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Article

The static and dynamic effects of oil rent on competitiveness: Application to the case of Saudi Arabia during the period 1970–2022

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Abstract: In this paper, we explore the static and dynamic effects of oil rent on competitiveness in Saudi Arabia's economy during the period 1970–2022. In addition, we examined the short-run, strong and long-run relationships between exports and industry, inflation, energy use (oil rents) and agriculture using the Autoregressive Distributed Lag (ARDL) approach developed. The analysis showed that government spending will contribute to enhancing the competitive environment with a difference of one year. Moreover, the industry will contribute to increasing competitiveness for a positive relationship in the long term. The results stated that there is an insignificant relationship between competitiveness, inflation, and oil rents. The analysis also shows that inflation has a negative impact with statistical significance in the short term. In addition, the error correction model (ECM) coefficient is negative and has statistical significance at 0.76 at a 1% significant level, which indicates the existence of an error correction mechanism and thus the existence of a long-term relationship between the variables.

Keywords: oil rent, competitiveness; Saudi Arabia
JEL Classification: E31, F10, F11, F14, F43, O47, O53, Q43

1. Introduction

Among the most important questions that are often asked in the topic of Economic Development is the following: why the richest countries of Western Europe in the 16th and 17th centuries (Portugal and Spain) are the countries that are the longest to embark on the process of development that Europe experienced during the industrial revolution as well as before? Without claiming to be exhaustive, one of the key elements of the answer is that the wealth accumulated by these two countries in the form of precious metals from the new world created, at this time in history, consumer societies through excellence and not production. This reality encouraged other young economies such as France, England, Holland and later Germany to become their suppliers in terms of goods and services (Fakhri et al., 2013). In fact, this observation drawn from the history of economic development is reproduced in many historical moments and has ended up becoming a law which stipulates that as a country has more income then its competitiveness decreases which makes it encourages more imports. In the contemporary era this problem has reproduced itself in a new form when many countries have discovered significant quantities of natural resources (the most important of which is oil) and have started to export it while benefiting, therefore, from significant amounts of income. These rents, if they have made it possible to promote economic growth, in the majority of these countries, as Puig and Al-Khodiry (2012) point out, their effects on competitiveness remain, however, doubtful. (Fakhri et al., 2013) emphasized that many countries have largely suffered from the phenomenon of

Duch Disease such as Algeria, Norway, Tunisia and while others have experienced endless inflation problems as was the case countries of Latin America. Along the same lines of ideas Qudah et al. (2016, p. 38) asserted that there is a negative relationship between oil rents and sectoral and/or global competitiveness. In other words, according to the authors as oil rents accumulate, then a certain economic dependence on this source of income is recorded. This dependence eliminates (by way of disincentive) any possible investment in non-energy sectors as long as growth could be generated by oil exports. Consequently, non-oil competitiveness decreases and reduces the penetration rate of national products in the world economy. Mukhamediyev and Temerbulatova (2019) stated that when oil prices increase it allows countries to gain a financial surplus which can encourage economic decision-makers to postpone economic reforms required to improve competitiveness. On the other hand, these surpluses can contribute to the reduction of the global competitiveness index, especially if these massive inflows of petro dollars will be spent on the acquisition of imported consumer goods.

For the rest of the countries, even the most developed like England, oil rents had generated mixed effects because if they made it possible to replenish the national budgets with significant resources of petro dollars, they contributed in one way or another to create sectoral problems, the most important of which are the decline in competitiveness and inflationary trends.

But if in the past we can understand why economic decision-makers had made false and ineffective economic choices and did not know how to manage the rents they collected for years by investing in idle and unproductive public investments (and this at because of their ignorance of the problems that oil rents can cause to traditionally exporting sectors), this would no longer be forgivable in the present, especially since economic theories and research have focused on a single idea stipulating that rents should be invested in the productive (human, ecological and technological investment) and use them to maintain a sustainable and sustained economy.

However, despite the clarity of the theoretical trends, we can note without too much risk that countries are far from following strategies that allow them to take advantage of oil rents without suffering its economic and social repercussions (as was the case in the majority of countries in Latin America when inflation became critical from the turn of the 1980s). According to another vision we consider that many oil exporting countries (like Algeria, Nigeria, South Sudan, Iraq and Libya) have become passive and neutral in the face of rent because it causes their economies and not the opposite. A certain determinism is noted in this regard and which is likely to persist in the medium term.

Thus, in this line of ideas is developed our work, which will try to question the behavior of Saudi Arabia towards its oil rents and to empirically study the effects of said rent on its competitiveness. However, what makes this work different from others? In our opinion, and while resorting to the review of previous literature, we propose a two-pronged work. the first is of a deterministic nature aiming to know the relational nature between the rent collected and the growth process by questioning whether this is generated exclusively by the rent while the second is to know if the Saudi development process has managed to manage the annuities in his favor or not at all.

It is widely known that Saudi Arabia is one of the major oil producing countries, both in terms of its daily production, its exports and its crude reserves. country a major international producer of crude oil. According to Sweidan and Elbargathi (2022) Saudi Arabia produced at the end of 2021 around 12.5% of global oil production behind the USA whose share is 18.5%. According to data displayed by British Petrolium, Saudi Arabia captured on average 17% of oil and almost 3.2% of world oil and gas reserves. Being this strategic weight in the oil market and its role in OPEC as a leading price maker.

