“Macroeconomic factors influencing the Saudi balance of payments’ current account dynamics from 1995 to 2019”

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ARTICLE INFO	Saidi Ouassaf, Ismail Bengana, Abdelkader Laallam, Nourredine Khababa and Kamel Si Mohammed (2024). Macroeconomic factors influencing the Saudi balance of payments’ current account dynamics from 1995 to 2019. *Public and Municipal Finance*, *13*(1), 106-123. doi:10.21511/pmf.13(1).2024.09
DOI	http://dx.doi.org/10.21511/pmf.13(1).2024.09
RELEASED ON	Tuesday, 18 June 2024
RECEIVED ON	Thursday, 22 February 2024
ACCEPTED ON	Tuesday, 16 April 2024

JOURNAL	"Public and Municipal Finance"
ISSN PRINT	2222-1867
ISSN ONLINE	2222-1875
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
40	7	9

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine

www.businessperspectives.org

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MACROECONOMIC FACTORS INFLUENCING THE SAUDI BALANCE OF PAYMENTS' CURRENT ACCOUNT DYNAMICS FROM 1995 TO 2019

Abstract

Reliable development reports highlight persistent deficits in developing countries' balance of payments since the 1980s and 1990s, attributed to monetary turmoil and ambitious development plans. Saudi Arabia faces similar challenges as the leading economy in the Middle East and North Africa region.

The objective of this study is to pinpoint the macroeconomic determinants influencing Saudi Arabia's current account balance from 1995 to 2019. This aligns with the objectives of Saudi Vision 2030, which emphasizes economic diversification and sustainability.

Eleven macroeconomic determinants were subjected to the Principal Component Analysis model and the Autoregressive Distributed Lag model for analysis. Five determinants, such as budget balance, goods exports, per capita gross domestic product, gross domestic product growth, and domestic liquidity growth, were identified as significant contributors to the current account balance. The Autoregressive Distributed Lag model revealed that goods exports, domestic liquidity growth, gross domestic product growth, and per capita gross domestic product exert a statistically significant positive impact on the current account balance in the long term.

The research findings highlight the significance of goods exports, economic growth, and domestic liquidity in shaping Saudi Arabia's current account balance, emphasizing the need for diversification away from oil dependence to mitigate economic vulnerabilities. The study underscores the implications for Saudi Vision 2030, stressing strategic policy interventions to foster non-oil exports and stimulate economic growth. Additionally, the analysis identifies temporal variations in export dynamics, emphasizing the importance of policy continuity and adaptability for economic resilience.

Keywords current account balance, oil-exporting countries, economic growth, macroeconomic determinants, Saudi Arabia

JEL Classification F32, F41, F43

Received on: 22nd of February, 2024
Accepted on: 16th of April, 2024
Published on: 18th of June, 2024

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Conflict of interest statement:
Author(s) reported no conflict of interest

INTRODUCTION

Development reports from reputable international institutions such as the International Monetary Fund, the World Bank, and the United Nations Trade and Development Organization have indicated a persistent trend towards deficits in the balance of payments of a group of developing countries since the 1980s and 1990s. This phenomenon is attributed to the monetary turmoil prevalent during that period. The escalating deficits are linked to the pursuit of ambitious development plans, despite the limited resources available to finance such programs.

http://dx.doi.org/10.21511/pmf.13(1).2024.09

Given the heavy reliance on imports and continuous pressure on the exchange rates of national currencies, these countries have experienced a decline in confidence from both local and foreign investors, further contributing to their deficit.

This study seeks to identify the critical macroeconomic determinants of Saudi Arabia's current account balance from 1995 to 2019. Eleven economic determinants, grounded in prior research, are presented, including the ratio of foreign reserves to gross domestic product, the ratio of the balance of the general budget to gross domestic product, the ratio of total goods exports to gross domestic product, the ratio of total goods imports to gross domestic product, the external openness rate, the ratio of average per capita gross domestic product, the inflation rate, gross domestic product growth rate, the ratio of the total investment to gross domestic product, the ratio of foreign investment to gross domestic product, and domestic liquidity growth rate.

Aligned with the objectives of Saudi Vision 2030, this study addresses non-oil investments and their impact on Saudi Arabia's economic diversification and its reflection on the country's export capacity, investment stimulation, and attractiveness of foreign investments, thereby influencing the current account balance.

To the best of the authors' knowledge, this study stands as one of the few recent examinations of the current Account Balance in the context of Saudi Arabia, aligning with the objectives outlined in Saudi Vision 2030. As such, it lays a solid groundwork for future research endeavors in this domain. The study significantly contributes to the literature on the current account balance through various dimensions. It represents the inaugural scientific data analysis addressing the current account balance in Saudi Arabia, encompassing pivotal explanatory variables applicable to oil-exporting nations. The insights garnered extend beyond academia, offering valuable information for governmental bodies, regulatory agencies, and public officials, shedding light on the factors steering current account dynamics. Notably, the study holds lessons pertinent to the realization of Saudi Vision 2030.

The subsequent sections of this study include a literature review, a discussion of data and methods, an analysis of estimated results, and concluding remarks with policy implications.

1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Existing scholarly works have predominantly centered on the impact of economic growth on current account balance, particularly during the notable decline in oil prices in 2014, which received considerable attention. In contrast, this study surpasses prior research efforts by scrutinizing this association over a three-and-a-half-decade period, utilizing annually gathered data encapsulating recent developments. This study injects a fresh econometric perspective, underscoring the substantial significance of oil pressures as a primary determinant of inflation, especially in times of economic turbulence and geopolitical risks. By delving into this intricate relationship, the study furnishes guidance and indispensable insights for enterprises, monetary policymakers, governments, and international institutions.

Numerous studies on the balance of payments of oil-exporting countries over the past three decades emphasize the imperative of corrective measures to stabilize their balance of payments in response to recurrent collapses in oil prices (Karamelikli et al., 2017; Tlemsani, 2021). In alignment with this economic context, Saudi Arabia, as outlined in its Vision 2030, strategically pursues domestic and international investments diversifying beyond the hydrocarbon industry.

The current account balance holds paramount importance within any country's balance of payments, offering a precise reflection of economic, financial, and investment trends. Saudi Arabia's current ac-

count balance, unlike many countries, had maintained a surplus for an extended period due to rising oil prices. However, fluctuations in oil prices, such as the 2014 decline, and financial crises, such as the 2009 global financial crisis, have significantly and negatively impacted Saudi Arabia's current account balances (Alshahrani & Alsadiq, 2014; Altayligil & Çetrez, 2020; Ouassaf, 2016).

