Monetary Policy Transmissions and Balance of Payments Stability in Egypt During the Covide-19 Crisis.

تأثير أدوات السياسة النقدية على استقرار ميزان المدفوعات في مصر خلال لزمة كوفيد-١٩

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The purpose of the paper is to examine the monetary approach to the balance of payments adjustment in Egypt. Specifically, the paper first investigates the impact of monetary policy variables; money supply, discount rate and two other variables exchange rate and income on the balance of payments adjustment during the period 1980- 2021. During that period Egypt launched several economic reform programs and was hit by three shocks: the Global Financial Crisis 2007- 2008, the Egyptian Uprising 2011, and the Covid-19 pandemic 2020-to the present. The second purpose of the paper is to investigate the impact of Covid-19 outbreak on the Egyptian balance of payments using a dummy variable. The study uses the Autoregression Distributed Lag ARDL Bound test for cointegration introduced by Pesaran, Shin and Smith (2001). The balance of payments is expressed as a function of its lagged values and in the current and lagged values of the explanatory variables. The paper uses the Error Correction model ECM to examine the impact of the monetary policy transmissions on the balance of payments in the long run and in the short run. The Augmented Dickey Fuller test is used to determine the degree of integration.

Keywords: Monetary Policy Transmissions, Money Supply, Domestic Credit, Exchange Rate, Balance of Payments, Autoregression Distributed Lag ARDL, Egypt, Covid-19.

JEL Classification: E52, C67, F1,J33,O55

والغرض من الورقة هو دراسة النهج النقدي لتسوية ميزان المدفوعات في مصر. وعلى وجه التحديد، تبحث الورقة في تأثير متغيرات السياسة النقدية، مثل العرض النقدي، والائتمان المحلي، والتضخم، ومعدل الصرف على تسوية ميزان المدفوعات خلال الفترة 1980-٢٠٢١. وخلال تلك الفترة أطلقت مصر العديد من برامج الإصلاح الاقتصادي وتعرضت لثلاث صدمات: الأزمة المالية العالمية ٢٠٠٨-2007، والثورة المصرية ٢٠١١، ووباء كوفيد-١٩ ٢٠٢٠ حتى الآن. الغرض الثاني من الورقة هو التحقيق في تأثير تفشي Covid-19 على ميزان المدفوعات المصري. تستخدم الدراسة اختبار ARDL Bound الذي قدمه بيساران وشين وسميث (٢٠٠١). ويعبر عن ميزان المدفوعات على أنه دالة لقيمه المؤجلة والقيم الحالية والمؤجلة للمتغيرات التفسيرية. وتستخدم الورقة نموذج تصحيح الأخطاء ECM لدراسة تأثير متغيرات السياسة النقدية على ميزان المدفوعات على المدى الطويل وعلى المدى القصير. يتم استخدام اختبار ديكي فولر المعزز واختبارات فيليبس لتحديد درجة التكامل.

الكلمات الرئيسية: قنوات السياسة النقدية، العرض النقدي، الائتمان المحلي، سعر الصرف، ميزان المدفوعات، مصر" الكوفيد-١٩.

I. Introduction

The monetary approach to the balance of payments go back to the 18th-century writings of David Hume. However, the continuity of its development, was delayed for a quarter of a century by the events of the 1930s great depression and the collapse of the international monetary system of 1931 and after, and the 'Keynesian revolution'. The modern revival of the monetary approach originated with the writings of James Meade in the early 1950s followed by Harry G. Johnson and Robert A. Mundell in the 1960s. At the same time, important contributions to the formal development of the approach were carried out, under the leadership of Jacques J. Polak at the International Monetary Fund, thereby yielding analytical foundations to the Fund's operational practices.

According to the monetary approach to balance of payments there will be disequilibrium in the money market if there are surpluses and deficits in the balance of payments. Deficits in the balance of payments are caused by money supply exceeding money demand, while surpluses are caused by money demand exceeding money supply.

Besides the monetary approach to balance of payments, there are two other approaches: the elasticity approach and the absorption approach. The elasticity approach on how exchange rate devaluations and appreciations affect exports and imports which constitute the current account. The elasticity approach considers that exchange rate devaluations cause changes in relative prices; domestic prices versus foreign prices which in turn cause substitution effects between consumption and production. However, there are conditions for currency devaluation to achieve improvement in balance of trade, current account, and balance of payments. The most important condition is the Marshall-Lerner condition. The Marshall Lerner condition states that for devaluations to exert a positive effect on the trade balance, and a stable foreign exchange market, the absolute values of the sum of the demand elasticities for exports and the demand elasticities for imports to be greater than unity . However, if the sum of price elasticities of demand for exports and imports, in absolute terms, is less unity devaluation will worsen (increase the deficit) the BOP. If the sum of these elasticities in absolute terms is equal to unity, devaluation has no effect on the BOP situation which will remain unchanged. Tijani 2014.

Thirlwall 1980 considers that the elasticity approach to balance of payments adjustment is a partial -equilibrium analysis because it does take into account the supply conditions and cost changes resulting from currency devaluation and that elasticities should be total elasticities of exports and imports and not partial elasticities.

The Absorption Approach or the Keynesian approach, similarly, concentrates on the current account; and shows how the devaluation of a currency might change the relationship between expenditures (absorption) and income. According to the absorption approach, any improvement in trade – balance requires an increase in income over total expenditure. This approach considers that exchange rate will have direct effect on relative prices, income, and absorption and eventually on trade balance. Howard, M., & Mamingi, N. (2002).

The review of empirical papers that investigate whether monetary policy variables play an important role in achieving balance of payments adjustment support that any disequilibrium of the balance of payments is necessarily caused by disequilibrium in the money market between the supply of money and the demand for money.

Egypt successful completion of a structural economic reform 2016-2019 with the support of the International Monetary Fund enable the Egyptian government to address the challenges of the Covid-19 pandemic. The 2016-2019 economic reform includes the liberalization of the exchange rate, the second elimination of the energy subsides, the tax system reform to include the value added taxes, the gradual reduction of the budget deficit, apply a monetary policy to curb inflation, and increase in expenditures on education and health.

The paper has two objectives; the first objective is to investigate whether the monetary policy variables play a role in balance of payments in Egypt. The second objective is to explore the impact of Covid-19 pandemic on the balance of payments as a monetary phenomenon and use only monetary policy and exchange rate policies to regulate the balance of payments. The second section briefly reviews empirical studies. The third section discusses the 2016-2019 economic reform program and the development of the balance of payments and its components during the COVID-19 pandemic. Section four introduces the data and the econometric methodology. Section five

provides the empirical results of the study. Finally, the conclusion and policy implication.

II. Literature Review

Agozi,V.(2020) used Polak(1957,1997) monetary model with data from 2007.Q1 to 2018:Q4 to examine the relationship between monetary variables and the balance of payments in Nigeria. The study applies the two Stage Least Squares TSLS method on the reduced form of the Polak structural model. The variables used are monetary and nonmonetary variables: money supply, domestic credit, foreign reserve assets, gross domestic product, imports, exports, and capital inflows. The Johansen cointegration procedure confirm the existence of a long run relationships among variables. The estimated balance of payments model shows that domestic credit coefficient is negative and significant in in the foreign reserves' assets equation. The study results show that the BOP in Nigeria is a monetary phenomenon and recommend that the monetary authority to use the domestic credit to manage BOP

Osisanwo et al 2019 study explores the impact of monetary policy variables on the balance of payments BOP in Nigeria with annual data from 1980 to 2015. The study applied the Autoregressive Distributed Lagged ARDL Bounds Test to investigate the cointegration among the variables. The dependent variable was the balance of payments, and the independent variables include monetary and non-monetary variables. The monetary independent variables are money supply, domestic credit, inflation, and exchange rate. The non-monetary variables include output growth and trade balance. The ARDL Bounds results confirm the long run relationship among the variables. Trade balance has a positive and significant long run impact on the balance of payments. Gross Domestic product has a negative significant impact on the balance of payments. All other variables have insignificant coefficients in the long run ARDL equation. Change in money supply lagged two periods has a negative and significant coefficient and change in GDP has a positive and significant impact on the balance of payments in the short run. They consider that the balance of payments adjustment is achieved through the money market equilibrium.

