving many economic problems, also it could

mislead the policy makers towards wrong policies because of the wrong estimation of unemployment rate and the real income growth rate.

(Galal, 2005) tried to estimate the size of informal economy in Egypt and found that 82% of entrepreneurs were extralegal, and about 39% of workers were also extralegal, with no intention for those entrepreneurs to become formal, as they don't want to forgo the gains of being invisible to the government.

For SMEs sector in Egypt, (Elasrag, 2010) found that 83.6% of SMEs in Egypt were informal in 1998, while 82.9% of them were informal in 1988 which means that the informal sector is getting bigger through time, especially in food industry.

(Schneider et al., 2019) found that the share of informal economy in Egypt reached up to 34.9% of GDP on average between 1997 and 2006, while the average percentage was 13.5% and 27.3% for the OECD and MENA countries in the same period.

Regarding the employment, (World Bank, 2013) stated that 55% of Egyptian employees and workers in the working age between (15-64) are informal, the same report found that 49% of firms in Egypt are informal and the percentage of informal jobs inside these firms is about 95%, also the 51% formal firms

contain 51% informal jobs, which means that even the formal firms aren't offering their workers formal jobs, only half of those worker have a formal contracted job and covered with social security and pension. While (AFDB, 2016) found that the employment in the informal economy of Egypt is about 61% of the total employment whether in formal or informal firms.

(Sieverding and Irene, 2012) stated that the cost of social insurance of the employment is too high in Egypt reaches up to 26% percent of the fixed wage and 15% of the varying wage of workers, which considered to be one of the highest rates in the world, which give more reasons to the firms to stay informal.

In a study by (ILO, 2013-B) that included 47 countries of various economic groups, Egypt came among the highest countries in terms of informal employment, which reached 8.2 million workers, representing 51.2% of informal workforce outside the agricultural sector.

(CAPMAS, 2021) found that the workforce with formal work contracts was 97.6% of males and 97.1% of females in the governmental sector, 33% of males and 41.5% of female in the private sector, and 57.1% of males and 48.3% of females in the cooperative and foreign sector, which confirm the severity of

the problem in the non-governmental sectors, more details about the status of employment in Egypt in table 1.

Table 1. estimation of employed (15 years and above) by employment status inside (formal) and outside (informal) of establishment (No 00):

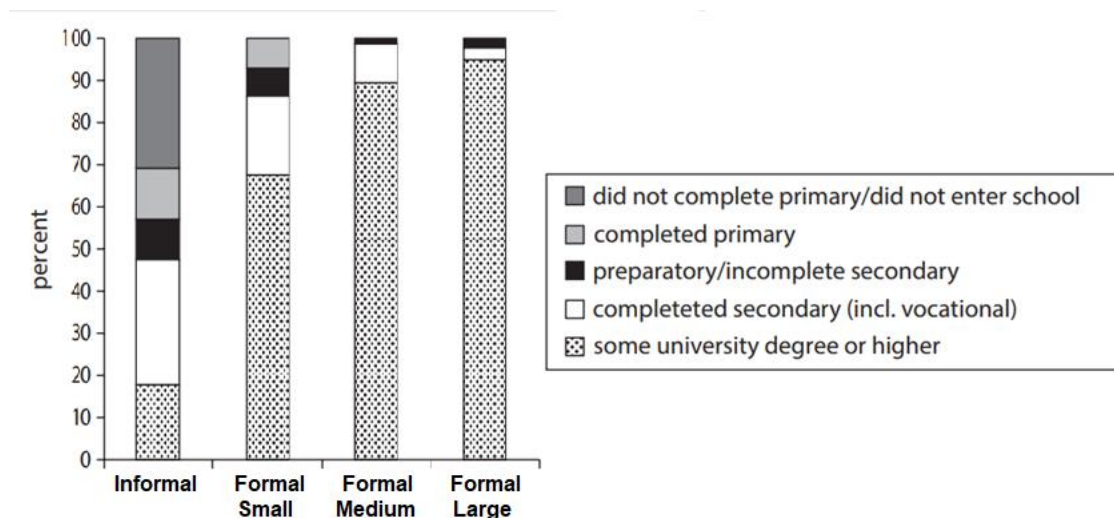
Region	Gender	Employee		Employer		Self employed		Family activity		Total	
		formal	informal	formal	informal	formal	informal	formal	informal	formal	informal
Urban	Male	51965	20846	5462	N\A	4379	11980	581	649	62387	33476
	Female	16894	883	268	N\A	557	867	516	596	18235	2346
Rural	Male	47753	47002	4176	N\A	4126	25791	719	3936	56774	76729
	Female	10647	1342	302	N\A	1115	1413	1074	6041	13137	8796
Total	Male	99718	67848	9637	N\A	8505	37771	1300	4586	119161	110205
	Female	27541	2224	570	N\A	1671	2280	1589	6637	31371	11141