Furthermore, Saudi Arabia's current account balance is characterized by the positive influence of oil exports and returns on national investments abroad, as well as negative impacts from total imports (goods and services) and migrant workers' remittances (SAMA, 2020; Ouassaf, 2020). These variables are undoubtedly outcomes of several factors that warrant thorough investigation.

Ranked 19th among the world's twenty largest economies and leading in the Middle East and North Africa (MENA) region, Saudi Arabia boasts the most significant free market in the Middle East. With ownership of 25% of the world's oil reserves and a strategic location facilitating easy access to European, Asian, and African markets, the country has witnessed substantial gross domestic product growth over the past two decades, attributed to rising oil prices, non-oil domestic product growth, and its World Trade Organization membership since December 11, 2005 (Ouassaf, 2016; WTO, 2011).

This study explores the principal determinants influencing Saudi Arabia's current account balance from 1995 to 2019. The motivation for this study stems from the fundamental understanding that current account balances play a pivotal role in shaping a country's foreign investment position. The academic literature encompasses four distinct paradigms regarding the impact of economic growth on the current account balance (Blanchard, 2007; Ghosh & Ostry, 1995). Conversely, during periods of low economic growth, governments may encounter challenges in achieving tax revenue and budget deficit targets, leading to inflows in the current Account Position (Barro, 1974). The Ricardian equivalence theory posits that the current account balance is cyclical (Nickel & Vansteenkiste, 2008).

Significantly, an escalation in the real exchange rate and a deterioration in the terms of trade contribute to worsening current account deficits in the transition region, aligning with Thirlwall's Balance of Payments Constrained Growth Model (Thirlwall, 1979). Additionally, the intertemporal approach underscores the dynamic nature of current account balance and its close ties to consumption and investment decisions (Gandolfo & Goldberg, 2005). These models highlight the role of temporary changes in cash flow, terms of trade, and productivity in influencing a country's borrowing or lending behavior through the current account, treating it as a shock absorber (Obstfeld & Rogoff, 1994). According to Bernanke (2005), macroeconomic stability, measured by low inflation, exhibits a positive and statistically significant relationship with current account balance. Recent studies emphasize the critical impact of oil dependency and intensity on current account balance (Cheung et al., 2013). Empirical research underscores the dominance of macroeconomic variables over institutional and financial determinants, particularly in oil-exporting and developing countries (Altayligil & Çetrez, 2020).

For instance, vital macroeconomic determinants of the current account in Turkey from 1987 to 2009 have been identified by Insel and Kayıkçı (2013), revealing a positive impact of inflation on the current account balance, while growth, openness, oil prices, and real exchange rate appreciation led to its deterioration. Post any economic, financial, or monetary shock, the current account balance required four quarters to return to its long-run equilibrium level.

Similarly, the fixed exchange rates were found to have led to sustainable current account deficits due to real exchange rate appreciation. Conversely, exchange rate flexibility can act as a disciplining mechanism, allowing exchange rates to adjust to current account disequilibrium, Özmen (2005). It has also been argued that flexibility in the exchange rate system enhances a country's ability to absorb shocks from external sources. Edwards and Yeyati (2005) introduced the concept of "current-account stability spells," emphasizing that time between structural disruptions was also introduced, and economic growth and foreign exchange accumulation were found effective in preventing breakdowns, while lower per capita income increased vulnerability (Camba-Crespo et al., 2022).

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Further research has explored the short-run relationship between current account deficits and various economic variables for emerging economies in Eastern Europe and the former Soviet Union. Results indicated a moderate level of current account deficits, with economic growth negatively impacting the current account balance, signifying a more considerable increase in domestic investment than savings. Additionally, poorer countries experienced higher current account deficits, aligning with the stages of development hypothesis. The limited impact of demographic variables and the significant impact of EU-15 nations' growth rates on external imbalances were also observed (Aristovnik, 2008).

Differently, a novel approach to the Balance of Payments Constrained Growth model and autoregressive distributed lag cointegration is used to estimate the balance of payments equilibrium growth rate for India's service sector. Results highlighted the developmental pace of India's service sector and the considerable backward linkage among primary benefits in the export basket (Thomas, 2019).

A broader study spanning from 1986 to 2013 examined macroeconomic, institutional, and financial determinants of the current account balances for 97 developing and developed countries. Findings indicated that increases in fiscal deficit, growth rate, trade openness, real effective exchange rate, financial market development, institutional quality, and stage of development led to higher current account deficits. Trade, inflation rate, and crude oil exports, on the other hand, helped minimize the current account deficit. The study also identified institutional determinants such as legal systems, property rights, political stability, voice and accountability, absence of violence, and political risks (Altayligil & Çetrez, 2020).

Alternatively, the vector autoregression (VAR) estimating methodology was employed to explore key determinants of current account balances for South Asian economies from 1980 to 2020. Findings indicated that exchange rate depreciation significantly enhanced current account balances, while higher per capita income, trade openness, and net foreign capital inflows did not threaten them. The fiscal deficit had no significant impact, except for Bangladesh and Nepal, where increasing savings negatively affected current account balances (Mallick, 2022).

Notably, the employed technique for long-term coefficient estimation was found less favorable in prominent oil-exporting nations such as Saudi Arabia. This method, when used with scientific data testing, particularly in countries heavily reliant on macroeconomic variables like oil, failed to identify significant determinants of current account balances.

This study aims to address this gap by employing two less-utilized techniques, overcoming limitations identified in previous studies, and providing new insights into the determinants of current account balances, especially in contexts marked by oil dependency and political stability.

Considering the comprehensive review of the literature above, the following hypotheses are formulated:

H1: There exists a positive and significant relationship between macroeconomic determinants and the current account balance of Saudi Arabia.

H1a: The ratio of foreign reserves to gross domestic product exhibits a positive and significant relationship with the current account balance of Saudi Arabia.

H1b: The ratio of the general budget balance to gross domestic product shows a positive and significant relationship with the current account balance of Saudi Arabia.

H1c: The ratio of total goods exports to gross domestic product displays a positive and significant relationship with the current account balance of Saudi Arabia.

H1d: The ratio of total goods imports to gross domestic product demonstrates a positive and significant relationship with the current account balance of Saudi Arabia.

H1e: The external openness rate is expected to have a positive and significant relationship with the current account balance of Saudi Arabia.

H1f: The ratio of average per capita gross domestic product is anticipated to exhibit a positive and significant relationship with the current account balance of Saudi Arabia.

H1g: The inflation rate is hypothesized to have a positive and significant relationship with the current account balance of Saudi Arabia.

H1h: The gross domestic product growth rate is expected to show a positive and significant relationship with the current account balance of Saudi Arabia.

H1i: The total investment to gross domestic product ratio is expected to demonstrate a positive and significant relationship with the current account balance of Saudi Arabia.

