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The relationship between the shadow economy and the elements of competitiveness in developing oil countries

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ABSTRACT

The purpose of this research is the analysis of the relationship between the shadow economy and the elements of competitiveness in developing oil countries. The current research is applied in terms of purpose, descriptive-analytical in terms of inference method, and post-event in terms of the overall design of the research. The final sample used for this study is the data of 72 developing oil countries during the years 2005-2020. The data was analyzed by applying Eviews software through vector panel autoregressive distributed lag model (PARDL) and the Markov switching method. The results showed that in the short term there is a significant relationship between the shadow economy and the input-oriented elements of the developing oil countries, but the significant relationship between the shadow economy and the efficiency-oriented and creativity-oriented elements of the competitiveness of the developing oil countries was not confirmed. Also, in the long term, there is a significant relationship between the shadow economy and the efficiency-oriented and input-oriented elements of the developing oil countries, but the significant relationship between the shadow economy and the creativity-oriented elements of the competitiveness of the developing oil countries was not confirmed. In addition, in the long term, there is a significant relationship between the shadow economy and the index of ease of doing business in developing oil countries, but in the short term, there is a significant relationship between the index of ease of doing business and the shadow economy of oil countries.

Keywords: Shadow Economy, Competitiveness, Ease of Doing Business

1. Introduction

In many countries, governments lose much of their potential revenue to the existence of the "underground economy," also known as the "black market," the "underground economy," or the "underground economy." will be This question is raised, what is the "shadow economy" and how does it happen? In this regard, various definitions and methods have been presented to measure this part of the economy. But perhaps among them, the most common definition can be presented as follows: "Shadow economy" refers to that part of the legal products and services of the market that are kept away from the eyes of the government monitoring authorities for some reason; Reasons such as: 1) refraining from paying all kinds of taxes such as income tax and value added tax; 2) refusing to pay the social security contribution; 3) Refusing to comply with some labor market laws such as the minimum wage law and 4) Refusing to do some administrative processes. In addition, illegal products and services such as smuggling and trading of prohibited goods that are not counted in the GDP can also be included in the definition of "shadow economy". In the meantime, one of the most important variables that can influence people's motivation to work in the informal sector is the degree of competitiveness and the existence of a platform that governments can create for better competition of industries and companies in comparison with other countries. In other words, the more competitive the overall economic environment is and the more fair laws and fewer monopolies there are, the more willing people are to work in the official sector to benefit from legal protections. In this regard, the aim of the current research is a comparative analysis of the relationship between the shadow economy and the elements of competitiveness in developing and developed oil countries.

The set of economic activities are divided into two general parts: official activities and informal activities, and most of the informal activities are organized in the form of shadow economy (Falahti et al., 2019). Evidence shows that a significant share of economic activities in developing countries is carried out in the informal sector (International Monetary Fund, 2018). The widespread presence of the informal sector means that the degree of politicization of economic activities from government plans and policies and the power of government supervision is low, and as a result, the failure of the government's economic policies or their deviation It is one of the expected results (Renani et al., 2011; Azarmand, 2006). On the other hand, in recent years, many developing countries (including Iran) have faced economic crisis, high inflation, repayment of foreign debts and the growth of the labor force population, especially in urban areas (as a result of continued rural migration). . Therefore, under these conditions, it is expected that the informal sector has experienced more growth. In this case, a large part of the economic activities will be covered by foreign government support, and as a result, it can be a serious challenge to the realization of the government's policies and plans. In such a way that a number of analysts consider the size of the informal sector to be one of the reasons for the failure of reform programs in Iran's economy (Falahti et al., 2019; Shahab and Pajooyan, 2014). During the last three decades, the informal sector has expanded on a global scale, so that some estimates indicate that 60% of the workers in all the countries of the world are informal. According to the Organization for Development and Economic Cooperation, three-quarters of the workers are in sub-Saharan African countries, two-thirds of the workers are in South and Southeast Asia, half of the workers are in Latin America and the Middle East, and finally, one-fourth of the workers are in developing countries in informal employment (Devin, 2021). Therefore, due to the large volume of the shadow economy, its impact must be large and significant. In this regard, the developed countries have been able to a large extent to provide the fields of shadow economic downsizing and accordingly control its impact on their economy. But among developing countries, the shadow is much higher and it has been reported up to two and a half times that of developed countries, so it doubles the necessity of applying the necessary measures.

According to the empirical and theoretical literature, the main reason for the large size of the shadow economy is related to the motivation of economic agents to evade taxes and not pay them. The main motivation and driving force behind shadow activities are economic factors and the main reason for the desire for such activities is to create a series of non-transparent activities in order to escape from legal frameworks (Falahti and others, 2019; Shahab and Pazhooyan, 2014; Medina and Schneider, 2018 and Eilat and Zines, 2000). Shadow economy includes all activities that are legal from both productive and non-

productive economic aspects, but for various reasons such as avoiding paying income tax, value added or other taxes, avoiding paying social security costs. It is kept hidden from public authorities (Schneider, 2011; Nguyen and Dong 2021).

