

Article

# Preventing Oil Shock Inflation: Sustainable Development Mechanisms vs. Islamic Mechanisms

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**Abstract:** This paper discusses the effects of both sustainable development and an Islamic system on the transmission of oil shocks into inflation. Sustainable development in this context includes wealth distribution equity, public governance effectiveness and alternative energy creation for the promotion of economic growth. These factors have been revised by Askari and Mirakhor under an Islamic approach using a set of Islamic indices to reflect a social, economic, political and ecological system that is in compliance with the Sharia principles. Using the ARDL model, we tested whether these Islamic mechanisms could have played the role of sustainable development in the fight against the transmission of oil shocks into inflation in MENA countries during the period 2000–2018. The results show that the Islamic system can play the role of sustainable development better than the traditional one, through fostering social equity, fighting against corruption, promoting humanity in employability and facilitating growth of the real economy. These Islamic values slow down the inflationary phenomenon caused by oil shocks.

**Keywords:** oil shocks; inflation; sustainability development; Islamic governance; Islamic index



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## 1. Introduction

Oil energy constitutes the principal energy for production. In fact, a rise in oil prices systematically leads to a rise in consumer prices, and consequently an inflationary trend. This occurred during the 1970s and recently during the Ukrainian war in 2022. Thus, consistent inflation is considered a macroeconomic policy objective in that it reflects a prosperous economy (Alvarez et al. [1], Misati et al. [2], Sek et al. [3], Valcarcel and Wohar [4], Lacheheb and Sirag [5], Nusair [6], Raheem et al. [7]).

Oil shocks lead to inflation, contributing to a decline in production and in productivity across the cost channel. This phenomenon is pointed out in the ‘pass-through’ theory (Shin and Smith [8], Ayadi [9]). However, this transmission can be slowed down by several mechanisms, namely monetary corrections, economies of scale, changes in customer behaviour, etc. (Hooker [10], Bratsiotis et al. [11]).

The rise of inflation due to oil shocks has been discussed recently by Aharon et al. [12] in the context of the COVID-19 pandemic. They showed that the pandemic led to improved inflation by oil shocks and that these shocks were asymmetrical (negative as well as positive shocks) in the ASEAN5 + 3 countries: Malaysia, Singapore, Thailand, the Philippines, and Japan. Asymmetric oil shocks causing inflation was first discovered by Anyars and Adabor [13] in Ghana. Their findings show that the sector most affected by the oil shocks is the transport sector followed by the food and energy sector. Babuga and Naseem [14] argued that the pass-through impact of oil shocks on inflation depends on the energy intensity and its regulation in the channel by other substitutable energy. Chen et al. [15] found that the transmission of oil shocks led to food inflation in Ghana.

Meanwhile, historical data show that when oil shocks in an Islamic regime lead to inflation, and the regime aggravates the transmission into inflation. For example, the

Islamic Revolution in Iran in 1976 exacerbated the energy crisis that occurred in 1973. According to Hooker [10], the United States felt an insignificant impact of the oil shocks on inflation. He purported that oil shocks in a liberal regime does not contribute to inflation.

Taking into account these views, we pose certain questions: Does the application of the Islamic system contribute to inflation and poverty? Can the Islamic system solve economic problems? Why do communities choose to attach themselves to Islam if the religion has a negative impact on the economy and society? The response to these questions are as follows.

There is a significant divergence between Islamic governance practices and theoretical Islamic governance. When applied incorrectly, Islam can have negative effects on the economy. The Islamic system is not the system of a specific regime or a specific Muslim country. On the contrary, the Islamic system is a general and homogenous one that can be observed in non-Muslim as well as Muslim countries. Therefore, the bad economic experiences of various Islamic regimes should not be taken as a reference.

This paper presents a short theoretical overview of the classic regulation mechanisms for when oil shocks cause inflation. It then focuses on the role of sustainable development mechanisms in fighting against inflationary trends ensuing from oil shocks. According to the EU settlement, sustainable development mechanisms include income equitable distribution, employability and stability, the fight against poverty, the role of the state in promoting investment, the creation of new sources of energy (such as renewable energy) and the protection of natural resources.

Alongside these mechanisms, we find similar mechanisms based on Islamic Sharia principles, such as social equity, investment in tangible goods, the fight against corruption and poverty, the protection of the environment, humanity and the value of work and state support. However, again, these mechanisms are derived from Islamic rules and practices (social, economic and political) as mentioned in the Qur'an and Sunna.

To investigate the theoretical Islamic system, we refer to Mirakhor and Askari [16], who described the degree of application of the Islamic system in both Muslim and non-Muslim countries. These authors created a collection of Islamic indices that reflect human and political rights, ethical value as labour value, transparency interdiction of fictive activities as money speculation, interdiction of excessive risk-taking, democracy and equality between the genders.

This study ranks countries in terms of how Islamic they are. The most Islamic Muslim country is Malaysia, ranked 37th, and the most Islamic Arab country is the United Arab Emirates, ranked 43rd. Iran is ranked 132nd. While the most Islamic country is non-Muslim, New Zealand, followed by Denmark, and Ireland.

The primary aim in this paper is to answer this following question: Can Islamic social, political and economic mechanisms be a complement to sustainable development to fight against the transmission of oil shocks into inflation?

Thus, the contribution of this paper is to show how theoretical Islamic practice can resolve oil shock transmission and mitigate inflation.

To answer this question, in Section 2, we begin with the theoretical literature describing the fundamental theories of the relationship between oil shocks and inflation and whether the classic sustainable development model and the Islamic social, economic and political mechanisms can slow down the inflationary trends. Next, Section 3 describes the methodology using an ARDL model to test the effect of classical sustainable development and Islamic rules on the relationship between oil shocks and inflation. Section 4 presents the main results, followed by the discussion in Section 5 and finally, Section 6 concludes the paper.