2. Literature review on the relationship between competitiveness and oil rents

It would be important to note that the theoretical relationship between competitiveness and rentier income is relatively recent. However, by drawing inspiration from recent advances in the studies that researchers have made in the analysis of this relationship, we can reread economic history and explain many phenomena that relate to this relationship. As an illustration why the industrial sectors in Spain and Portugal were in no way competitive during the 18th, 19th and last quarter of the 20th century at a time when the other neighboring countries of Western Europe were taking off economically in a manner early and hasty? the answer to this question can no longer turn a blind eye to the reality that these two countries (first colonizers of the new world) have collected significant amounts of income which were historically spent, largely on the acquisition of luxury goods from of France, England and South East Asia, as noted by Henri Denis.

Also, Corden and Neary (1982) noted that countries which have received significant rents following the export of their natural resources (Netherlands, Great Britain, Australia and other countries of the OPEC) during the period 1960-1970 suffered a deterioration in the terms of competitiveness of their industrial sectors. This in turn generated a reduction in new job creation, an increase in trade deficits and a reduction in real income from the manufacturing sectors. At this stage an essential question arises: what are the essential reasons explaining such a phenomenon? The answer can be summarized in three essential points.

2.1. The increase in oil prices as a generator of price increases

When oil prices increase then they therefore increase the prices of final or intermediate consumption goods because these are highly dependent on the oil good. This inflation can persist in the short and medium term by generating negative effects on the manufacturing and industrial sector which realizes that its costs are increased and that its penetration into the world market has become increasingly difficult. Remember that the oil crisis of 1973 generated this phenomenon of rising costs followed by economic stagnation, which was described by economists as a new phenomenon known as “stagflation”.

2.2. Oil rents increase the money supply and appreciate the national currency

As supported in many theses and economic research (Buiter and Pervis (1982,

1993), Eastwood and Venables (1982)), the flow of oil rents resulting from both an increase in oil revenues and new exploited resources will increase the mass monetary and therefore generate an "income effect" which affects both current and permanent income. Following this increase in income, the demand for imports increases (wealth effect) increasing, consequently, the demand for currencies increases which appreciates the local currency compared to the foreign one and makes imported goods cheaper compared to exported goods. The consequent result is the decline in the competitiveness of local productive sectors.

2.3. Oil rents as an advantage to the economy in the short term and a brake on growth in the long term

If rents constituted a boon to economic decision-makers in the short term because through them decision-makers can overcome the financial difficulties that their countries may suffer and finance their public sectors, it will no longer represent the same advantages in the long term. Worse still, in futuristic horizons it could become a brake on growth. This is well explained by Cox and Harvie (1982) who concluded that the effect of rent on the economy is sequential. In a first stage, the accumulation of more rents (following a positive price shock or an expansion of the productive base) will make it possible, in the short term, to generate wealth effects, which benefit households and businesses (at least indirectly via an increase in demand for the goods they produce). Also, following the increase in the monetary value of oil exports, the trade balance improves and consequently improves the trade balance of energy goods. However, "non-oil" sectors and products will suffer inverse and opposite effects by recording a drop in their demands following an increase in their costs and prices.

At this level an important question overwhelms: what is the transmission mechanism that produces all these effects in the short term?

According to Cox and Harvie (1982), rents directly influence the increase in the money supply, which will lead, ceteris paribus, to an appreciation of the national currency in relation to foreign currencies and consequently reduce the competitiveness of sectors "excluding energies" and will generate a reduction in jobs. In the long term, and as energy prices rise, the competitiveness of the manufacturing sectors will deteriorate further and will contribute to a reduction in growth.

2.4. Rents as a disincentive to private investment

As the country benefits from rents then it conceptualizes and builds its development strategies on its basis. This is due to the relative ease of obtaining it on the one hand and its availability and abundance as a natural resource. Thus, faced with mass and daily rents, economic decision-makers in all developing countries have tried to use them to embark on paths of sustained and sustainable economic growth. The results of such strategies were almost consistent although the countries' experiences were different. These are bipartisan economic models. The first part constitutes the new investments that the countries have undertaken and which have been of a public nature and with a socio-economic vocation. The second is that of the financing slots which all converged on the annuities collected. Other types of financing were secondary, unimportant or even marginalized. Consequently, when the State launches

into public projects and investments, it will generate a crowding out effect of private investments. To put an end to these problems, massive privatization programs should be maintained to give the private sectors more freedom of action and initiative.

2.5. Literature review

In this paragraph, we will try to focus mainly on the literature relating to the case of Saudi Arabia while trying to choose the research, which has empirically addressed two essential questions. Firstly, the theoretical relationship which is established between rents on the one hand and sectoral and total competitiveness on the other hand and secondly the nature of the futuristic strategies to be maintained by the kingdom to transition from one polluting growth model to another one more ecological.