The International Monetary Fund (2018) lists factors such as the tax burden, the quality of institutions or corruption, laws and regulations, and the quality of public sector services among the causes of the shadow economy of countries. Therefore, another reason for the large size of the shadow economy in the countries of the world (especially oil-dependent economies) can be the inappropriate business environment and non-competitive atmosphere in the countries. On the other hand, the existence of a suitable space makes people follow up their activities easily, both in terms of obtaining the necessary permits and in terms of market rules, without discrimination. Therefore, the more suitable the business environment in the countries is, it can reduce the motivation of economic agents to operate in the shadow sector. Therefore, considering the weakness of oil countries in this sector compared to developed countries, this variable seems to be more indicative of tax evasion for the large informal sector of oil economies. In addition to the discussions related to the general atmosphere of the economy, the performance of the government itself can be very important considering that it is the provider of public goods in the economy. Therefore, the more effective the government is as a tax receiver and the only producer of public goods, the more it can influence the motivation of people in the society to work in the official sector. In various studies about the causes of the formation of the shadow economy, special attention has been paid to the topics related to tax evasion. This is despite the fact that in domestic and foreign studies, factors such as the existence of a competitive platform and the ease of creating an economic business have been given less attention. Therefore, according to the observed theoretical and practical contradictions regarding the tax behavior of governments and the motivation of individuals to work in the informal sector in developing oil countries compared to developed countries, it seems that for a better view of the causes and The motivation of individuals and companies in the shadow sector should be studied by considering factors other than the tax burden. Based on this, this research intends to answer the following question: What is the relationship between the variables of the competitive environment and the ease of creating an economic business with the shadow economy in developing oil countries?

The importance of conducting research

Considering that little research has been done in the field of the shadow economy in the country, the results of this research can contribute to the expansion and development of the existing theories in terms of dealing with the relationship between the shadow economy and the elements of competitiveness. It provides a foundation for other topics. In this regard and in explaining the theoretical importance of the subject and the reason for the researcher's concern to pay attention to the shadow economy approach and the elements of competitiveness in developing oil countries; Evidence shows that a significant share of the economic activities of developing countries is carried out in the informal sector (International Monetary Fund, 2018). This is while the developed countries have been able to a large extent to provide the grounds for reducing the shadow economy and, accordingly, control its impact on their economy. But among developing countries, the shadow economy has a much higher share and it has been reported to be two and a half times that of developed countries (Ajideh and others, 2022). Therefore, it doubles the necessity of applying the necessary measures.

The shadow economy absorbs vital resources from the formal economy and partially prevents the implementation of policies that are necessary for the public interest. Although some shadow economies may have beneficial effects for some citizens or even the official economy of a country, in general, the shadow economy harms the country's competitiveness. Because it reduces the trust of foreign companies in that country and, as a result, the possibility of their cooperation. On the other hand, competition can provide incentives to bring underground operations to the surface and thus combat the undeclared economy (Poufinas et al., 2021).

In this regard, the correlation between the shadow economy and economic growth has been covered in the literature through a series of empirical studies, and a large number of researches related to the competitiveness and economic development of countries have also been published. As a result, since the shadow economy and economic development are related and competitiveness is a determining factor of

economic development, it seems reasonable to investigate whether and how the two are connected. Using appropriate econometric methods, this study seeks to find evidence that shows that the more competitive a country is, according to the global competitiveness index, GDP per capita, etc., the smaller its shadow economy is. be Therefore, due to the existence of a research gap in this field, the necessity of conducting the present research was felt by the researcher. In addition, conducting this research is very important in understanding the issues related to the shadow economy, and the findings of the research can help experts to better implement the goals and solve the existing complications. It seems that the problem of the shadow economy in many developing countries, especially the oil-rich countries, has been neglected and practically not much attention is paid to this issue.

Shadow Economy

The shadow economy was noticed after the Second World War and following the government's intervention in the economic fields, which led to the creation of strong incentives for economic activists to go to the informal sector (Jafari Samimi et al., 2007).

The starting point of almost all debates about the shadow economy is how to define it or how to estimate its size. Since the term "shadow economy" includes many economic activities, it is difficult to come up with a formal definition. In general, it can be understood that the shadow economy includes the economic activities of people who are outside the official norms and institutions (Enste, 2018).

In the case of shadow economy, there is no agreed definition in economic literature (Egonk and Yilmaz, 2000). The economy of developing countries can be recognized by examining the two parts of the formal economy and the informal (shadow) economy. The official sector of the economy can be easily identified in the light of sources, reports and data contained in statistics and censuses, as well as by studying its structure, but the complex and invisible network of the shadow economy must be identified and evaluated with slow research and the role of quantitative and qualitative found this phenomenon in the country's economy (Ismail Pourian Kandstar, 2019).

