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Determinants of the Current Account Balance in the Saudi Balance of Payments during 1995-2019

Saidi OUASSAF
Department of Finance, School of Business, King Faisal University, KSA
Email: souassaf@kfu.edu.sa

Yahdiyh SEMLALI
Department of Administration, School of Business, King Faisal University, KSA
Email: yahdiyh@kfu.edu.sa

Ismail BENGANA
Department of quantitative methods, School of Business, King Faisal University, KSA
Email: ibenggana@kfu.edu.sa

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Abstracts

This study aims to know the impact of several macroeconomic variables on the current account in the Saudi Arabia balance of payments during the period between 1996 and 2020. The matter comes with (the ratio of external reserves to GDP, the ratio of the balance of the general budget balance to GDP, the ratio of total merchandise exports to GDP Total, the ratio of total merchandise imports to GDP, the degree of external openness (external exposure), a ratio of average per capita income to GDP, inflation rate, economic growth rate, a ratio of total investment to GDP, the ratio of inward foreign investments to GDP domestic liquidity growth rate.

The study found an inverse relationship between the current account balance on the one hand, and foreign reserves to GDP ratio and average per capita income on the other hand. While we record a direct relationship between the current account balance and the degree of external openness (external exposure).

As for the significance of the model as a whole, the results of the study showed the significant of the model by indicating the suitability of the study model to the relationship between the dependent variable and the independent variables.

Key words: Current account, Balance of payments, Macroeconomic, Saudi Arabia.

*Corresponding author e-mail: souassaf@kfu.edu.sa

1.0 Introduction

Reports of international institutions (International Monetary Fund, World Bank) on world development indicate the balance of payments. It includes the current account balance of a development group of countries during the eighties and nineties of the last century (the twentieth century). It witnessed an increasing trend of the deficit as a result of the monetary turmoil. Experiencing this period was due to the adoption of ambitious development programs by developed countries because of the limited resources available to finance these programs. As well as, the financial crises that faced developing countries in the mid-eighties and early nineties, prompted these countries to put pressure on imports, besides exerting continuous pressure on the exchange rate of the national currency (other than the countries to fix the price of its currency). The reason led to a decline in the confidence of local and foreign investors in supporting development efforts during that period.

Studies conducted on the balance of payments of four Gulf countries (Kuwait, Oman, Saudi Arabia, and the UAE) during the three decades of the twentieth century concluded that these countries should adopt corrective programs in order to achieve stability in their balance of payments against oil price fluctuations. This is what many oil-exporting countries are witnessing after every collapse in oil prices, and this is what is required to encourage non-oil national and foreign investments.

The balance of the current account (a main account in the balance of payments) of any country is a true reflection of the country's economic, financial and investment trends towards the outside world, and the Kingdom of Saudi Arabia, like the rest of the world, is considered the balance of its current account among the accounts worthy of attention, and it is considered the only account among the rest of the balance of payments accounts that Its balance was distinguished by a surplus state for a long period, due to the rise in oil prices, and the current account balance is negatively affected mainly by fluctuations in oil prices (the fall in oil prices in 2014), in addition to the financial and economic crises (the global financial crisis of 2009), leading to the Corona pandemic and its products dire social and economic effects.

This study aims to know the impact of a number of macroeconomic variables on the current account in the Saudi balance of payments during the period **1995-2019**, and the matter comes with (the ratio of external reserves to GDP, the ratio of the balance of the general budget balance to GDP, the ratio of total merchandise exports to GDP Total, ratio of total merchandise imports to GDP, degree of external openness (external exposure), ratio of average per capita income to GDP, inflation rate, economic growth rate, ratio of total investment to GDP, ratio of inward foreign investments to GDP domestic liquidity growth rate

The problem of the study was summarized in analyzing the development of the current account in the Saudi balance of payments during the study period (**1995-2019**) in light of the main characteristics of the Saudi economy and the determining factors of the current

account. After adjusting the most important terms of the study (current account, capital, and financial account, national investments abroad, foreign investments at home, inflation rate, liquidity...).

To answer this problem, we divided it a sub-problem:

1- Is there a correlation between the dependent variable and all or some or any independent variables in the study?

2- Is the relationship between the variables chosen to be at the short or a long term?

To solve this general problem and sub-problems we will depend on the next plan:

The contributions of this study are (i) a description and analysis of the current account and its components, (ii) to examine if there are any factors effected on the current account. To solve this problem, we proceeded as follows: section 2 delivers the literature review. Section (3) presents the methodology, model and data. Section 4 discusses the results. Section 5 presents the conclusion along with policy directions.

2.0 Literature Review:

The subject of the current account and its factors are shown in many studies for many countries in different periods of time. In addition, many researchers wrote in this domain, and they used a lot of statistical tools.