Source: CAPMAS (2021). Annual Bulletin Labor Force Survey.

Note: the previous table shows the Estimation of Employed (15 years & above) by Employment status inside and outside (formal and informal) establishment, it is clear that there is a huge gap between rural areas and urban areas, as the informality in the rural is much higher than it is in urban areas for both males and females, also there is a huge gap between males and females in employees, employer, and self-employed categories, while this gap shrinks in family activities category, which mostly led by women especially in rural areas, this increases women's exposure to problems related to the informal economy such as the absence of social security.

(Gatti et al., 2014) found that the employment in the informal sector has been affected by the education system, where the share of managers who enrolled in the secondary school or obtained a university degree are just 45% in the informal firms comparing to 85% in the formal firms, the study also found that the workers of informal firms is more likely to be less educated with much low skills, which reflect on the productivity and the growth of the firm, as they found that as the firm does more formal as it tend to employ more educated and skilled workers, as it shown in the next graph.

Figure 1. Percentage of Managers in (informal – formal) firm according to their level of education (2009):



Source: (Gatti et al., 2014). P18.

3. THE MODEL

The study will depend on (ARDL) model to test the existence of a long run relationship between informal economy and employment in Egypt between (1991-2021). The data is collected from World Bank data bank whether for the informal economy estimates or for employment estimates.

For the informal economy variable, it was calculated using (Dynamic general equilibrium model) DGE as a percentage of official GDP, while for the employment variable, it was calculated through ILO estimates as (Employment to population ratio)*

First: Stationarity Tests

The stationary of the time series is one of the necessary and required characteristics when studying the cointegration of the model variables. To judge the stationary of the data, the Unit Root Test was used using the Augmented Dickey Fuller Test and Philip Perron Test. The following table shows the results of this test:

* *Employment to population ratio is the proportion of a country's population that is employed. Employment is defined as persons of working age who, during a short reference period, were engaged in any activity to produce goods or provide services for pay or profit, whether at work during the reference period (who worked in a job for at least one hour) or not at work due to temporary absence from a job, or to working-time arrangements. Ages 15 and older are generally considered the working-age population.*

Table 2. Results of the unit root test using the Augmented dickey fuller (ADF) test and Philip Perron (PP) test

variables	ADF test		PP test	
	t-Statistic	Sig.	t-Statistic	Sig.
employment	-4.973183*	0.0021	-4.986937*	0.0020
informal economy	-4.544015*	0.0058	-4.589587*	0.0052

* Stable at the first level of differences.

The results indicate that the employment variable and the informal economy variable are stable at the first level of differences I (1), using the Intercept constant, which indicates the validity of using the Bounds Test approach and the ARDL model to clarify the long run level of cointegration between the two variables.

Second: cointegration test between the variables of the study

The equation of the ARDL model used to study and determine the cointegration relationship between employment and the informal economy in Egypt in the long term is as follows:

$$EM_{it} = a_0 + a_1 IFE_{it} + z_{it} \quad (1)$$

Where:

EM_{it} : it represents employment.

IFE_{it} : represents the informal economy.

a_0 : the constant of the equation, a_1 is the parameter of the independent variable.

z_{it} : random error term.

To study and define the co-integration relationship, the following stages must be passed.