Tedds (2018) in a very broad definition, the shadow economy can include all transactions, legal and illegal, market and non-market, which are intentionally excluded from the gross domestic product or excluded from the tax base or activities that are not recognized by the tax authorities.

The shadow economy, which is also known by other names such as underground, informal, black, unregistered, illegal, etc., includes all activities and businesses that are carried out outside the radar of official supervision (Jafari Samimi and Akbari, 2012).

Feige (1997) considers four categories of shadow economy: First, the illegal economy refers to the income from economic activities that violate the law, such as the illegal drug trade, the production and distribution of prohibited goods, and the black market of currency. Second, the unreported economy refers to income that is not reported to government and tax authorities. Like tax evasion. Third, the unrecorded economy, which leads to the difference between real income and production. Fourth, the informal economy that does not follow work contracts, business licenses, and the social system.

The shadow economy is a set of value-added activities that are not defined and included in the laws of the official economy. Activities outside the market of households and non-profit organizations, as well as those market activities that remain out of the eyes of the authorities for various reasons, create a set of activities of the shadow economy (Emadzadeh and Rafiei Tabatabai, 2011).

The following table provides a suitable agreed upon definition for the underground (or shadow) economy. From the table below, it is clear that a broad definition of shadow economy is the unreported income of the production of goods and legal services of any monetary transaction or trading of goods that are subject to tax if reported.

Table 1- Classification of shadow economy activities

All kinds of activities	non-monetary transactions		Monetary transactions	
Illegal activities	Bartering of drugs, stolen goods, smuggling, etc., production or planting of drugs for own consumption, theft for own consumption		Trading in stolen goods, trading and producing drugs, gambling, smuggling, fraud, etc.	
	Tax avoidance	**tax evasion**	**Tax avoidance**	**tax evasion**
legal activities	Do everything yourself and let your friends help you.	Exchange of goods with legal goods and services	Employee discounts, fringe benefits	unreported income from self-employment; Unreported wages, salaries, and assets related to legitimate goods and services

Reference: Schneider and Bowen (2018)

Consequences of shadow economy

The existence of a shadow economy has effects and consequences on the economy of countries. Among them, we can point out the emergence of monetary and financial problems, disruptions in social and economic planning, lack of proper recognition of the economic situation, the application of inappropriate policies and the ineffectiveness of social measures. They deviate. Therefore, knowing the statistics and figures of the activities of the shadow economy sector is of great importance for applying effective and appropriate policies (Hosseini and Nasrollahi, 2016).

Economists believe that the expansion of the shadow economy has both negative and positive consequences for the economy and the society itself. Therefore, it should be considered when implementing the country's economic policy. Therefore, every socio-economic phenomenon or process can have its advantages and disadvantages, and the shadow economy is no exception to this rule because its nature is also dual. So the consequences of the shadow economy can be divided into two categories, positive and negative (Mandroshchenko and others, 2018).

Factors affecting the shadow economy with an emphasis on oil revenues

According to the researchers, there are two different views about the role of oil in the development of the country as a whole: on the one hand, the majority of experts believe that oil has brought significant financial resources for consumption and investment in Iran, and thus the possibility of faster growth for Iran. It has provided national income and for consumption. Undoubtedly, without oil, economic and social growth and development would not be possible at such a speed (Esmail Pourian Kandstar, 2019).

On the other hand, some believe that the structural and institutional weaknesses of the Iranian society have created obstacles for the proper use of the potential of oil revenues, and sometimes the oil rents have aggravated those weaknesses. As a result, while the oil income has helped Iran's consumption and production in some ways, it has caused economic and political backwardness in other ways. Of course, according to the argument of this group, the problem lies not in oil, but in the structures that determine the way oil is used. For this reason, a group of supporters of this view believe that the positive effect of oil on Iran's economy can be strengthened by making efforts to compensate for structural weaknesses and adopting appropriate policies. But many people consider the existence of oil rents to be the main problem. According to them, oil as a whole has been a big disaster for Iran (Esmail Pourian Kandstar, 2019).

Oil revenues account for an important part of the foreign exchange earnings of oil exporting countries and the activities of various economic sectors are affected by it. Iran, as the fourth oil-rich country in the world, can achieve economic development if its oil revenues are properly managed, however, whether before or after the revolution, lack of proper management not only did not lead to economic development, but It has brought more dependence on oil revenues and caused that in the event of a drop in the price of oil, on the one hand, the government budget will be challenged and there will be a disruption in the government's construction and financial plans and programs, and on the other hand, the high price and inflation, which Another of the main consequences of the decrease in oil revenues is to burden the shoulders of the society (Rashidi and Mousavi, 2018).