To properly situate the literature review in its true spatio-temporal framework, it would be important to know the behavior of Saudi economic decision-makers towards the development models they have chosen and implemented. In trying to deduce this behavior we must reread the different strategies that the Kingdom of Saudi Arabia (KSA) had followed during the second half of the 20th century until then.

Without too much risk, we can distinguish three essential phases. A first phase (1950–1990) where the KSA was largely dependent on oil revenues and where growth was financed by these rents. The second phase spanned between 1990–2016 in which the KSA began to develop a private sector to support the state's growth efforts and to think about the post-oil period. The third phase is the one that began in 2016 and which set an ambitious objective aimed at progressive decarbonization and a vision of economic diversification.

In fact, the Saudi economy certainly has many advantages which allow it to maintain this type of strategy, as shown by Looney (2004) who showed that the Saudi economy, for a long time dependent on oil revenues, could, on the basis of its comparative advantages in terms of natural resources, its financial capacities, to embark on industrial activities as well as in the design of a new development model based on new low-polluting and non-polluting energy sources. However, according to the author, such a strategy must be accompanied by parallel strategies to improve the quality of human resources and align it with that operating in organizations in developed countries. Also, according to the author, promoting the private sector and giving it more space is intended to be central within the framework of a public-private partnership. In addition to these key success factors for the energy transition in Saudi Arabia cited by Looney (2004), Khorsheed (2015) emphasized the fact that the energy transition and competitiveness require powerful and efficient institutions. These institutions must essentially cover the aspects of production, acquisition and dissemination of knowledge, the Technical and Vocational Training Company (TVTC), private sector training organizations, national laboratories and hospitals and KACST.

This same idea was confirmed by Sohail (2012) by stating that the KSA has various comparative advantages in terms of a very strategic location (between Europe, Asia and Africa), abundant oil and mineral resources. natural resources and significant financial resources. According to Sohail, if Saudi Arabia wants to strengthen its competitiveness then it must satisfy four essential conditions. First, create a culture of

productivity. Second, introduce financial reforms, third, implement the entrepreneurial idea and culture in companies. Fourth, to support an integrated approach in favor of the development of clusters and the creation of economic cities. Quinto, to develop distinct strategies for the different provinces.

Faced with a growing awareness in favor of economic diversification and the improvement of global competitiveness, by trying to properly exploit the enormous potential available to Saudi Arabia, the country had tried, since 2015, to develop a strategy "excluding oil" which will end with total Decarbonization (zero CO_2 emissions) within the horizons of 2060. According to Krane (2023) this objective is paradoxical for Saudi Arabia because it would be difficult to display such an objective at the time when the rent Oil represents more than 75% of the country's budget. According to the author, displaying the objective without its prerequisites can be paradoxical. The main mechanisms to be chosen by the KSA to succeed in its economic transition to the ecological are three in number. First, intensive investment in renewable energies which reduces dependence on oil. Second, align oil prices with their international market levels, which allows economic agents to make trade-offs between oil and other less polluting forms of energy. Third, to provide incentives to produce electricity from gas and not oil.

Sweidan and Elbargathi (2022) tried to answer two essential questions. First, to what extent could risks arising from geopolitical dimensions affect development in the Saudi case and this through the rents that the country had received during the time horizon from 1970 to 2018? Second, what is the effect of the risks arising from globalization and the international geopolitical dimension on oil revenue and consequently on the economic development of Saudi Arabia. To answer this, the authors used a time series autoregressive distributed lag model with moderation effects from which they published three key results. Firstly, that development in Saudi Arabia is influenced in a positive and significant way by oil revenue and globalization. Secondly, that the geopolitical dimension has no significant effect on development in either the short or long term. Thirdly, that economic decision-makers should invest more efforts allowing the Saudi economy to further diversify and strengthen the Saudi institutional framework.

Hasanov and Razek (2023) tried to find out through which mechanism the KSA could improve its competitiveness to align with the objectives displayed by economic decision-makers in the 2030 vision. The authors used an analysis of political scenarios to quantify the effects on competitiveness of the new Public Investment Fund (PIF) strategy for 2021–2025. The authors' findings are that PIFs could be an effective mechanism to boost future productivity and, therefore, competitiveness. Also, the authors suggest that the kingdom is maintaining a new strategy based on the substitution of imports by local industry, which makes it possible to diversify the Saudi economy and give it more autonomy. Also, the kingdom should attract more foreign investment which will make it possible to adapt and adopt new technologies and improve economic, financial and social infrastructure and the business environment, thus strengthening competitiveness.

Al Qudah et al. (2016) attempted to study the effect of oil rents on the global competitiveness of GCC states using panel data covering a period from 2006 to 2014. The authors highlighted how oil rents, the export of oil energy and crude oil prices

will manage to have an impact on competitiveness. The main findings of this article are that there is a negative and significant relationship between rents and The Global Competitiveness Index (GCI) while oil prices had a positive and significant relationship with GCI at the 90% level. The effect of exports is insignificant. These results highlight a reality that there is a phenomenon of Duch's disease in the GCI countries, which continues to this day.