The first stage: Bounds Test

Conducting the Bounds Test to test the absence or existence of a long run relationship between the variables of the model, as it depends on the following hypotheses.

Ho: $\delta_1 = \delta_2 = 0$ (null, i.e., the long run relationship does not exist)

H1: $\delta_1 \neq \delta_2 \neq 0$ (Alternative, i.e., the long run relationship exists)

The following table shows the results of the Bounds Test for the equation of the previous model.

Table 3. Bounds Test Results

Test Statistic	Value	Significant level	I (0)	I (1)
F-Statistic	15.22519	10%	4.05	4.49
		5%	4.68	5.15
		1%	6.1	6.73

It is clear from the results of the previous table that the calculated F-Statistic value amounted to 15.22519, which is greater than the critical value for the minimum of 6.1 and the

maximum of 6.73 at a significant level of 1%. Hence, this indicates the existence of cointegration between the variables of the model, i.e. the existence of a long run relationship between employment and the informal economy.

Then we reject the null hypothesis, and accept the alternative hypothesis, which states that there is a cointegration, that is, the existence of a long run relationship between the two variables.

The second stage: estimation of the ARDL model

After confirming the existence of cointegration between the variables of the model, the ARDL model is used to estimate the long run relationship between employment and the informal economy in Egypt during the period (1991-2021). The following table shows the results of the estimate.

Table 4. Results of estimating the relationship between employment and the informal economy in Egypt during the period (1991-2021)

Dependent Variable: EMPLOYMENT				
Selected Model: ARDL (1, 5)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
$EM_{it} (-1)$	0.440445**	0.107233	4.107376	0.0007

IFE _{it}	0.237839	0.570829	0.416655	0.6821
IFE _{it} (-1)	-1.168632	0.779564	1.499085	0.1522
IFE _{it} (-2)	1.577860	0.751638	2.099229	0.0510
IFE _{it} (-3)	1.745312*	0.762974	2.287511	0.0353
IFE _{it} (-4)	3.562246**	0.801488	4.444540	0.0004
IFE _{it} (-5)	-1.573839	0.897274	1.754022	0.0974
R-squared	0.957148			
Adjusted R-squared	0.936982			
F-statistic	47.46390			0.001021
Durbin-Watson stat	2.499120			

** Significant at 1%, * Significant at 5%.

When the assumption of stationarity and cointegration are fulfilled, then the modelling of the data can be done. The model obtained is as follows:

$$EM_{it} = 0.440445 EM_{it} (-1) + 0.237839 IFE_{it} - 1.168632 IFE_{it} (-1) + 1.577860 IFE_{it} (-2) + 1.745312 IFE_{it} (-3) - 3.562246 IFE_{it} (-4) - 1.573839 IFE_{it} (-5) \quad (2)$$

Where: EM_{it} : it represents employment without any lags, whereas $EM_{it}(-1)$ it represents employment after the first lag. Similarly, for the informal economy IFE_{it} .

The results of the estimation in the previous table indicate that the value of the adjusted coefficient of determination R², was 0.936, which means that the informal economy variable explains 93.6% of the variations in employment in Egypt, and the remaining 6.4% is explained by other variables that do not include in the model through a linear relationship. and that the value of the statistical F test indicates that the model is good, and its explanatory explanation is high, and that most of the independent variables have a significant effect on employment during the study period (1991-2021).

Where employment with one lag period affects employment without lags positively, where the effect reached at 0.44, and this means that there is a long run and statistically significant relationship between them. It is also clear that the informal economy has a positive effect on employment, with an effect of 0.24, which means that there is a long run relationship between them, but it is not statistically significant. Also, the informal economy with three lags affects employment positively, as the effect reached 1.745, and this means that there is a long run and

statistically significant relationship between them. And that the informal economy with four lags affects employment negatively, as the effect ratio reached 3.562246, and this means that there is a long run and statistically significant relationship between them. This proves the validity of the study's hypothesis: the existence of a long run cointegration relationship between employment and the informal economy.

The third stage: Error Correction Model (ECM)

The Error Correction Model is used to measure the short run relationship while measuring the speed of error adjustment and correction to rebalance in the long-term relation.