The impact of income from natural resources on the shadow economy has been discussed in various studies. The evaluation of the effect of this variable on the shadow economy can be considered important considering its role in Iran's economy. With the increase of oil revenues, the government's current budget increases. This also increases inflation. As a result, the desire to participate in underground activities increases. Therefore, with the increase in oil revenues, the shadow economy is expected to increase (Motalabi et al., 2018).

Experts estimate that 80 to 90 percent of Iran's export revenues and 40 to 50 percent of the government's annual budget are oil revenues. The main source of financial aid and subsidies is oil revenues. So macroeconomic variables are directly dependent on oil fluctuations and oil revenues (Esmail Pourian Kandstar, 2019).

Competitiveness index

Today, economic enterprises without global sales and transnational production almost lose the possibility of facing their competitors; Because with multinational production, the cost price of the product can be lowered and by selling on a wide level and in global markets, the profit margin can be reduced in competition with other companies. In fact, the competition in productivity is the face of today's economy in the world. An economy that cannot improve its productivity and knowledge production in such tight competition will only be able to sell raw materials and when these materials are exhausted, the economy will face a major crisis (Shahiki Tash et al., 2016).

Due to the special importance of this issue, the global competitiveness index has recently been proposed, and the World Economic Forum publishes its report every year. In the global competitiveness report, the global competitiveness index is used as a comprehensive tool to measure the fundamental principles of micro and macro economy of national competitiveness. The ranks in this report indicate the ability of each country to sell and provide its products and services and the ability of each country to achieve sustainable economic prosperity in the short and medium term. The competitiveness index of the countries is calculated quantitatively in the range of numbers 1 to 7, based on this, the closer the index is to the number 7, the more competitive the country is. This index is a weighted average of various components that measures different aspects of competitiveness. These components are included in the three pillars of basic requirements, efficiency enhancement factors, and technology factors. The three basic pillars of competitiveness are divided into 12 sub-branches. A total of 199 criteria are decisive in calculating the global competitiveness index (Shahiki Tash et al., 2016)

Competitiveness, economic growth and shadow economy

The theoretical basis of the relationship between competitiveness and economic growth should be sought in the development process. According to development theories such as Rostow's theory (1990), development is a multi-stage process; In this way, without success in one stage, it is not possible to go through another stage. But what happens at each stage of the development process, which causes an economic leap, is related to the competitiveness of the economy (Refah Kahriz et al., 2018).

In fact, the theoretical basis between economic competitiveness and economic growth should be sought in the new developments of the world economy. Today, the economy is defined as a phenomenon without geographical boundaries. Responding to the needs of customers and taking appropriate market share requires transnational production and daily improvement of productivity. When in the context of new economic developments, intense competition for productivity and innovation prevails, if an economy cannot improve or at least maintain its competitiveness, the achievement of economic growth will be faced with a very serious obstacle. In such a situation, the only goal and focus of the economy will be on maintaining the domestic market, and all the power of the economy will be used to counter the entry of foreign goods in order to maintain the domestic production enterprises (which operate only in the domestic market). The result of such performance will be low and volatile economic growth. Therefore, economic growth in the modern world cannot be separated from improving competitiveness. Therefore, today, when we talk about the growth and development of a country or region, the formation of the concept of competitiveness is one of

the issues that are investigated (Refah Kahriz et al., 2018).

In order to carefully examine the theoretical foundations of competitiveness and economic growth, the theoretical basis of the 12 determining pillars of the global competitiveness index (i.e. institutions, infrastructures, macroeconomic spaces, health and education at primary levels, higher education and training of human resources, efficiency of the goods market) , labor market efficiency, financial market development, technology, market size, business skills and innovation and economic growth are analyzed (Kordalska and Olczyk, 2015).

Research literature

Yunus and others (2022), conducted a research entitled "Financial inclusion, shadow economy and economic growth in developing economies". In this study, the effect of financial inclusion and the size of the shadow economy on the economic growth of developing economies during the period of 2008-2017 was investigated. The results show that financial inclusion has a positive and significant effect on economic growth. While in developing economies, the size of the shadow economy has a significant negative impact on economic growth.

Ishak and Farzangan (2022) examined a research on how oil price shocks affect the occurrence of protests in a country and how the size of a country's shadow economy affects this relationship. Using panel data from 144 countries, from 1991 to 2015, evidence was obtained that negative oil price shocks significantly increase protests in countries with a small shadow economy.

Wu and Schneider (2021) conducted a research titled "Nonlinearity of Shadow Economy and Economic Development". This study shows a long-term U-shaped relationship between GDP per capita and the size of the shadow economy using a dataset of 158 countries. According to the authors, the U-shaped pattern between shadow economy and GDP per capita is worth further investigation.

Devin (2021), in a research, investigated the effect of institutions and how institutions affect the formation of the shadow economy. For this purpose, the changes in the size of the informal economy were linked to the changes in the institutional environment and the political cycle in order to show the reason for the size and stability of the informal economy in emerging markets and developing economies. The analysis of this research shows that the influence of quality indicators of financial institutions, commercial and regulatory environment, and political and legal environment on the informal economy are significant.

