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The Impact of Imports on Economic Growth in Egypt

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Abstract

Several economic and noneconomic factors can affect the economic growth of any developing country. The study in hand is concerned with investigating the impact of real imports on economic growth in Egypt together with determining the main economic variables that affect the demand of imports. Initially, the study presented theoretical and empirical literature for these economic relations displaying the main theories and previous studies concerning the effect of imports and open-door policies on economic growth in some developing countries. Then, stepping to the applied analysis, the empirical examination is presented through two models using an Autoregressive Distributed Lag (ARDL) bounds estimation technique applied on annual observations in Egypt since launching the open door policy in 1974 till 2021. The first model investigates the impact of real imports together with other explanatory and control variables on the GDP annual growth rate. Whereas, the second model examines the significance of GDP, purchasing power parity (PPP) (used as a proxy for relative prices—RP), average official exchange rate (ER) and foreign reserves (FR) on real imports of goods and services in Egypt. The results of the ARDL bounds tests for both models confirm the existence of a cointegrated long-run relationship between the dependent and the independent variables. After confirming the long-run relationship, the short-run coefficients have been estimated by ARDL error correction model (ECM) to find that in Egypt, it takes a period of less than two years to adjust any shock in economic growth.

Keywords

Economic Growth, Real Imports, Imports' Demand, ARDL Model, ECM

1. Introduction

The trend toward globalization of the world economy goes back to the 18th cen-

tury, and on the contrary, the recent rise of anti-globalization sentiments in other parts of the world makes it hard for countries to determine the main determinants of economic growth.

Economic literature has suggested several domestic and external factors that were proven to play a crucial role in achieving economic growth. For instance, sound macroeconomic policies, political stability, sufficient domestic savings, migrant workers' remittances, foreign direct investment, foreign aid and international trade are all crucial for achieving economic growth (Makun, 2017).

Classical and neo-classical economists argue that engagement in foreign trade is the major source of economic growth. This can be attributed to the fact that trade promotes economic activity by enhancing exports which generate foreign exchanges necessary for importing the raw materials and other inputs required for achieving economic growth (Khan et al., 2019).

Egypt has been continuously trying to achieve stable long-term economic growth. The Open Door Economic Policy launched by former president M. El-Sadat, the new investment regulation Law 43 in 1974 that lowered tariffs, allowed investors to defer paying customs duties and gave permission to import without a license and the formation of the General Authority for Investment and Free Zones, all together have been reflected in a continuous annual increase in both exports and imports.

Despite several drawbacks concerning these liberalization measures reflected in; the reluctant foreign direct investment that has been slowly—but continuously—increasing through the 1970s from 0 in 1974 to 6.7 in 1979 as a percentage of GDP; the fluctuating exports declined from 20.4 in 1974 to 17.2 in the following year, 1975 as percentage of GDP. These ups and downs continued till reaching 31 in 1981 as percentage of GDP. On the contrary, imports increased continuously throughout the second half of the 1970s from 31.3 in 1974 to 43.5 in 1981 with a one-year drop in 1976 (27.9) as a percentage of GDP. This data obtained all from the World Bank data series, reflect slow and fluctuating values that have been consequently reflected in fluctuating but generally increasing GDP growth rate that increased from 1.6 in 1974 to 13.3 in 1976 to drop to 4.5 at the end of the 1970s.

During the 1980s, real imports have been tremendously fluctuating up and down between the peak of 43.5% in 1981 and 22.2% of GDP with an average of 33.08% of GDP over this period. On the contrary, during the 1990s, real imports have been continuously declining as percentage of GDP from 35.4 in 1991 to 22.8 in 2000 before heading up again through the first half of the 2000s to reach 38.6% of GDP in 2008 to decrease again and reach its lowest unprecedented level of 19.6% of GDP in 2016 since launching the open door policy in 1970s (Hammad, 1987).

The main objective of this study is to investigate the significance of imports on the economic growth rate in Egypt. In this context, it was important to test the impact of imports on the economic growth rate in Egypt in both the short

run and the long run and then to identify the most significant factors that affect imports in Egypt. However, it was more realistic to initially, display the basic theoretical background and empirical studies concerning both; the relation between trade openness (imports and exports) and economic growth, and; the main economic variables affecting the demand for imports.

2. Theoretical and Empirical Literature

2.1. Trade Openness and Economic Growth

The neoclassical Solow-Swan growth model introduced in 1956 has been viewed as an extension to the Harrod-Domar model (1946) emphasized three main pillars for economic growth; capital, labor, and technology (Izotov, 2021). Accordingly, the country's production function is Y = F (K, AL). Where; Y represents Gross Domestic Product (GDP), K stands for Capital, and L is the number of labor whose productivity relies on the technological state A. Consequently, the long-run economic growth rate is solely determined by technological advances (Dimand & Spencer, 2008).

Most countries developing their economies follow these theoretical models by reducing imports which consume their foreign reserves in order to minimize their trade deficits or to improve their trade balances. To reduce imports, countries can either impose tariffs and/or quotas or subsidize competing domestic industries. Thereby, these countries follow the import substitution strategy to replace imported goods with domestically produced ones (Hogendorn, 1996).