Al Rasasi et al. (2019) attempt to study the relationship that can be established between Saudi oil revenues and the economic growth of the Kingdom over the last 47 years. The main results of this work are that there is, in the short and long term, a strong relationship between the state's oil revenues and the growth and development of the country. According to the authors, this strong relationship is explained by the good governance approved by decision-makers in terms of spending oil revenues. Also, the fact that the country has directed its public spending and invested its revenues in the promotion of the private sector ensuring the improvement of its competitiveness has made it possible to avoid the famous problem of Dutch Disease. The authors concluded that, based on the lessons of Kingdom Vision 2030, the government should change its role. This requires stripping oneself of its usual functions (direct distribution of wealth, aid to businesses, public production, etc.) to assume functions allowing it to achieve the strategic objectives that the kingdom had displayed, mainly economic diversification, improvement of the general competitiveness index. (GCI), to invest in critical infrastructure, private sector development (while establishing the rules and regulations that will foster a strong and vibrant private sector), oversee the conversion of oil wealth into financial investments whose monetary returns will replace the oil revenues.

Bajwa et al. (2019) had tried to examine the extent to which Saudi Arabia's dependence on oil revenues serves as a brake on the country's overall competitiveness. In other words, had the KSA suffered from Duch Disease (DD) and if so what were its effects on competitiveness? The authors concluded that although Saudi Arabia had all the symptoms, the diagnosis of Dutch disease remains to be confirmed. According to the authors, aware of this phenomenon, political and economic decision-makers had taken, as part of the 2030 vision, measures aimed at confronting the DD phenomenon and to increase the competitiveness of the private sector. As such, the government has encouraged private initiatives for the development of the manufacturing sector by ensuring that it is well diversified so that it can result in the creation of a value-added supply chain. The authors characterize this direction as timely and far-sighted policy.

Fakhri et al. (2013) tried to know the dynamic effect of oil rents on industrial value added in a sample of countries with different levels of development including the KSA. The authors used a structural vector autoregressive (SVAR) model relating industrial value added and oil rents, to test the effect of a real shock and a nominal shock on the model variables. The main results obtained are three in number. First, that in the case of KSA the problem of Dutch Disease (DD) is only a short-term phenomenon, which only occurs at the time of shocks to oil rents. Second, that oil rents have a positive effect for all countries (including the KSA) which experience interdependence between industry on the one hand and oil rents on the other. In other words; if rents are used in the productive way they can improve competitiviness.

Mahadi et al. (2011) tried to find out to what extent the Gulf countries had been

influenced by DD and whether it had consequently, delayed and reduced their competitiveness? To achieve this, the authors used a test linked to the autoregressive distributed lag (ARDL) used to find out if there is a long-term relationship between the real exchange rate and the real price of oil. The results converged on the fact that these countries had suffered from DD in Oman, Qatar and Saudi Arabia which slowed down the competitiveness of the industrial and manufacturing sectors (excluding oil).

3. Data and model

As already mentioned above, the central problem of our work is to determine to what extent the accumulation of oil rents had affected Saudi exports. And if this relationship is confirmed, what will be the possible remedies to stimulate "non-oil" competitiveness in the case of the KSA in the context of its 2030 vision. It is also likely that there is a long-term relationship likely to be established between oil revenue on the one hand and exports of goods and services on the other. Other control variables are included in the model to be estimated. It is known that there are several factors that affect the competitiveness of oil-producing countries, including the Kingdom of Saudi Arabia, and we decided to choose from them exports (chosen as an indicator of the countrys international competitiveness), the monetary value of agriculture, oil rents, industry, inflation and finally general government final consumption expenditures.

Statistical data were obtained from the World Bank's national accounts data and expand from 1970 to 2020. Sources include the World Bank's Development Indicators (WDI 2023) as well as the Saudi General Authority for Statistics.

3.1. Descriptive statistics

The main variables used in the model will be presented and discussed as below (i.e., **Table 1** and **Figure 1**).

Table 1. Presentation of the model variables.

Variable name	Short forms	Data Source
-Exports of goods and services	LEXO	General authority for statistics KSA
-Industry (including construction), value added (current US$)	LINDU	The word bank
-General government final consumption expenditure (constant 2015 US$)	LGVE	The word bank
-Agriculture, forestry, and fishing, value added per worker (constant 2015 US$)	LAGR	General authority for statistics KSA
-Oil rents	OIL	General authority for statistics KSA
-Inflation	INF	The word bank

Table 2 shows common descriptive sample statistics. From this we can conclude that the outlet is approximately symmetrical. LEXO (26. 28677), LINDU 24.72334, OIL (37.52306) INF (3.58756) LGVE (26.88867), LAGR (23.67599) joint funds in Saudi Arabia. In order to draw important conclusions from these descriptive statistics, we cannot confirm that these distributions are normal. The normal distribution of these variables was rejected under the null hypothesis and confirmed by the Jarque-Bera test.