In a research, Nguyen and Dong (2021) examined the impact of shadow economy and corruption along with public spending, trade openness, foreign direct investment (FDI), inflation and tax revenue on the economic growth of BRICS countries. The data of this article was collected from the World Bank, Transparency International and the Heritage Foundation in the period from 1991 to 2017. The results show that public spending and openness can increase the economic growth of BRICS countries. Also, foreign direct investment, inflation and tax revenue have a positive effect on this growth. In addition, the main finding of the authors is that the shadow economy and corruption control have a positive effect on the economic growth of BRICS countries.

Bakloti and Boujalbaneh (2020) conducted a research titled "Simultaneous equation model of economic growth and shadow economy: Is there a difference between developed and developing countries?" they did. This study establishes the mutual relationship between economic growth and shadow economy for 17 developing countries and 33 developed countries during the period of 2005-2015. It was found that the relationship between economic growth and the underground economy in the countries of the Middle East and North Africa is one-way, but it is two-way in the countries of the Organization for Economic Cooperation and Development. The results also showed that institutional quality strongly interacts with the relationship between economic growth and the shadow economy.

Sahnoun and Abdenaher (2019), in a study of the effects and causal links between the shadow economy and the unemployment rate, using a dynamic simultaneous equation panel data model for 38 developing countries and 40 developed countries during the year 2000. -2015 were investigated. The analysis showed that there is a one-way and negative causality from the unemployment rate to the shadow economy in developing countries. This is despite the fact that in developed countries there is a two-way and negative causal relationship between the shadow economy and the unemployment rate.

Sharifi et al. (2022), in a study, investigated a model (TVP-FAVAR) with the aim of investigating the effect of financial development and tax evasion on the underground sector of Iran's economy along with other related variables. For this purpose, time series data in the period from 1973 to 2015 and two tools of instantaneous and cumulative response functions were used. The results of this research show that the dynamics of the underground economy in response to shocks as much as one standard deviation in financial development has a downward trend and an upward reaction due to the impulse of tax evasion.

Fard et al. (2021), in a study, the causality between financial development (bank-based and stock-based) and the underground economy in Iran's economy was investigated using Hsiao's causality method during the period of 1973-2017. Based on the results, the index of the underground economy in Iran's economy had a low level and a decreasing trend before the oil shock of 1973 and also during the period of revolution and war. But in the rest of the studied years, its trend has been approximately increasing.

Falahti et al. (2020), in a research entitled "Institutional quality, natural resource rent and shadow economy" investigated the effect of natural resource rent and institutional quality on the shadow economy in 87 countries with high inflation and low inflation during the period 2000-2018. The findings of this study show that in both groups of low-inflation countries and high-inflation countries, the increase in institutional quality has reduced the shadow economy, and the rent of natural resources has had a positive relationship with the shadow economy.

Shahbazi et al. (2020), in a research entitled "Asymmetric Effects of Shadow Economy on Financial Development in Iran" investigated the impact of positive and negative shocks of shadow economy on financial development during the period from 1976 to 2015 in short The results of the research show that the impact of positive and negative shadow economy shocks on financial development in the long-term and short-term periods is asymmetric and this asymmetry is such that in the short-term The long-term negative shock of the shadow economy has a greater impact than its positive shock.

Shahabadi et al. (2019) conducted a research titled "Measuring the underground economy in selected developing countries with abundance of natural resources". In this study, the size of the underground economy of selected developing countries with abundance of natural resources was estimated during the period of 2004-2015. The results of the estimation of the underground economy showed that the size of the underground economy in the selected developing countries with an abundance of natural resources was accompanied by fluctuations during the period under review, but overall, this trend is increasing.

Research methodology

This research is practical in terms of purpose, descriptive-correlative in nature, analytical, and post-event in terms of data type. Library and internet information was used to collect the data for this research, and information banks such as the World Bank and the International Monetary Fund were also used to collect the data. The statistical population of this research includes the developing countries that export oil, and based on this, the information related to 72 developing countries that export oil, whose information is available in the research period, were selected as a sample of the research. In this research, a simple sampling method was used. In fact, the sample of this research is all the countries whose information is available for the research variables. In this research, to check the hypotheses, at first, the research model is estimated using the auto regression model method with panel autoregressive distributed lag model (PARDL) for oil exporting countries (natural resources) in order to estimate the short-term effects to determine the long-term research variables in these two sets of countries should be determined. Then, the Markov Switching-VAR method is used for a more detailed examination of the effects of the pillars and factors of competitiveness on the shadow economy in Iran.

The main research model and variables

In this research, following the research of Devin (2021), Medina and Schmidt (2018), Hajili et al. (2017), Model (1) has been used to examine the hypotheses:

$$SHD_{it} = \beta_0 + \beta_1 EDB_{it} + \beta_2 GCIf_{it} + \beta_3 GCIe_{it} + \beta_4 GCIi_{it} + e_{it} \quad (1)$$

Where:
(SHD_it): shadow economy:

It is equal to a percentage of the gross domestic product for the country in question in the year in question.