However, it was empirically proven that subsidizing domestic industries and imposing trade barriers on imports—especially imports of capital intermediary goods used in exports' production may affect negatively exports and thereby economic growth (Khan et al, 2019). And from here, the impact of imports on economic growth has been controversial.

Removing trade barriers under a perfectly competitive market together with liberalizing imports of consumer goods encourages competitive domestic producers to increase their production quantities and improve their qualities to be import-substituting which eventually enhances production efficiency and reduces factor usage in the short run. However, in the long run, it's guaranteed that the industry becomes more innovative, productive and competitive which is reflected graphically as a rightward shift of the industry supply curve. Conversely, in imperfectly competitive markets, the rise in imports repels domestic import—substituting firms which reduces domestic investment and hampers production and economic growth.

On the other hand, imports of capital and intermediate goods allow domestic firms to diversify, specialize, enhance their productivity and eventually realize higher profits over time. These higher profits enable firms to conduct more research and development (R&D) and exert more innovative efforts (Kim et al., 2007).

Empirically, extensive developmental studies have tested the impact of exports

on economic growth considering exports as the main channel of innovation, know-how and improved productivity. Besides, exports are also the main source of foreign exchange which is crucial to financing imports of intermediate goods such as machinery and equipment. This is translated through the different policies and strategies formulated by several developing countries to raise their exports and achieve higher and sustainable economic growth rates (Chang et al., 2014).

Compared to the empirical studies on exports, the number of studies on the relationship between imports and economic growth is quite limited. This can be attributed to the fact that theoretically, the impact of imports on economic growth has been more complicated than that of exports and is thus reflected through incorporating additional independent variables to expand the original neoclassical model such as foreign trade (Izotov, 2021).

The results of country studies have been contradictory. In 1997 Coe and others applied a quantitative model over the period 1971-1990 on a group of 77 developing countries to test the impact of three main independent variables; foreign R&D capital stock (measured as a weighted average of import shares from 22 developed countries); the share of imports from developed exporting countries as a percentage of GDP and the secondary school enrolment on the countries' overall productivity. The study concluded a positive significant relation between the variables. Moreover, the productivity of the developing country tends to be higher when trade is more open to developed countries that enjoy a larger accumulative experience with R&D. This eventually implies that developing countries with larger foreign R&D capital stock will enjoy higher domestic productivity with the increase in imports (Coe & Hoffmaister, 1995).

Lawrence and Weinstein (1999) examined this relationship using a set of panel data on manufacturing industries in Japan. They found a positive relationship between imports and total factor productivity (TFP) growth. Conversely, Muendler (2004) tested the effect of imports on competition in the industrial sector in Brazil. He concluded that the competitive effects of imports on competition are large even though the effect of intermediate imports on labor productivity is small (Kim et al., 2007).

In 2008, Ugur examined the causal relationship between economic growth (real GDP) and different categories of imports in Turkey. The study applied a multivariate VAR model, Granger Causality test, impulse response function and variance decomposition analysis over the period 1994-2005. The results indicated a bidirectional relationship among GDP and real investment goods import, and a unidirectional relationship between GDP and real raw material import. However, the relation between GDP and real consumption goods imports is found to be unidirectional flowing from GDP to them (Ugur, 2008).

Later in 2009, Aktaş also examined the relation between imports, exports and economic growth in Turkey over the period 1996-2006 through applying Johansen's Cointegration test. In the short run, he concluded two-way causal relationship among the three variables except for the relation between exports and im-

ports to growth. Over the long run, the relation turned out to be an equilibrium relation (Arvas & Torusdağ, 2017).

Lately, in 2019, a study conducted in Bangladesh by Miyan and Biplob investigated the relation between exports, imports and economic growth through applying the Johansen Co-integration test and Granger-causality test in Vector Error Correction Model (VECM) framework over the period 1981-2017. The researchers confirmed the existence of short-run causal relation from exports to economic growth and from economic growth to imports, whereas, in the long run, a statistically significant equilibrium relation exists between the three variables (Miyan & Biplob, 2019).

2.2. The Demand for Import

As mentioned earlier, growth models have highlighted the significance of imports as a substantial instrument for economic growth. This is revealed from several recent studies indicating that imports of intermediaries are a significant determinant of economic growth in countries with manufacturing bases formulated on export-oriented industries (Grossman & Helpman, 1991; Lee, 1995: pp. 91-110; Mazumdar, 2001: pp. 209-224). Even countries with diversified economies, that include agricultural, industrial, tourism and services sectors, for instance, Egypt can benefit from the imports of intermediate goods that raise labors' productivity and allow workers to gain knowledge from the embedded technology in the imported machines and equipment. Besides, they raise government revenues through the customs duties imposed on them (Bakari, 2016).

The imperfect substitution consumption theory of John Hicks assumes that any rational consumer seeks to maximize his utility or satisfaction subject to his income ability (Vacu & Odhiambo, 2020). This theory also assumes that neither imports nor exports can perfectly substitute domestic goods, which implies that the country acts as both an importer and exporter (Khan et al., 2013). Accordingly, import demand is dependent on the income of the importing country and price of the imported goods and the price of domestically produced goods (Goldstein & Khan, 1985). Likewise, the Keynesian theory presented import demand as a function of income and price.