Table 5. Error correction model estimation results for the ARDL model

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
DIFE _{it}	0.237839	0.472625	0.503230	0.6213
D (IFE _{it} (-1))	1.812913**	0.571515	3.172119	0.0056
D (IFE _{it} (-2))	3.390773**	0.620536	5.464269	0.0000
D (IFE _{it} (-3))	5.136085**	0.695221	7.387704	0.0000
D (IFE _{it} (-4))	1.573839	0.790939	1.989837	0.0629
CointEq (-1) *	- 0.559555**	- 0.078316	- 7.144870	- 0.0000

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R-squared	0.847881			
Adjusted R-squared	0.799843			
F-statistic	17.65031			0.000001
Durbin-Watson stat	2.499120			

** Significant at 1%, * Significant at 5%.

It is clear from the table that the value of the error correction coefficient for the equation of the relationship between employment and the informal economy has a negative sign and amounted to -0.559555 It is also statistically significant at the 1% level. In addition to the existence of a cointegration between employment and the informal economy in the short and long run together.

The fourth stage: diagnostic and stability tests

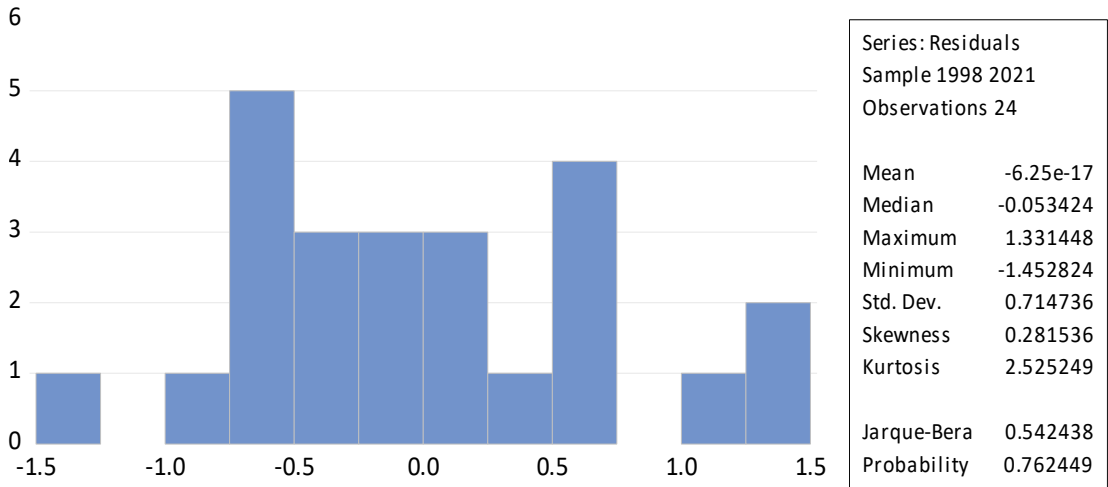
To accept the proposed model, some standard tests must be verified.

1) Normality test

It is clear from the results that the P-Value (Sig.) = 0.762 for the Jarque-Bera test is greater than 0.05, and therefore we accept

the null hypothesis which states that the residuals follow a normal distribution.

Figure 2. Normality test



2) serially uncorrelated residuals

The results of the examination using the Breusch-Godfrey Serial Correlation LM Test indicated the following.

Table 6. Breusch-Godfrey Serial Correlation LM Test

Test	Obs*R-squared	Prob. Chi-Square
Breusch-Pagan-Godfrey	3.447387	0.1784

The result of the test value shows that the null hypothesis cannot be rejected, as the P-Value (Sig.) = 0.7248 is greater

than 0.05, and therefore the model does not suffer from the problem of serially uncorrelated residuals.

3) Homoskedasticity

The results of the examination using the ARCH Test indicated the following.

Table 7. ARCH Test

Test	Obs*R-squared	Prob. Chi-Square
Heteroskedasticity Test	0.133956	0.7144

The result of the test value shows that the null hypothesis cannot be rejected, as the P-Value (Sig.) = 0.7144 is greater than 0.05. Therefore, the model does not suffer from the problem of Heteroskedasticity.