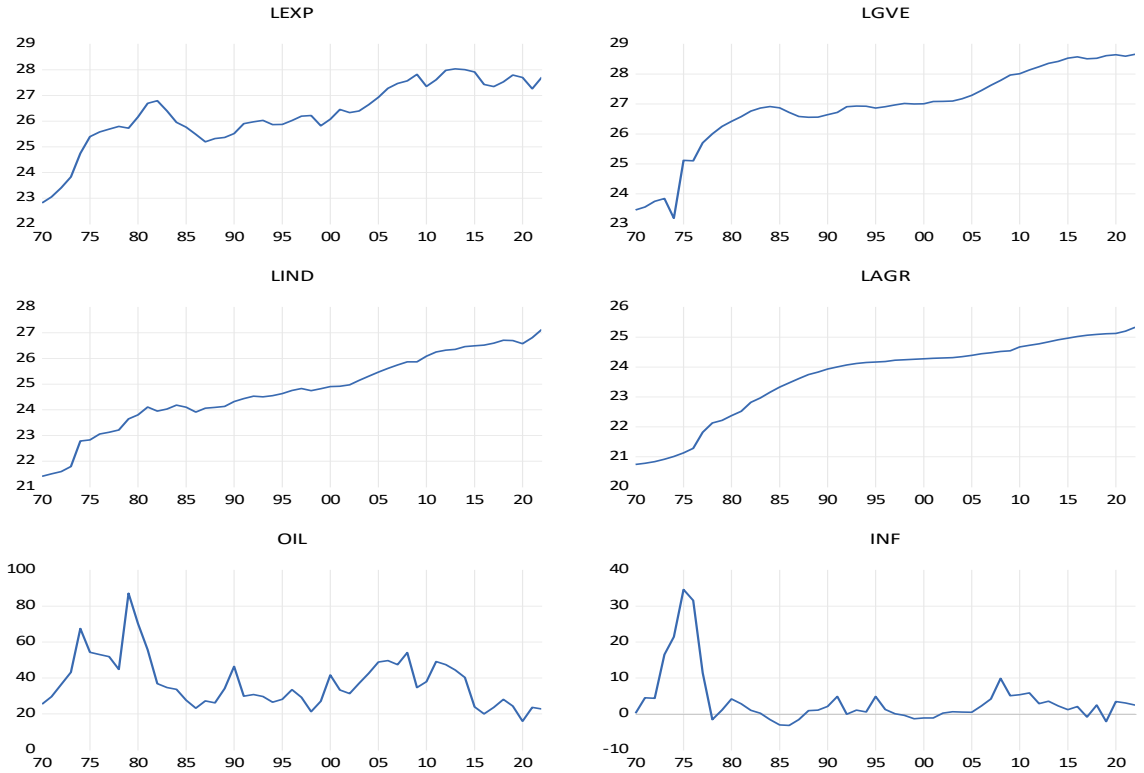

Figure 1. Graphical evolution of variables.

Table 2. Common sample descriptive statistics (data in logarithms, except, INF, OIL, in %).

	LEXO	INF	LAGR	LGVE	LIND	OIL
Mean	26.28677	3.58756	23.67599	26.88867	24.72334	37.52306
Median	26.19608	1.22207	24.18571	26.9326	24.749	34.17045
Maximum	28.03503	34.57611	25.3282	28.66065	27.13681	87.08524
Minimum	22.81592	-3.203331	20.74558	23.18734	21.41063	15.97891
Std. Dev.	1.241263	7.34351	1.349902	1.391227	1.458343	13.93185
Skewness	-0.789464	2.848973	-0.980117	-1.057309	-0.426993	1.19729
Kurtosis	3.634704	11.32197	2.74537	3.868928	2.660888	4.765137
Jarque-Bera	6.395035	224.6357	8.628737	11.54218	1.864472	19.54313
Probability	0.040864	0	0.013375	0.003116	0.393672	0.000057
Sum	1393.199	190.1407	1254.827	1425.099	1310.337	1988.722
Sum Sq. Dev.	80.11812	2804.211	94.7562	100.6466	110.5918	10093.01
Observations	53	53	53	53	53	53

Source: Author's computation with Eviews.

3.2. Model specification

To study the impact of oil rents on competitiveness in Saudi Arabia, an open macroeconomic model was identified. The study needs that we conceive a whole framework linking and including various sectors of the economy to enable a complete analysis. Thus, the used model should include a set of variables such as industry, Oil rents, agriculture, and inflation through it we explore the relationship between these indicators with the exports. The competitiveness model is expressed from an ad hoc

model which seems to be, in our opinion, explanatory of the relationship that this paper wishes to study. To detect whether the phenomenon of Duch Disese took place in the case of KSA then it was necessary to choose exports of goods and services as the explained variable. The explanatory variables are the oil rent to know to what extent this could have had a positive or negative impact on exports. The control variables are industrial value added, inflation and public spending on final consumption. Formally, this relationship will be presented as follow:

$$LEXO = F (LINDU, OIL, INF, LGVE, LAGR) \quad (1)$$

Formally, the econometric representation of the model can be specified as follow:

$$LEXO_t = \beta_0 + \beta_1 LINDU_t + \beta_2 OIL_t + \beta_3 INF_t + \beta_4 LGVE_t + \beta_4 LAGR_t + U_t \quad (2)$$

where β_0, β_1, β_2 … β_5 = Parameters to be estimated in the model;
LEXO = Exports of goods and services (constant 2015 US$);
INDU: Industry (including construction), value added (current US$);
OIL = Ratio of Oil rents to GDP;
INF: Inflation rate;
LGVE = General government final consumption expenditure (% of GDP);
U_t = White noise error term in the study model.