Finally, the neoclassical theory which is based on the comparative advantage theory of David Ricardo and is also associated with the Heckscher Ohlin (H-O) framework, assumes that the country would import goods that have the least factor endowment and thus higher production cost than the other trading partner. This theory also assumes that both employment and output are fixed and thus any changes in income have no effects on imports (Vacu & Odhiambo, 2020).

Economic researchers assumed several economic and non-economic explanatory variables in an attempt to estimate the import demand function in developing countries. Domestic real income, GDP, price of imports, domestic prices and real international reserves are among the economic variables affecting import demand (Ibrahim & Aljebrin, 2012). However, the standard and most commonly studied

import demand function includes only relative prices and domestic income.

3. Econometric Model

Most previous researchers in Egypt have focused only on the importance of exports on economic growth, despite the fact that the volume of imports to Egypt exceeds the volume of exports. This highlights the importance to fill the gap by studying and analyzing the significance of imports on growth (Khan et al., 2019). Therefore, the study in hand provides an empirical analysis through two models using an ARDL methodology. The first model investigates the dynamic impact of imports on economic growth (proxied by GDP annual growth rate) in Egypt over the period 1974 to 2021.

The study then, stepped to the second model using the same estimation technique to determine the main factors that affect real imports of goods and services in Egypt over the same study period. Where the independent variables are: GDP measured in constant 2015 US$, purchasing power parity (PPP) used as a proxy for relative prices (RP), average official exchange rate (ER) and foreign reserves (FR).

The study in hand attempts to predict the import demand function for Egypt, by considering simultaneously a wider variety of explanatory variables that have been controversial between the economic theory and countries' empirical analysis. For instance, theoretically, the demand for imports decreases with the depreciation of the domestic currency and vice versa. Likewise, the economic theory also predicts that the accumulation of foreign reserves increases the demand for imports and thus influences trade liberalization policies in developing countries (Arize & Malindretos, 2012). Empirically, however, this is not certain as; the impact of devaluation policies and the accumulation of foreign reserves on the trade balance of several developing countries have been controversial (Ibrahim & Aljebrin, 2012).

3.1. Model (1): Testing the Significance of Imports on Economic Growth in Egypt

To examine whether imports have a significant impact on economic growth in Egypt the study uses annual time series data for Egypt from 1974-2021 to examine the dynamic impact of imports on economic growth rate in Egypt. Based on Panta et al. (2021); Millia et al. (2021), this study used GDP annual growth rate as a proxy for Economic growth in Egypt—our main dependent variable whereas, real imports (M), average official exchange rate (ER), foreign reserves (FR), and relative prices proxied by purchasing power parity (PPP) as the main independent explanatory variables.

In addition, the researchers added three control variables namely; foreign direct investment (FDI), gross capital formation (GCF) and financial development (FD) to ensure data reliability and credibility, to correct model specification and finally to ensure that the results are not biased due to omitted variables (Panta et al., 2021; Millia et al., 2021; Dodaro, 1993). All the data are derived from World Bank Development Indicators (WDI). **Table 1** presents the variables definitions and data sources used in this study.

Table 1. Variable definition and data.

Variable	Description	Data Source
GDP	GDP growth rate (annual %)	WDI
M	Imports of goods and services (constant 2015 US$)	WDI
ER	Official exchange rate (LCU per US$, period average)	WDI
FR	Total Reserves minus gold (current US$)	WDI
PPP	Price level ratio of PPP conversion factor (GDP) to market exchange rate	WDI
FD	Domestic credit to private sector (% of GDP)	WDI
FDI	Foreign direct investment, net inflows (% of GDP)	WDI
GCF	Gross Capital Formation	WDI

$$\ln\left(GDP\right)_t = \alpha_0 + \alpha_1 M_t + \alpha_2 RP_t + \alpha_3 ER_t + \alpha_4 FR_t + \alpha_5 FDI_t + \alpha_6 GCF_t + \alpha_7 FD_t + \varepsilon \quad (1)$$

The study employs autoregressive distributive lag model (ARDL) bounds estimation technique formulated by Pesaran et al. (2001) to test the impact of imports on economic growth in Egypt. ARDL is commonly used to estimate long run relationships between different economic variables in a single equation. This method was used for its advantages compared to other co-integration estimation techniques.

First, ARDL is more effective at different levels of integration, in other words, it draws a complete picture of whether the variables are integrated at order zero I (0), one I (1) or mixed integration while Johansen cointegration methods require that all variables have the same order of integration (Pesaran et al., 2001). Second, ARDL is not sensitive to datasets with small number of observations which is usually the case with time series data collected at country level. Third, ARDL cointegration method has superior advantages compared to other techniques as it produces unbiased estimates in the long run and valid t-statistic value even if endogeneity and serial correlation exists (Harris et al., 2003). Fourth, after the long-run cointegration relationship is confirmed by ARDL cointegration test, the short-run coefficients can be estimated by ARDL error correction model (ECM) without losing valid long-run coefficients.