(EDB_it): ease of doing business index:

The ease of doing business index is obtained for the country in question in the year in question. It is an index created by the World Bank in which a higher rank (smaller number) indicates better, usually simpler, regulations for businesses and stronger protections for private property rights.

(GCIf_it): competitiveness index in input-oriented elements:

Based on the economic theories of development and assuming the calculation of the Global Competitiveness Index (GCI), the economy that is in the first stage of development and according to the Global Competitiveness Report is input-oriented, compares with other countries only based on their natural factors, i.e. natural resources and The labor force competes without basic skills.

(GCIe_it): competitiveness index in the pillars of efficiency:

Economic productivity, which is at a higher stage of competition, increases with the increase in the level of development and wages increase. At this stage, the country is moving towards the second level of development, that is, efficiency-oriented. With the increase in production efficiency, the quality of products and wages increase, but the prices cannot increase.

(GCIi_it): competitiveness index in the pillars of creativity:

A country that is in the stage of innovation (creativity-oriented), wages will increase only if the business has the ability to compete with new and unique products. At this stage, companies should compete by producing new and diverse products using the most complex production processes and new innovations.

Research hypotheses

Hypothesis 1: There is a relationship between the shadow economy and the input-oriented elements of the competitiveness of developing oil countries and developed countries in the short and long term.

Hypothesis 2: There is a relationship between the shadow economy and the efficiency-oriented elements of competitiveness of developing oil countries and developed countries in the short and long term.

Hypothesis 3: There is a relationship between the shadow economy and the elements of creativity-oriented competitiveness of developing oil countries and developed countries in the short and long term.

Hypothesis 4: There is a relationship between the shadow economy and the index of ease of doing business in oil developing countries and developed countries in the short and long term.

Research findings

Descriptive statistics

Table 2 shows the descriptive statistics of the research variables.

Table 2- Descriptive statistics of research variables (developing oil countries)

Variable	mean	median	minimum	maximum	standard deviation	skewness
shadow economy	38/066	35/6	5/5	435/0	22/206	4/833
Ease of doing business	67/042	66	1	148	37/074	0/168
Input-oriented elements	71/084	74	0	169	37/286	0/091
Efficiency oriented elements	63/137	58	2	146	33/325	0/403
Creativity oriented elements	75/447	80	10	96	16/491	-1/387

In the above table, regarding the shadow economy variable, the average value is 38.066, which indicates the balance point and the center of gravity of the distribution; The median value is 35.6, which indicates that half of the data is smaller than it and the other half is larger than it; The largest variable value of the shadow economy is 435 and the lowest is 5.5. Also, the standard deviation is 22.206, which represents the dispersion of the data from the average value; According to the skewness value of 4.833 for the shadow economy variable, the distribution is not completely symmetrical, and also the value of 922.79 for kurtosis, the peak value of the desired distribution is higher than the normal distribution.

The results of the long-term and short-term estimation of the impact of the shadow economy

(SHD_it) on the input-oriented elements (GCIf_it), the efficiency-oriented elements (GCIi_it), the creativity-oriented elements (GCIe_it) competition. The adoption of oil developing countries for the period of 2005-2020 approach (PARDL) is shown in Table 3:

Table 3. Long-term and short-term estimation results of the shadow economy on the elements of competitiveness of developing oil countries

Long term				
Variable name	Regression coefficient	Standard error	t- statistic	p-value
GCII	0/018	0/002	7/848	0/000
GCIF	-0/004	0/002	-2/361	0/018
GCIE	0/000	0/001	0/093	0/926
Short term				
D(GCII)	-0/003	0/004	-0/688	0/492
D(GCIF)	0/016	0/007	2/416	0/016
D(GCIE)	0/000	0/004	0/018	0/986
a	17/078	1/823	9/428	0/000
trend	0/313	0/060	5/211	0/000
Error correction	-0/538	0/040	-13/425	0/000

The results of the estimation in terms of origin and trend indicate that in the long term, between the shadow economy (SHD_it) and the efficiency-oriented elements (GCIi_it), the input-oriented elements (GCIf_it)) developing oil countries, there is a significant relationship, so that with an increase of one unit in the index of efficiency-oriented elements, it is expected that the ranking of the shadow economy will increase by 0.018 units, and similarly, in case of an increase of one unit of the elements of input-oriented economy, the rank of the economy is expected to increase. A shadow is reduced by 0.004 units. This is while the significant relationship between the shadow economy and the elements of creativity-oriented competitiveness (GCIe_it) of developing oil countries was not confirmed. In addition, in the short term, the significant relationship between any of the elements of competitiveness and the shadow economy was not confirmed. Also, the coefficient of the error correction sentence in Table 3 indicates the existence of a significant short-term relationship between the variables of the model. This coefficient is significant at the probability level of one percent and has a negative sign, so that it is expected that in each period, about -0.538 unit deviation of the short-term relationship from the long-term path will be adjusted. The mentioned coefficient in this model indicates the adjustment speed towards the long-term equilibrium relationship. Based on this, the effect of a shock on the competitiveness variables in the short term will last for about two periods (1.86) and after that, the short term relationship will be on the path of long term balanced relationship.