Gulzar 2015 examines the monetary approach to the Pakistan balance of payments for the period 1990–2008. The paper used the reserve flow equation to test whether excess money supply played a significant role as a cause of disturbance in the balance of payments. The paper applied cointegration tests and error-correction modeling. The empirical results showed that monetary variables do not

play an important role in determining Pakistan's balance of payments. The significant relationships were found among net foreign assets, exchange rate, inflation, and balance of payment, which reflected a strong positive relationship, while reflected a strongly negative relationship among money supply, domestic credit and balance of payments as suggested by the monetary approach to balance of payments. But there is insignificant relationship between interest rate and Pakistan's balance of payments. The results evidently showed that, although some variables suggested by the monetary approach play significant roles in the disturbance of balance of payments, but the balance of payments is not a purely monetary phenomenon. Therefore, disequilibrium in the Balance of payments cannot be corrected only through monetary policy actions by the authorities. Some other measure should also be kept under consideration like increase in exports, improving quality of products, sustained growth in industrial and agriculture sectors and decreasing in imports.

Tijani 2014 tried to understand the application of monetary approach as adjustment mechanism to correct balance of payments dis-equilibrium. He studied the review of empirical studies of the theory in Nigeria, that explained the observed behavior of Nigeria's balance of payments. He aimed at the verification or refutation of monetary theory in Nigeria's balance of payments adjustment mechanisms, because despite that the theory sounds logical it needs to be empirically testing.

The study used a linear regression analysis with annual data from 1970 to 2010. The estimated result shows a positive and significant relationship between the dependent variable (Balance of Payments) and the independent variables (Domestic Credit,). Gross Domestic Product has a negative and significant impact on the balance of payments. the Exchange Rate and balance of trade have a positive but insignificant relationship with the balance of payments. While inflation rate has a negative and insignificant relationship with the balance of payments. The independent variables used in the study explained only 66 percent of the variations in the balance of payments. The study concludes that though not entirely, monetary measures are not the only variables that affect the balance of payments.

Mushendami et al 2015 used quarterly data from 1991 to 2015 to examine whether the monetary approach to balance of payment holds in Namibia. They applied these quarterly data with the Vector Error Correction Model (VECM), on variables such as NFA to proxy for balance of payments, exchange rate to present the elasticity approach for the balance of payments ,

GDP to represent the Keynesian approach for the balance of payments . Consumer price index, interest rates and domestic credit are the monetary policy tools representing the monetary approach to balance of payments. They also included fiscal balance to take account of the impact of fiscal policy on the balance of payments adjustment. They found that, an increase in domestic credit has a negative effect on the NFA and vice versa, while improvement in fiscal balance tends to improve the NFA in the short run. Variables such as interest rate, exchange rate, GDP and CPI were found to be insignificant. The Granger causality results indicate that there is a unidirectional causality running from GDP, fiscal balance, exchange rate and domestic credit to NFA. The variance decomposition shows that, most of the variations in the NFA are caused mainly by its own shocks, domestic credit, interest rate and exchange rate, while CPI, fiscal balance and GDP cause the least variations to the NFA. The Granger causality and variance decomposition results, regarding the fiscal balance and domestic credit, are consistent with the short run results. They finally concluded that, monetary policy variables are not the only variables that cause of variations in the NFA in Namibia, as fiscal balance, which is a non-monetary variable also has a significant impact on the NFA.

Udude, 2015 investigated empirically the impact of monetary policy on Nigerian balance of payment. The research was conducted using Error Correction Model ECM technique of multiple regression models using statistical time series data from 1980-2010. Annual data on Balance of Payments (BOP) used as the dependent variable; while broad money supply (M2), Interest rate (INT), exchange rate (EXCR) and gross domestic product (GDP) are represented the explanatory variables and sourced mainly from CBN publications. The data were first tested for the presence of unit root using the Augmented Dicey Fuller test while and then Johansen co integration test was used to test for long run relationship between the dependent and independent variables. The ADF results indicated that all the variables were stationary after first difference at 5 and 1 percent level of significance and the Johansen co integration test revealed the presence of a long run relationship among the variables. The Error Correction Model ECM technique was employed to estimate the individual parameters and the result indicated that the coefficients of M2 and exchange rate were positive and significant while GDP has a negative and significant coefficient. However, the coefficient of interest rate was negative and statistically insignificant. The error correction tern was found to be negative but insignificant which means that model is explosive. The study therefore concluded

that monetary policy instruments affect significantly balance of payment and recommended that Central Bank of Nigeria (CBN) should intensify the process of regular monitoring of the operation of deposit money banks to ensure the adjustment of balance of payments deficit.

Fleermuys 2005 examines the monetary approach to the Namibian balance of payments for the period 1993–2003. Through the reserve flow equation, it tests whether excess money supply played a significant role as a cause of disturbance in the balance of payments equilibrium. The paper used cointegration tests and error-correction modelling. The empirical results showed that not all monetary variables do play an overwhelming role in determining Namibia's balance of payments. Inflation rate and domestic credit are the only two monetary variables that have significant relationships with net foreign assets. Inflation rate has a significant and positive relationship with net foreign assets while domestic credit has a strong negative relationship with net foreign assets, which reflected a strongly negative relationship as posited by the monetary approach to balance of payments. The results evidently showed that, although some variables suggested by the monetary approach play significant roles, the balance of payments is not a purely monetary phenomenon. A balance of payments disequilibrium can, therefore, not be corrected only through monetary policy actions by the authorities.

Akonji 2013 examines the influence of the monetary policy variables on the Nigerian current account components during the period of 1970-2010. The study applied the Johansen cointegration test, the Ordinary Least Squares Method OLS, and the Error Correction Model. The results indicate a long-run relationship monetary policy represented by money supply and components of current account. Money supply positively influences all components of the current account. Money supply also positively affects exports, imports, and industrial output. The error correction tern was negative and significant to indicate that short run shocks adjusted back to long run equilibrium at 30 percent each year.

Boateng and Ayentimi (2013) analyze balance of payment using the monetary approach in a single equation OLS framework and the result reveals that BOP imbalances in Ghana is not influence by only monetary variables. To effectively manage balance of payment account, the authors argue that government should not rely solely on monetary tools, give equal consideration to other policy variables.

J.Duasa 2007 paper examines the short-run and the long run relationships between trade balance and a dependent variable and four explanatory variables; real exchange rate, income, and money supply in Malaysia during the period 1980-2013 . The study included both income, exchange rate and monetary variables to examine both the monetary, the absorption, and the elasticity approaches to the balance of payments. The paper applied The ARDL Bounds cointegration model to test for the long run relationship among variables. The Vector Error Correction Model captures the short run relationship and the long run speed of adjustment toward equilibrium. the paper also stimulated the variance decomposition and impulse response functions to consider the variables response to shocks. The results indicate a long run relationship between trade balance and income and between trade balance and the monetary variables but not between trade balance and the exchange rate. These results suggest that the Marshall-learner condition does not hold in the long-run for Malaysia.

Ying Li et al 2020 test five major economies of the world, United Kingdom, Japan, Brazil, Chin and lastly, India, for the changes in the monetary policy decisions that have been implemented following the Covid-19 outbreak. The assessment was undertaken in the form of an event study analysis, further substantiated with a regression analysis conducted for exploring the significance of CPI and real GDP in predicting the policy interest rates in the economy. The results of the event study analysis presented that the abnormal changes in the interest rates were statistically significant in the case of the United Kingdom, Brazil, and China, while the abnormal changes were found to be statistically insignificant in the case of India and Japan.