ARDL Specification and Error Correction Specification

$$\begin{aligned}\Delta\ln\left(GDP\right)_t = {} & \alpha_0 + \alpha_1 t + \sum_{i=1}^{n}\alpha_1\Delta\ln\left(GDP\right)_{t-i} + \sum_{i=0}^{n}\alpha_2\Delta M_{t-i} + \sum_{i=0}^{n}\alpha_3\Delta RP_{t-i} \\ & + \sum_{i=0}^{n}\alpha_4\Delta ER_{t-i} + \sum_{i=0}^{n}\alpha_5\Delta FR_{t-i} + \sum_{i=0}^{n}\alpha_6\Delta FDI_{t-i} + \sum_{i=0}^{n}\alpha_7\Delta GCF_{t-i} \\ & + \sum_{i=0}^{n}\alpha_{58}\Delta FD_{t-i} + \vartheta_1\ln\left(GDP\right)_{t-1} + \vartheta_2 M_{t-1} + \vartheta_3 RP_{t-1} + \vartheta_4 ER_{t-1} \\ & + \vartheta_5 FR_{t-1} + \vartheta_6 FFDI_{t-1} + \vartheta_5 GCF_{t-1} + \vartheta_5 FD_{t-1} + \mu_{1t}\end{aligned}$$

where α_1 - α_7 and ϑ_1 - ϑ_7 are regression coefficients, α_0 is a constant and μ_{1t} is white noise error term and the error correction specification will be:

$$\Delta \ln M = \alpha_0 + \alpha_1 t + \sum_{i=1}^{n} \alpha_1 \Delta \ln(M)_{t-i} + \sum_{i=0}^{n} \alpha_2 \Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_3 \Delta RP_{t-i} + \sum_{i=0}^{n} \alpha_4 \Delta ER_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta FR_{t-i} + \sum_{i=0}^{n} \alpha_6 \Delta FDI_{t-i} + \sum_{i=0}^{n} \alpha_6 \Delta GCFR_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta FD_{t-i} + \gamma_1 ECM_{t-1} + \mu_{1t}$$

where α_1 - α_7 and γ_1 are coefficients, α_0 is a constant, ECM_{t-1} is lagged error term and μ_{1t} is white noise error term.

3.2. Model (2): Identifying the Variables That Affect the Demand for Imports in Egypt

The second step involves determining the main factors that affect imports in Egypt. Consequently, the researchers followed the model of Dhungel (2019) to present the general import demand function as follows:

$$M = f(RP, GDP, ER, FR)$$

Which could be written as follows:

$$\ln(M)_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 RP_t + \alpha_3 ER_t + \alpha_4 FR_t + \varepsilon \quad (2)$$

The dependent variable is real imports of goods and services (M) measured in constant 2015 US$. The independent variables are GDP measured in constant 2015 US$, relative prices (RP), average official exchange rate (ER) and foreign reserves (FR) respectively.

ARDL Specification and Error Correction Specification

$$\Delta \ln(M)_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{n} \alpha_1 \Delta \ln(M)_{t-i} + \sum_{i=0}^{n} \alpha_2 \Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_3 \Delta RP_{t-i} + \sum_{i=0}^{n} \alpha_4 \Delta ER_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta FR_{t-i} + \vartheta_1 \ln(M)_{t-1} + \vartheta_2 GDP_{t-1} + \vartheta_3 RP_{t-1} + \vartheta_4 ER_{t-1} + \vartheta_5 FR_{t-1} + \mu_{1t}$$

where α_1 - α_7 and ϑ_1 - ϑ_7 are regression coefficients, α_0 is a constant and μ_{1t} is white noise error term and the error correction specification will be:

$$\Delta \ln M = \alpha_0 + \alpha_1 t + \sum_{i=1}^{n} \alpha_1 \Delta \ln(M)_{t-i} + \sum_{i=0}^{n} \alpha_2 \Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_3 \Delta RP_{t-i} + \sum_{i=0}^{n} \alpha_4 \Delta ER_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta FR_{t-i} + \gamma_1 ECM_{t-1} + \mu_{1t}$$

where α_1 - α_7 and γ_1 are coefficients, α_0 is a constant, and ECM_{t-1} is lagged error term μ_{1t} is white noise error term.

3.3. Unit Root Tests

Before applying ARDL bound test, we need to test for the order of stationarity

of the time series data to ensure that all variables are either stationary at a level I (0), the first difference I (1), or mixed integrating order to avoid spurious results that lead to type 1 error and thus biased results (Engle & Granger, 1987; Pesaran et al., 2001; Narayan, 2005). We used Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) to test for the order of the stationarity of all variables under study. Table 2 confirmed that ARDL bound test can be applied in this study since no variable is integrated at the second difference I (2), where all variables under study are either integrated at level I (0), first difference I (1), or both.

The results show that all variables are integrated at level or the first difference and that no variables are integrated at order two. According to ADF test, all variables are stationary at first difference except GDP, FDI, and GCF which are integrated at both: at level and at the first difference. Also, PP test confirms the same results as ADF tests. Thus, all requirement or order level is fulfilled and thus ARDL bound test can be applied in this study.

