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The Effect of Wealth Funds and Institutional Quality on the Interaction between Oil Price and Economic Growth

Elham kheirandish*[1], Sholeh Bagheri pormehr [2]

1. PhD in Economics, Institute for Management and Planning studies,Tehran, Iran,

2. Assistant Professor, Khatam University,Tehran, Iran

Original Article

Abstract. Fluctuations in natural resource and commodity prices generally cause prosperity and recession cycles in natural resource-rich economies and can lead to irregular growth performance. Therefore, managing financial funds arising from natural resources is among the most significant policy challenges in countries with abundant natural resources. Wealth funds are savings and investment funds with specific purposes that are created by governments to pursue macroeconomic management objectives. Although several decades have passed since the establishment of these funds in different countries, only a few studies have been conducted on their effectiveness and efficiency.

This study investigates the effect of wealth funds on the economic growth of 15 major oil-exporting countries, which account for 80% of the world's net oil exports, using the Generalized Method of Moments (GMM) estimator for Dynamic Panel Data (DPD) considering institutional quality level. The results indicate that wealth funds positively and significantly impact the correlation between oil prices and economic growth in oil-exporting countries. This also applies to the correlation between oil prices and economic growth in oil-exporting countries with high institutional quality.

Keywords: *Oil Shocks, Economic Growth, Sovereign Wealth Funds (SWF), Institutional Quality, Generalized Method of Moments, Dynamic Panel Data*

JEL Classification: *F00, O40, Q43, C39, C23*

INTRODUCTION

Despite the benefits that natural capital can provide for accessing financial resources, some studies, such as Sachs and Warner (2001), indicate that countries with abundant natural resources have slower economic growth in the long run and lower development levels.

Corresponding author E-mail addresses: e.kheirandish@yahoo.com
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This phenomenon has been known as the “resource curse” in the economic literature. Based on studies, four factors affecting the resource curse are as follows:

First, by increasing the real exchange rate, the boom in the natural resource market weakens the competitiveness of domestically traded sectors, such as shifting resources from industrial manufacturing sectors to natural resources (like oil) and non-traded sectors. This phenomenon, known as Dutch disease, is followed by deindustrialization and the consequent deprivation of the positive external effects of industrialization, such as human capital accumulation that is necessary for long-term economic growth. Second, trade relations in economies dependent on natural resources are constantly changing to reduce real incomes due to faster price growth of imported industrial goods than the growth of exported commodity prices. Third, given the volatile nature of international commodity prices, dependence on natural resource revenue causes financial fluctuations and macroeconomic instability. This is due to the low elasticity of supply and demand for these commodities. Fourth, the institutional quality and political structure in countries with abundant natural resources are such that they are not allowed to use these resources for long-term growth; for example, governments with resource-rich economies, especially those without a strong institutional and legal framework, suffer from the voracity effect. This suggests that a positive shock to government revenues (e.g., windfall due to rising natural resource prices) leads to a disproportionate increase in government expenditure (Tornell & Lane, 1999), which can be due to the rent-seeking behaviour of influential groups or policymakers to increase the chances of re-election by increasing public spending. Generally, this increase in expenditure occurs in a way in which a small portion of it is transferred to the private sector. This either slightly increases the country’s economic growth or causes costly behaviours in line with business cycles that worsen the government budget situation.

Many natural resource-rich countries have established stabilization or reserve funds to tackle the challenges of using natural resource revenues. These funds are diverse in purpose and use. They also have different names; for example, financial stability funds act as fiscal instruments to save and set aside a certain amount of revenues for the future when the economy needs stability. These funds, which help the economy in adverse conditions, are also referred to as rainy-day funds (RDFs) in the economic literature.

Balding (2012) defined the stabilization fund as “a government account designed to smooth public expenditures and consumption by setting aside revenues during periods of rapid growth that could be used during economic contractions”. In general, the purpose of stabilization funds, especially in resource-rich economies, is to mitigate negative shocks to government expenditure caused by the sharp decline in resource prices and resource revenues (Sugawara, 2014).

Sovereign wealth funds (SWFs) are among the most significant types of funds that are typically created when governments have budgetary surpluses and little or no international debt. It is not always possible or desirable for this excess liquidity to be held as money, or consumed immediately. This is especially the case when a country is reliant on raw material exports, such as oil, copper, or diamonds. In such countries, the main reason for creating an SWF is because of the properties of resource revenues, i.e., high volatility of resource prices, the unpredictability of extraction, and the exhaustibility of resources (Igbara, 2017).

In 2020, the size of their managed assets reached USD 8.5 billion. However, this still comprises a minimal share in comparison to the managed assets of traditional financial institutions (banks, insurance companies, monetary funds, mutual funds). Nonetheless, in comparison with other alternative asset managers (private equity, hedge fund, and others) and together with the size of individual countries’ foreign exchange reserves, we can discuss the increasing influence of SWFs (Černohorský & Tesnerová, 2021).

On the other hand, SWFs have expanded since the end of the last century due to rising energy prices and the export boom in Asia. Although the term "SWF" has been commonly used since 2005, the first investment fund was established in 1953 with the formation of the Kuwait Investment Board to manage oil revenues (Bloomberg, 2022). According to the Global SWF website, 169 SWFs have been established in 83 countries by June 2022. The Middle East, China, Southeast Asia, and Norway are the four active poles of SWFs. Fig. 1 shows the number of sovereign wealth funds (SWFs) established worldwide per decade from 1940 until 2021.