Queyranne et al 2021 finds that neutral interest rate for Morocco has been on a downward trend in Morocco since the global financial crisis 2008 and may have fallen in period of the epidemic. In this context, the transition of monetary policy impact to output and prices appears relatively low given the limited exchange rate flexibility until recently. The transition of monetary policy impact to some market prices has also weakened somewhat after the epidemic. A lower natural interest rate and lower base rates raise the question of whether further rate cuts would weaken the banking system. However, the elasticity of cash demand to deposit interest rates is low, implying a limited risk that banks will lose funding with further cuts.

However, relying on verification and savings accounts for financing may weaken cash movements. If monetary policy reaches an effective minimum, limited and reliable recourse to the asset purchase programmed can usefully complement traditional measures and promote the transition of monetary policy under an inflation-targeting system with a flexible exchange rate.

Jumaeva 2020 article studied the impact of the pandemic on the balance of payments of developed and developing countries. In addition, the article presents proposals and recommendations aimed at easing the impact of pandemic on the balance of payments in the Republic of Uzbekistan.

III. Egyptian Monetary Policy and Balance of Payments During the Covid 19 pandemic:

In 2016 Egypt applied an economic reform program with the support of the International Fund. For monetary policy, the Central Bank of Egypt (CBE) put in place a formal inflation target of 9 percent and set interest rates according to the global economy conditions, and at the same time taking into consideration the recent rates of inflation. It also liberalized (devalued) the Egyptian pound in November 2016 to make it subject to supply and demand forces. A deflationary monetary policy was introduced to reduce inflation and to increase international reserves. A new value added tax VAT was introduced and energy subsidies were lifted to reduce budget deficit. Structural reforms were introduced to support job creation.

Despite the side effects of the currency devaluation, resulting in an increase in the US dollar prices in the domestic market of more than 40 percent, it helped to eradicate the black market, and the Egyptian pound has witnessed a gradual recovery as of February 2017.

Moreover, Egypt's net international reserves (NIRs) have increased from under $25 billion in 2016 to around $45 billion in February 2020, before witnessing a notable decline due to the COVID-19 crisis. The budget deficit declined as well to 8.2 percent of gross domestic product (GDP) during last fiscal year, while primary surplus hit 2 percent of GDP. Egypt also has managed to decrease the inflation rate as of 2018 when it declined to 20.86 percent in 2018, down from 23.54 percent in 2017. Inflation rate continued to decline to 13.87 percent in 2019, reaching 5.86 percent in 2020.

These achievements have helped Egypt to hold up against the COVID-crisis and strengthen its economic conditions during the difficult impacts of the pandemic.

The Central Bank of Egypt CBE takes protective steps toward building more resilient reserves buffers to protect the economy against long uncertainty due to COVID-19, as total reserves (official and non-official) stand at $41 billion in 2020, covering more than 7.8 months of merchandise imports and 3.6 times short-term external debt.

The CBE overnight deposit rate, overnight lending rate, and the main operations rate were cut by 3 percent to 9.25 percent, 10.25 percent, and 9.75 percent respectively. The three-interest rate have witnessed two additional cuts in September and November to reach 8.25 percent, 9.25 percent, and 8.75 percent respectively. The discount rate was reduced to 9.75 by 300 points in 2021 and then to 8.75 percent in 2022.

The interest rate on loans to mortgage, industrial, agricultural, and tourism sectors was reduced to 8 percent from 10 percent. EGP 50 billion with an interest rate of 8 percent were allocated to the tourism sector. In addition, Egypt was in a strong position that allowed it to provide EGP 100 billion for backing the affected economic sector under especially the Tourism sector. which was enhanced by the package of unprecedented precautionary measures and actions that have been taken by the CBE and the cabinet to curtail COVID-19 impacts. These actions included introducing 3 percent (300 bps) cuts to the key interest at one time, providing additional allocations for the affected sectors, providing EGP 20 billion from the CBE to back the stock exchange with an EGP 3 billion from the National Bank of Egypt for the same purpose, in addition to other facilities.

The International Monetary Fund continues its support to the Egyptian government during the Covid-19 pandemic. IMF provides the Egyptian government of about $8 billion in financial support through a two-parts plan to help Egypt address the financing needs that resulted from the pandemic.

First: The Rapid Financing Instrument provided $2.8 billion in emergency financial assistance in May 2020 to ensure that the government had enough foreign currency to fund essential imports and other needs.

Second: The Stand-by Arrangement (SBA), approved in June 2020, provided the government access to a total of about US$5.4 billion over the subsequent 12 months. The SBA helped the authorities maintain economic stability, rebuild international reserves to restore reserves declined in response to the pandemic crisis, and continue key structural reforms, including measures to strengthen public finances, further fiscal transparency and governance, and advance laws to improve the business climate, to position Egypt for a strong and inclusive recovery. Economic policies under the program achieved a balance between supporting the economy to protect it from the COVID-19 shock and guarantee that debt remains sustainable to maintain investor confidence

Annual growth of broad money (M2) continued to pick up for the second consecutive quarter to record 13.1% in 2019 Q4, after stabilizing in 2019 Q2, and following a period of continued decline since the fading of the exchange rate revaluation effect to record 11.6% in 2019 Q1, the lowest since 2012 Q4. The increase in 2019 Q4 was mainly driven by the increase in fiscal deficit contribution, which has more than offset the continued decline in contribution of other counterpart assets of broad money.

The Balance of Payments

Table 1 Egypt Balance of payments USD billion

	2019/2020			2020/2021		
	Q_3	Q_4	Q_1	Q_2	Q_3	Q_4
Trade Balance	-9.4	-8.4	-8.6	-10.6	-11.4	-11.5
Balance of Current account	-2.8	-3.8	-2.8	-4.8	-5.7	-5.1
Capital account	-1.1	1.3	3.9	5.3	7.9	6.3
Over all Balance	-5.5	-3.5	-0.1	1.5	0.3	0.1

CBE Monetary Report quarterly data

Table 2 Egypt Balance of Payments USD billion

	2018/2019	2019/2020	2020/2021	2021/2022
Trade Balance	-38034.4	-36465.1	-42059.6	-11074.5
Current Account Balance	-10893.9	-11166.7	-18436.4	-4000.7
Capital Account	-129.2	-248.5	-153.0	-36.3
Financial Account	10986.1	1 5623.	23527.0	6085.8
Overall Balance	-102.5	-8587.2	-69.2	311.4

CBE Monetary Report annual data

According to CBE Monetary Report, Egypt's transactions with the external world recorded an overall BOP slight deficit of US$ 69.2 million during July/Sept. 2020/2021 (against a surplus of US$ 227.3 million in July/Sept. 2019/2020).

The current account deficit doubled to about US$ 2.8 billion (against about US$ 1.4 billion).

The capital and financial account resulted in a net inflow of US$ 3.9 billion (against US$ 657.9 million).

The increase in the current account deficit was due to the following developments:

- The services balance surplus decreased by 78.3 percent, recording US$ 876.3 million (against about US$ 4.0 billion).

- The non-oil trade deficit increased to about US$ 8.7 billion (against about US$ 8.2 billion).

- On the other hand, the Egyptian workers' remittances increased by 19.6 percent to about US$ 8.0 billion (against about US$ 6.7 billion).

- The oil trade balance turned into a surplus of US$ 143.7 million (against a deficit of about US$ 606.2 million).

- The investment income balance deficit decreased by 7.8 percent to US$ 3.1 billion (against about US$ 3.3 billion). The capital and financial account revealed an increase in net inflows to US$ 3.9 billion (against US$ 657.9 million)

Egypt's transactions with the external world recorded an overall BOP surplus of US$ 1.5 billion in the first half of FY 2020/2021 (against overall surplus of US$ 410.9 million in the corresponding period). The current account deficit rose by 66.9 percent to US$ 7.6 billion (against US$ 4.6 billion in the corresponding period). The capital and financial account resulted in a net inflow of US$ 9.2 billion (against US$ 5.2 billion in the corresponding period). The improvement in the current account deficit was due to the following developments:

- The services surplus dropped by 69.9% to post only US$ 1.9 billion (compared to US$ 6.3 billion).

- The non-oil trade deficit increased to about US$ 19.1 billion (against about US$ 18.0 billion).