H1j: The ratio of foreign investment to gross domestic product is anticipated to have a positive and significant relationship with the current account balance of Saudi Arabia.

H1k: There exists a positive and statistically significant association between the domestic liquidity growth rate and the current account balance of Saudi Arabia.

2. METHOD AND DATA ANALYSIS

This study scrutinizes the principal determinants influencing the current Account Balance in the Kingdom of Saudi Arabia. The dataset encompassing the requisite criteria spans the years 1995 to 2019. Guided by prevailing literature underscoring the pronounced impact of macroeconomic variables in contrast to institutional and financial factors on the current account balance (Altayligil & Çetrez, 2020; Çetin et al., 2023; Cheung et al., 2013), the study incorporates the following selected variables. Firstly, the ratio of foreign reserves as a percentage of gross domestic product is considered. Additionally, the study includes the ratio of the general budget balance to gross domestic product and the ratio of total goods exports/imports to gross domestic product. The external openness rate is also a focal variable. The percentage of average per capita gross domestic product, the inflation rate, and the growth rate are distinct variables in this investigation. Lastly, the study incorporates total investment, foreign investment, and domestic liquidity growth as additional independent variables. Details regarding data sources, measurement units, and definitions are outlined in Table 1.

Table 1. Designated variables and their description

Variables	Acronym	Measurement unit	Source
Current account balance	CAB	Percent to GDP	World Development Indicators (2022)
Foreign reserves	F.R.	Percent to GDP	Saudi Central Bank (2022)
General budget	BGB	Percent to GDP	General Authority for Statistics(2023)
Total goods exports	EXP	Percent to GDP	United Nations Conference on Trade and Development (2022)
Total goods imports	IMP	Percent to GDP	United Nations Conference on Trade and Development (2022)
Gross domestic product per capita	GDPC	$/per capita	World Development Indicators (2022)
External openness rate	EOR	Percent to GDP	United Nations Conference on Trade and Development (2022)
Inflation rate	I.R.	Growth (%)	World Development Indicators (2022)
Gross Domestic Product growth rate	GDPG	Growth (%)	World Development Indicators (2022)
Total investment	T.I.	Percent to GDP	General Authority for Statistics (2022)
Foreign investment	F.I.	Percent to GDP	World Development Indicators (2022)
Domestic liquidity growth	DL	Percent to GDP	World Development Indicators (2022)

http://dx.doi.org/10.21511/pmf.13(1).2024.09

The fundamental model employed in this study is expressed as follows:

$$CAB = f\begin{pmatrix} FR, BGB, EXP, IMP, GDPC, \\ EOR, IR, GDPG, TI, FI, DL \end{pmatrix}. \quad (1)$$

As previously noted, this investigation utilized the autoregressive distributed lag technique to analyze the interdependencies among variables derived from the current account balance, as proposed by Pesaran et al. (2001). In instances with limited time series observations (small T) and a combination of stationary and non-stationary variables, the autoregressive distributed lag technique proves advantageous, particularly without resorting to higher-order differencing. The selection of the autoregressive distributed lag model was based on its enhanced utility and efficacy in capturing both short- and long-term effects (Avishek Khanal et al., 2022; Das et al., 2023; Ye et al., 2023).

The approximated ARDL mathematical equation is formulated as follows:

$$\begin{aligned} CAB_t &= \beta_0 + \beta_1 \Delta BGB_t + \beta_2 \Delta EXP_t \\ &+ \beta_3 \Delta GDPG_t + \beta_4 \Delta GDPC_t \\ &+ \beta_5 \Delta DL_t + \beta_6 BGB_t + \beta_7 \Delta EXP_{it} \\ &+ \beta_8 GDPG_t + \beta_9 GDPC_t + \beta_{10} DL_t + \varepsilon_t . \end{aligned} \quad (2)$$

In the provided model, 0 denotes the constant term. The coefficients β_1, β_2, β_3, β_4, and β_5 pertain to the short-term dynamics, while β_6, β_7, β_8, β_9, and β_{10} correspond to the long-term dynamics. The variable 't' represents time, and ε_t signifies the error correction term, addressing the adjustment error speed.

Before demonstrating the autoregressive distributed lag technique's applicability, the designated variables' stationarity status underwent scrutiny. Ensuring the stationarity of selected variables is crucial, as any departure from this condition may result in spurious regression outcomes characterized by bias, inconsistency, and invalidity. Two types of unit root tests were employed for this purpose. The first test followed the methodology proposed by Dickey and Fuller (1979), while the second type utilized the approach introduced by Phillips and Perron (1988) to examine unit roots within individual processes.

Additionally, two essential steps were undertaken subsequent to variable determination and data collection:

1) a pre-processing step involving data screening and the identification of the most pertinent determinants for the study through principal component analysis;

2) a processing step focused on modeling the intricacies inherent in the study.

This step specifically delved into cointegration processes using autoregressive distributed lag to explore the relationship between the study determinants in both short-term and long-term perspectives.

2.1. Data pre-processing and data screening

For the purpose of data screening, assessments were conducted for missing values, outliers, and adherence to normality distribution. Table 2 reveals the absence of any missing values among the determinants. Outlier analysis, as depicted in Figure 1, identifies outliers solely within the variable foreign investment. In terms of normality assumptions, external openness rate, per capita gross domestic product, and foreign reserves demonstrate a normal distribution as indicated by Skewness (S = 0); however, all variables exhibit abnormality according to Kurtosis (K = 3) assumptions. Notably, the use of kurtosis revealed that the presence of non-outliers does not consistently prevent the emergence of potentially misleading results.

Moreover, employing a linear regression model devoid of quantiles and asymmetry has demonstrated the capacity to generate accurate estimation results (Balsalobre-Lorente et al., 2022; Dawar et al., 2021; Peng et al., 2022). Despite most of the data failing to meet normality assumptions, the current dataset is retained for analysis for two reasons. First, in cases where the data set contains limited observations, omitting data is warranted if subjected to alternative transformations. Second, when some data exhibit negative values, their exclusion is considered after undergoing suitable transformations.