3.4. Co-Integration Testing

Applying ARDL bound requires the selection of the optimal lag length to avoid any biases in the model's reliability (Baloch & Suad, 2018). The Akaike Information Criterion (AIC) chooses the optimal lag length since it produces more accurate and consistent results than the Schwartz Bayesian criterion (SBC). The results show that the optimal lag length selected for Model (1) is ARDL (2, 2, 0, 0, 1, 2, 2) and for Model (2) is ARDL (1, 2, 0, 2, 0).

The second step after the selection of the optimal lag length is to test the existence of cointegration relation between the import (M) and economic growth as the dependent variables for models 1 and 2 and the other independent and control variables by performing an "F-test" on the null hypothesis

Table 2. Unit root tests results.

Variables	ADF Test (at Level)	ADF Test (at First Difference)	PP Test (at Level)	PP Test (at First Difference)
GDP	−4.162***	−10.642***	−4.394***	−12.328***
M	−0.292	−5.389***	−0.211	−5.246***
ER	0.427	−5.025 ***	0.265	−4.923***
FR	−0.735	−4.687***	−1.132	−4.681***
PPP	−1.293	−4.096***	−1.601	−4.087 **
FD	−1.587	−5.512 ***	−1.738	−5.652***
FDI	−2.933**	−6.104***	−3.142**	−6.086***
GCF	−5.085***	−10.762***	−4.994***	−12.139***

Source: Author's computation using Stata 14. Note: *, **, *** indicates that the null hypothesis is rejected at the 10%, 5% and 1% level of significance, respectively.

that the coefficients on the level variables are jointly equal to zero (Pesaran et al., 2001).

A cointegrating long-run relationship between the variables exists when the null hypothesis is not accepted. According to Pesaran et al. (2001), if the F-statistic calculated is less than I (0), we accept the null hypothesis of no cointegration relationship among variables exists, on the other hand, if the F-statistic exceeds I (1), we confirm the long-run cointegrating relationship between variables.

The results of the ARDL bounds tests confirm the existence of a cointegrated long-run relationship between economic growth rate and other independent and control variables in model (1) and between imports and other independent variables in model (2), where the F-statistic lies above 4.43 for model (1) and lies above the upper bound critical value of 5.06 at a 1% significance level for model (2). Table 3 shows the estimates of the ARDL bound tests and the critical value.

3.5. Diagnostic Tests

Finally, a set of diagnostic tests has been performed. The statistical results indicate that the R^2 is above 90% for both models (1) and (2), which indicates that the explanatory variables are able to explain the variations in the dependent variable by 95% in model (1) and by 99% in model (2).

In addition, some diagnostic tests are performed to ensure the accuracy of our results. Table 4 indicates that there is no evidence for serial correlation where the residuals are normally distributed and serially uncorrelated up to order two. Moreover, we found no evidence for heteroscedasticity. For models specification, the Ramsey RESET test indicates that both models are correctly specified and there are no omitted variables.

The CUSUM and CUSUMSQ statistics fluctuate within the 5 percent critical bounds, implying that the estimate parameters are accurate and stable over time. Therefore, both models are stable and provide reliable results.

Table 3. Estimates of the ARDL bound tests and the critical value

	F-Bounds Test					Cointegration Status
	Test Statistic	Critical Value	Significance Level	I (0) bound	I (1) bound	
Model 1	F-statistic K = 6	11.763	10%	2.12	3.13	Cointegrated
			5%	2.45	3.61	
			1%	3.15	4.43	
Model 2	F-statistic K = 4	6.501	10%	2.45	3.52	Cointegrated
			5%	2.86	4.01	
			1%	3.74	5.06	

Source: Author's computation using Stata 14.

Table 4. The diagnostic tests.

LM Test Statistic	Model (1)	Model (2)
R^2	0.9562	0.9977
Adjusted R^2	0.9092	0.9934
F-statistics	371.10 (0.014)	236.20 (0.000)
Multicollinearity	1.499624 (0.0056)	1.8796 (0.0109)
Serial Correlation	10.425 (0.0338)	23.484 (0.0002)
Heteroscedasticity	44.00 (0.4290)	30.00 (0.4140)
Ramsey RESET test for normality	2.12 (0.1022)	2.79 (0.0718)

Source: Author's computation using Stata 14.

4. Estimation Results

4.1. Results for Model (1)

The results of model (1) came in line with our expectations and with the economic theory. The long run results proved that all independent variables are statistically significant except gross capital formation.

Our main regressor, real imports (M) came significant with a positive impact on GDP growth rate. The results reveal that a 1% increase in import lead to 0.0026% increase in economic growth in Egypt in the long run and 0.0005% in the short run. This result came aligned with the previously mentioned literature and can be interpreted easily knowing that more than 60% of the import structure in Egypt are manufacturing inputs and raw materials, namely; mineral and chemical products, machinery and electrical equipment, base metals, vehicles, raw hides, wood, paper-making products, artificial resins and rubber. All are used in production (Mehmood & Mansoor, 2021; Zaidi et al., 2021).