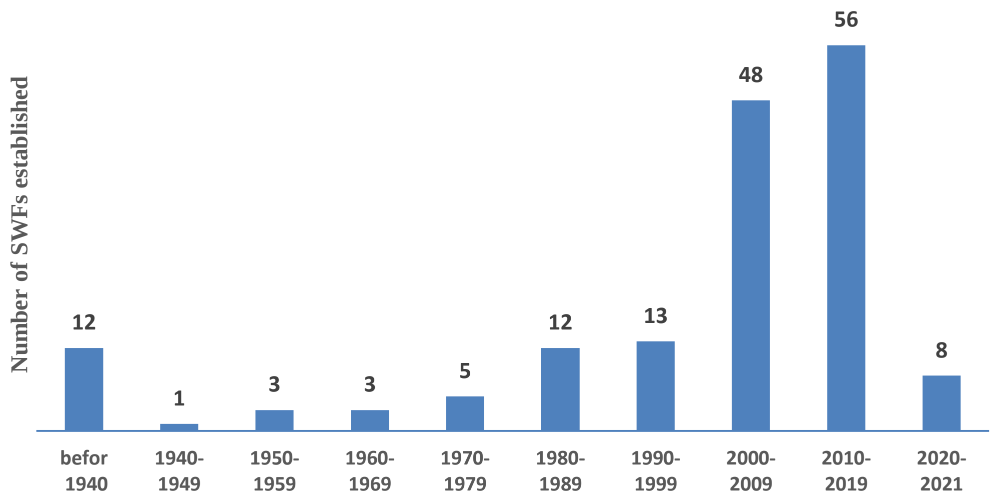

Figure 1.SWFs by year of establishment

Source: Statista Research Department

Assets managed by SWFs have grown rapidly over the past decade. According to the latest report by the SWF Institute, the total assets currently managed by SWFs worldwide are about \$10.5 trillion.[1] More than 50% of the funds' capital comes from oil and gas sales. Wealth funds established by Middle Eastern countries play a significant role in global capital markets in terms of size or scope. Fig. 2 shows the assets managed by the world's SWFs between 2008 and 2017, by oil and non-oil funds.

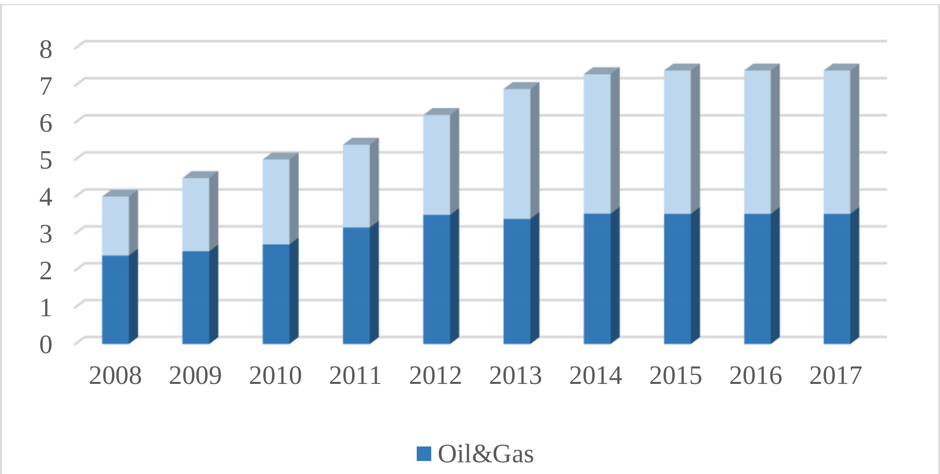

Figure 2. Assets managed by SWFs from 2008 to 2017 (trillion dollars)

Source: SWF Institute (2017)

Despite the relatively long history of reserve funds and SWFs, only a few studies have been conducted to investigate their effectiveness and efficiency. This could be due to a lack of

1 . Statista Research Department, Jun 22, 2022

data. This study examines the effect of wealth funds on the economic growth of 15 major oil-exporting countries with respect to its interaction with institutional quality. Section 1 deals with the theoretical framework. Section 2 presents the literature associated with the effect of SWFs and institutional quality on the interaction between oil prices and economic growth. Sections 3and 4, respectively, provide the model and data used to investigate the research topic. Section 5 presents the results of model estimation and last Section summarizes the research.

1. THEORETICAL FRAMEWORK

Natural resources are among the most substantial sources of wealth for countries. Oil is one of these valuable resources, and countries with oil reserves are expected to have high growth rates due to rapid access to financial capital. However, these countries' experiences have shown that this is not the case. In fact, their economic growth rate is far from their potential growth rate, which stems mainly from their rich oil reserves. Among the key findings in growth and development economics is that natural resource-rich economies grow slower than resource-poor economies and lag behind them in terms of development. This paradoxical phenomenon has been described as the resource curse in the recent literature on economic growth. Although the availability of natural resources does not necessarily imply the resource curse, on average, countries with access to abundant resources lag behind countries with fewer resources in terms of economic development. Over the past four decades, the Organization of Petroleum Exporting Countries (OPEC) has experienced a negative rate of GDP per capita (Gylfason, 2001). Venezuela, which was among the ten richest countries in the early 19th century, has now fallen to the level of a developing country, despite its vast oil reserves. Similarly, Alaska is the only U.S. state with a negative growth rate over the last two decades, despite its extensive oil reserves and fishing industry (Akanni, 2007).