To have a non bias estimation we should convert the variables to logarithm except, oil rent, INF. The econometric version of (2) is given as:

$$LEXOt = \beta_0 + \beta_1 LINDt + \beta_2 LGVEt + \beta_3 LAGRt + \beta_4 OILt + \beta_4 INFt + Ut \quad (3)$$

On a scientific level and to detect the phenomenon of Duch DISEASE it is more convenient to resort directly to exports and not to exchange rates. Indeed, it is possible that the appreciation of the exchange rate does not degrade competitiveness if the industry is endowed with external returns to scale or historical comparative advantages (Krugmann and Helpman, 1990). However, the use of exports is intended to be more logical and timely.

The aim of our model is to analyze how the relationships between exports and industry, inflation, energy use (oil rents) and agriculture can be established in both the short-run, and long run using the ARDL approach developed by Pesaran et al. (1999). To be carried out successfully, it would be important to note that we will use the ARDL method which have the advantage of taking into consideration the temporal dynamics of variables denominated in time series, which makes it possible to resolve many problems, especially those which focus on forecasts, adjustments and anticipations of economic policies or dealing with similar issues. Nevertheless, why such a choice? The answer to this question is justified by three fundamental reasons. First of all, the merit of this method is that it works well for small sample sizes (which is the case in our research). Secondly, unlike other methods, ARDL is normally applied to time series without this posing problems of stagnation and without requiring, a priori, that the variables should have the same order of integration. Thirdly, and as pointed out (Harris and Sollis, 2003) the ARDL method does not pose any endogeneity problem. Thus, according to the method of Pesaran et al. (1999), our ARDL model should include long-term relationships between variables and can be written as follows:

$$\Delta \text{LEXO}_{it} = \alpha_{1i} + \gamma_{1i} \text{LINDU}_{it-1} + \gamma_{2i} LGVE_{it-1} + \gamma_{3i} \text{LAGR}_{it-1} + \gamma_{4i} \text{OIL}_{it-1} + \gamma_{5i} INF_{it-1} + \sum_{i=1}^{p} \beta_{1i} \Delta \text{LINDU}_{it-i} + \sum_{i=0}^{q} \beta_{2i} \Delta LGVE_{it-i} + \sum_{i=0}^{q} \beta_{3i} \Delta \text{LAGR}_{it-i} + \sum_{i=0}^{\text{R}} \beta_{4i} \Delta L\text{OIL}_{it-i} + \sum_{i=0}^{S} \beta_{5i} \Delta INF_{it-i} + \varepsilon_{1it}$$

4. Results and discussion

4.1. Unit root test

as known in the case where the data are time series, we must always start with the study of the stationarity of the statistical series which is intended as the basic condition to be respected. Also, it is important to ensure that the variables are not integrated of order (2) or higher. The stationarity test allows us to check whether there is a unit root or not at all. In the case where a unit root exists then we are certain that the series is no longer stationary. Also, it would be important to note that when certain variables of the ARDL model are integrated of order two I(2) then the model is no longer valid because they are based on the hypothesis that the variables are I(0) or I(1).

On a practical level, to test the stationarity of the series we will use the standard Augmented Dicky-Fuller (ADF) and Philips-Perron unit root (PP) tests which are applied to check the order of integration of the variables. If one of them turns out to be integrated of order two or more, then it would be impossible to apply the test approach linked to the cointegration test. **Table 3** shows the result of ADF and PP test.

Table 3. ADF and pp unit root test.

	Level		**First Difference**		
VERIABLE	ADF	PP	ADF	PP	(I)
LEXO	3.014364**	2.849723**	4.592157*	−4.540824*	1
LINDU	−2.002829	−2.061825	4.468867*	−6.45999*	1
OIL	2.86618***	2.88694***	7.806205*	−8.379978*	1
INF	−2.474593	−2.788817	5.537819*	−6.39936*	1
EDU	3.069921**	2.785452**	5.333271*	−5.322028*	1
LGVE	2.837252**	−2.52386	9.240203*	−8.944094*	1
LAGR	−4.294963*	3.213313**	−1.417848	3.517387**	0

Notes: *, **, and *** refer to 1%, 5%, and 10% level of significance, respectively.
Source: Author's computation with Eviews.

The application of the said tests to our statistical series revealed to us that all the series are integrated of order (1) which means that they are stationary in primary difference.

4.2. ARDL cointegration test and parameters estimates

Once the order of integration of all the variables in the model is determined, then it would be possible to use the ARDL approach to define whether the variables are cointegrated in order to determine whether there are equilibrium relationships of long

term between them. To do this, we will use the Bound test which calculates an F statistic (**Table 4**) which tests (as a null hypothesis) whether the coefficients associated with the lagged variables are zero or not. To know the validity of this hypothesis it would be convenient, as for any other test, to compare whether the critical values of the statistic are lower or higher than the significance threshold of 10%, 5% and 1%. In the case of our study, the results are expressed in **Table 4** indicate that the value of F-statistics 21.83 is further than the upper set critical value, and it's significant at the 1% level, which provides evidence that there's cointegration between the export, government expenditure, industry, agriculture, oil rent, and inflation in Saudia Arabia. (Khan, Z. A., et al., (2021). In other words, the rejection of the null hypothesis means that the variables are cointegrated and that there is a long-term relationship between the different variables retained in the model.