The exchange rate was found to have positive significant impact on economic growth in Egypt, where a 1% increase in ER (which is depreciation reflecting that more pounds are needed to buy one dollar for example) leads to a 0.376% increase in economic growth. This result also came in line with the economic theory namely, the J-curve effect. According to this phenomenon, the devaluation/depreciation of the exchange rate has negative effects on the balance of trade in the short run because of its effects on the trade contracts negotiated before the decline in the value of currency which lead to changes in the relative prices. In contrast, in the long run, domestic consumers reduce their demand for imported products, besides; with the reduction in the relative price of exports so that the volume of exports of the country increases. Both effects together improve the trade balance (Refaey, 2022).

FDI, as expected, has a positive significant impact on economic growth in the long run—which coincides with the H-O theory that considered FDI as a partial alternative to international trade. However, it has a negative significant impact on GDP growth rate in the short run. One possible explanation is due to crowd-

ing out domestic investment (Bouchoucha & Ali, 2019). Our model result indicates that a 1% increase in FDI will increase economic growth by 0.435% in the long run but will decrease growth rate by 0.527% in the short run.

Moreover, The ECM (−1) shows the short-run adjustment process. In model (1), the error correction coefficient is −2.282 and significant at 1%. This finding implies that the rate of adjustment to the long run equilibrium in the current year at the speed of 2.28% in Egypt. Also, the results imply that it takes less than two years to adjust any shock in economic growth in Egypt. This is shown through Table 5.

4.2. Results for Model (2)

The results for model (2) showed that 2 out of 4 variables are statistically

Table 5. Estimated long run and short run results for the impact of import on economic growth.

Dependent variable: GDP growth rate				
Selected Model ARDL (2, 2, 0, 0, 1, 2, 2)				
Variable	**Coefficient**	**Standard error**	**t-stat**	**Prob.**
Long run				
Real Imports (M)	0.00266	0.00296	2.90	0.084
Exchange Rate (ER)	0.37611	0.10737	3.50	0.004
Relative Prices (PPP)	30.8487	5.85611	5.27	0.000
Gross Capital formation (GCF)	0.03077	0.02108	1.46	0.167
Foreign Direct Investment (FDI)	0.43538	0.08212	5.30	0.000
Financial Development (FD)				
Short-run				
ΔM	0.0005	0.0003	−1.48	0.101
ΔM (1)	0.0004	0.0026	−1.70	0.102
ΔGDP	0.5171	0.1695	3.05	0.099
ΔGCF	−0.0219	0.0284	−0.77	0.450
ΔFDI	−0.5276	0.1905	−2.77	0.015
ΔFDI (1)	−0.4583	0.1868	−2.45	0.028
ΔFD	−0.2037	0.0818	−2.49	0.026
ΔFD (1)	−0.1919	0.0782	−2.45	0.028
ECM (−1)	−2.2820	0.2900	−7.87	0.000
R^2 = 0.9562		Adjusted R^2 = 0.9092		
DW statistic = 1.499		Sum squared residuals = 0.0773		
F-Statistic = 371.1		Prob.(F-Statistic) = 0.014		
Schwartz Bayesian Criterion = 196.2		Akike Info Criterion = 174.8		

Source: Author's computation using Stata 14.

significant. In other words, the exchange rate and relative prices are considered the main determinants of import demand in Egypt with value of R^2 around 0.96. This implies that 96 percent of the variations in imports are explained by exchange rate and relative prices.

Also, the F-statistics proved that the overall model is significant. This result has been confirmed with different diagnostic test presented earlier in **Table 4** which has proved that the results are statistically reliable and credible with no serial autocorrelation, heteroscedasticity or multi collinearity detected. In addition, the model is proved to be correctly specified with no omitted variables.

The results came in line with our expectations and with the economic theory. Based on the literature, it was proved that exchange rate has a significant impact on import demand, especially in the developing and emerging countries. In Egypt, the elasticity coefficient indicates that a 1% increase in ER (exchange rate depreciation) leads to increase in import demand by 0.002%.

It's worth mentioning that the exchange rate policy adopted by the Central Bank of Egypt (CBE) has been characterized by massive changes over years in response to several currency crises. From a crawling peg exchange rate system in 2001 followed by a floating system in 2003 to managed floating in 2012 to a stabilized crawl-managed arrangement in 2015 back to floating exchange rate system in November 2016. In 2017 the exchange rate regime in Egypt shifted to flexible exchange rate (Refaey, 2022). Eventually, in October 2022, the CBE in response to requirements of the IMF to grant Egypt another loan announced a "durably flexible foreign exchange rate regime" which implies a full liberalization of the pound.

These exchange rate policy fluctuations together with the reduction in the value of the pound against foreign currencies of major trading-partners to Egypt do not affect the demand on imports negatively, in contrast the positive significant relation between the exchange rate and the demand on imports can possibly be explained knowing that Egypt is an importing country with more than 70% of its basic needs imported from abroad. For instance; in the fourth quarter of 2022, the imports composition as percentage of total imports to Egypt has been; minerals and chemicals (25%); wheat, maize and livestock (24%); machines and equipment (15%); base metals (13%); artificial resins and rubber (6%) and vehicles and aircraft (5.5%).

Interestingly, relative prices seem to be one of the important determinants of import demand in Egypt, where a 1% increase in relative prices lead to a decrease in import demand by 0.0006%. In fact, this result again coincides with the literature.