4) stability for the model parameters in the short and long runs

in order to verify the results of the ARDL model and its credibility, two tests are used to ensure that there is no structural change in the data that leads to an error in the stationary and consistency of the short run model parameters with the long run parameters of the model.

The first: is the Cumulative Sum of Recursive Residual “CUSUM” test.

The second: is the Cumulative Sum of Square Residual “CUSUMSQ” test.

The structural stationary of the estimated parameters of the error correction form for the ARDL model is achieved if the CUSUM & CUSUMSQ test graph falls within the critical limits at the 5% level, and these parameters are unstable if the test statistic graph moves outside the limits at this level.

Figure 3. CUSUM test

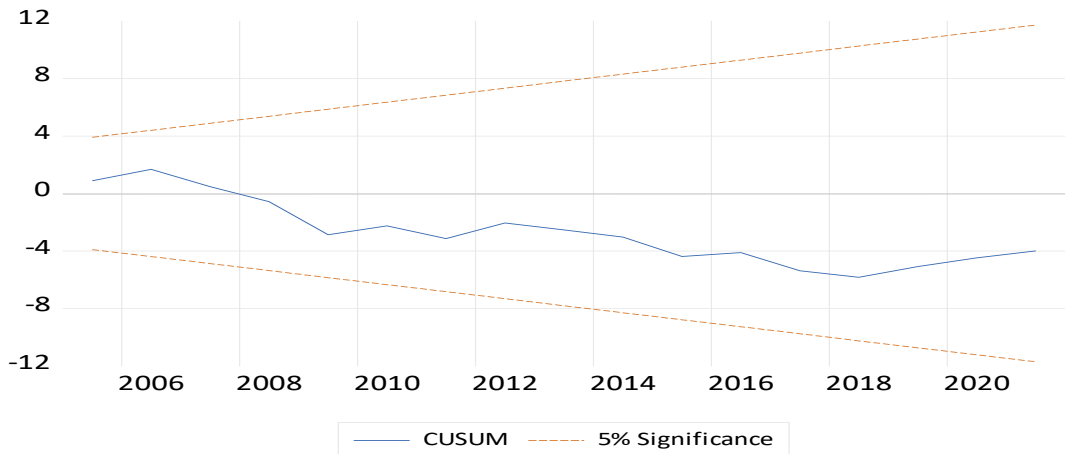
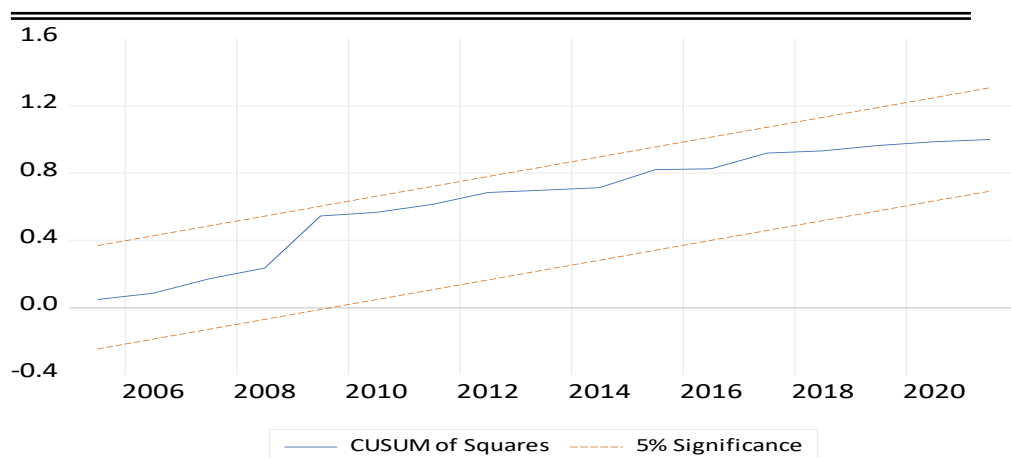