Table 4. Results of ARDL bounding test for cointegration.

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	21.83725	10%	2.08	3
k	5	5%	2.39	3.38
		2.50%	2.7	3.73
		1%	3.06	4.15

Null Hypothesis: No levels relationship
Source: Author's computation with Eviews.

5. Long-run and short-run analysis based on ARDL

5.1. Long-run analysis

Table 5 shows that in the long-term model, there is a set of variables that have a positive sign on Saoudian exports such as industry, public consumption and oil revenues, with the exception of agriculture, whose coefficient had a negative sign and was significant at the 1% level. The effect of inflation was statistically insignificant. Let us explain these results further. From **Table 5** we note that oil revenues had a positive and significant effect on Saudi exports, which casts doubt on the existence of DD in the long term. This result aligns with the objectives of economic decision-makers and especially at the level of economic diversification "outside oil" and that of sources of income of which exports is one of them. Such a result demonstrates the effort made by the KSA to rationalize its expenses and allocate them to investments with high socio-economic returns. The rent is no longer consumed but invested in strengthening the institutional, infrastructure and attraction of human resources with high returns and added-value.

Like rents, the industrial sector has a positive and significant effect on exports in the long term. This also aligns with the objectives of the kingdom and as such industry appears to be the link that allows exports to be diversified, especially in the chemical and petroleum sectors which presented certain comparative advantages. Also, we note that this effect is very important because any increase in industry of 1% leads in the long term to an increase in exports of 0.61% which represented more than 60%. This strong interdependence between the two variables highlights a little-declared reality stipulating that in certain branches of industrial activity the KSA presents comparative

advantages allowing them to export most of its production. Also, such a result allows us to think that it is the logical consequence of the new economic strategy, characterized by free trade and the adoption of market mechanisms and economic standards in the allocation of resources. These variables, and as seen in the literature review, are considered to be the guarantors of the success of the new KSA strategy that the government had tried to ensure in light of the 2030 reform plan that Saudi Arabia has been pursuing since 2017.

Table 5. Long-run model (Dependent Variable: LEXO).

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LGVE	0.708947	0.201568	3.517153	0.0018
LIND	0.613016	0.163299	3.753945	0.001
LAGR	−0.564	0.089045	−6.33386	0.000
OIL	0.029368	0.002905	10.10938	0.000
INF	0.003238	0.009032	0.358484	0.7233

Source: Author's computation with Eviews.

In the same context, the analysis shows that there is a statistically significant positive relationship between government expenditure and exports, as any increase in government expenditure by 1% will lead to an increase in exports by 0.7% in the long run. Therefore, it can be said that the high level of government expenditure may be linked to structural transformation and increased government expenditure on development programs in accordance with the modern development vision, which works to invest human resources and redirect them to serve the local economy, as efficiency increases with the improvement of the labor situation in light of the transfer of workers from non-profit sectors. Transforming effective sectors such as agriculture into modern, more efficient sectors. This increases the income of workers and reflects positively on improving production levels. (Sultanuzzaman et al., 2018).

On the other hand, we find that the agriculture coefficient appeared with a negative sign with statistical significance, as whenever agriculture increases by 1%, this negatively affects competitiveness, represented by exports, by 0.56%, which is not consistent with economic theory. The reason for this may be attributed to the fact that the share of agricultural exports in the total GDP is very small compared to the share of oil exports. The share of agricultural exports in the total GDP reached 2.3% in 2021. The deficit in the agricultural trade balance reached $20 billion.

5.2. Short run analyses (Error Correction Model for export)

The results from the cointegration tests permits us to conduct error correction model (ECM). The short run results of the model estimation is given in **Table 6**.

Table 6 shows the short-run estimation results. As expected, the coefficient of the error correction term is negative and significant. When export is far away from its equilibrium level, it adjusts by almost 76% within the first period (year). Here it can be said that the full convergence to the equilibrium level takes about 1.3 period (years). In the case of any shock to competitiveness, the speed of reaching the equilibrium level is fast and significant.

Table 6. ARDL error correction regression.

Coefficient	Std. Error	t-Statistic	Prob.
0.344154	0.068832	4.999885	0.0000
0.050071	0.080255	0.623904	0.5388
0.14365	0.058802	2.442935	0.0227
−0.388398	0.06689	−5.80653	0.0000
−0.337684	0.113618	−2.972085	0.0068
−0.222973	0.100398	−2.220885	0.0365
−0.149081	0.063137	−2.361226	0.0271
−0.037906	0.100099	−0.378686	0.7084
0.820883	0.126869	6.470307	0.0000
−0.228441	0.17755	−1.286633	0.2110
0.435805	0.160208	2.720239	0.0122
−2.193797	0.296524	−7.39837	0.0000
1.768365	0.266025	6.647365	0.0000
−0.846806	0.286401	−2.956718	0.0071
−0.62474	0.255255	−2.447516	0.0224
0.007691	0.001666	4.616051	0.0001
−0.014073	0.003593	−3.916186	0.0007
0.000646	0.003826	0.168933	0.8673
0.014007	0.00409	3.424936	0.0023
−0.765116	0.055112	−13.88299	0.0000
Adj R-squared=	0.965368	DW= 2.371503	
F-statistic=	21.83725	Prob= 0.0000	

Source: Author's computation with Eviews.