The resource curse, both economically and politically, has taken up a significant part of the theoretical and experimental literature. In the neoclassical economic growth literature, the presence of finite natural resources such as oil reduces the long-term growth of the economy resulting from technological developments. Jones (1998) estimated the economic slowdown caused by natural resources as 0.75% in the U.S. In addition to the growth model, other such as Dutch disease, rent-seeking, and institutional quality have also been proposed to explain the backwardness of countries with natural resources. Corden and Neary (1982) developed the classical economic theory which describes the Dutch disease. In Dutch disease theory, the resource boom affects the economy in two ways: the spending effect and the resource movement effect. The spending effect occurs as a result of the extra revenue from the resource boom, such as rising oil prices. Revenue from the sale of resources increases aggregate demand and changes the relative price of non-traded goods to traded goods. In other words, it increases the real exchange rate and makes the current account for manufactured goods negative. Increasing aggregate demand also shifts labour and other manufacturing resources from traded sectors (industry) to non-traded sectors. The result of these two effects is deindustrialization, which is defined as the weakening of the industrial sector as an important factor in long-term economic growth. To counter the negative effects of the Dutch disease, governments often implement support programs, such as imposing heavy tariffs on imported industrial goods or allocating energy and capital subsidies to support backward industries. However, in most cases, such types of support have not been successful and failed to stop the deindustrialization process (Akanni, 2007). Recent studies have examined the effect of institutional quality on the correlation between natural resources and economic growth and reported that a proper institutional structure can prevent the detrimental effects of a natural resource boom on economic growth, and natural resources can even be used as a factor for long-term growth. However, the endogeneity of institutions in relation to natural resources is among the important challenges of this theory, which makes its experimental test difficult (Moshiri, 2015 and 2017).

The role of institutions in the resource curse is so important that some researchers believe that the role of resources in the economic collapse of oil-producing countries is not as important as institutions. In other words, with strong institutions and a proper political structure, these countries can avoid the Dutch disease and turn the resource curse phenomenon into a resource blessing and, accordingly, sustain their economic growth (Dartey, 2014). In fact, the quality of institutions determines whether countries can avoid the resource curse. The presence of grabber-friendly institutions in resource-rich economies leads to slower economic growth, while producer-friendly institutions help countries make the most of their natural resources. The most important features of grabber-friendly institutions are weak rule of law, high risk of expropriation, bureaucratic inefficiency, and corruption in government. Countries with good institutional quality are found to benefit from their natural resources and achieve a high standard of living (Mehlum et al., 2006).

The World Bank has developed a unique tool to measure the institutional and governance framework called “world governance indicators (WGI)”. Kaufmann, Kraay, and Mastruzzi (2010) first described the existing concepts of governance and provided a revised definition of governance as “traditions and institutions by which authority is exercised in a country including 1. The process by which governments are selected, monitored and replaced. 2. The capacity of the government to formulate and implement accurate and effective policies. 3. The respect of citizens and the government for the institutions that govern economic and social interactions”.

According to Ahmadov (2013), the authors have identified two criteria of governance (six dimensions of governance) for each of these three areas, including voice and accountability (VA), and political stability and absence of violence (PSAV) as criteria for measuring the first area, government effectiveness (GE) and regulatory quality (RQ) as criteria for measuring the second area, and rule of law (RL) and control of corruption (CC) as criteria for measuring the third area. In the present study, a combination of these criteria was used to measure the quality of institutions in countries.

SWFs are also among the strategies employed by many governments to prevent the resource curse. They are generally designed for one or more of the following purposes. These funds can be used to stabilize the economy and control the adverse effects of commodity price fluctuations, or to equitably distribute income between generations. These funds can also create economic diversification by directing funds to invest in sectors other than the exploitation of natural resources. Funds have also been used to limit government expenditure by controlling the flow of resources to the national budget (Igbara, 2017).

SWFs are usually distinguished based on their stated objectives and policies and, consequently, asset allocation. Although SWFs generally pursue multiple objectives, four types of SWFs can be identified according to the Santigo Principles[2].

Stabilization funds are set up to protect government budgets and economies from commodity price fluctuations and external shocks. Chile, Timor-Leste, Iran, and Russia have this type of fund. The investment horizon and liquidity objectives of these funds are similar to the management of central banks in terms of their role in fiscal policies contrary to the business cycle. This is to smooth the boom/bust cycle. They tend to invest heavily in highly liquid assets (and sometimes in instruments that are inversely associated with the fund’s risk source) by

[2]. The Santiago Principles consists of 24 principles and practices endorsed by International Forum of Sovereign Wealth Funds (IFSWF) members. The Santiago Principles promote transparency, good governance, accountability, and prudent investment practices while encouraging a more open dialogue and a deeper understanding of the SWF activities. (IFSWF)

allocating more than 80% of their resources to fixed-income assets, including government securities, with a proportion of about 70% of total assets.

Savings funds intend to share the wealth between different generations by transferring non-renewable assets into a diversified portfolio of financial assets. Their investment guidelines emphasize high-risk and high-yield investments. Therefore, in these funds, a large portion of the portfolio is allocated to stocks and other investments (more than 70%). The UAE, Libya, and Russia have this fund.

Development (Investment) funds are established to allocate resources to economic and social projects on a priority basis and exist in the UAE and Iran.

Pension funds are set up to meet identified expenditures in the future with respect to pension-related contingent liabilities on the government's balance sheet (Al-Hassan & Papaioannou, 2013). Fig. 3 shows the proportion of assets of the SWFs for each of the mentioned funds.

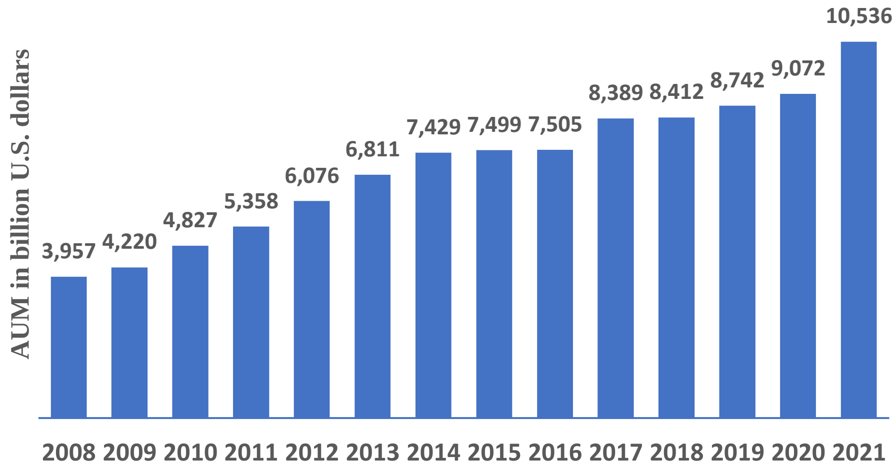

Figure 3.The proportion of assets of SWFs by fund type, 2010 (%)