Surprisingly, foreign reserves were expected to have positive significant impact on import demand since it relaxes the demand liquidity restrictions. Concerning Egypt, foreign reserves were found to be an insignificant explanatory variable (Arize & Osang, 2007). However, in other way, our findings are still consistent with the literature. In developing importing countries such as Egypt; the

economic impact of foreign reserves on real imports are too small compared to other variables such as real income and relative prices. For this reason, foreign reserves were excluded from both models. This step was necessary for more reliable and accurate results.

The study also finds that, economic growth shows a positive significant impact on import demand in the long run but not in the short run in Egypt over the study period, where a 1% increase in GDP will increase import demand by 0.00018% in the long run. This result was expected and was supported heavily by the literature mentioned earlier. It could be explained by the fact that Egypt is an emerging country with high economic growth rate. Thus, as Egypt accelerates its rate of growth, the demand on imports also rises since we import most of the raw materials needed for manufacturing process.

Following the papers of Odhiambo (2009) and Narayan and Smyth (2008), we obtain the short-run dynamic parameters by estimating an error correction model (ECM) associated with the long-run estimates. The error correction term represents the speed of adjustments towards equilibrium. In other words, it measures the speed at which import demand adjust to changes in independent explanatory variables and converging to equilibrium level after any demand or supply side shocks. It is negative and statistically negative which indicates that

Table 6. Estimated long run and short run elasticities of import demand function.

Dependent variable: Import demand Selected Model ARDL (1,2,0,2,0)				
Variable	**Coefficient**	**Standard error**	**t-stat**	**Prob.**
Long run				
Exchange Rate (ER)	0.00216	0.0071	0.23	0.018
Foreign Reserves (FR)	−0.26673	0.3675	−0.73	0.476
Relative Prices (PPP)	−0.00067	0.0004	−1.37	0.107
GDP growth rate	0.00018	0.0001	1.47	0.057
Short-run				
ΔER	0.0061	0.0001	1.28	0.055
Δ ER (1)	0.0004	0.0025	2.04	0.216
ΔPPP	−0.0009	0.0012	1.88	0.075
ΔPPP (1)	0.0022	0.0001	−0.77	0.450
ECM (−1)	−0.9093	0.1983	−4.58	0.000
R^2 = 0.997		Adjusted R^2 = 0.993		
DW statistic = 1.87		Sum squared residuals = 0.0032		
F-Statistic = 236.20		Prob.(F-Statistic) = 0.000		
Schwartz Bayesian Criterion = 146.2		Akike Info Criterion = 144.8		

Source: Author's computation using Stata 14.

coefficient of ECM lies between 0 and −1 (Odhiambo, 2009; Narayan & Smyth, 2008). In this case, the ECM causes import demand to converge monotonically to its long-run equilibrium path in response to the changes in the exogenous variables.

The long-run estimation results are reported in **Table 6** which shows that; the exchange rate in one past period (Δ ER) has a statistically positive significant impact on real imports. This result indicates that any past fluctuations in ER have a significant impact on current import demand. The results also reveals that PPP (which acts here as a proxy for relative prices) is statistically positively significant at one past period (ΔPPP) which indicates that there is a positive relation between relative prices and import demand in both the long run and the short run.

Finally, the error correction coefficient is −0.9093 and significant at 1%. This finding implies that the rate of adjustment to the equilibrium is 90% in case of