In The study of Aysu and Fazil, the paper examines the theoretical and empirical linkage between current account deficits and a broad set of macroeconomic variables in Turkey. This paper employs the Auto Regressive Distributed Lag (ARDL) model to specify the determinants of the current account in Turkey between 1987 and 2009. Results indicate that inflation affects the current account balance positively, whereas growth, openness, oil prices, and appreciation of the real exchange rate cause the current account balance to deteriorate. After any shock, it takes four quarters for the current account balance to return to its long-run equilibrium level (Aysu & Fazil, 2015). Paper of Mini, try to estimate the impact of services trade on India's Economic Growth and Current Account Balance, during the post-reform period from 1990-91 to 2011-12. Facilitated by economic globalization, domestic liberalization, and technological advances, which resulted in increasing international fragmentation of the production process, India's services trade began growing rapidly post-1991. With the help of Thirlwall's Balance of Payments Constrained Growth Model and ARDL approach to cointegration (Mini, 2012).

The paper by Kandil studies the role of public and private imbalances in the behavior of the current account balance in the United States in the context of an intertemporal model. The estimation evaluates the effects of public and private imbalances on the dynamics of the current account. A higher budget deficit correlates with a reduction in private consumption and an increase in private savings. Government saving does not vary significantly with macroeconomic variables in the short or the long run. In contrast, fluctuations in government investment vary significantly with a number of economic variables in the long and the short run (Kandil, 2012).

Study of Basu is to focus on a dynamic interaction between current account imbalance and unemployment in response to some policy-induced shocks for a small open economy under a flexible exchange rate. This study uses a two-sector framework: one sector is traded and another is the non-traded sector that is subject to an effective demand constraint.

The results of comparative static exercises depend on a set of structural features of a developing country, which include asset substitutability, wage-price rigidity, and sectoral asymmetries. The paper shows that expansionary monetary policy, balanced budget fiscal expansion, and financial liberalization have an ambiguous effect on the current account balance. A foreign exchange reserves, non-traded sector, and the level of employment (Basu, 2019).

As for the paper, Aristovnik tests the short-term empirical link between current account deficits and a broad set of economic variables proposed by the theoretical and empirical literature for the emerging economies of Eastern Europe and the former Soviet Union. The empirical results of a modern (dynamic) panel data econometric analysis of countries in Central and Eastern Europe, Southern and Eastern Europe, and the Commonwealth of Independent States from 1992 to 2003 are chiefly consistent with theoretical and previous empirical analyses, indicating that there is a moderate level of persisting current account deficits beyond what can be explained by the behavior of its determinants (Aristovnik, 2008).

This study of Camba-Crespo & all aims to identify structural breaks in the current account and the periods between these breaks, the authors name stability spells, and study their characteristics and determinants.
This study identifies 212 significant structural breaks and 341 stability spells. These spells become shorter and more volatile the further they are from equilibrium, and half of them last 10 years or less. The results show that economic growth and foreign-exchange piling are particularly useful to prevent breaks, while lower per capita income increases exposure to break risks (Camba-Crespo & all, 2021).

In study of KAMRUL, he employed Co-integration and Error Correction Model (ECM) to study the behavior of Current Account Deficit (CAD) of Bangladesh and its determinants. The determinants of CAD include budget surplus, domestic saving, domestic income growth, foreign income growth, foreign interest rate, terms of trade, export and real exchange rate. A long-run equilibrium (co-integration) relationship is found between CAD and its determinants, although some variables are non-stationary.

Out of eight independent variables only three of them namely terms of trade, export and foreign interest rate, are found to have significant impact on CAD both in the long and short run. ECM formulation of the CAD model shows that more than 72% discrepancy between actual and long run value of CAD is corrected in each year. The important

implication of the study is that domestic economic policy has little to do with correcting CAD as all significant factors are related to the external economic conditions (KAMRUL, 2016).

It should be noted that there are several other studies that dealt with this subject, which can be summarized in Tab.**01** In Appendix **01**.

3.0 Data, Model, and Empirical Approach

For estimation purposes, we use annual data over 1995-2019. Detailed description and sources are provided in Appendix 1. The variables, which represent these data, are:

- As the dependent variable, we use Ratio of current account balance to GDP. (Cab),
- The independent variables in the model are 11 Variables:
- Ratio of foreign reserves to GDP (FR).
- Ratio of the balance of the general budget GDP (BGB).
- Ratio of total goods exports to GDP (Exp)
- Ratio of total goods imports to GDP (Imp)
- Average per capita gross domestic product (GDPC)
- External openness rate. (EOR)
- Inflation rate (IR)
- GDP growth rate (GDPG):
- Total investment to GDP ratio (TI)
- Ratio of foreign investment to GDP (FI)
- Domestic liquidity growth rate (DL)

Evolution of variables during the period studied show a great volatility in behavior. That volatility contains almost the variables.