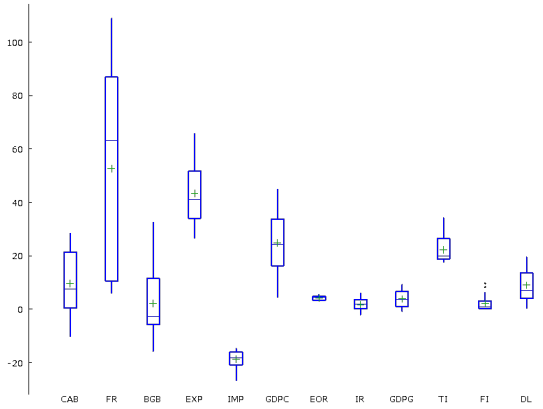

Figure 1. Box plot of the study's variables

Table 2. Summary statistics using the observations from 1995–2019

Variable	Mean	Minimum	Maximum	Std. Dev.	Skewness	Ex. kurtosis	Missing obs.
CAB	9.7240	–10.200	28.500	11.688	0.15117	–1.0367	0
FR	52.644	6.0523	108.89	37.913	–0.11028	–1.6814	0
BGB	2.2636	–15.800	32.600	11.614	0.73296	0.11421	0
EXP	43.402	26.530	65.815	11.045	0.34670	–0.97241	0
IMP	–18.588	–26.698	–14.702	2.7462	–0.94567	1.0321	0
GDPC	24.813	4.4133	44.855	11.201	–0.043160	–0.82509	0
EOR	4.1816	2.9617	5.5406	0.82360	–0.016631	–1.3465	0
IR	1.7580	–2.1100	6.1200	2.1538	0.23592	–0.79671	0
GDPG	3.8900	–0.75000	9.2500	3.1172	0.16583	–1.1428	0
TI	22.206	17.566	34.211	4.7065	1.0047	–0.10800	0
FI	2.0522	0.034547	9.6785	2.7787	1.5158	1.0930	0
DL	8.9956	0.30000	19.550	5.9385	0.39445	–0.99709	0

2.2. Identification of variables

2.2.1. *Principal Component Analysis*

During this phase, all determinants underwent inclusion in principal component analysis to discern the most pivotal factors influencing the Kingdom of Saudi Arabia's current account balance. As illustrated in Figure 1, a subgroup comprising five determinants (goods exports, domestic liquidity growth, budget balance, per capita gross domestic product, and gross domestic product growth) encapsulates the current account balance.

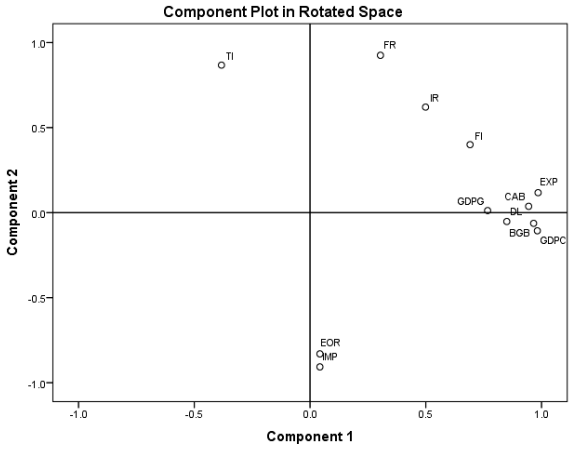

Figure 2. Distribution of variables in correlation circle

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2.2.2. *Utilization of a scatter plot*

In the subsequent phase, a scatter plot was utilized to further affirm the significance of the determinants under examination in this study. Figure 2 attests to a linear relationship between the current account balance and five specific determinants: budget balance, goods exports, per capita gross domestic product, domestic liquidity growth, and gross domestic product growth.

2.2.3. *Categorization of the study period based on governmental policies*

This analysis involves classifying study years into subgroups, covering the period from 1995 to 2019. Three distinct subgroups are delineated as follows:

- 1995 to 2003: Characterized by the decline in oil prices and, consequently, the reduction in Saudi exports;
- 2004 to 2006: Marked by the rise in oil prices and, consequently, the increase in Saudi exports;
- 2014 to 2019: Defined by the decline in oil prices and, consequently, the reduction in Saudi export revenues.

3. RESULTS

3.1. Descriptive analysis

In this phase of the study, data processing is undertaken, and the initial step involves a descriptive analysis.

Observing Figure 5 alongside the summary statistics presented in Table 1, it is evident that all determinants exhibit substantial volatility. It is noteworthy that the data are presented on an annual basis. The

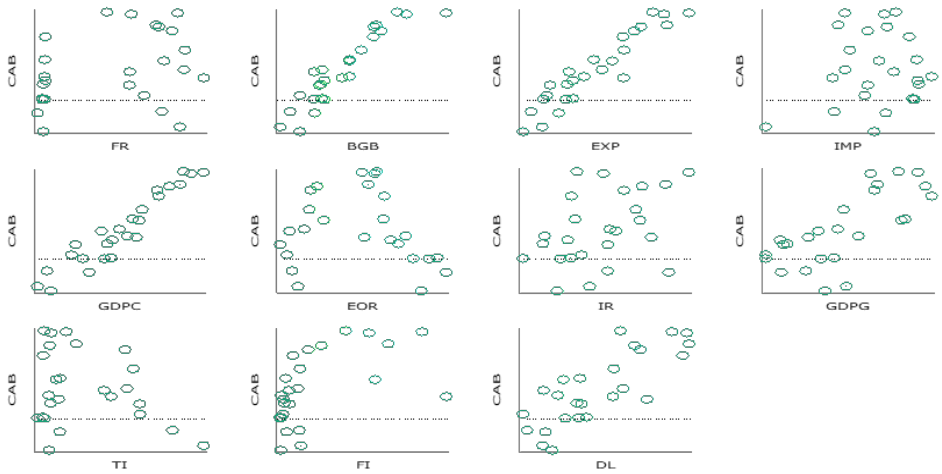

Figure 3. Scatter forms of variables

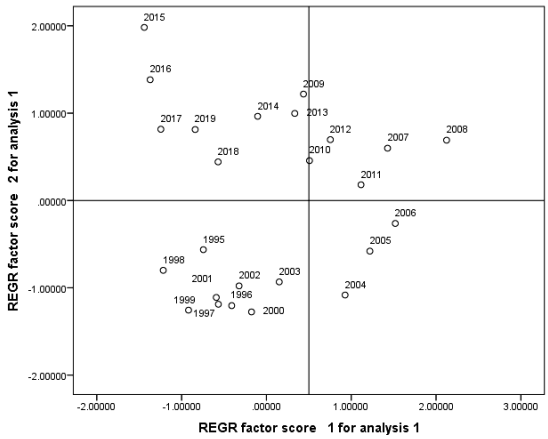

Figure 4. Distribution years in the individual circle

mean values of all determinants fall within the range of 2.26 to 43.4. Additionally, the standard deviation for the majority of determinants exceeds 11, with the exceptions being gross domestic product growth (3.12) and domestic liquidity growth (5.94).