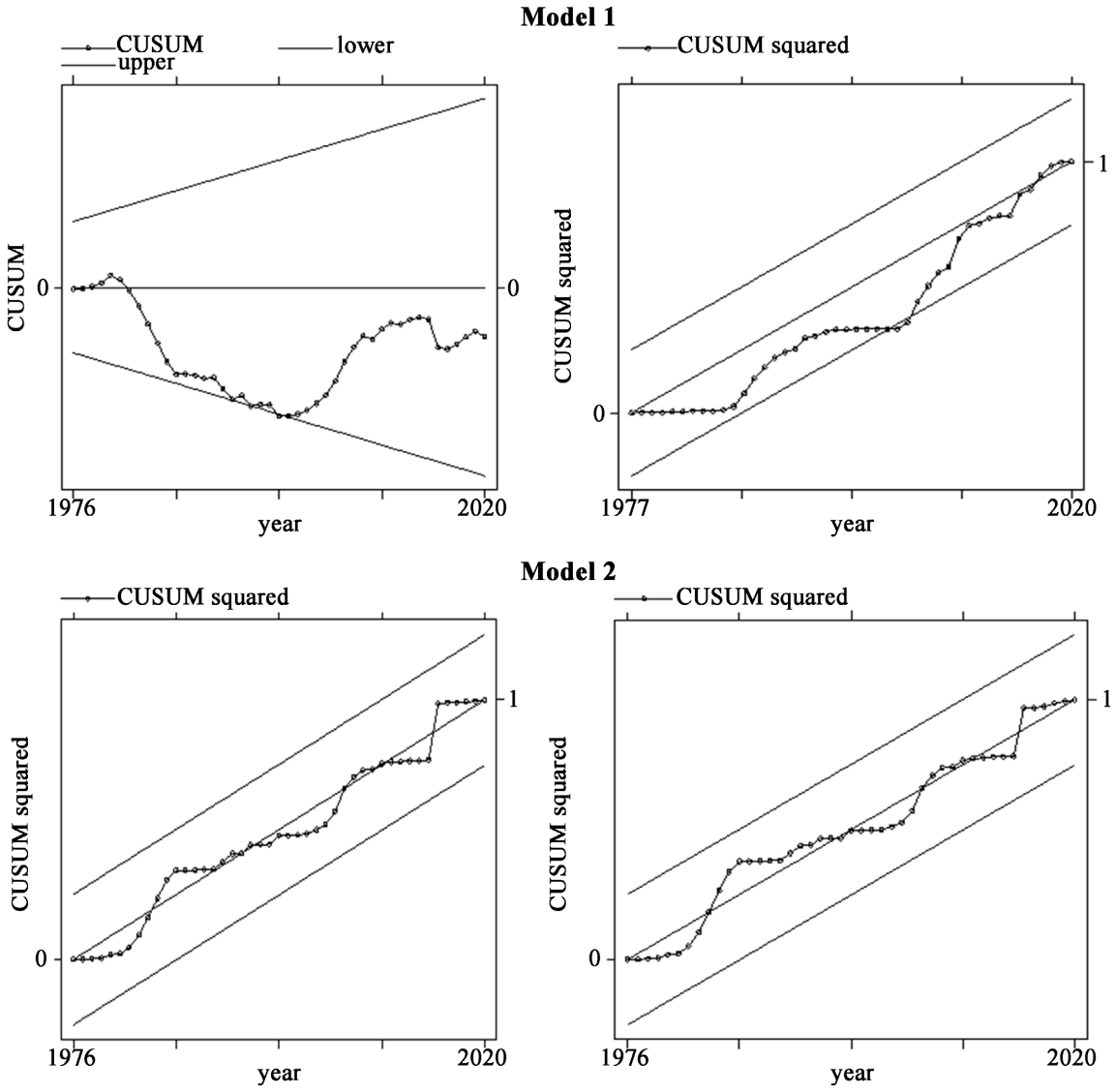

Figure 1. The results for CUSUM and CUSUMSQ tests for parameter stability prove that the model is stable as both the CUSUM and CUSUMSQ plots lie between the critical lower and upper bounds at the 5% significance level.

any shock. Also, the results indicate that it takes less than one year to adjust any shock in import demand in Egypt.

The models results therefore can be summarized as follows: in model (1), the long run results proved that all independent variables; exchange rate, relative prices and foreign direct investment have a statistically significant impact on real imports except gross capital formation. Besides, the rate of adjustment to the long run equilibrium in the current year is at the speed of 2.28%. Also, it was found that it takes less than two years to adjust any shock in economic growth in Egypt.

Concerning model (2), the results showed that only 2 out of 4 variables are statistically significant. Namely, the exchange rate and relative prices. This finding implies that the rate of adjustment to the equilibrium is 90% in case of any shock and also, it was found that the results indicate that it takes less than one year to adjust any shock in import demand in Egypt.

5. Structural Break Test

The stability test for the estimated parameters of this selected ARDL model is necessary to ensure the stability of the ARDL-ECM model. Thus, the study uses the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) tests (Persan & Pesaran, 1997). **Figure 1** shows that both the CUSUM and CUSUMSQ plots lie between the critical lower and upper bounds at the 5% significance level. Therefore, the model is stable and provides reliable results. More specifically, it confirms the accuracy of short and long run parameters and verifies the stability of ARDL model for structural break.

6. Conclusion

After displaying the main neoclassical growth models which encouraged open-door policies, it was found that the general trend followed by most developing countries was the reduction in imports using trade barriers and increasing exports for realizing desired rates of economic growth, However, empirical testing in several developing countries found a significant and positive impact of imports on GDP growth rates given that these imported products and technologies are used domestically in export production. This paper then contributes to the prevailing literature in fulfilling the gap in studying the impact of imports on economic growth, besides, analyzing the main factors affecting import demand in Egypt.

The empirical examination is subdivided into two models. The first model investigates the dynamic impact of imports on economic growth (measured by GDP annual growth rate) in Egypt over the period 1974 to 2021. Using the ARDL bounds estimation technique and setting the main independent variables to be: real imports (M), average official exchange rate (ER), foreign reserves (FR), and purchasing power parity (PPP) used as a proxy for relative prices (RP). In addition to three control variables; foreign direct investment (FDI), gross capital formation (GCF) and financial development (FD). The results confirmed a cointe-

grated long-run relationship between the economic growth rate and both the independent and the control variables.

The study then, continued to the second model using the same estimation technique to determine the main factors that affect the demand for real imports of goods and services in Egypt over the same study period. Where the independent variables are: GDP measured in constant 2015 US$, purchasing power parity (PPP) used as a proxy for relative prices (RP), average official exchange rate (ER) and foreign reserves (FR). Likewise, the results of the ARDL bounds tests confirm the existence of cointegrated long-run relationship between imports and other independent variables in the second model.

After confirming the long-run relationship by the ARDL cointegration test, the short-run coefficients have been estimated by ARDL error correction model (ECM) to find that in Egypt, it takes a time period less than two years to adjust any shock in economic growth.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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