5.3. Diagnostic tests: Tests on the residuals of the ARDL regression

Diagnostic tests on the residuals of the ARDL regression were carried out in order to validate the model. The Breusch-Godfrey Serial test of autocorrelation of the residuals of the regression confirms the absence of autocorrelation. White's test confirms the absence of heteroscedasticity of the residuals while the Jarque-Bera test shows that they follow a normal distribution. Ramsey's test shows that there are no missing variables or functional form issues in the model. Moreover, the results of the validation test of the estimated ARDL model shows that. The probabilities for the three tests are greater than 0.05. This allows us to accept the null hypothesis H0 for each test which means that the error term has a normal distribution, and there is no distress in the functional form of the model (i.e.**, Table 7**).

Table 7. Diagnostics tests.

Test	Calculated Statistics	Prob.
Heteroskedasticity Test	1.040671	0.4638
Breusch-Pagan-Godfrey Test	1.911547	0.1727
Jargue-Bera Test of Normality	0.111583	0.945737

5.4. CUSUM and CISUMQ stability tests

The last step of the ARDL estimation is to check the stability of the long- and short- term parameters. The techniques of CUSUM based on the cumulative sum of the recursive residuals and CUSUMQ based on the cumulative sum of the square of the recursive residuals are applied (**Figure 2**).

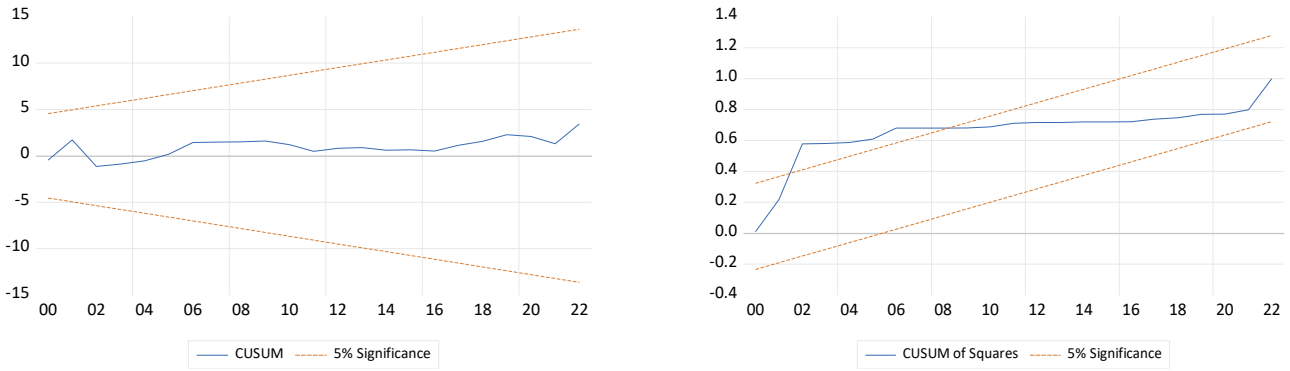

Figure 2. Plot of CUSUM and CUSUMQ.
Source: Author's computation with Eviews.

We notice that the blue line of the CUSUM des Carrés deviates from the critical limit before going back. This is recorded mainly in the period of global oil shock accompanied by uncertainty in the national economy which would have facilitated such an unusual movement.

The results show that the statistics graph of CUSUM and CUSUMQ remain within the interval of critical values at the 5% threshold, which implies that the coefficients of the model are stable.

6. Conclusion

The aim of this paper was to empirically study the short- and long-run relationship between exports, government and industry final consumption expenditures, oil rents, agriculture, and inflation in Saudi Arabia for the period 1970–2020.

The autoregressive distributed distribution (ARDL) approach proposed by Pesaran et al. was used.

The analysis showed us that government spending will contribute to enhancing the competitive environment with a difference of one year. Moreover, the industry will contribute to increasing competitiveness for a positive relationship in the long term

It also becomes clear that there cannot be a significant relationship between competitiveness, inflation, and oil rents.

Our results indicate the importance of industry and government spending directed according to structural transformation is important in achieving competitiveness as well as sustainable development of the country.

The analysis also shows that inflation has a negative impact with statistical significance in the short term, and the effect disappears in the long term, which may lead us to the Saudi government taking the initiative to seek to achieve good inflation in a thoughtful manner, through which economic activity can be stimulated (without

creating failures or distortions). Economic) Here we are talking about stimulating exports to be more competitive at the international level.

The estimates obtained above show that the ECM error correction coefficient is negative and has statistical significance at 0.76 at a 1% significant level, which indicates the existence of an error correction mechanism and thus the existence of a long-term relationship between the variables. In other meaning, any deviation in the long term requires correction for approximately (one year and three months in order to reach the equilibrium value in the long term).

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