Also, the results of the short-term and long-term estimate of the shadow economy's impact (SHD_it) on the ease of doing business index (EDB_it) of developing oil countries for the period of 2005-2020 approach (PARDL) are shown in Table 4.

Table 4- Results of long-term and short-term estimation of the impact of the shadow economy on the index of ease of doing business in developing oil countries

Long term				
Variable name	**Regression coefficient**	**Standard error**	**t- statistic**	**p-value**
EDB	0/061	0/011	5/763	0/000
Short term				
D(EDB)	-0/006	0/069	-0/082	0/935
a	15/575	1/563	9/967	0/000
trend	0/275	0/058	4/787	0/000
Error correction	-0/551	0/042	-13/052	0/000

The results of the estimation in terms of origin and trend indicate that in the long term, there is a significant relationship between the shadow economy (SHD_it) and the ease of doing business index

(EDB_it) of oil developing countries, so that with the increase One unit of the ease of doing business index is expected to increase the rank of the shadow economy by 0.061 units, while in the short term, there is a significant relationship between the ease of doing business index and the shadow economy of the countries The developing oil was not confirmed.

The coefficient of the error correction sentence in Table 5 indicates the existence of a significant long-term relationship between the model variables. This coefficient is significant at the probability level of one percent and has a negative sign, so that it is expected that in each period, about 0.551 units of deviation of the short-term relationship will be adjusted from the long-term path. The mentioned coefficient in this model indicates the speed of adjustment towards the long-term equilibrium relationship. Based on this, the effect of a shock on the ease of doing business variables in the short term will last about two periods (1.81) of time, and after that, the short-term relationship will be on the path of the long-term equilibrium relationship.

Discussion and conclusion

The shadow economy absorbs vital resources from the formal economy and partially prevents the implementation of policies that are necessary for the public interest. Also, the size of the shadow economy of the countries is different and even in some countries it exceeds a quarter of the gross domestic product (GDP). Although some shadow economies may have beneficial effects for some citizens or even the official economy of a country, in general, the shadow economy damages the country's competitiveness; Because it reduces the confidence of foreign investors in that country and, as a result, the possibility of their cooperation. On the other hand, competitiveness can provide incentives to bring underground operations to the surface and thus combat the undeclared economy. Using appropriate econometric methods, this research found evidence that the more competitive a country is, according to the global competitiveness index, its shadow economy becomes smaller (as a percentage of GDP). More precisely, as it was predicted, there is a negative relationship between the shadow economy and global competitiveness, and these results can help the relevant policy makers to curb the shadow economy with appropriate guidance towards increasing competitiveness. The country should help. The results of this research are in line with the research of Yunus and others (2022), Ishak and Farzangan (2022), Devin (2021), Nguyen and Dong (2021), Bakluti and Boujalbaneh (2020), Sharifi and others (2022) and Karazmoodeh Fard et al. (2021) are matched.

The shadow economy absorbs vital resources from the formal economy and partially prevents the implementation of policies that are necessary for the public interest. Although some shadow economies may have beneficial effects for some citizens or even the official economy of a country, in general, the shadow economy harms the country's competitiveness. Because it reduces the trust of foreign companies in that country and, as a result, the possibility of their cooperation. On the other hand, competition can provide incentives to bring underground operations to the surface and thus combat the undeclared economy. Since the shadow economy and economic development are related and competitiveness is a determining factor of economic development, it seems reasonable to investigate whether and how these two are connected. Using appropriate econometric methods, this study seeks to find evidence that shows the more competitive a country is, according to the global competitiveness index, GDP per capita, etc., the smaller its shadow economy will be. It seems that the problem of the shadow economy has been neglected in many developing countries, especially oil-rich countries, and practically not much attention is paid to this issue. Therefore, the current research deals with this completely new issue and it is expected that due to the importance of these indicators in the motivation of people, job creation and economic activity in a country, it is necessary to examine the changes of these variables in the informal sector and thus The impact of various variables such as the competitive atmosphere in the economy and the index of ease of doing business in the informal sector should be better understood for developing oil countries.