Source: Statista Research Department

Despite the differences in SWFs, most of them have been established based on valuable commodities such as oil, natural gas, or gold. In other words, a large number of SWFs have been set up in countries with abundant natural resources, such as oil. The majority of oil-related SWFs have been established in the Arab states of the Persian Gulf, Russia, Norway, and the former Soviet republics. Another significant group of SWFs established based on net exports includes Asian countries, such as Singapore, Korea, China, and other East Asian exporters (Şimşek, 2018). Therefore, SWFs seem to be mainly set up based on two sources of wealth and income: natural resource abundance, especially oil, and high net exports. In establishing SWFs, these countries, especially those in the first group, seek primarily to reach macroeconomic goals and prevent the Dutch disease, or resource curse, and, consequently, increase economic growth. Given the goals of SWFs, natural resource-dependent countries are expected to be more competitive and create diverse economic contexts that will lead to sustainable growth and a more competitive economy in the long run.

This literature also discusses "Absorption Capacity". Absorption constraints describe the difficulties that an economy can face in finding productive uses for a large influx of investment that arrives all at once, particularly in developing countries. A parking fund allows governments to hold some of the wealth offshore until the economy is ready to put it to use (James, 2022).

Spending that is focused on expanding absorptive capacity, especially in the tradeable sector, can diversify the economy and reduce the cost of misjudging the duration of a resource windfall (Chang & Lebdioui, 2020).

2. LITERATURE REVIEW

By explaining the Dutch disease, Corden and Neary (1982) tried to describe the problems arising from natural resource abundance in countries with such resources. However, the term resource curse was coined in 1988 after the publication of Gelb's study entitled "Oil Windfalls: Blessing or Curse?" Since then, economists have sought an appropriate explanation for the resource curse phenomenon in oil-exporting countries. According to this phenomenon, countries with natural resources, especially oil-producing countries, are often unable to use their resources to achieve economic development. Political ends and increasing government expenditure along with rising revenues from natural resources and, consequently, the Dutch disease, as well as providing the ground for rent-seeking and corruption are among the factors that either cause natural resources, as resources for the growth and development of countries, to be interpreted as the resource curse or prevent natural resources from contributing sufficiently to the country's economic growth.

Recent studies have focused more on the social and political characteristics of society, which affect the relationship between natural resources and economic growth. One approach is to assume that institutions are endogenous in relation to natural resources. For example, rent-seeking models show that natural resources undermine the quality of institutions and lead entrepreneurs from manufacturing sectors to rent-seeking activities. An alternative approach is to consider institutional quality as an environment in which natural resources affect economic performance. In such a case, if the quality of institutions is favourable and supports economic activities, natural resources have a positive effect on economic growth. Sachs and Warner (1995) suggested that although natural resources have a negative effect on growth, there is no significant relationship between institutional quality and resource abundance. Sala-i-Martin and Subranabian (2013), however, reported that although resource abundance has a minimal impact on growth, it negatively and significantly affects institutional quality (Moshiri, 2017).

Akanni (2007) indicated that oil rents in oil-exporting countries have failed to promote economic growth due to weak rule of law, bureaucracy, and corruption. Mehlum et al. (2006) found that the resource curse occurs in countries with grabber-friendly institutions, not in countries with producer-friendly institutions. Sarmidi et al. (2014) argued that with increasing institutional quality, the negative impact of resource abundance on growth disappears. Bargoui et al. (2017) showed that in natural resource-rich countries, higher economic growth is associated with higher institutional quality. Also, natural resources in oil-producing Arab countries have generally been a curse, meaning that these countries have failed to properly allocate significant revenues from crude oil production to activities that promote growth and development. Alexeev and Conrad (2011) claimed that in most countries, except for transition economies, the quality of institutions changes slowly and natural resources are less likely to affect the quality of institutions.

Limited studies have been conducted on the effects of SWFs on avoiding the oil resource curse. Mochebelele (2013) examined the difference between the average economic growth of twelve countries including Algeria, Angola, Canada, Norway, Mexico, and Oman before and after the establishment of SWF. They concluded that the difference between the average economic growth before and after the establishment of SWF was significant in eight countries and not in the rest. Oleka et al. (2014) found that there was a statistically significant and negative correlation between economic growth and the establishment of the fund in Nigeria. They argued that the SWF was newly established in Nigeria. As a result, it faced many challenges and did not contribute to the GDP growth of the economy. Mohaddes and Raeisi

(2017) reported that although commodity terms of trade (CToT) volatility exert a negative impact on economic growth (through lower physical capital accumulation and total factor productivity (TFP)), the negative effect can be mitigated if a country has an SWF and better institutional quality (resulting in more stable government expenditure). Igbara et al. (2017) showed that, under certain conditions, SWFs can help generate economic benefits in times of recession.

Bagheri Parmehr and Lajord (2021), using an X-VAR model, showed that the National Development Fund of Iran has not been able to fulfil its role in the economy based on the primary goals of a wealth fund, and attributed the reason to the institutional characteristics of this fund in Iran.

Affuso et al. (2022) show that by using a nonparametric synthetic control method, the fund contributed to a higher real per capita GDP in Iceland's economy. James et al (2022) find that management quality and institutions truly matter for SWF's success. Funds are more successful when matched with efficient governance and strong political institutions.