3.2. Modeling using Ordinary Least Squares

Following the identification of the five crucial determinants (budget balance, goods exports, per capita gross domestic product, domestic liquidity growth, and gross domestic product growth, Ordinary Least Squares (OLS) were employed to assess the impact of these determinants on the current account balance. The results, as presented in Table 3, indicated insignificant effects on current account balance (Durbin-Watson statistics = 0.54), suggesting the potential presence of a spurious regression (Durbin-Watson < R^2), despite a high coefficient of determination (R^2 = 0.89). This renders the model invalid, necessitating the consideration of cointegration among all study determinants (cointegration modeling).

Table 3. Estimation model using OLS

Coefficient	Std. error	t-statistic	Prob.
–15.37669	9.072974	–1.694780	0.1064
0.166332	0.236718	0.702658	0.4908
0.232590	0.313530	0.741843	0.4673
0.202732	0.382296	0.530302	0.6020
0.525923	0.335143	1.569250	0.1331
0.087925	0.243588	0.360958	0.7221
0.914048	Mean dependent variable		9.724000
0.891429	S.D. dependent variable		11.68807
3.851232	Akaike info criterion		5.740227
281.8078	Schwarz criterion		6.032757
–65.75283	Hannan-Quinn criterion		5.821362
40.41073	Durbin-Watson statistic		0.547940
0.000000	–		–

3.3. Cointegration modeling

3.3.1. Stationarity analysis

To assess stationarity assumptions, both difference stationary and unit roots were employed for the endogenous variables of current account balance, bud-

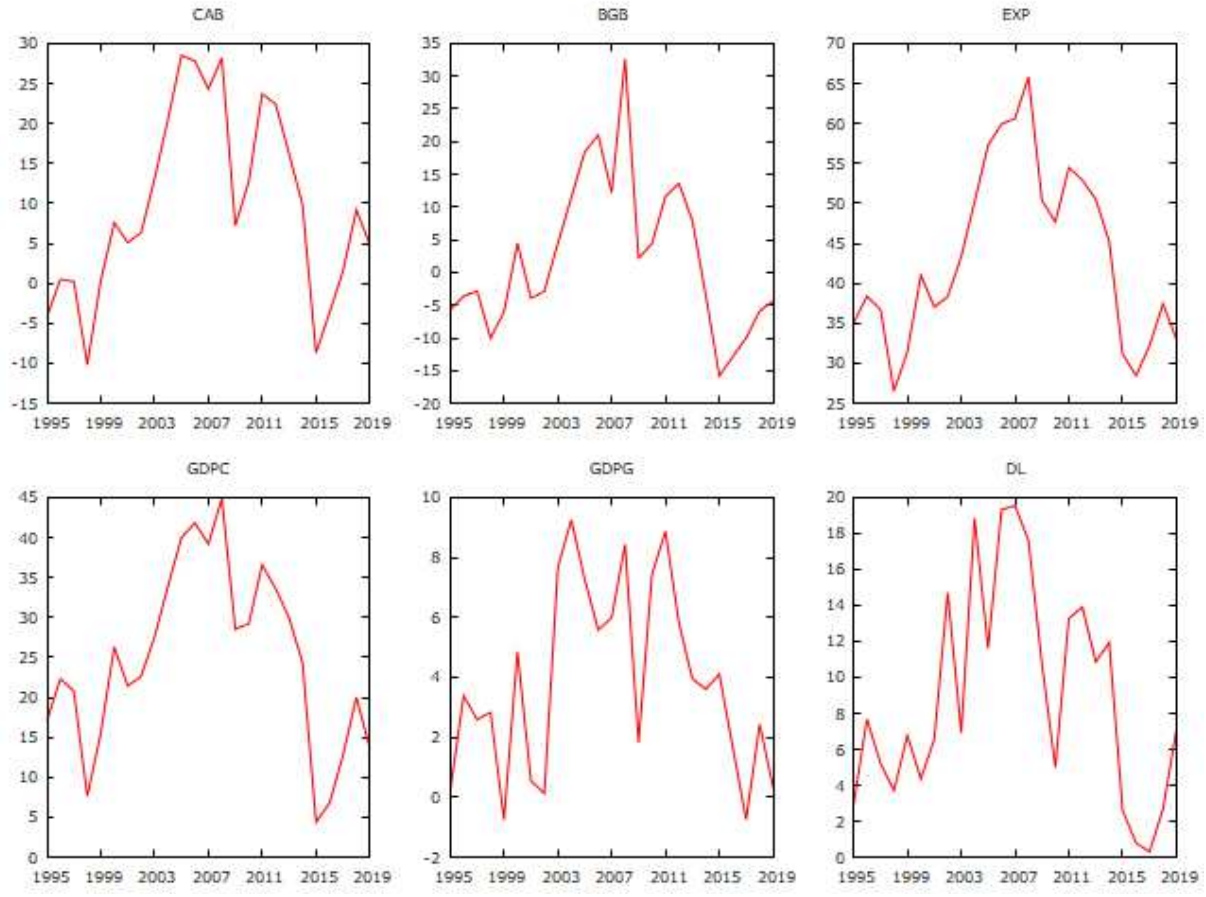

Figure 5. Evolution variables of the study

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get balance, goods exports, per capita gross domestic product, domestic liquidity growth, and gross domestic product growth. The findings revealed that the determinants exhibit stationarity at the first difference (I(1)). Factors influencing the current account balance were approximated using principal component analysis and scatter plots. Using these factors or variables, dependent or independent, and the differentiation for the all-time series determined that they are stationary at order 1 (I(1)).

Subsequently, the Johnson-Juslus or the autoregressive distributed lag method (or the Engle-Granger test as per Econometrics Analysis 7th Edition) was employed. Unlike other cointegration techniques, the autoregressive distributed lag method's primary advantage lies in its ability to test the long-run relationship without requiring the same order of integration for all variables. Notably, the autoregressive distributed lag approach applies to small samples, offering robust estimates even in such scenarios, whereas alternative methods often rely on larger sample sizes. Consequently, the autoregressive distributed lag approach obviates the need for unit root tests and autocorrelation function tests to assess the order of integration.

3.3.2. *Determination of the optimal lag structure*

The optimal lag structure was determined based on the Akaike Information Criterion (AIC) test value, yielding a value of 4.48. Among the 20 models considered, the autoregressive distributed lag (1,2,0,2,2) model emerged as the most suitable, encompassing the smallest values.