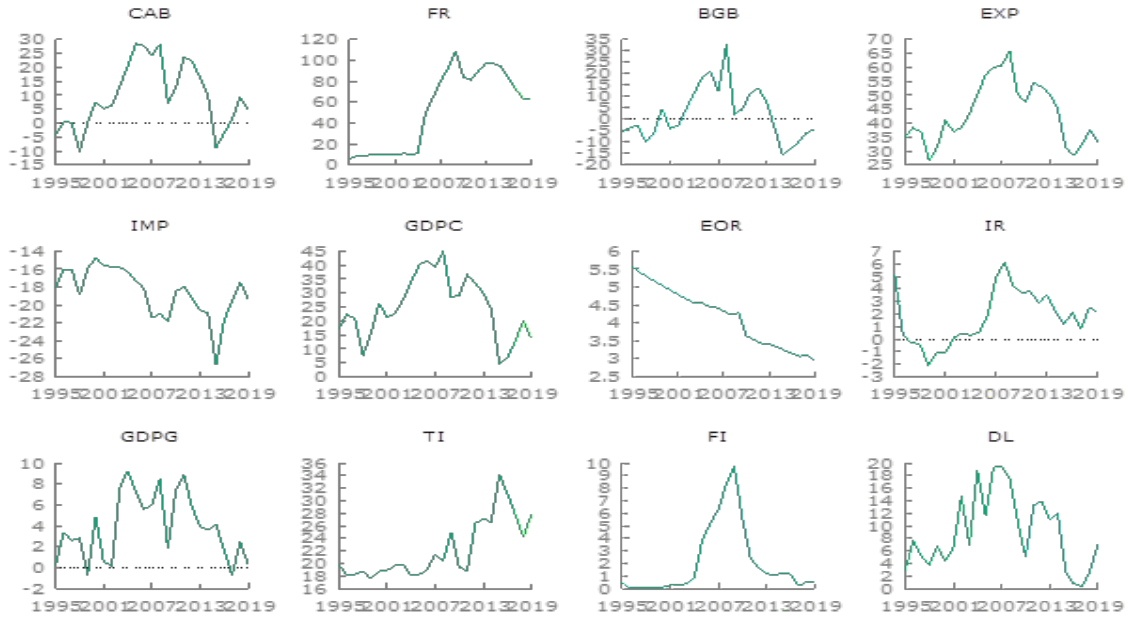

Fig.1: Evolution variables of study

The main variable of the study, which is the current account balance, had 30 downward shocks in the years 1995 (the effects of the Gulf crisis on oil prices) - 1998 (the effects of the Asian financial crisis on oil prices and global demand) - 2015 (the drop in world oil prices and its impact on Saudi exports

. EOR witch show decreasing since 1995 (For the same reason as before) and the FI shows an increase until 2009, Then it came down, As for the rest of the other variables, there were significant fluctuations during the studied period.

When we use principal component analysis (PCA) to know initially the relationship between variables, we found the dependent variable with a sub-group containing CAB-EXP-DL-BGB-GDPC and GDPG. And with this analysis might be

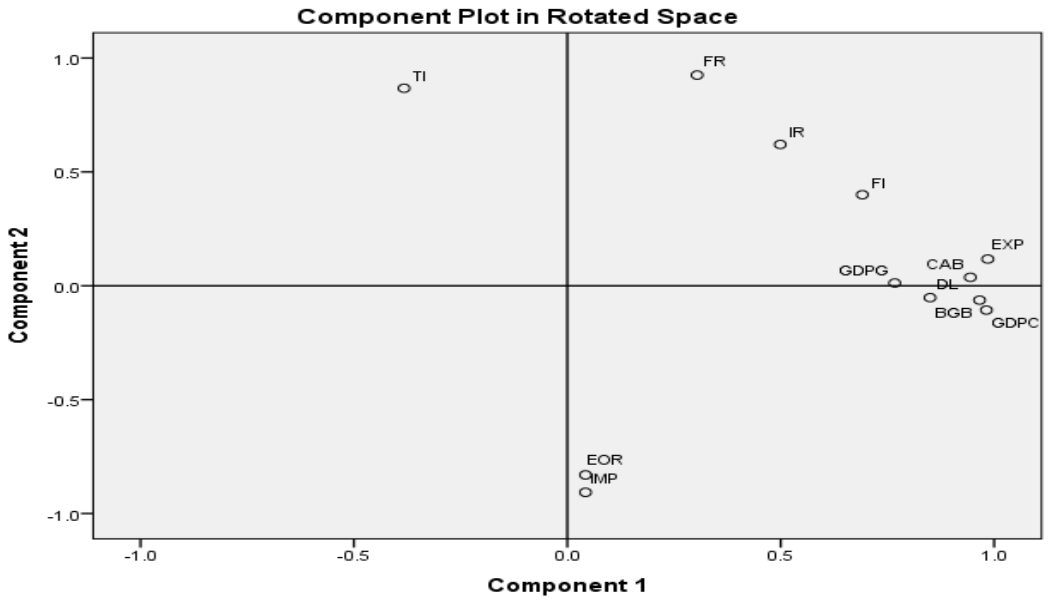

Fig.2: Distribution variables in correlation circle

This analysis could be known as the classification of the years of study in subgroups, especially groups from 1995 to 2003. Where we can distinguish **03** subgroups:

- From 1995 to 2003: the decline in oil prices and consequently the decline in Saudi exports

- From 2004 to 2006: the rise in oil prices and consequently the increase in Saudi exports

- From 2014 to 2019: the decline in oil prices and consequently the decline in Saudi export revenues.

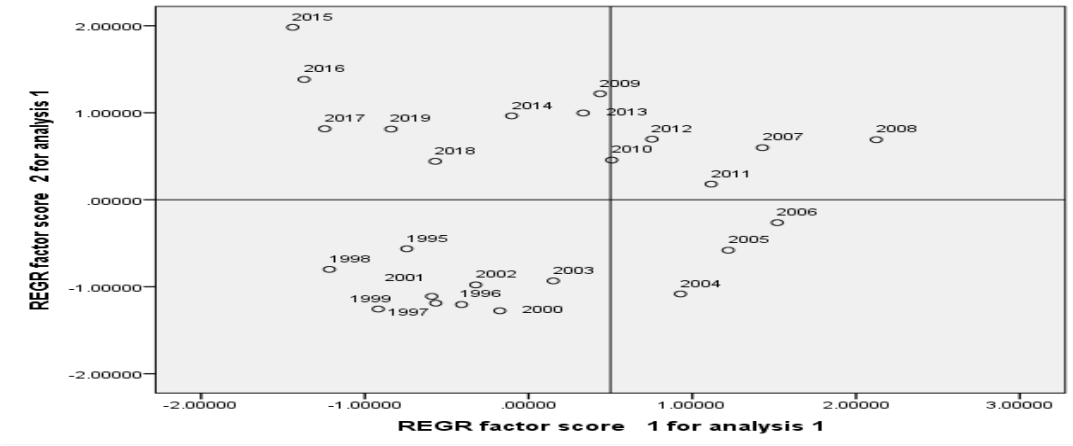

Fig.3: Distribution years in individual circle

When we draw a scatters of the dependent and independent variables two by two, we get the following graphs:

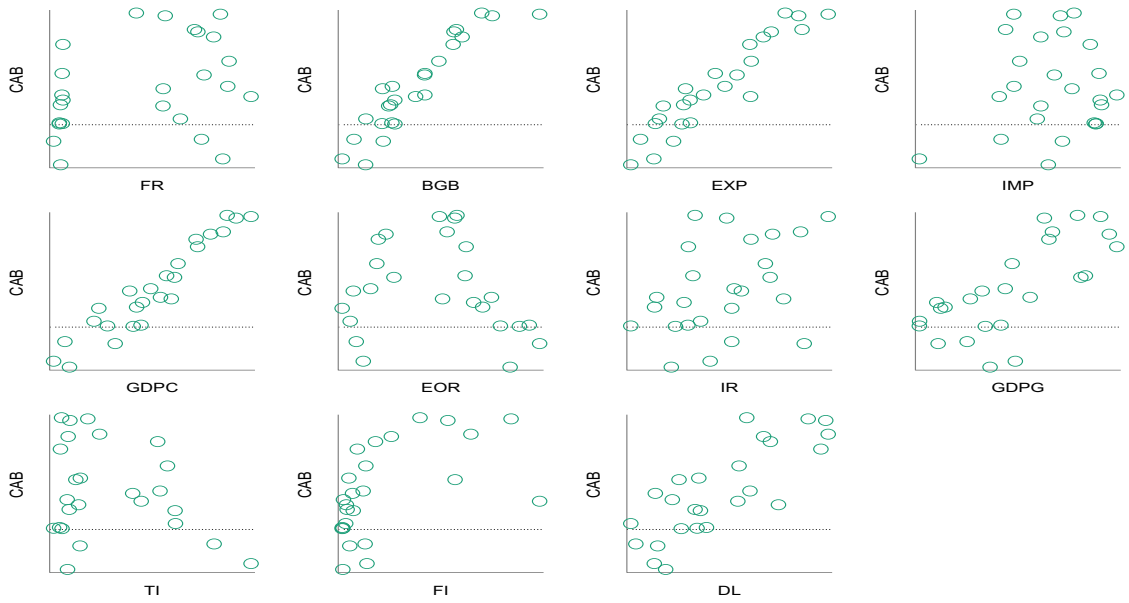

Fig.4: Scatter forms of variables

There are initially linear relationships between CAB and BGB-EXP-GDPC and GDPG.