- On the other hand, the Egyptian workers' remittances increased by 13.5% to post US$ 15.5 billion (compared to US$ 13.7 billion).

- The oil trade deficit improved to record only US$ 54.2 million (compared to US$ 733.3 million). - Investment income deficit 1 narrowed by 6.0 percent to record US$ 5.4 billion (compared to US$ 5.8 billion). The capital and financial account rose by US$ 3.9 billion, to register US$ 9.2 billion in the first half of FY 2020/2021 (compared to US$ 5.2 billion in the same period a year earlier).

Egypt's transactions with the external world recorded an overall BOP surplus of US$ 1.8 billion in **July/March of FY 2020/2021** (against an overall deficit of about US$ 5.1 billion in the corresponding period). The current account deficit rose by 81.2 percent to US$ 13.3 billion (against US$ 7.3 billion in the corresponding period). The capital and financial account resulted in a net inflow of US$ 17.1 billion (against US$ 4.1 billion in the corresponding period). The improvement in the current account deficit was due to the following developments:

- The services surplus dropped by 62.2 percent to post only US$ 3.2 billion (compared to US$ 8.4 billion).

- The non-oil trade deficit increased to about US$ 30.7 billion (against about US$ 27.3 billion). - On the other hand, the Egyptian workers' remittances increased by 8.5 percent to post US$ 23.4 billion (compared to US$ 21.5 billion).

- The oil trade balance achieved a surplus of US$ 174.9 million (compared to a deficit of US$ 773.3 million). - Investment income deficit 1 narrowed by 3.6 percent to record US$ 8.9 billion (compared to US$ 9.2 billion). The capital and financial account rose by US$ 13.0 billion, to register US$ 17.1 billion in July/March of FY 2020/2021 (compared to US$ 4.1 billion in the same period a year earlier).

IV. Data and Methodology

All variables used in this study: trade balance, real exchange rate, Gross Domestic product GDP, real Discount rate, and money supply are obtained

from World Bank data base 2022. The data used are annual time series from 1980 t0 2020. Trade balance is measured as the ratio of the value of exports (X) to the value of imports (M) instead of using the value of exports minus the value of imports. This ratio of the value of exports to the value of imports$\left(\frac{X}{M}\right)$ is not affected by the units of measurement and can be considered as a nominal variable or a real variable. Real gross domestic product GDP is used as a proxy for income. Money supply is presented by real broad money supply M_2. Real exchange rate REER is measured as

$$REER = e\frac{P^*}{P}$$

Where $e = official\ nominal\ exchange\ rate$

P^*= the price level of the United States economy measured by the consumer price index

P = the price level of the Egyptian economy measured by the consumer price index

The real discount rate is measured as:

REALDISTCOUNT= nominal discount rate-inflation rate.[1]

All variables are in real terms where nominal values are converted to real values by GDP deflator. All variables are in natural logarithms except real discount rate.

Real gross domestic Product (GDPC) = gross domestic product at constant prices. [2]

Methodology:

1. Autoregressive Distributed Lag Model ARDL

[1] This is the simplified formula derived from The Real Interest Rate formula: Real Interest Rate= [(1+Nominal Interest Rate)/(1+inflation Rate)]-1

[2] GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in constant local currency.

ARDL is an OLS model consisting of lags of both the dependent variable and the independent variables.

ARDL (p, q) is a model consisting of p lags for the dependent variable Y and q lags of the independent variable X

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \cdots + \beta_\rho Y_{t-\rho} + \delta_1 X_t + \delta_2 X_{t-1} + \cdots + \delta_q X_{t-q} + \varepsilon_t$$

In Compact form: ARDL (ρ, q):

$$Y_t = \beta_0 + \sum_{i=1}^{\rho} \beta_i Y_{t-i} + \sum_{i=0}^{q} \delta_i X_{t-i} + \varepsilon_t$$

ARDL model is "autoregressive" because Y is explained, in part, by lagged values of itself.

ARDL model is also "Distributed "lag because Y is further explained by lagged values X.

Current values of X may be included in the model.

2. ARDL Bounds Test model

ARDL models have long been used to examine the relationships between time series variables. However, ARDL models has gained renewed interest in recent years as a method for examine cointegrating relationships between variables that are stationary at level I(0) and non-stationary variables I(1) thanks to the work of Pesaran and Shin 1998 and Pesaran et al 2001 under the name of ARDL Bounds Test Model. ARDL Bounds model can also be specified if all variables are I(1). ARDL Bounds model can include endogenous and exogenous variables

the ARDL Bounds Test has two components a short run terms and long run terms.

$$ARDL\ short-run \qquad Long-run\ terms$$

$$\Delta \mathrm{Ln}\,{}^{X}/_{M_t} = \beta_0 + \sum_{i=1}^{\rho} \gamma_i \Delta \mathrm{Ln}\,{}^{X}/_{M_{t-i}} + \sum_{i=0}^{\rho} \delta_i \Delta \mathrm{LGDP}_{t-i} + \sum_{i=0}^{\rho} \partial_i \Delta \mathrm{LREER}_{t-i} + \sum_{i=0}^{\rho} \emptyset_i \Delta \mathrm{LnMS}_i + \varphi_1 {}^{X}/_{M_{t-1}} + \varphi_2 \mathrm{LGDP}_{t-1} + \varphi_3 \mathrm{LREER}_{t-1} + \varphi_4 LnMS_{t-1} + \varepsilon_t$$

Where $\frac{X}{M}$, GDP, EX, MS are trade balance, Gross Domestic Product and Money Supply respectively. Δ is the first difference operator and ρ is the optimal lag length that can be obtained by Akike criteria or Schurtize criteria.

The ARDL Bounds model is a form of unrestricted error correction model because the long-run terms are specified. The null hypothesis of no cointegration is :

$$H_0: \varphi_1 = \varphi_2 = \varphi_3 = \varphi_4 = 0$$

And the alternative hypothesis is :

$$H_a: \varphi_1 \neq \varphi_2 \neq \varphi_3 \neq \varphi_4 \neq 0$$

The ARDL Bounds Cointegration test includes two bounds; an upper bound critical value for I(1) values and a lower Bound critical Value for I(0) values. If the F statistics is above the upper bound, we can conclude the existence of cointegration and reject the null hypothesis of no cointegration. If the F statistics is below the upper bound, we cannot reject the null hypothesis of no cointegration. If F statistics is between the two bounds, the result is inconclusive.

3. The Error Correction Model

Given that cointegration exists, the question is what the speed of adjustment to long-run equilibrium after a deviation is has occurred in the short-run. therefore, we proceed to (1) Vector Error Correction model to examine the long run dynamics

$$\Delta \mathrm{Ln}\,{}^{X}/_{M_t} = \beta_0 + \sum_{i=1}^{\rho} \gamma_i \Delta \mathrm{Ln}\,{}^{X}/_{M_{t-i}} + \sum_{i=0}^{\rho} \delta_i \Delta \mathrm{LGDP}_{t-i} + \sum_{i=0}^{\rho} \partial_i\, \Delta \mathrm{LEX}_{t-i} + \sum_{i=0}^{\rho} \emptyset_i \Delta \mathrm{LnMS}_i + \varphi ECT_{t-1} + \varepsilon_t$$

The Error Correction Term φECT_{t-1} replaces the ARDL Bounds test long-run terms $(\varphi_1 Y_{t-1} + \varphi_2 X_{t-1})$. ECT_{t-1} is lagged OLS residuals obtained from running the long-run model:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon_t$$

$$ECT_{t-1} = \varepsilon_{t-1} = Y_{t-1} - (\beta_0 + \beta_1 X_{1t-1} + \beta_2 X_{2t-1}$$

The Coefficient of ECT_{t-1}, φ is the speed of adjustment to long run equilibrium. to ensure convergence toward ling-run equilibrium φ must be negative and significant. If φ is significant, it also means X Granger – Causes Y in the long-run. The significance of φ is determined by its T-statistics.