A country that is interested in ensuring that its shadow economy will not expand; It should improve its competitiveness. Competition is a multidimensional and complex concept, especially when it refers to the national economy. Various indices of competitiveness describe its size and also its dimensions with regard to commercial activity, infrastructure and institutional environments and macroeconomics. At the same time, the competitiveness of a country primarily depends on

its economic development, which in turn is affected by several factors. Some of these factors, such as investment, favorable business conditions, legal environment, etc., promote economic development, while others, such as low labor productivity, insufficient qualification of employees, etc., cannot meet the requirements of the labor market. They slow down the speed of economic development. Another thing that was confirmed in this research is the existence of a long-term relationship between the ease of doing business and the size of its shadow economy. In this regard, there is evidence that a country may be able to fight the shadow economy by increasing the ease of doing business. In fact, the shadow economy of a country is the result of the interaction between socio-economic development and its long-term psychological and cultural factors. Some of these factors can be considered and recognized as influential factors only with regard to the shadow economy and competition, but they cannot be significantly affected, at least in the short term. The issues can be considered in terms of the problem of people's mentality. A practical way to deal with the problem of the shadow economy, that is, to reduce the size of this phenomenon, is to promote socio-economic development and ease of doing business. When an economy is growing, ease of doing business also increases a country's competitiveness and most importantly, it helps to form a positive public attitude towards self-efficacy. By increasing business dynamism, developing skills, promoting the adoption of information and communication technology (ICT), increasing market size and infrastructure can be achieved. In addition, restrictive laws and higher living standards may lead to a reduction in the shadow economy. Higher levels of GDP also potentially provide a stronger financial system through macroeconomic stability and can provide more assistance in this area in addition to the guidelines that are formulated to curb unemployment. , because people can do transactions through the formal economy instead of the informal economy. In this regard, increasing exports as a percentage of GDP seems to be a useful tool to reduce the shadow economy. This is while reducing the consequences of the shadow economy through the ease of doing business and increasing GDP per capita and exports (as a percentage of GDP) is definitely a difficult task for the respective countries. However, achieving higher levels of (perceived) competitiveness is not inconceivable. According to the findings of the research, it can be generally stated that competitiveness is the ability of a country to maintain its relative advantages in order to support the economic growth and prosperity of its citizens, and the ease of doing business with the shadow economy. The suggestions based on the research findings are:

1) Considering the relationship between the shadow economy with the input-oriented, efficiency-oriented and creativity-oriented elements of competitiveness, it is important to pay attention to the degree of development of countries in policy-making as well as the implementation of programs. In fact, the executive policies of each country are different according to the level of development. Therefore, some countries need improvement in some elements of competitiveness, and in others this necessity is not felt. Therefore, it is suggested that this should be considered in improving activities related to improving competitiveness and ease of doing business, as well as reducing the shadow economy.
2) According to the results of the research, based on the relationship between the shadow economy and competitiveness, it is suggested to developing and developed oil countries to achieve desirable competitiveness at the national level, to factors such as "infrastructure sound legal and judicial system", "effective competitive regime", "suitable market regulations for competition-friendly products" and "efficient bankruptcy regime" have paid special attention, because without these cases, the industry will not be able to "efficiency in allocation", "efficiency in production" It will not have "effectiveness in dynamics". These three cases provide the basis for the emergence of market forces, provide the basis for the allocation of resources to productive firms, demonstrate cost reduction in practice, and provide incentives for new entrants to develop in the industry.
3) According to the results of the research based on the relationship between the shadow economy and the ease of doing business index, paying attention to the effective factors in this area can affect the level of ease of doing business and subsequently reduce the shadow economy and economic growth. Be stable, helpful. Therefore, in order to achieve

this goal, it is suggested that the governments take appropriate policies and measures such as:

- Proper implementation of the value-added tax law and the comprehensive tax law of the country in order to prevent tax evasion and reduce redundant administrative bureaucracies;
- Harmonization of interest rates and fees of loan facilities granted by banks and financial and credit institutions with the rate of production efficiency in Iran (currently, the rate of production efficiency in Iran is 9% in the most optimistic conditions, while the bank interest rate is based on the proposals made to the council Excellent money and credit, at least 20% will be for cooperative contracts);
- Requiring the government to implement the General Policies Law of principle No. 44 of the Constitution and increasing the share and role of the real private sector in the country's economy;
- Honoring the high status of entrepreneurs in the society as stars of the society; etc.

To have an effect on the formation and performance of businesses and to improve the ease of doing business.

4) Considering the relationship between the shadow economy and competitiveness as well as the ease of doing business, governments and policy makers should consider the level of development of the country and with the understanding that the conditions of the country's development and existence The necessary tools to increase the quantitative and qualitative level of people's cultural level are different in different countries. Approve and implement different educational programs in order to institutionalize the culture of the formal economy and also to understand the disadvantages of the shadow economy, and avoid implementing the same programs.
5) According to the experimental results in this research, the elements of competitiveness, which are among the factors affecting the level of development of countries, none of them can replace each other, and therefore it is suggested that, for the effectiveness of government policies and increasing productivity, these separate elements and be considered complementary to each other so that the efficient use of the aforementioned elements can be realized in order to improve the competitiveness.

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