4.0 Results and Discussions

4.1 Summary Statistics and Correlation Analysis

Tables 1 and 2 present correlation coefficients between the rate of change in the current account balance and the underlying components. Correlation coefficients establish the closeness of cyclicality between the affected variables. Table 1 presents correlation coefficients within developing countries. Table 2 presents correlation coefficients within advanced countries.

4.2 Main PCSE Results:

According to PCA analysis and scatters, we can determine approximately the factors that affected the CAB, we use these factors or variables whether it is dependent and independent variables like endogenous variables and do the differentiation to all the time series. We found out that it is stationers at 1 (I(1)). Now we use the Johnson-Juslus method or the ARDL method, where the results of the estimation in the latter gave us the following results:

Table.1: Estimation results: ARDL methodology (1995-2019).

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(CAB(-1))	-0.137167	0.129896	-1.055972	0.3136
D(CAB(-2))	0.212876	0.121046	1.758633	0.1064

D(BGB)	0.093595	0.095001	0.985200	0.3457
D(BGB(-1))	0.059871	0.149369	0.400828	0.6962
D(BGB(-2))	-0.157444	0.116068	-1.356479	0.2021
D(EOR)	-14.78426	4.457798	-3.316494	0.0069
D(FR)	0.012705	0.042413	0.299551	0.7701
D(FR(-1))	-0.111995	0.038750	-2.890174	0.0147
D(GDPC)	0.916090	0.098055	9.342584	0.0000
D(DL)	0.093509	0.075907	1.231896	0.2437
C	-0.835480	0.612096	-1.364949	0.1995

R-squared	0.983583	Mean dependent var	0.209091
Adjusted R-squared	0.968658	S.D. dependent var	8.776750
S.E. of regression	1.553819	Akaike info criterion	4.026161
Sum squared resid	26.55788	Schwarz criterion	4.571682
Log likelihood	-33.28777	Hannan-Quinn criter.	4.154670
F-statistic	65.90172	Durbin-Watson stat	1.877460
Prob(F-statistic)	0.000000		

From the estimate table, we can write the formula of the estimated linear model according to the following equation:

D(CAB) = -0.137*D(CAB(-1)) + 0.212*D(CAB(-2)) + 0.093*D(BGB) + 0.059*D(BGB(-1)) - 0.157*D(BGB(-2)) - 14.784*D(EOR) + 0.012*D(FR) - 0.111*D(FR(-1)) + 0.916*D(GDPC) + 0.093*D(DL) - 0.835

Where it appears from the previous table that both the estimators of the constant and the variable are not partially statistically significant according to (T) test, but according to (F) test, the model appears to be significant in its entirety. In addition, the estimated model is the best model as it is characterized by the highest R-square, the lowest values for AIC - SC- HQ, and the largest number of significant estimated parameters.
The last values give DW test and value which measures autocorrelation between errors, where DW value near than 2, it means no autocorrelation.

Table.2: Correlation coefficients within advanced countries.

F-statistic	2.446760	Prob. F(1,19)	0.1343
Obs*R-squared	2.395791	Prob. Chi-Square(1)	0.1217

Tab.3:Heteroskedasticity Test

The result is below in Tab. 03 show measure Heteroscedasticity by Breusch-Pagan test, as p-value = P(Chi-square (1) > 2.395) = 0.121 >0.05,it requires accepted H1 and rejected H0, it means absence heteroscedasticity.

Normality test by Chi-square (2) = 1.956 with p-value = 0.375< 0.05 that means accepted H0 and rejected H1, which means the errors are normally distributed.