4. The Long Run Equation

If there is an evidence of a long run relationship among the variables(cointegration), a long run model is estimated.Type equation here.

$$\mathrm{Ln}\,{}^{X}/_{M_t} = \beta_0 + \sum_{i=1}^{\rho} \gamma_i \mathrm{Ln}\,{}^{X}/_{M_{t-i}} + \sum_{i=0}^{\rho} \delta_i \mathrm{LGDP}_{t-i} + \sum_{i=0}^{\rho} \partial_i\, \mathrm{LEX}_{t-i} + \sum_{i=0}^{\rho} \emptyset_i \mathrm{LnMS}_i + \sum_{i=1}^{\rho} \alpha\, DummyCovid_{t-i} + \varepsilon_t$$

A dummy variable is included in the long run model to capture the impact of Covid-19 pandemic on the trade balance. The Covid-19 dummy variables takes the value of 1 in 2019 and 2020 and zero otherwise.

5. ARDL Short-Run Dynamics

Whether or not we have a cointegration, we examine whether we have short run causality among the variables. We use the ARDL short-run specification to examine if short run causality exists. Short-run terms go with the difference operator. Causal impact is measured by the T-statistics of the coefficients of the short run terms. If there are different lags for each regressor, we can perform a joint F test of their coefficients using Wald test. The Error Correction model includes the short-run components of the ARDL specification i.e., the difference terms. when there is no cointegration, we estimate only the following ARDL short-run model:

$$\Delta\mathrm{Ln}\,{}^{X}/_{M_t} = \beta_0 + \sum_{i=1}^{\rho} \gamma_i \Delta\mathrm{Ln}\,{}^{X}/_{M_{t-i}} + \sum_{i=0}^{\rho} \delta_i \Delta\mathrm{LGDP}_{t-i} + \sum_{i=0}^{\rho} \partial_i\, \Delta\mathrm{LEX}_{t-i} + \sum_{i=0}^{\rho} \emptyset_i \Delta\mathrm{LnMS}_i + \varepsilon_t$$

We perform T-Statistics test to determine the statistical significance of each short-run regressors to determine if there is short run Granger Causality.

V. Empirical Results

1. Lag Length

Table 1

VAR Lag Order Selection Criteria
Endogenous variables: LOG(XM) LOG(GDPC) LOG(REALMS) LOG(REER) REALDISCOUNT

Lag	LogL	LR	FPE	AIC	SC	HQ
1	138.9416	NA	1.72e-09	-5.996926	-4.919566*	-5.613609
2	172.1547	48.94559*	1.18e-09*	-6.429193*	-4.274474	-5.662560*
3	190.7142	22.46682	1.95e-09	-6.090222	-2.858144	-4.940273

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

The Lage length according to most criteria is 2.

2. Testing Integration Orders

We begin our analysis by ensuring that no series under consideration is integrated of order 2 or higher. To do this, we run a unit root test on the first difference of each series. In this case, the standard ADF test will suffice. A particularly easy way of doing this is creating a group object with all variables of interest, and then running a unit root test on the group, specifying that the test should be done on the individual series.

Table 2 Intermediate ADF test results D(GROUP07)

Series	Prob.	Lag	Max Lag	Obs
D(LOG(XM))	0.0001	0	0	39
D(LOG(GDPC))	0.0043	0	0	41
D(LOG(REALMS))	0.0010	0	0	41
D(LOG(REER))	0.0134	0	0	39
D(REALDISCOUNT)	0.0000	0	0	39

Notice in the lower table that the column heading Prob**.** lists the pp-values associated with each individual series. Since the pp-value is less than 0.05 for each of the series under consideration and the null hypothesis is a unit root, we will reject the null at 0.05 significance level. In particular, since the test was conducted under first differences, we conclude that there are no unit roots in first differences, and so each of the series must be either I(0) or I(1)(1). We can therefore proceed onto the estimation of the ARDL model.

3. The ARDL Model

In this model, the dependent variable is the log(X/M), while the dynamic regressors are the log ((GDP) log(Real money supply), log(Real Exchange rate) , and Real Discount Rate. Moreover, the DGP under consideration specifies a restricted constant, or Case 2, with 2 lags

Table 3:The ARDL Model.

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LOG(XM(-1))	0.651087	0.161539	4.030520	0.0004
LOG(XM(-2))	-0.190260	0.136898	-1.389795	0.1752
LOG(GDPC)	-0.495661	0.180516	-2.745804	0.0103
LOG(REALMS)	-0.459285	0.178661	-2.570707	0.0155
LOG (REALMS (-1))	0.582080	0.280052	2.078467	0.0466
LOG (REALMS (-2))	0.459000	0.207369	2.213442	0.0349
LOG(REER)	0.053773	0.059179	0.908638	0.3710
REALDISCOUNT	0.000494	0.002996	0.164927	0.8701
REALDISCOUNT (-1)	0.006672	0.002895	2.304753	0.0285
C	-0.005222	1.120455	-0.004661	0.9963

R-squared	0.926913	Mean dependent var	-0.618166
Adjusted R-squared	0.904231	S.D. dependent var	0.192767
S.E. of regression	0.059655	Akaike info criterion	-2.583925
Sum squared resid	0.103203	Schwarz criterion	-2.157371
Log likelihood	60.38654	Hannan-Quinn criteria.	-2.430881
F-statistic	40.86525	Durbin-Watson stat	2.170318
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Diagnostic Tests of the ARDL Model:

a. To verify whether the residuals from the model are serially uncorrelated

Table 4

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.360014	Prob. F(2,27)	0.7010
Obs*R-squared	1.013026	Prob. Chi-Square(2)	0.6026

Since the null hypothesis is that the residuals are serially uncorrelated, the F-statistic pp-value of 0.7010 indicates that we will fail to reject this null. We therefore conclude that the residuals are serially uncorrelated.

b. Similarly, testing for residual homoskedasticity, we select a type of test. In our case, we chose Breusch-Pagan-Godfrey. Here's the output.

Table 5
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.637591	Prob. F(9,29)	0.7558
Obs*R-squared	6.442293	Prob. Chi-Square(9)	0.6950
Scaled explained SS	3.397578	Prob. Chi-Square(9)	0.9464

Since the null hypothesis is that the residuals are homoscedastic, the F-statistic pp-value of 0.7558 indicates that we will fail to reject this null. We therefore conclude that the residuals are homoscedastic.

4. The ARDL Bounds Cointegration Test

To test for the presence of cointegration, Below the table of coefficient estimates, we have two additional tables presenting the error correction ECEC term and the F-Bounds test. The output is below.

Table 6: The ARDL Bounds Cointegration Test

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPC)	-0.919299	0.350495	-2.622857	0.0138
LOG(REALMS)	1.079050	0.350939	3.074752	0.0046
LOG(REER)	0.099732	0.107087	0.931311	0.3594
REALDISCOUNT	0.013290	0.005990	2.218636	0.0345
C	-0.009685	2.077399	-0.004662	0.9963

EC = LOG(XM) - (-0.9193*LOG(GDPC) + 1.0791*LOG(REALMS) + 0.0997 *LOG(REER) + 0.0133*REALDISCOUNT -0.0097)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.007465	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

The F-statistic value 5.007465 is evidently above the I (1) critical value bound at all levels of significance. Our analysis of this series indicates that we reject the null hypothesis that there is no equilibrating relationship. The long run estimates suggested that money supply (REALMS) and real discount rate (REALDISCOUNT) have positive and significant impact on trade

Balance (X/M). Specifically, a 1 percent increase in money supply and real discount rate increase trade balance by 3.07 percent and 2.21 percent respectively. Income (GDPC) has a negative and significant impact on trade balance. This confirms the absorption approach to balance of payments. Thus, if gross domestic product (GDPC) increases by 1 percent, trade balance is expected to decline by 2.62 percent. The negative sign of the coefficient of GDP supports the Keynesian view that increase in income encourage people to purchase imported goods and worsens the trade balance. The coefficient of the real exchange rate (REER) is positive but insignificant. This indicates the weak relationship between exchange rate and trade balance in contrast with the elasticity approach to the balance of payments. The insignificance of the real exchange rate coefficient suggests that the Marshall-Learner condition is not held in the long run for the case of Egypt. The Egyptian government intervened in the foreign exchange market at different occasions. This intervention in the foreign exchange market distorts the relationship between the exchange rate and the balance of trade.