Figure 4. CUSUMSQ test

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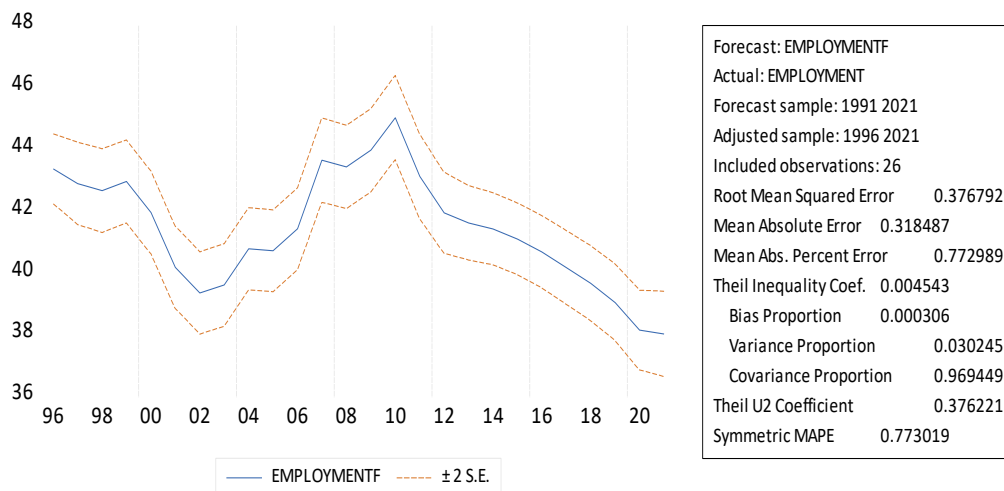


Each of the previous two figures indicates that the estimated parameters of the two tests fall within the critical limits at the level of 5%, and therefore there is stability for the model parameters in the short and long runs.

5) Test the predictive performance of the error correction model for the estimator.

It is clear from the following results that the estimated error correction model has a high predictive power. Where the value of Theil inequality coefficient, Bias proportion and Variance proportion between estimated and actual value in the model approached to 0, whereas the Covariance proportion which reflect the correlation between estimated and actual value approached to 1 (96.9%).

Where the value of each y_i approached one



Based on the foregoing, there is a cointegration relationship between the dependent variable employment and the independent variable informal economy in the short and long term. Hence, the validity of the study's hypothesis that "there is cointegration relationship between employment and the informal economy in Egypt."

4. CONCLUSION & RECOMMENDATIONS

The study aimed to test the impact of the informal economy on the employment in Egypt, using ARDL model to test the long run relationship between the two variables, the results show that there is a long run relationship between the two variables, and the informal economy affect the employment in Egypt. therefore, there are many recommendations regarding

integrating informal economy into the formal economy could affect the employment in Egypt in a positive way.

Therefore, the study recommends the following:

- a- The primary concern of the economic policy makers in Egypt should be formalizing the larger and more profitable informal firms by giving them more incentives, not more legal complications, with lowering the cost and the time of registration, and trying to answer the most important question, according to informal firms and entrepreneurs, which is what are the benefits that would accrue to me if I became formal?, Which require a media campaign addressing the informal sector of the benefits of becoming formal.
- b- After providing the required incentives, the government should increase the law enforcement to foster the process of informal firms formalizing, which require the application of governance rules, anti-corruption policies, and social, political, and economic awareness.
- c- Regarding the informal jobs, the government should treat this issue in isolation from formalizing firms, as the firms whether formal or informal, prefer to keep their workers informal to avoid the high social insurance cost, to avoid

the costs of letting the workers go, and to be more flexible with economic recession, which require lowering the cost of social insurance and connect the workers in informal firms with the health care insurance provided by the government.

- d- The government must improve the skills acquired from technical and university education, and link those skills to labor market needs, while teaching entrepreneurship at all educational levels, in partnership and coordination with the private sector, which lead to improving labor force skills and make the most use of the low-cost, young, abundant workforce.
- e- Accelerate the financial inclusion in Egypt with giving more incentives to micro enterprises to go formal especially women led enterprises, through banking sector initiatives which encourage the micro enterprises to formalize their activities.

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