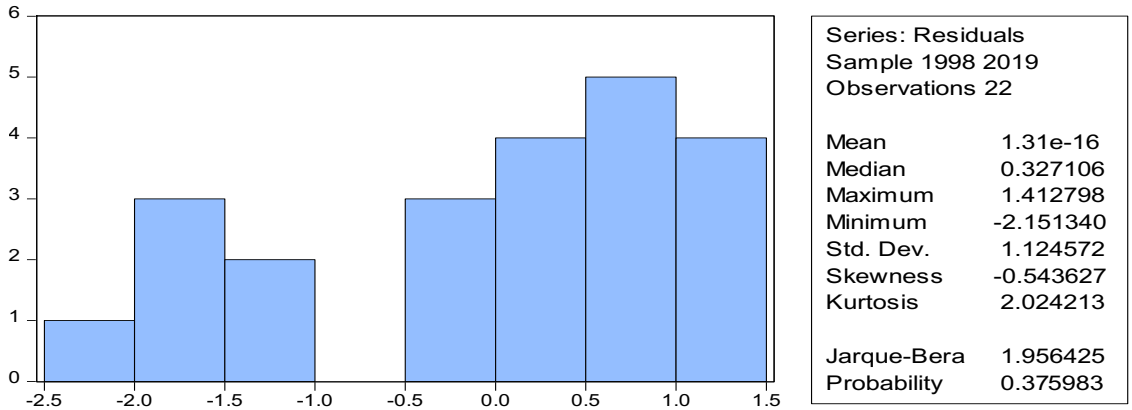

Fig.5: Normality test

But in the ARDL method, the diagnostic of parameters is considered first then the diagnostic of residuals, because of his tests, the most important of which are: the Wald Test and the Bound Test, we can conclude whether there is a long equilibrium relationship or not. Their results are given as follows:

Tabl.3: Wald test table

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	3.129716	(3, 11)	0.0697
Chi-square	9.389149	3	0.0245

Null Hypothesis: C(1)=C(4)=C(8)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-0.137167	0.129896
C(4)	0.059871	0.149369
C(8)	-0.111995	0.038750

CUSUM and CUSUMSQ are plots to check the stability of the long-run parameters together with the short-run movements for the ARDL-Error Correction Model are given

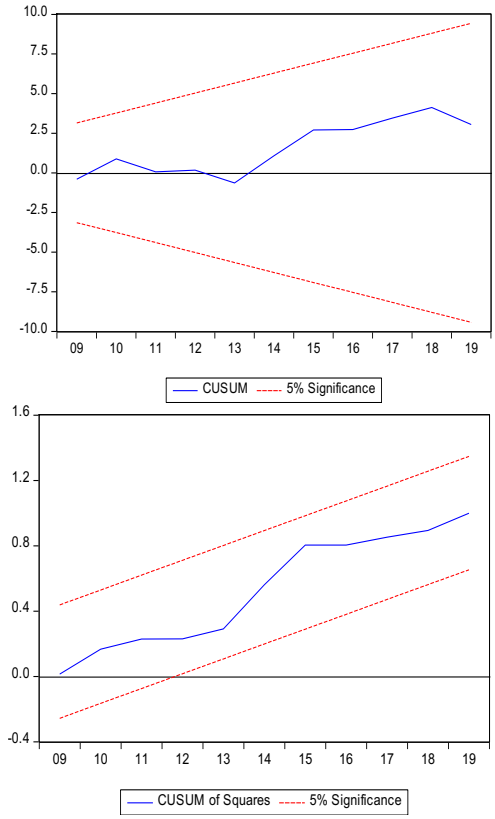

Fig.6: CUSUM and CUSUMSQ graphs

CUSUM and CUSUMSQ statistics are well within the 5% critical bounds implying that short-run and long-run coefficients in the ARDL-Error Correction Model are stable.

In our case the blue line stays between intervals of confidence in 5 percent, in this case, means that the model estimated is stable, with no structural breaks, so the model is best.

After viewing various tests related to the ARDL method, we found that the model is best; we can now explain statistically the results of the model:

1- *When FR increase by one unit, the dependent variable CAB, decreases by 0.111 unit.*
2- *A Variable EOR height in one unit We will notice the variable CAB decreases by 14.784 units;*
3- *Finally, when GDPC go up by unit,* ***the variable CAB increase by 0.916 unit;***
4- *The other variables like DL, GDPC shows no effect on CAB, but when it finds with other variable shows its effect.*

4.3 Discussions

The foreign reserves FR plays an important role in the national economy of any country. As it is determined by the economic decisions and policies of that country, which is considered a criterion for the economic strength or weakness of the state at the international and regional levels. It has a strong cash reserve that serves as a guarantee for the state in

front of those authorities. Moreover, it indicates the confidence of the international community in the economy of that state. As for the Kingdom of Saudi Arabia, the increase in its rise leads to an increase in the stability of exchange rates and the general level of prices. Thus had a positive impact on the current account.

The presence of a negative impact of trade openness or External openness EOR on the current account balance in the long run, due to the weak value of foreign direct investments incoming into the Kingdom. The structure of Saudi exports still lack diversification, and the upward trend in the value of Saudi imports. It eventually reflects the failure of the import substitution policy adopted by the Kingdom, while the actual real exchange rate does not effect on the current account balance. This is due to the weak flexibility of the domestic supply of exported goods.

The results confirmed that there is a causal relationship between the balance of the general budget and the balance of the current account. The increase in the first leads to increase the second. Since the balance considered to have a deficits or surpluses. many studies have proven that there is a relationship between the two deficits in one direction. Also, there are those who found the relationship in both directions, it means there is a reciprocal effect.