By reviewing the literature on the effect of SWF and institutions on the economic growth of oil-exporting countries, to the extent of our knowledge, no study has ever simultaneously investigated the effect of SWFs and institutional quality on the interaction between oil price and economic growth in a group of the largest net oil-exporting countries. Therefore, this study can be considered innovative.

3. EXPERIMENTAL MODEL

In this section, the experimental models used to investigate the effect of natural resources, particularly oil, SWFs, and institutional quality on the economic growth of oil-exporting countries are presented. According to neoclassical growth models such as Solow (1956), Cass (1965), and Koopmans (1965), the per capita growth rate is a function of the growth of physical and human capital and technology. However, according to the law of diminishing returns on physical and human capital, only technological development can explain long-term economic growth. The neoclassical growth model also implies a negative relationship between long-term growth and per capita primary income. In other words, assuming similar economic and institutional structures, poor countries tend to grow faster than rich countries due to low per capita income and high productivity rates. As a result, all countries will eventually converge in terms of per capita income in the long run (Barro, 1991).

In this study, a neoclassical growth model was used to investigate the effect of wealth funds on the economic growth of countries with natural resources. In this model, the effect of conventional variables in neoclassical growth models, such as physical investment, human capital (population as quantification, and HCI as qualification), and other control variables, along with the dummy variable of wealth funds were estimated. The first model, inspired by Barro's model, was employed to evaluate the role of SWFs by controlling institutional quality, as follows:

$$y_{it} = \beta_0 + \beta_1 y_{it-1} + \beta_2 Oil_t + \beta_3 Oil_t Swf_{it} + \beta_4 X_{it} + \mu_i + \varepsilon_{it} \quad (1)$$

Where y_{it} is the GDP growth rate, Oil_t is the real oil price growth rate, Swf_{it} is the dummy variable of the presence or absence of a fund in a country and period, and X_{it} represents a set of variables affecting the economic growth of countries that are used in experimental growth models. This set included variables, such as the initial rate of GDP as an indicator to control growth convergence (IY_0), investment to GDP ratio as an indicator of investment, human capital index (HCI) based on the number of years of study, the growth rate of population (GPOP), real exchange rate, and trade-to-GDP ratio. About the last variable, the argument concerning the role of trade, as one of the main deterministic factors of economic growth, goes back to the classical economic theories by Adam Smith and David Ricardo. They argued that international trade plays a key role in economic growth. The ELG (export-led growth) paradigm has received renewed attention following the highly successful East Asian export-led growth strategy during the 1970s and 1980s. Several influential studies provide a useful framework for analysing the relationship between exports and economic growth, i.e., Baldwin and Forslid (1996), Feenstra (1990), Segerstrom, Anant and Dinopoulos (1990), Grossman and Helpman (1990), and Rivera-Batiz and Romer (1991). The basic idea of this literature is that exports increase total factor productivity because of their impact on the economics of scale and other externalities, such as technology transfer, improving skills of workers, improving managerial skills, and increasing the productive capacity of the economy (Abou-Stait, 2005).

In addition to these variables, the institutional quality index of $\mathrm{IQ}_{\mathrm{it}}$, defined as a dummy variable, was also used in the model (1 = institutional quality equal to/greater than 1; 0 = institutional quality less than 1).

Based on Eq. 1, the effect of SWFs on intensifying or mitigating the interaction between rising oil prices and economic growth can be evaluated by the correlation coefficient of rising oil prices and the SWF. The effect of rising oil prices on economic growth depends on SWFs as follows: $\rho = \frac{\partial Growth}{\partial \mathrm{Oil}} = \beta_2 + \beta_3 Swf_{it}$

Where β_3 and β_2 represent the effect of rising oil prices on economic growth in the presence or absence of SWFs. The second model shows the role of institutional quality in the impact of rising oil prices on economic growth. The relationship between rising oil prices and economic growth in different countries depends on their institutional quality:

$$y_{it} = \alpha_0 + \alpha_1 y_{it-1} + \alpha_2 Oil_t + \alpha_3 Oil_t IQ_{it} + \alpha_4 X_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

Where β_1 and β_2 indicate the effect of rising oil prices on economic growth at different levels of institutional quality: $\rho = \frac{\partial Growth}{\partial \mathrm{Oil}} = \alpha_2 + \alpha_3 IQ_{it}$

In the third model, the role of the existence of SWFs in the direction and extent of the impact of rising oil prices on the economic growth of countries with specific levels of institutional quality was evaluated.

$$y_{it} = \gamma_0 + \gamma_1 y_{it-1} + \gamma_2 Oil_t + \alpha\gamma_3 Oil_t Swf_{it} IQ_{it} + \gamma_4 X_{it} + \mu_i + \varepsilon_{it} \quad (3)$$

In this equation, the effect of rising oil prices on economic growth depends on the two factors of SWFs and institutional quality as follows: $\rho = \frac{\partial Growth}{\partial \mathrm{Oil}} = \gamma_2 + \gamma_3 Swf_{it} IQ_{it}$

Accordingly, the impact of SWFs on the relationship between oil price and economic growth at different levels of institutional quality can be assessed.

The most important reason for using the GMM estimator for DPD in this study was the existence of autocorrelation in residuals of the DPD method. Given that the use of lagged dependent variable violates the exogenous assumption of independent variables of the model, Arrelano and Bond's GMM estimator for DPD was employed in this study.

This method, which uses an instrumental variable to estimate, in addition to solving the problem of being endogenous, reduces or eliminates possible collinearity in the model, removes time-invariant variables and increases the temporal dimension of variables.

4. DATA

The GDP growth data of 15 oil-exporting countries from 1980-2017 were used to estimate the model. The 15 countries studied, including Norway, Canada, Iran, Saudi Arabia, the UAE, Kuwait, Qatar, Algeria, Colombia, Mexico, Venezuela, Angola, Nigeria, Oman, and Russia, accounted for 80% of the world's total net oil exports in 2015.