5. The Long-Run Model with the COViD-19 Dummy

Table 7

Independent Variables

Dependent Variable	$Ln\frac{X}{M_{t-1}}$	$LnREER$	$LnGDP$	LnM_2	LnM_{2t-1}	$realdiscount$	$Dummycovid$
$Ln(X/M)$	0.645004 * (0.092603)	0.035259 (0.025401)	-.45134* (0.142593)	-0.217164 (0.170553)	0.598542 * (0.188137)	0.002389 (0.002563)	0.039728 (0.051463)

Standard error in parentheses

*Significant at 5 %

The long-run model includes a dummy variable to capture the impact of Covid-19 pandemic on the trade Ballance. The dummy variable" Dummy covid" takes the value of 1 for 2019 and 2020 and zero otherwise. The results of the long-run model show that a negative and insignificant relationship between current money supply and trade balance while a positive and significant relationship between money supply lagged for one period and trade balance. The increase in money supply if not accompanied with an equivalent increase in money demand would worsen the trade balance because people would use the excess money supply to

purchase foreign goods and services. The Central Bank of Egypt control Monetary aggregates through controlling interest rates, conducting open market operations and changes in reserve requirements.

The relationship between income and trade balance is negative and significant and it shows that an increase in income causes a deterioration in trade balance. This can be explained that an increase in income causes an increase in imports and thus worsens the trade balance.

The insignificant relationship between real exchange rate and trade balance might suggest that the Marshall-Lerner hypothesis is not applicable in the case of Egypt. The insignificant relationship between real exchange rate and trade balance can also be explained that exchange rate policy in Egypt is determined by the government intervention in the foreign exchange market and not by exchange rate market's fundamentals. Egyptian government intervened several times in the exchange rate market since the implementation of the first economic reform in 1991.

6. Short – Run Model -Error Correction Model and the Speed of Adjustment

When variables are non-stationary in levels but are cointegrated we can estimate the short-run model the Error Correction model where variables are in differences -in stationary form. The Error correction model included the error correction term which is the residuals from the long-run model lagged one period. The error correction term $the\ coefficient\ of\ the\ ECT_{t-1}$ determines the speed of adjustment toward the long run equilibrium where the deviations of the short run values from the long run equilibrium is corrected gradually by the ECT_{t-1} through a series of partial short run adjustments. The coefficient of the error correction term statistically significant, negative, and greater than -1. In this case, it makes sense to study the speed of adjustment equation. We have the following output.

Table 8: The Error Correction Model

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(XM(-1))	0.190260	0.115128	1.652593	0.1092
DLOG(REALMS)	-0.459285	0.132489	-3.466576	0.0017
DLOG (REALMS (-1))	-0.459000	0.180894	-2.537394	0.0168
D(REALDISCOUNT)	0.000494	0.002136	0.231303	0.8187
ECT (-1)*	-0.539173	0.090845	-5.935059	0.0000

R-squared	0.586643	Mean dependent var	0.013921
Adjusted R-squared	0.538013	S.D. dependent var	0.081057
S.E. of regression	0.055094	Akaike info criterion	-2.840335
Sum squared resid	0.103203	Schwarz criterion	-2.627058
Log likelihood	60.38654	Hannan-Quinn criter.	-2.763813
Durbin-Watson stat	2.170318		

* p-value incompatible with t-Bounds distribution.

As expected, the EC term, here represented as ECT (-1), is negative with an associated coefficient estimate of −0.539173 This implies that about 54.17% of any movements into disequilibrium in the short-run are corrected for each one year. The coefficient of ETC_{t-1} *indicates a high rate of convergence toward long run equilibrium.* Moreover, given the very large t-statistic, namely −5.935059, we can also conclude that the coefficient is highly significant. The significance of the error correction term ECT is evidence of the existence of long run Granger causality at least from one direction. The one period lagged error correction term is negative and significant at 5% level.$-1 < ECT_{t-1} < 0$.

The Cointegrating Equation:

EC = LOG(XM) - (-0.9193*LOG(GDPC) + 1.0791*LOG(REALMS) + 0.0997*LOG(REER) + 0.0133*REALDISCOUNT -0.0097)

The short-run estimates suggested that the first lag of trade balance has a positive but insignificant impact on the current trade balance in Egypt. The short run estimates also show that both the current real money supply and the first lag of real money supply have negative and significant impact on the current trade balance. A 1 unit increase in current money supply in the short

run reduces current trade balance by 3.46 percent and a 1 unit increase in the first lag of money supply reduces the current trade balance by 2.53 percent. The negative sign of the coefficient of the difference of the natural logarithms of money supply supports the monetary approach to balance of payments. The fall of domestic money supply improves trade balance since foreigners send their money to domestic economy to purchase domestic goods and services and therefore improve trade balance. The current real discount rate does not have an impact on trade balance in the short run.

Short-Run Model Diagnostics

a. Jarque-Ber statistic for testing normality:

$$H_0 = Residuals\ are\ Normally\ Distributed.$$

$P = 0.490591 > 0.05$ we cannot reject null hypothesis.

b. Serial Correlation LM test – Breusch-Godfrey Test

$$H_0 = no\ serial\ correlation$$

Table 9

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.360014	Prob. F(2,27)	0.7010
Obs*R-squared	1.013026	Prob. Chi-Square(2)	0.6026

the F statistic P- value is 0.7010 greater than 0.05 so we cannot reject the null hypothesis.

c. Heteroskedasticity: Breusch-Pagan- Godfrey test

$$H_0 = Homoskedasticity$$

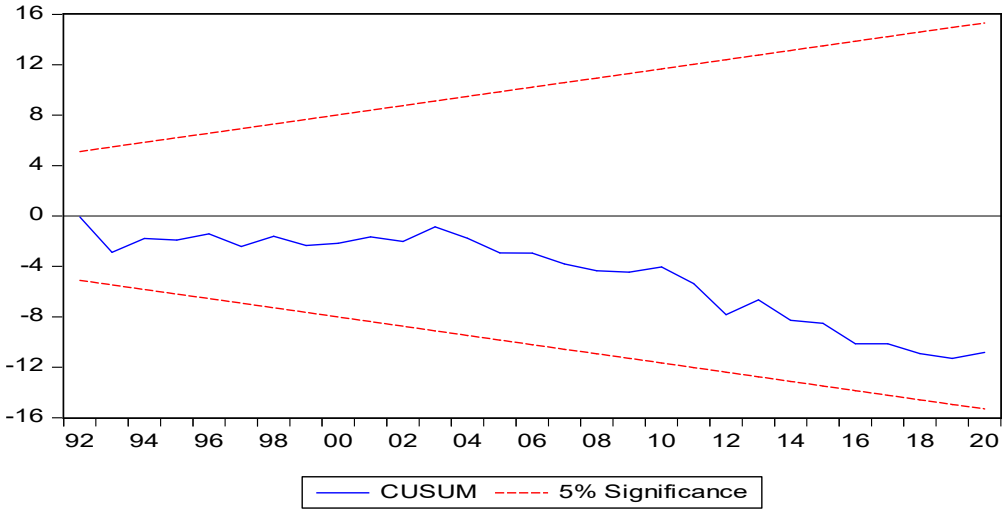
Table 10

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.637591	Prob. F(9,29)	0.7558
Obs*R-squared	6.442293	Prob. Chi-Square (9)	0.6950
Scaled explained SS	3.397578	Prob. Chi-Square (9)	0.9464

The F statistic P- value= 0.7558 is greater than 0.05 so we cannot reject the null hypothesis.