The general form of the error correction version of the autoregressive distributed Lag model is expressed as:

$$\begin{aligned}\Delta(CAB)_t &= \beta_0 + \sum_{i=1}^{2}\beta_1\Delta(CAB)_{t-1} \\ &+\beta_2\Delta(EXP)_t + \sum_{i=1}^{2}\beta_3\Delta(EXP)_{t-i} \\ &+\beta_4\Delta\left(DL\right)_t + \sum_{i=1}^{p}\beta_5\Delta(DL)_{t-i} \\ &+\beta_6\Delta BGB_t + \sum_{i=0}^{q}\beta_7\Delta(BGB)_{t-i} \\ &+\beta_8\Delta GDPC_t + \beta_9\Delta GDPG_t \\ &+\sum_{i=0}^{r}\beta_{10}\Delta(GDPG)_{t-i}.\end{aligned} \tag{3}$$

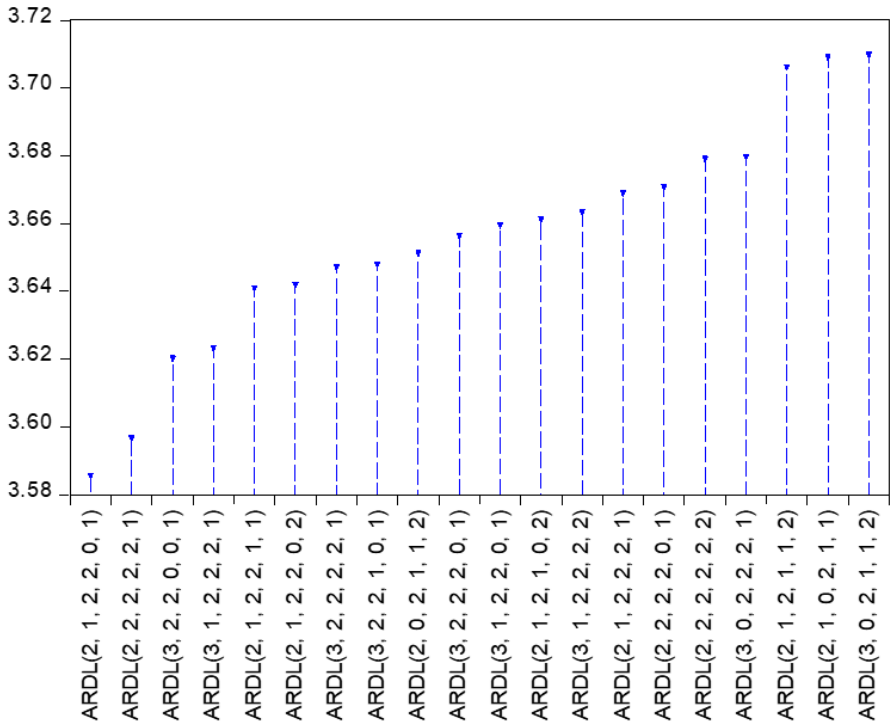

Figure 6. Akaike information criteria (top 20 models)

3.3.3. Unrestricted error correction model estimation

The unrestricted error correction model results are presented in Table 4. Notably, a negative and significant correction coefficient is observed in the vector error correction model, suggesting a long-term relationship. The unrestricted error correction model procedures outlined above are crucial for testing the existence of, at most, one cointegrating vector between a dependent variable and a set of regressors. Following the assumptions made by Pesaran et al. (2001) in Case III, involving unrestricted intercepts and no trends, the derived model can be expressed as the Unrestricted Autoregressive Distributed Lag error correction model.

3.3.4. Bounds and Wald tests (coefficient diagnostics)

The autoregressive distributed lag methodology emphasizes diagnostic parameter tests, specifically the Wald and Bounds tests, over the examination of residual diagnostics. These diagnostic parameter tests ascertain the presence or absence of a long-term equilibrium relationship. The outcomes are detailed in Table 5.

The Bound test results show that the computed F-statistic surpasses the upper bound values. Consequently, a long-run level relationship exists between the current account balance and its determinants across all levels (refer to Table 6).

Table 6. Wald test

Test Statistic	Value	df	Probability
F-statistic	4.456940	(5, 8)	0.0308
Chi-square	22.28470	5	0.0005
Null Hypothesis: C(1) = C(4) = C(6) = C(9) = C(13) = 0			
Null Hypothesis Summary			
Normalized Restriction (= 0)	**Value**	**Std. Err.**	
C(1)	0.346672	0.216347	
C(4)	–0.451804	0.212533	
C(6)	–0.214921	0.174994	
C(9)	–0.141205	0.198931	
C(13)	0.570857	0.183648	

Note: Restrictions are linear in coefficients.

The Wald Test imposed restrictions on the estimated long-run coefficients of variation for CAB, DL, BGB, and GDPG. The null and alternative hypotheses are outlined as follows:

H_0: $\beta_1 = \beta_4 = \beta_6 = \beta_9 = \beta_{13} = 0$ *(No long-run relationship).*

Against the alternative hypothesis

Table 4. Unrestricted error correction model (ARDL)

Variable	Coefficient	Std. error	t-statistic	Probability
D(DCAB(–1))	0.367900	0.055342	6.647807	0.0002
D(DEXP)	0.145041	0.126417	1.147315	0.2844
D(DDL)	0.144723	0.051289	2.821743	0.0224
D(DDL(–1))	0.293399	0.054882	5.346033	0.0007
D(DBGB)	0.056520	0.038994	1.449459	0.1853
D(DBGB(–1))	0.094182	0.050687	1.858111	0.1002
D(DGDPG)	0.245710	0.081201	3.025940	0.0164
CointEq(–1)*	0.285428	0.024086	11.85038	0.0000
R-squared	0.994935	Mean dependent variable		–0.186364
Adjusted R-squared	0.992402	S.D. dependent variable		12.35893
S.E. of regression	1.077295	Akaike info criterion		3.262071
Sum squared resid	16.24790	Schwarz criterion		3.658814
Log-likelihood	–27.88278	Hannan-Quinn criterion		3.355532
Durbin-Watson statistic	2.481650	–		–

Note: * – correction coefficient is positive and significant.

Table 5. F-bounds test

Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	11.46379	10%	2.08	3
		5%	2.39	3.38
k	5	2.5%	2.7	3.73
		1%	3.06	4.15

Note: Null hypothesis: No levels of relationship.

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H_0: $\beta_1 \neq \beta_4 \neq \beta_6 \neq \beta_9 \neq \beta_{13} \neq 0$ *(a long-run relationship exists).*

The autoregressive distributed lag results in Table 7 display the computed F-statistic values, which were assessed against the critical values tabulated in the work of Pesaran et al. (2001). Consequently, based on the findings from the Wald and Bounds tests, it can be concluded that there is indeed a long-run relationship that can be estimated using ordinary least squares, as detailed in Table 7.

Based on the Output Presented in Table 7, the following findings are observed:

- CAB (DCAB(–2) → CAB, b = 0.127, t = 2.878, p < 0.05);
- EXP (EXP(–1) → CAB, b = 0.212, t = 2.12, p < 0.10);
- DL (DDL(–1) → CAB, b = 0.143, t = 2.04, p < 0.10);
- GDPC (DGDPC → CAB, b = 0.310, t = 3.470, p < 0.01);
- GDP (DGDP(–1) → CAB, b = 0.183, t = 3.10, p < 0.05).