The index made by principal component analysis (PCA) using six components of institutional quality was employed to investigate the effect of institutional quality on the relationship between economic growth and oil price. These six components were defined by the World Bank and measured for different countries, which were discussed in detail in the theoretical framework of the research.

Table 1 presents some characteristics of the model variables. In this table, countries are grouped based on the oil export rate as well as the level of development, which was determined by the institutional quality index (more and less than 1).

Table 1. Summary of data related to the model variables (1980 to 2017)

Variables	Description	Group of Countries	Average	Deviation
Economic growth	constant-price GDP	Total	3	6.4
		Low IQ	3.1	7.1
		High IQ	2.4	1.8
Investment Ratio	Investment/GDP Ratio	Total	26	13
		Low IQ	24	14
		High IQ	24	3
Human Capital Ratio	Growth of the human capital index based on the number of school years and return to education	Total	17	57
		Low IQ	24	67
		High IQ	0.5	0.2
Trade Ratio	Sum of Import & Export/GDP Ratio	Total	29	65
		Low IQ	32	64
		High IQ	9	67
Population Ratio	-	Total	2.8	2.7
		Low IQ	3.2	3
		High IQ	9	0.3
Exchange Rate	Real Effective Exchange Rate (REER)	Total	147.5	651.4
Oil Price Variation	Variation of real-world oil price average	-	1.7	23

All the figures except the real exchange rate are in percentage.
Source: WDI and researcher calculations

As can be seen in Table 1, oil-exporting countries with low institutional quality had, on average, higher economic growth and human investment than developed countries with high institutional quality, which was consistent with the convergence hypothesis in the neoclassical growth model.

Another noteworthy point was the large standard deviation of indicators in oil-exporting countries with a low institutional quality compared to countries with high institutional quality, suggesting that the indicators were more homogeneous in countries with high institutional quality than in other countries.

Then, panel data unit root tests, such as Levin, Lin & Chu (LLC), Im, Pesaran & Shin (IPS), and Fisher tests were applied to avoid errors in the estimation of model coefficients. The test results presented in Table 2 indicated that all the model variables were stationary.

Table 2: Unit root tests of the model variables

Variables	Probability			Stationary
	Levin, Lin & Chu	Fisher	Im, Pesaran & Shin	
Economic growth	-	0.00	0.00	✓
Investment Ratio	-	0.00	0.00	✓
Human Capital	-	0.04	0.00	✓
Oil Price Variation	0.00	0.00	0.00	✓
Trade Ration	-	0.00	0.00	✓
Exchange Rate	0.00	0.00	0.00	✓
Population Ratio	-	0.00	0.00	✓

It was not possible to perform the test due to the imbalanced data.
Source: researcher calculations

Table 3 shows the status of the countries studied in the model in terms of the number of SWFs and the year of establishment of these funds by their institutional quality.

Table3 . Status of funds of the studied countries

Group/Countries	SWF	Inception
Low IQ Countries (IQ<1)		
Saudi Arabia	SAMA - Foreign Holdings	1952
	Public Investment Fund	1971
Kuwait	Kuwait Investment Authority (KIA)	1953
UAE	Abu Dhabi Investment Authority (ADIA)	1976
	International Petroleum Investment Company (IPIC)	1984
	Mubadala Investment Company (PJSC)	2002
	Investment Corporation of Dubai (ICD)	2006
	Abu Dhabi Investment Council (ADIC)	2007
	Emirates Investment Authority	2008
Oman	State General Reserve Fund	1980
	Oman Investment Fund	2006
Venezuela	Macroeconomic Stabilization Fund (FEM)	1998
Iran	National Development Fund	1999
Algeria	Revenue Regulation Fund	2000
Mexico	Oil Revenues Stabilization Fund of Mexico (ORSFM)	2000
Qatar	Qatar Investment Authority (QIA)	2005
Russia	Russian National Wealth Fund	2008
Nigeria	Nigeria Sovereign Investment Authority	2011
Angola	Fundo Soberano de Angola (FSDEA)	2012
Colombia	Colombia Savings and Stabilization Fund	2012
High IQ Countries (IQ>1)		
Canada	Alberta Heritage Savings Trust Fund	1976
Norway	Government Pension Fund Global	1990

Source: retrieved from the SWF institute website

As can be seen, all the studied countries had SWFs, and as mentioned earlier, Kuwait had the oldest one. Among the studied countries, the UAE, with 6 funds, had the highest number of funds in the group of savings funds.

5. MODEL ESTIMATION RESULTS

In this study, three models were used to investigate the effect of funds and institutional quality on the interaction between oil prices and the economic growth of the studied countries. Arrelano and Bond's GMM estimator for DPD was also employed. There are some advantages we can mention to using GMM. First, estimates will no longer be biased by any omitted variables that are constant over time (unobserved country-specific or 'fixed' effects). Secondly, the use of instrumental variables allows parameters to be estimated consistently in models that include endogenous right-hand-side variables, such as investment rates in the context of a growth equation (Bond et al, 2001).

Before estimating the GMM model, preliminary checks should be performed. For example, the Arrelano-Bond serial correlation test shows that the AR (1) coefficient is not statistically significant and AR (2) is significant, which is given in Appendix B, and therefore the GMM method is allowed to be used. Chow's and Hausman's tests also show that the fixed effect method should be used to estimate the model (Appendix C) .Table 4 shows the estimation results for all four models. Based on the first model, the effect of rising oil prices on economic growth without considering the effect of SWFs was positive, but not statistically significant. The difference in the effect of rising oil prices on economic growth was positive and significant between countries/periods with and without SWFs. More specifically, the existence of SWFs in oil-exporting countries increased the impact of rising oil prices on economic growth by an average of 0.045. The results, according to the Wald test, showed that the final effect of rising oil prices on the economic growth of countries with the presence of SWF was positive and statistically significant (Appendix D).