d. Stability Diagnosis :Figure 1

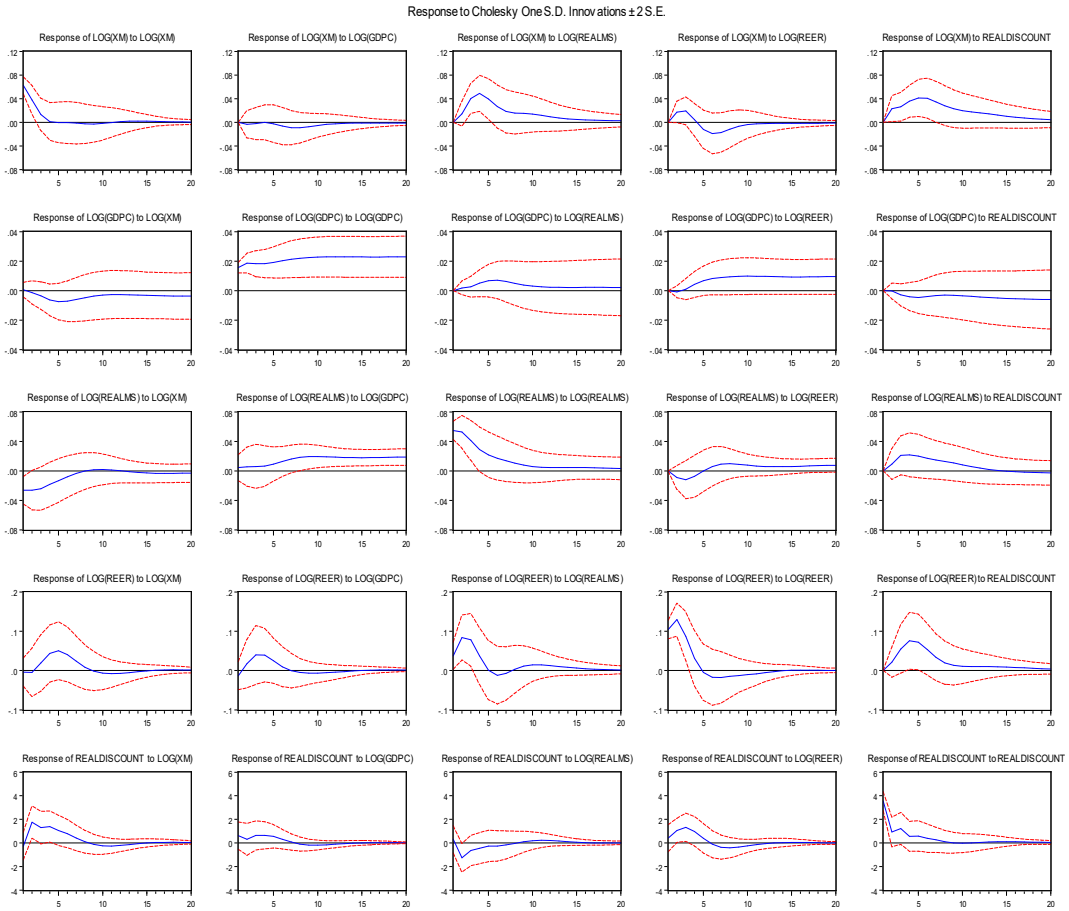


The blue line lies within the 5% boundaries

7. Impulse Response

Impulse -response functions allow us to trace out the time path current and future values of the variables in the model to a one increase in the current of one of the VAR errors. It shows the effect of one unit shock in one variable on another variable.in order to identify the impulse responses, a restriction is applied in the main matrix. The order of the variables play an important role as the restrictions on the matrix implies some variables have no contemporaneous influence on some of the variables in the model. The magnitude of the shock is one standard deviation. The confidence intervals are computed $\pm 2SE$ confidence bands. The X axis represents the periods (years) and the y axis represents the percentage variation in each variable. The main diagonal shows a shock of a variable to itself. In order to identify the impulse responses, a restriction is applied in the main matrix. Here the order of the variables is : real money supply, real discount rate, real gross domestic product, real exchange rate , and real trade balance.

Figure 2



8. Variance Decomposition/Forecast Error Decomposition

The variance decomposition displays the percentage of the error made forecasting a variable over time due to specific shock. it shows how much of the variability in the dependent variable is explained by its own shocks versus the shocks in the other variables in the model. We computed variance decompositions from an estimated VAR of the used variables. Results from the variance decomposition show that, apart from own shocks, most of the variations in Trade Balance are mainly caused by shocks in real money supply, gross domestic product, and real interest rate represented by the discount rate. In the first year, 100 percent of variations in Trade Balance result from own shocks. The proportion of variations in Trade Balance resulting from own shocks decreases over time, reaching 23.4 percent in the tenth year and 21.9 percent in the twentieth year. Money supply, gross domestic product, and interest rate shocks account for a combined 74 percent and 76 percent

of variations in Trade Balance, in the tenth and twentieth years, respectively. Real exchange rate shocks account for 7.1 percent and 6.8 percent of Trade Balance fluctuations, in the tenth and twentieth years, respectively. Table below presents the variance decomposition results.

Variance Decomposition of LOG(XM):

Period	S.E.	LOG(XM)	LOG(GDPC)	LOG(REA...	LOG(REER)	REALDIS...
1	0.062639	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.079989	83.74586	0.178869	3.219084	4.617247	8.238944
3	0.096140	59.84676	0.181082	19.66668	7.136092	13.16938
4	0.113619	42.85954	0.130624	32.54614	5.244680	19.21902
5	0.127653	33.95494	0.144521	35.26140	5.036198	25.60294
6	0.138007	29.05352	0.351503	33.83926	6.232194	30.52352
7	0.144821	26.39643	0.728168	32.34462	7.112220	33.41857
8	0.149098	24.93802	1.079299	31.61422	7.351396	35.01707
9	0.151936	24.05292	1.291561	31.40519	7.283258	35.96707
10	0.153981	23.43500	1.382460	31.37776	7.152027	36.65276
11	0.155503	22.97985	1.410919	31.33706	7.038286	37.23389
12	0.156631	22.65278	1.416524	31.24117	6.954695	37.73483
13	0.157458	22.42699	1.416297	31.12186	6.897453	38.13740
14	0.158055	22.27341	1.415926	31.01352	6.860280	38.43686
15	0.158483	22.16698	1.416911	30.93060	6.837639	38.64787
16	0.158790	22.09036	1.419385	30.87278	6.825126	38.79235
17	0.159013	22.03326	1.423065	30.83424	6.819217	38.89022
18	0.159177	21.98988	1.427523	30.80896	6.817087	38.95655
19	0.159300	21.95682	1.432266	30.79230	6.816644	39.00197
20	0.159392	21.93173	1.436837	30.78112	6.816610	39.03370

Variance Decomposition of LOG(GDPC):

Period	S.E.	LOG(XM)	LOG(GDPC)	LOG(REA...	LOG(REER)	REALDIS...
1	0.015550	0.119010	99.88099	0.000000	0.000000	0.000000
2	0.024399	0.349585	98.96642	0.529774	0.135959	0.018261
3	0.030905	1.520862	96.34204	1.025123	0.182454	0.929517
4	0.037264	3.963289	90.32672	2.479391	1.358852	1.871745
5	0.043824	5.798027	84.27607	4.140934	3.312413	2.472556
6	0.050144	6.519858	80.60873	5.152680	5.169201	2.549528
7	0.055936	6.429723	79.10057	5.367677	6.674300	2.427731
8	0.061244	5.983550	78.73806	5.119301	7.879250	2.279837
9	0.066190	5.448955	78.81447	4.706250	8.851302	2.179026
10	0.070860	4.947704	79.00750	4.283881	9.618911	2.142000
11	0.075288	4.520062	79.20791	3.907346	10.19827	2.166413
12	0.079488	4.172166	79.38337	3.587599	10.61588	2.240988
13	0.083478	3.897268	79.52000	3.320027	10.90971	2.352999
14	0.087284	3.684418	79.60966	3.096144	11.11936	2.490418
15	0.090933	3.521378	79.65102	2.907488	11.27761	2.642508
16	0.094455	3.395948	79.65009	2.746650	11.40738	2.799939
17	0.097869	3.297017	79.61770	2.607414	11.52254	2.955336
18	0.101193	3.215499	79.56580	2.484785	11.63020	3.103716
19	0.104435	3.144832	79.50457	2.374973	11.73315	3.242479
20	0.107604	3.080890	79.44116	2.275303	11.83171	3.370932