When we discuss the hypotheses that we set out in this research, it becomes clear to us:
- The first hypothesis is verified because it turns out that part of the variables affects the dependent variable.
- The second hypothesis was also verified, because when we used the ARDL method after we found that all variables were stationary in the first difference. The relationship between the variable in long term.

5.0 Conclusion and Policy Recommendations

The study of the Saudi current account balance showed us that a number of factors that affected it. Such as foreign reserves and external openness to world markets. As well as, the volume of the gross domestic product. All are considered as a very important factors, especially for an economy that depends on oil rents. which began for quite some time ago to depend on other non-oil incomes.

The Saudi Arabia current account achieved a surplus throughout the study period. Except some years such as: 1995, 1998, and 2015. Where they witnessed a deficit in the years in which the crises occurred in international oil prices and the exports decrease. the Kingdom's imports consisted of goods and services, in addition to transfers of expatriate workers and foreign aid to the Kingdom.

With Vision 2030, the structure of the Saudi Arabia current account is expected to change in terms of commodity and service diversification in various sectors. Such as, agriculture, industry, alternative energies and tourism, where it is expected that non-oil exports will reach 16% to 50% of GDP with a reduction in the import bill. It should be noted that the success of this vision or other strategic plans depends on:

- Diversifying the economy and not relying on a single resource to collect foreign currency. Substitution of imports by establishing an alternative national industry for imported products and goods;
- Developing non-oil exports by providing incentives to businessmen working in the foreign sector;
- Providing more incentives to foreign investors in terms of the investment climate in the Kingdom;
- Encouraging religious tourism.

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Appendix 1. Variables and Econometric methodology

As the dependent variable, we use Ratio of current account balance to GDP. (Cab), is part of a country's financial inflow and outflow record. It is part of the balance of payments, the statement of all transactions made between one country and another.

- The independent variables in the model are 11 Variables:

Ratio of foreign reserves to GDP (FR). Are assets denominated in a foreign currency that are held by a nation's central bank. These may include foreign currencies, bonds, treasury bills, and other government securities

Ratio of the balance of the general budget GDP (BGB). is calculated as the difference between a government's revenues (taxes and proceeds from asset sales) and its expenditures. It is

often expressed as a ratio of Gross Domestic Product (GDP). If the balance is positive, the government has a surplus (it spends less than it receives). If the balance is negative, the government has a deficit

Ratio of total goods exports to GDP (Exp): is measure of the proportion of a firm's sales that are exported, which expresses export sales revenues as a fraction of total sales revenue.

Ratio of total goods imports to GDP (Imp): the ratio of exports to imports is one of the indicators that serve to indicate a country's foreign trade deficit. It shows how much the country can pay for the value of the goods sold abroad and the value of the imported goods.

External openness rate (EOR). is one measure of the extent to which a country is engaged in the global trading system. Trade openness is usually measured by the ratio between the sum of exports and imports and gross domestic product (GDP)

Average per capita gross domestic product (GDPC). Is a popular metric for the average prosperity and well-being of a country, Unlike some other measures of economic productivity, it takes population size into account, allowing easy comparisons between countries with different sizes

Inflation rate (IR): is the rate of increase in prices over a given period. Inflation is typically a broad measure, such as the overall increase in prices or the increase in the cost of living in a country

GDP growth rate (GDPG): is also known as the Economic Growth Rate, and it measures the change in the GDP of the country in comparison to an earlier period. The amount of change is measured in percentage (%), which serves as a determinant of economic health in the country and the possible growth in the future

Total investment to GDP ratio (TI): his indicator refers to the share of investment in total. Production. It is obtained by calculating gross capital formation as percentage of gross domestic product

Ratio of foreign investment to GDP (FI): is the investment by an entity (individual or firm) based outside the country where the investment in being made. What makes foreign direct investment from foreign portfolio investment is the notion of control. So while FPI entails the entry of funds into a country, FDI is more than that; it also comes with some direct control.

Domestic liquidity growth rate (DL): means the sum of (a) all unrestricted cash and Cash Equivalents owned by a domestic Credit Party and held in the United States and (b) availability under the Revolving Credit Facility.

Appendix 2. Data sources

Data were collected from national, regional and international sources.