Table 4.Results of Estimations

Variable\Model	Model1	Model2	Model3
Intercept	-0.002	-0.006	-0.006
Investment Ratio	0.139*	0.118*	0.118*
Human Capital Growth	0.039*	0.042*	0.042*
Oil Price Variation (Lagged)	0.004	0.01	0.01
Trade Ratio	-0.093**	0.01	0.01
Population Growth Rate	1.8	0.9	0.9
Exchange Rate	0.00004*	0.0003*	0.0003*
Interaction between Oil & SWF	0.045*		
Interaction between Oil & IQ		0.03*	
Interaction between Oil & IQ-SWF			0.03*
Observations	346	302	302
Countries	15	15	15

Source: researcher calculations
* Significant at the 0.01 level
** Significant at the 0.05 level

In the second model, which included the interaction between rising oil prices and institutional quality, rising oil prices had a positive effect on economic growth. However, it was not statistically significant. Also, the difference in the effect of rising oil prices on economic growth between countries/periods with high and low institutional quality was positive and significant. Overall, the model results indicated that the oil price had a positive effect on economic growth in countries/periods with low institutional quality. This effect was greater in countries/periods with high institutional quality. Therefore, based on the significance test performed (Appendix B), the sum of the estimated coefficients was not significantly different from zero.

In the third model, the interaction between rising oil prices, SWF, and institutional quality was considered. The effect of SWF on oil prices was conditioned by the existence of high institutional quality. The results showed that the difference in the effect of rising oil prices on economic growth between countries/periods with and without high institutional quality and SWFs was positive and significant.

As mentioned before, limited studies have been conducted on the effects of SWFs on the nexuses between oil prices and economic growth. Our result is in line with those of Affuso et al. (2022), Bagheri Parmehr and Lajord (2021), and Igbara et al. (2017), which showed the positive effect of SWFs on the economy. On the other hand, it does not comply with the results of Oleka et al. (2014), which found that there was a statistically significant and negative correlation between economic growth and the establishment of the fund in Nigeria and Mochebelele (2013). They concluded that the difference between average economic growth, before and after the establishment of SWF, was not significant in some countries.

Examining the coefficients of other control variables in the model revealed that human capital growth and the investment ratio had a positive and significant effect on economic growth. However, the effect of the population growth rate on economic growth was positive but statistically insignificant. The effect of the trade ratio on economic growth was estimated to be negative and significant in the first model. However, the coefficient of this variable was positive, but insignificant in the other two models.

The estimated coefficients, except for the trade coefficient in the first model, were consistent with other studies conducted on economic growth. Given that the studied countries were oil exporters, an increase in the trade ratio could also suggest a lack of GDP growth relative to the revenue growth rate from oil sales, and hence the Dutch disease.

CONCLUSIONS

Among the key empirical findings in development economics is the fact that economies rich in natural resources grow at a slower rate than economies without these resources. This has been described as the resource curse. So far, many studies have been conducted on the effect of natural resource abundance on long-term economic growth, about 40% of which have not rejected the resource curse hypothesis. However, about 20% have shown that abundant natural resources have a positive effect on economic growth (Havranek et al., 2016). Due to the sharp oil price volatility, as well as the high revenue from rising oil prices, oil-exporting countries have a special situation among natural resource-rich countries. Although many theoretical and experimental studies have examined the effect of oil price shocks on the economic growth of oil-exporting countries, there are very limited studies on the effect of SWFs and institutional quality on the interaction between oil prices and economic growth in these countries.

This study aimed to evaluate the effect of wealth funds and institutional quality on the interaction between oil prices and economic growth in 15 oil-exporting countries, which account for 80% of the world’s net oil exports.

The results indicated that SWFs had a positive and significant effect on the interaction between rising oil prices and the economic growth of oil-exporting countries. In other words, in countries where oil sales profits are managed by SWFs, rising oil prices are expected to further boost economic growth. It was also found that the oil price had a positive and significant effect on economic growth in countries/periods with low institutional quality. This effect was greater in countries/periods with high institutional quality. The results of the present study were consistent with most of the studies performed in this field. Most of the previous research reported that natural resource abundance in countries with high institutional quality accelerated economic growth. Also, the existence of SWFs in some oil-exporting countries improved their economic growth.

In this study, the effect of SWFs on the interaction between rising oil prices and economic growth was investigated. However, the quality of fund management was not directly considered due to the unavailability of micro data related to these funds and their management. In fact, the quality of fund management was associated with the institutional quality of countries, so it indirectly reflected the management effect of funds. Therefore, the results of the present study could be more accurate, practical, and effective if access was provided to the portfolio of SWFs and their investments. Examining the target markets of these funds and the extent and manner of their financial interactions with oil-importing countries can be another interesting subject of study in this field.

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A .Results

- **Model 1**

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =        346
Group variable: id                              Number of groups   =         15
Time variable: year
                                                Obs per group:
                                                              min =         16
                                                              avg =   23.06667
                                                              max =         25

Number of instruments =     33                  Wald chi2(8)       =    4750.53
                                                Prob > chi2        =     0.0000
Two-step results
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Growth						
L1.	.4044657	.1696583	2.38	0.017	.0719415	.7369899
Investment	.1391175	.0071485	19.46	0.000	.1251067	.1531283
Ghc	.0385397	.0039377	9.79	0.000	.0308221	.0462574
Trade	-.093557	.0436982	-2.14	0.032	-.1792039	-.0079101
GPOP	1.826495	1.440236	1.27	0.205	-.9963159	4.649306
Exchange	-.0000378	.0000144	-2.63	0.009	-.000066	-9.64e-06
OIL						
L1.	-.0038626	.0077971	-0.50	0.620	-.0191448	.0114195
OilSwf	.0446225	.0085348	5.23	0.000	.0278945	.0613505
_cons	-.0020141	.0218636	-0.09	0.927	-.044866	.0408378

```
Warning: gmm two-step standard errors are biased; robust standard
         errors are recommended.
Instruments for differenced equation
        GMM-type: L(2/2).Growth
        Standard: D.Investment D.Ghc D.Trade D.GPOP D.Exchange LD.OIL
                  D.OilSwf
Instruments for level equation
        Standard: _cons
```

.