These variables were found to exhibit a positive and significant relationship with the current account balance. However, the budget balance was identified to have an insignificant relationship with the current account balance.

3.3.5. Residual diagnostics

The above outcome (see Table 8) indicates a Breusch-Godfrey test for Heteroscedasticity. The p-value (P(Chi-square (1) > 0.785) = 0.375) is greater than 0.05, leading to the acceptance of *H1* and rejection of *H0*, suggesting the absence of heteroscedasticity.

Table 7 details the estimation using the auto-regressive distributed lag model. The goodness of fit for the specification is reflected in the R-squared (0.98)

Table 7. Model estimated using ARDL

Dependent Variable: DCAB				
Method: ARDL				
Number of models evaluated: 729				
Selected Model: ARDL(2, 1, 2, 2, 0, 1)				
Variable	**Coefficient**	**Std. error**	**t-statistics**	**P-value**
DCAB(–1)	0.346672	0.216347	1.602391	0.1477
DCAB(–2)	0.367900	0.127830	2.878035	0.0206
DEXP	0.145041	0.357081	0.406184	0.6953
DEXP(–1)	0.451804	0.212533	2.125808	0.0662
DDL	0.144723	0.116479	1.242488	0.2492
DDL(–1)	0.214921	0.174994	1.228159	0.2543
DDL(–2)	0.293399	0.143335	2.046952	0.0749
DBGB	0.056520	0.134597	0.419916	0.6856
DBGB(–1)	–0.141205	0.198931	–0.709821	0.4980
DBGB(–2)	–0.094182	0.105398	–0.893580	0.3976
DGDPC	1.078872	0.310895	3.470215	0.0084
DGDPG	0.245710	0.170938	1.437421	0.1885
DGDPG(–1)	0.570857	0.183648	3.108437	0.0145
C	0.227731	0.327241	0.695911	0.5062
R-squared	0.989956	Mean dependent variable		0.209091
Adjusted R-squared	0.973634	S.D. dependent variable		8.776750
S.E. of regression	1.425127	Akaike info criterion		3.807526
Sum squared resid	16.24790	Schwarz criterion		4.501825
Log likelihood	–27.88278	Hannan-Quinn criterion		3.971082
F-statistic	60.65295	Durbin-Watson statistic		2.481650
Prob(F-statistic)	0.000002			

Note: The final equation sample is larger than the selection sample.

Table 8. Breusch-Godfrey serial correlation LM test

F-statistic	0.776441	Prob. F(2,6)	0.5013
Obs*R-squared	4.523226	Prob. Chi-Square(2)	0.1042
Heteroskedasticity Test: ARCH			
F-statistic	0.737406	Prob. F(1,19)	0.4012
Obs*R-squared	0.784577	Prob. Chi-Square(1)	0.3757

and adjusted R-squared (0.97). Diagnostic tests, including the Breusch-Godfrey serial correlation (L.M.) and (ARCH), affirm the model's robustness. All tests indicate the model's desirable econometric properties, including a correct functional form, serially uncorrelated residuals, normal distribution, and homoscedasticity. Therefore, the reported results are reliable, ensuring valid interpretations.

3.3.6. Stability of the model

The Regression Specification Error Test (Ramsey RESET), Cumulative Sum (CUSUM) Analysis, and Cumulative Sum of Squares (CUSUMSQ) tests have been utilized to assess the model's stability. The results of the study indicate that the p-value of the t-test (0.5715) exceeds 0.5, leading to the acceptance of *H0*. This aligns with the requirements of the Ramsey test.

CUSUM and CUSUMSQ plots have been employed to ascertain the stability of the long-run parameters and short-run movements in the autoregressive distributed lag error correction model. The statistics for Cumulative Sum Analysis and Cumulative Sum of Squares in this study fall comfortably within the 5% critical bounds, indicating stability in both the short-run and long-run coefficients of the autoregressive distributed lag error correction model. The presence of the blue line within the confidence intervals of 5% signifies model stability without any evident structural breaks, thereby validating the model.

Based on the preceding analysis, it has been determined that five out of the eleven selected determinants exhibit a positive and significant relationship with the current account balance of Saudi Arabia. These determinants are the budget balance, goods exports, per capita gross domestic product, gross domestic product growth, and domestic liquidity growth. Consequently, the corresponding hypotheses (*H1b, H1c, H1f, H1h,* and *H1k*) are accepted.

Table 9. Ramsey RESET test

	Value	df	Probability
t-statistic	1.179039	7	0.2769
F-statistic	1.390134	(1, 7)	0.2769
F-test summary			
	Sum of Sq.	**df**	**Mean Squares**
Test SSR	2.692061	1	2.692061
Restricted SSR	16.24790	8	2.030988
Unrestricted SSR	13.55584	7	1.936549

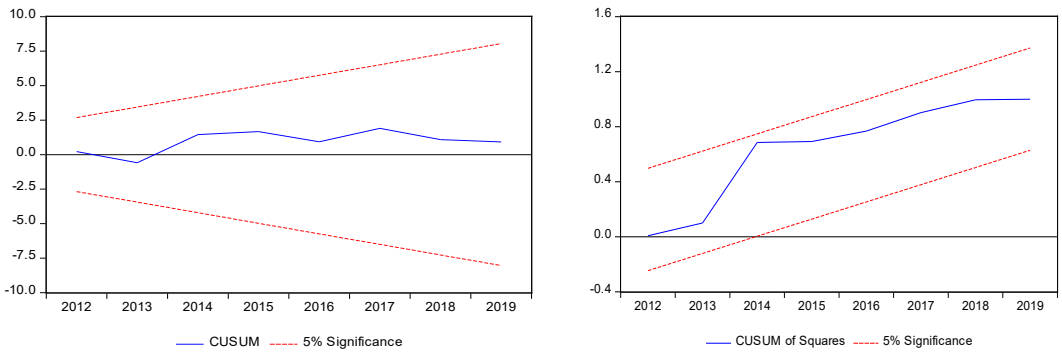

Figure 7. CUSUM and CUSUMSQ graphs

http://dx.doi.org/10.21511/pmf.13(1).2024.09

4. DISCUSSION

This study sought to discern the primary macroeconomic factors influencing the current account balance of the Saudi economy within the period 1995–2019. From the initial selection of 11 determinants, applying the principal component analysis and scatter plots revealed that five determinants, namely, budget balance, goods exports, per capita gross domestic product, gross domestic product growth, and domestic liquidity growth, hold significant importance. An autoregressive distributed lag cointegration model was employed to examine the association between these chosen determinants and the current account balance. The findings indicate that four determinants (goods exports, domestic liquidity growth, gross domestic product growth, per capita gross domestic product) exhibit a positive and substantial relationship with the current account balance in the long run, while the remaining determinants impact the model itself, as evident from the F-test and adjusted R^2.