- United Nations Conference on Trade and Development database
- Unified Arab Economic Report

- Saudi Central Bank Reports
- General Authority for Statistics

Appendix3. Other Literature Review

No	Study	year	Objectives	Results
01	Kumar Behera	2016	This paper is to examine the issue of high current account deficit (CAD) from various perspectives focusing its behavior, financing pattern and sustainability for India.	It found that the widening of CAD is due to fall in household financial savings and corporate investments. In addition, it was found that a large part of India's CAD has been financed by FDI and portfolio investments, which are partly replaced by short-term volatile flows. The unit root and cointegration tests indicate a sustainable current account for India. Further, econometric analysis reveals that India's current account is driven by fiscal deficit, terms of trade growth, inflation, real deposit rate, trade openness, relative income growth and the age dependency factor.
02	De Beer	2013	This paper analyses South Africa's experience with FDI flows. The paper highlights the South African experience in an international comparative context.	The results indicate that South Africa has performed below par (on par) with comparator countries in terms of FDI inflows (outflows). Since 2004, the South African economy has become increasingly dependent on capital inflows to finance the widening current account deficit. While FDI inflows have been much smaller than portfolio flows, net dividend payments on FDI flows (non-fdi flows) made up 36 per cent (15 per cent) of the current account deficit for the period 2004 to 2012. Unless there is a significant rise (decline) in the exports (imports) of goods and services, the South African economy will be dependent on foreign capital inflows to offset the investment income repayments and the current account deficit. The policy challenge is to promote FDI that enhances exports production and economic growth.
03	Hinaunye Eita & all:	2010	This paper investigates macroeconomic determinants of the current account balance in Namibia.	The results show that there is evidence of twin deficit hypothesis in Namibia. Evidence of twin deficit hypothesis suggest that it is important for Namibia to have fiscal discipline in order to improve its current account. Increase in capital flows, real GDP or per capita, results in a deterioration of the current account. Increase in interest rate, commodity prices and population cause the current account balance to improve. This suggest that contractionary monetary policy contributed to reduction of unproductive

				imports and improved the current account balance.
04	Mihret Ayele	2011	This paper is to examine whether real exchange rate devaluation improves the current account balance of four highly indebted low-income countries of East Africa.	The panel PMG/ARDL estimation result reveals that real exchange rate devaluation has no significant impact on the current account balance, both in the short and long run. However, the time-series analysis using the bound testing and restricted ARDL estimation suggests that real exchange rate devaluation improves the current account balance in the long run for only Ethiopia.
05	Karimova	2019	This study investigates the current account deficit (CAD) of Turkey from the perspective of its capital account. We discuss how global liquidity conditions and monetary policies in Turkey have contributed to higher deficits through real exchange rate appreciations. We analyze the impact and consequences of exchange rate (ER) changes on the investments of non-financial firms. In the case of real ER depreciations,	we find that the magnitude of the contractionary effect through balance sheets of firms with dollarized liabilities is significantly higher than the expansionary effect through trade competitiveness. We also analyze the "soft-landing" policies aimed at reducing the CAD in Turkey and estimate the rate of economic growth that must be foregone for a percentage reduction in CAD.
06	Fausten & all	2015	This investigation examines the temporal evolution of the balancing item, identifying structural breaks that are plausible a priori. It also explores alternative data-driven and structural approaches to the diagnosis of the errors and omissions	The balancing item in the Australian balance of payments has been increasing in magnitude and volatility, violating with increasing frequency internationally agreed acceptability criteria of smallness.

			in the statistical record.	
07	Kandil	2016	This paper is to study the role of public and private imbalances in the cyclicality of the current account balance in a sample of advanced and developing countries. Within developing countries, the evidence does not establish the dependency of private investment on private savings and private consumption is the main driver of the saving/investment balance.	In contrast, private savings seem to be better mobilized to finance private investment and the latter is the main driver of the saving/investment balance in advanced countries. Deterioration in the current account balance in response to higher private consumption could be detrimental to growth and external stability. In contrast, an investment strategy that promotes growth is likely to attract financial flows and reduce the risk of a widening current account deficit on external stability.
08	Aßmann	2016	This paper contributes a Bayesian analysis, which allows a parsimonious yet flexible handling of country specific heterogeneity via random coefficients. Furthermore, the analysis allows for serially correlated errors in order to capture persistence within the employed macroeconomic data. Bayesian specification tests provide evidence in favor of models incorporating heterogeneity and serial correlation	The results suggest that consideration of serial correlation and heterogeneity is necessary to assess correctly the determinants and costs of reversals. Results are checked for robustness against the underlying reversal definition.

Appendix 3. Bounds Test and Ramsey TEST table

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F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)

			Asymptotic: n=1000	
F-statistic	41.94627	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15
			Finite Sample:	
Actual Sample Size	22		n=35	
		10%	2.331	3.417
		5%	2.804	4.013
		1%	3.9	5.419

Ramsey RESET Test
Equation: UNTITLED
Specification: D(CAB) D(CAB(-1)) D(CAB(-2)) D(BGB) D(BGB(-1)) D(BGB(-2)) D(EOR) D(FR) D(FR(-1)) D(GDPC) D(DL) C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.338989	10	0.7416
F-statistic	0.114913	(1, 10)	0.7416

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.301719	1	0.301719
Restricted SSR	26.55788	11	2.414353
Unrestricted SSR	26.25617	10	2.625617