- **Model 2**

```
Arellano-Bond dynamic panel-data estimation     Number of obs      =       302
Group variable: id                              Number of groups   =        15
Time variable: year
                                                Obs per group:
                                                              min =        16
                                                              avg =  20.13333
                                                              max =        21

Number of instruments =     29                  Wald chi2(8)       =    593.22
                                                Prob > chi2        =    0.0000
Two-step results
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Growth						
L1.	.3604126	.1209666	2.98	0.003	.1233224	.5975028
Investment	.1182748	.0138607	8.53	0.000	.0911083	.1454414
Ghc	.0419675	.0029363	14.29	0.000	.0362125	.0477225
Trade	.0106094	.0367823	0.29	0.773	-.0614826	.0827014
GPOP	.9008023	.9732646	0.93	0.355	-1.006761	2.808366
Exchange	-.0003392	.0000875	-3.88	0.000	-.0005108	-.0001677
OIL						
L1.	-.0102789	.0103866	-0.99	0.322	-.0306362	.0100785
OilIQDUM	.0296622	.0109501	2.71	0.007	.0082004	.0511241
_cons	-.0056957	.0351912	-0.16	0.871	-.0746693	.0632779

```
Warning: gmm two-step standard errors are biased; robust standard
         errors are recommended.
Instruments for differenced equation
        GMM-type: L(2/2).Growth
        Standard: D.Investment D.Ghc D.Trade D.GPOP D.Exchange LD.OIL
                  D.OilIQDUM
Instruments for level equation
        Standard: _cons
```

- **Model 3**

```
Arellano-Bond dynamic panel-data estimation     Number of obs     =        302
Group variable: id                              Number of groups  =         15
Time variable: year
                                                Obs per group:
                                                              min =         16
                                                              avg =   20.13333
                                                              max =         21

Number of instruments =     29                  Wald chi2(8)      =     593.22
                                                Prob > chi2       =     0.0000
Two-step results
```

Growth	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Growth						
L1.	.3604126	.1209666	2.98	0.003	.1233224	.5975028
Investment	.1182748	.0138607	8.53	0.000	.0911083	.1454414
Ghc	.0419675	.0029363	14.29	0.000	.0362125	.0477225
Trade	.0106094	.0367823	0.29	0.773	-.0614826	.0827014
GPOP	.9008023	.9732646	0.93	0.355	-1.006761	2.808366
Exchange	-.0003392	.0000875	-3.88	0.000	-.0005108	-.0001677
OIL						
L1.	-.0102789	.0103866	-0.99	0.322	-.0306362	.0100785
IQDUMOilSwf	.0296622	.0109501	2.71	0.007	.0082004	.0511241
_cons	-.0056957	.0351912	-0.16	0.871	-.0746693	.0632779

```
Warning: gmm two-step standard errors are biased; robust standard
         errors are recommended.
Instruments for differenced equation
        GMM-type: L(2/2).Growth
        Standard: D.Investment D.Ghc D.Trade D.GPOP D.Exchange LD.OIL
                  D.IQDUMOilSwf
Instruments for level equation
        Standard: _cons
```

.

B.

Arellano-Bond Serial Correlation Test
Equation: Untitled
Date: 12/08/22 Time: 12:27
Sample: 1980 2018
Included observations: 300

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	1.587344	0.361773	0.227911	0.1124
AR(2)	-6.844978	-0.971584	0.141941	0.0000

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.655687	6	0.9954

** WARNING: estimated cross-section random effects variance is zero.

C.

```
Fixed-effects (within) regression               Number of obs     =        362
Group variable: id                              Number of groups  =         15

R-sq:                                           Obs per group:
     within  = 0.1282                                         min =         17
     between = 0.0801                                         avg =       24.1
     overall = 0.1014                                         max =         26

                                                F(7,340)          =       7.14
corr(u_i, Xb)  = -0.3193                        Prob > F          =     0.0000
```

Growth	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Investment	.1396886	.0278898	5.01	0.000	.0848304	.1945468
Ghc	.0170865	.0231265	0.74	0.461	-.0284027	.0625756
Trade	.0097381	.0199566	0.49	0.626	-.0295158	.0489921
GPOP	-.0229115	.113844	-0.20	0.841	-.2468388	.2010157
Exchange	-.0000341	.0000281	-1.21	0.226	-.0000895	.0000212
OilSwf	.0373974	.0114808	3.26	0.001	.0148151	.0599798
OIL						
L1.	.027522	.0098837	2.78	0.006	.0080811	.046963
_cons	-.0045442	.0160685	-0.28	0.778	-.0361503	.027062
sigma_u	.02201507					
sigma_e	.04435727					
rho	.19764182	(fraction of variance due to u_i)				

F test that all u_i=0: F(14, 340) = 2.97 Prob > F = 0.0003

D. Tests of Significance

Model Number	H0	Coefficient	Z statistic	Probability
1	Oil(-1)+OilSwf=0	0.04	4.21	0.00
2	Oil(-1)+OilIQDUM=0	0.019	1.23	0.217
3	Oil(-1)+IQDUMOilSwf=0	0.019	1.23	0.217