Variance Decomposition of LOG(REALMS):

Period	S.E.	LOG(XM)	LOG(GDPC)	LOG(REA...	LOG(REER)	REALDIS...
1	0.061015	18.70225	0.501234	80.79652	0.000000	0.000000
2	0.086054	18.71443	0.660628	78.35170	1.122504	1.150738
3	0.101583	19.14946	0.815990	72.73855	2.196904	5.099094
4	0.109842	19.16370	1.041734	69.21527	2.352303	8.226987
5	0.114866	18.85148	1.576726	66.89092	2.151271	10.52960
6	0.118462	18.18022	2.619144	64.98556	2.272447	11.94263
7	0.121599	17.34153	4.211335	62.93498	2.710891	12.80127
8	0.124415	16.56568	6.162743	60.81390	3.187897	13.26978
9	0.126883	15.94260	8.220544	58.83269	3.547436	13.45672
10	0.128982	15.45126	10.20518	57.13015	3.781981	13.43142
11	0.130763	15.04321	12.04153	55.71287	3.934255	13.26814
12	0.132326	14.69013	13.72084	54.51283	4.043283	13.03292
13	0.133770	14.38183	15.26402	53.44763	4.134644	12.77188
14	0.135171	14.11199	16.70114	52.45254	4.224809	12.50952
15	0.136573	13.87070	18.06223	51.48631	4.324972	12.25579
16	0.137997	13.64556	19.37242	50.52660	4.442115	12.01330
17	0.139449	13.42573	20.64928	49.56405	4.578811	11.78212
18	0.140931	13.20462	21.90227	48.59777	4.733374	11.56197
19	0.142436	12.98013	23.13385	47.63195	4.901021	11.35304
20	0.143960	12.75334	24.34174	46.67322	5.075666	11.15603

Variance Decomposition of LOG(REER):

Period	S.E.	LOG(XM)	LOG(GDPC)	LOG(REA...	LOG(REER)	REALDIS...
1	0.111613	0.126413	1.410441	11.21475	87.24840	0.000000
2	0.192333	0.099551	1.286871	22.68253	74.70470	1.226344
3	0.235831	0.726755	3.681833	26.02802	63.32786	6.235529
4	0.258949	3.385024	5.315635	23.64118	53.98365	13.67450
5	0.274578	6.333369	5.531611	21.02765	48.04090	19.06647
6	0.283603	7.968220	5.295405	19.90162	45.40902	21.42574
7	0.287184	8.451641	5.164473	19.47871	44.66747	22.23770
8	0.288418	8.462644	5.151943	19.32367	44.55743	22.50431
9	0.289282	8.416610	5.172547	19.35962	44.48388	22.56735
10	0.290205	8.420764	5.190037	19.49156	44.33775	22.55989
11	0.291042	8.452577	5.199036	19.62718	44.16570	22.55551
12	0.291671	8.478947	5.200011	19.72993	44.01154	22.57957
13	0.292095	8.487566	5.194716	19.79750	43.89303	22.62719
14	0.292375	8.482300	5.186793	19.83622	43.80976	22.68493
15	0.292567	8.472383	5.179988	19.85363	43.75258	22.74142
16	0.292706	8.464598	5.176083	19.85760	43.71193	22.78979
17	0.292810	8.460847	5.174832	19.85516	43.68195	22.82721
18	0.292884	8.459810	5.175154	19.85114	43.66008	22.85382
19	0.292935	8.459582	5.176102	19.84792	43.64491	22.87149
20	0.292969	8.459132	5.177159	19.84617	43.63495	22.88259

Variance Decomposition of REALDISCOUNT:

Period	S.E.	LOG(XM)	LOG(GDPC)	LOG(REA...	LOG(REER)	REALDIS...
1	3.657354	0.622379	2.909045	0.709197	1.208044	94.55134
2	4.488351	15.86296	2.380642	8.368900	6.342383	67.04511
3	5.089410	18.78946	3.396991	8.121089	11.74965	57.94281
4	5.449444	22.85197	4.328031	7.800423	13.46641	51.55316
5	5.627576	24.90857	5.036124	7.533592	13.09454	49.42717
6	5.710007	26.05919	5.182084	7.526177	12.75892	48.47362
7	5.745420	26.24002	5.133543	7.528875	13.01817	48.07940
8	5.763516	26.10277	5.133484	7.489005	13.47052	47.80422
9	5.779792	26.00993	5.205256	7.474535	13.77480	47.53549
10	5.797000	26.03404	5.286334	7.541155	13.88339	47.25508
11	5.811557	26.10509	5.338298	7.655865	13.88210	47.01864
12	5.820869	26.15654	5.360620	7.758586	13.85184	46.87241
13	5.825619	26.17216	5.365386	7.822009	13.82954	46.81091
14	5.827840	26.16537	5.363601	7.850083	13.82107	46.79988
15	5.829139	26.15389	5.361211	7.857713	13.82005	46.80713
16	5.830189	26.14718	5.360031	7.857179	13.82003	46.81558
17	5.831074	26.14616	5.359760	7.854954	13.81854	46.82059
18	5.831718	26.14792	5.359701	7.853234	13.81622	46.82292
19	5.832106	26.14972	5.359527	7.852237	13.81440	46.82412
20	5.832304	26.15046	5.359284	7.851707	13.81365	46.82490

Cholesky Ordering: LOG(XM) LOG(GDPC) LOG(REALMS) LOG(REER) REALDISC...

Conclusion

The study used the ARDL Bounds cointegration test to investigate the monetary approach to balance of payments and the existence of a long relationship between trade balance, real exchange rate, gross domestic product, real discount rate, and money supply. The study also included a dummy variable to explore the impact of the COVId-19 pandemic on the balance of payments.

The results show that money supply and gross domestic product are among the determinants of the balance of payments. The money supply has a positive and significant coefficient in the balance of payments long run model and a negative significant coefficient in the short run balance of payments model. The results show that there is a weak relationship between trade balance and real exchange rate. This result disagrees with the elasticity approach to balance of payments. The weak relationship between the balance of payments and real exchange rate can be explained by the Egyptian government control and intervention in the market for foreign exchange. The results show that the coefficients of real discount rate are insignificant in both the balance of payments long run and short run models.

The coefficient of Covid - 19 dummy is positive but insignificant. This may indicate that the pandemic does not exert negative effect on the trade balance due to 2016-2019 successful economic reform and economic measures implemented by the CBE, and the IMF support to the Egyptian economy during the pandemic. This result can also be explained with the short period especially the study is using annual data. The impulse response function and the variance decomposition function assures the previous results where most of the variations in trade balance are caused by shocks of the variable itself, the real money supply, and the real gross domestic product.

As for policy recommendation that can be concluded from the study is that deficit and disequilibrium in the balance of trade and the balance of payments, should be addressed by monetary policy tools and policies of economic growth. Exchange rate devaluations is not a sufficient condition to balance of payments adjustment.

Besides, the Central Bank of Egypt CBE should implement unconventional monetary policy instruments and made changes to its monetary policy tools

to address low growth and increase in unemployment resulting from the negative impact of COVID-19. Central banks should consider lowering the interest rate to increase loans to companies (and reduce their cost) and provide commercial banks with more liquidity to support business activities and make temporary use of capital flow management measures to prevent free exchange rate falls. Managing capital flow includes a wide range of measures, such as restrictions on residents' foreign investments and offshoring transfers, and other restrictions on non-residents' remittances abroad. Egyptian government as other developing countries do, can also renegotiate external debt repayment plans and conditions to ensure smooth debt servicing, including the suspension of interest rate payments during the crisis time.

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