The findings revealed a positive and statistically significant influence of goods exports on the current account balance. The interaction between oil and the current account balance is a pivotal subject of economic investigation. Oil holds considerable significance for the economies under scrutiny, constituting a substantial portion of their exports and revenue streams. Alterations in the trade balance primarily mediate the impact of oil on the current account balance. Elevated oil prices lead to an increase in the value of oil exports, thereby enhancing the trade balance and positively affecting the current account balance. Conversely, a decline in oil prices results in reduced value of oil exports, leading to a deterioration in the trade balance and adversely affecting the current account balance. Additionally, oil revenues have repercussions on other components of the current account, such as income and current transfers. Heightened oil earnings may contribute to increased income from foreign investments and remittances, thereby bolstering the current account balance.

Moreover, oil-exporting nations may accumulate substantial foreign assets and domestic liquidity or partake in sovereign wealth fund investments, thereby influencing the current account balance through alterations in investment income. Previous literature focused on oil-exporting countries has consistently regarded goods exports as a paramount determinant of the current account balance (Morsy, 2012; Tlemsani, 2021). Notably, Saudi Arabia has maintained a surplus in its current account balance for several consecutive years, primarily attributable to its significant oil exports, as substantiated by the findings of this study. Prior research has demonstrated that oil exports play a pivotal role in diminishing the current account deficits of a nation (Altayligil & Çetrez, 2020).

Notably, this study contributes to the understanding of the temporal variations in Saudi Arabia's governmental policies throughout the investigation period, as discerned through scatter plots. The outcomes categorize the empirical study duration into three distinct periods: the first spanning from 1995 to 2003, characterized by a decline in oil prices and, consequently, a reduction in Saudi exports; the second from 2004 to 2006, marked by an upswing in oil prices and a significant event in Saudi Arabia's history – joining the World Trade Organization, leading to an increase in both Saudi exports and imports; and the third from 2014 to 2019, witnessing a downturn in oil prices and, consequently, a decrease in Saudi export revenues.

These fluctuations in Saudi exports may have consequential economic implications, particularly considering the nation's historical dependence on oil exports under past government policies. Consequently, this finding reaffirms the existing structure of Saudi exports, characterized by a lack of diversification. In essence, this study aligns with the strategic objectives outlined in Saudi Vision 2030, emphasizing the need to reduce reliance on oil exports (Guendouz & Ouassaf, 2020).

Furthermore, the positive and significant relationships identified between gross domestic product growth, domestic liquidity growth, and per capita gross domestic product with the current account balance corroborate the findings of Tlemsani (2021) and Mallick (2022) regarding their significance as determinants of Saudi Arabia's current account balance.

CONCLUSION AND RECOMMENDATIONS

This study delves into the paramount macroeconomic determinants shaping Saudi Arabia's current account balance from 1995 to 2019. The scrutinized determinants encompass the ratio of foreign reserves to gross domestic product, the ratio of the balance of the general budget to gross domestic product, the percentage of total goods exports to gross domestic product, the proportion of total goods imports to gross domestic product, the external openness rate, the ratio of average per capita gross domestic product, the inflation rate, gross domestic product growth rate, total investment to gross domestic product ratio, the ratio of foreign investment to gross domestic product, and domestic liquidity growth rate. Statistical analyses identified five determinants that significantly influence the current account balance of the Saudi economy.

The findings of this study underscore several key conclusions: First, Goods Exports as a Primary Driver: The analysis revealed a significant and positive relationship between goods exports and the current account balance. Given Saudi Arabia's heavy reliance on oil exports, fluctuations in oil prices played a pivotal role in shaping the current account balance over the study period. Elevated oil prices bolstered the trade balance and contributed to a surplus in the current account, while downturns in oil prices led to deficits. This underscores the importance of diversifying Saudi Arabia's export base to mitigate vulnerabilities associated with oil price fluctuations. Second, Impact of Economic Growth and Domestic Liquidity: Gross domestic product growth, domestic liquidity growth, and per capita gross domestic product exhibited positive and significant relationships with the current account balance. These findings emphasize the importance of sustained economic growth and domestic economic activity in supporting a favorable current account balance. Policies aimed at fostering economic expansion and enhancing domestic liquidity can contribute positively to Saudi Arabia's external balance. Third, Policy Implications for Saudi Vision 2030: The research findings have significant implications for Saudi Vision 2030, which seeks to reduce the country's dependence on oil exports and diversify its economy. The study underscores the need for strategic policy interventions to promote non-oil exports, stimulate economic growth, and enhance domestic economic activity. By reducing reliance on oil exports and fostering a more diversified and resilient economy, Saudi Arabia can strengthen its current account balance and achieve sustainable economic development. Fourth, Temporal Variations and Economic Policies: The analysis identified distinct temporal variations in Saudi Arabia's export dynamics, reflecting oil price shifts and government policy changes. Understanding these temporal variations is crucial for designing effective economic policies and mitigating the impact of external shocks on the economy. The findings highlight the importance of policy continuity and adaptability to ensure economic resilience and stability in the face of evolving global economic conditions.

Overall, this study contributes to a deeper understanding of the macroeconomic determinants influencing Saudi Arabia's current account balance and provides valuable insights for policymakers, economists, and stakeholders involved in shaping the country's economic trajectory. By addressing the identified challenges and leveraging the opportunities presented by Saudi Vision 2030, Saudi Arabia can enhance its economic resilience, promote sustainable growth, and achieve its long-term development objectives.

The findings not only elucidate the nexus between economic growth, oil pressures, and the current account balance but also underscore the need for vigilant consideration of this relationship. In essence, this study elevates the collective understanding and serves as a compass for various stakeholders, facilitating informed contributions to economic decision-making processes.

The study acknowledges its limitations and suggests avenues for future research. Expanding the scope by integrating data from other countries and regions, increasing the sample size, and considering additional variables are proposed for future investigations. Additionally, exploring strategies to boost foreign investment in non-oil sectors, enhancing local services such as tourism, and understanding mechanisms to encourage expatriate workers' local spending could be valuable areas for future research.

http://dx.doi.org/10.21511/pmf.13(1).2024.09

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ACKNOWLEDGMENTS (FUNDING)

The authors gratefully acknowledge financial support from The Deanship of Scientific Research, King Faisal University (KFU) in Saudi Arabia. The present work was done under Project Number (CHAIR 138).

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