## 2. Brief Literature Review

There is insufficient literature on Islamic sustainable development and its relationship with oil shocks. Even the notion of Islamic sustainable development does not figure in the literature review. This literature review does, however, discuss socioeconomic Sharia

principles, sustainable development (energy renewal and social equity), inflation and oil shocks. Therefore, we will opt to present the literature separately, and then we will try to gather them into a single model in the methodology.

### *2.1. Relationship between Inflation, and Oil Shocks*

Oloko et al. [17] examined the effect of oil price shocks on inflation persistence in the top ten oil-exporting and oil-importing countries using an FCVAR model. These authors showed that the transmission of oil shocks into inflation is slowing down in a floating exchange rate system and inflation targeting. Meller and Nautz [18], Gerlach and Tillmann [19] and Bratsiotis et al. [11] showed that the persistence of inflation rates due to the oil shocks corresponds to an effective monetary policy.

The impact of economic aggregate factors on inflation oil shocks transmission have been discussed by many authors. For example, Berument et al. [20], have shown that in Turkey, the inflationary effect was mitigated when national wages, interest rate, rent and income are adjusted to crude oil price. Hooker [21] and Lescaroux and Mignon [22] showed that a change in production and consumption behaviour reduces the energy intensity of advanced economies and slows down the transmission of oil shocks into inflation. However, the same author, in his study in 2002 (Hooker [21]), identifies a structural break in the Phillips curve of inflation in the United States and finds that oil price transmission has become negligible since 1980. Gregorio et al. [23] used a Phillips curve and a rolling VAR model to point out that a decline in oil price during inflation is mainly due to the degree of development of the economy.

Oil supply chain management plays an important role in the price of goods and services. However, Kilian [24] showed that oil shocks can be slowed down by good crude oil supply chain policy. In addition, Zhang et al. [25] found that oil supply shocks mainly affect inflation. Peersman and Robays [26] found that the effects of oil price shocks on inflation in Europe were mainly due to wage growth. Therefore, the lack of increase in wage limits the shock transmission.

In addition, the oil shocks can affect all economic activity as well as inflation. Cunado and Perez [27] tested the effect of oil shocks on the economy and in consumer price in Asian countries. They found that the effects of oil shocks on the overall economy is significant and that it is important that the country affected by the shocks use local currency for oil transactions. This effect is for the short run.

In contrast, Cunado et al. [27] showed that during oil shocks, supply has a limited impact on the economy and on consumer price. However, demand has a significant impact on oil shocks. During oil shocks, the supply is limited by the interest rate and by exchange rate regulation.

### *2.2. Regulation of the Transmission of Oil Shocks by the Mechanisms of the Sustainable Economy*

According to the OECD, a sustainable economy can be identified by the production of renewable energies and also by equity and social rent. A sustainable economy is characterised by a good distribution of wealth between households, employability stability and poverty reduction.

Bovar et al. [28], based on the EU agreement in 2006, proposed 11 critical indicators of a sustainable economy: GDP per capita growth rate, total greenhouse gas emissions, share of renewable energy in gross domestic energy consumption, transport energy consumption, resource productivity, index of the abundance of common bird populations, catches of fish outside safe biological limits, healthy life expectancy, rate of risk of work after social transfers, the employment rate of older workers (55–64 years) and official development assistance.

Crude oil and renewable energy consumption plays a vital role in producing a sustainable economy. According to the World Bank, from 2010 to 2016, the total consumption of renewable energy increased by more than 106%. However, the consumption of crude oil is almost 30% of total world energy consumption. Given the development of the renew-

able energy industry, several researchers have examined the association between oil and renewable energy prices.

Maghyreh and Abdoh [29] studied the dependence of stock prices and oil prices in clean energy and in oil and gas companies, respectively. Their empirical results show that oil shocks are more important in oil and gas stock returns than in clean energy equity returns. These findings have important practical implications for investors and policymakers interested in investing in fossil fuels and renewable energy.

Kumar et al. [30] investigated the sensitivity of energy prices to oil price changes. They show that the link between fossil fuel and renewable energy prices varies in different time horizons, such as in the short or long term.

In terms of employability, Mehra and Herrington [31] reported that inflation is affected by its past; they expected values that correspond with oil supply and employability shocks.

### *2.3. Involvement of Islamic Religious Mechanisms in the Economy*

The Islamic religious system is not limited to religious practices; it is oriented to the relationship between human beings and Allah, between human being and human being and between human being and the environment. This paradigm has been discussed by Dariah et al. [32] and Askari et al. [33]. The relationships are meant to systematically lead to sustainable development. Through these relationships, Islam promotes not only the embodiment of spiritual power but also promotes equity and well-being of humans and develops a system based on governance, economy and law. This is not Sharia law but is the applied law that results from Islam principles.

An Islamic socioeconomic system is a system of governance based on maintaining the social equity of wealth distribution, upholding property rights and prohibiting money speculation. Any creation of money without a tangible counterpart is assumed to be fictive money, which is prohibited by Islamic laws. Economically, fictive currency leads to a divergence between the natural and financial spheres. Indeed, economic shocks, such as oil and inflationary shocks result from this divergence.

In this context, Lattanzio [34] showed that religious and cultural practices majorly affect the country's economic performance. Therefore, Sharia law's institutionalisation in a Muslim country's legal system entails a higher economic cost. However, the government's application of existing social norms leads to decisive economic results. On the financial level, Gassouma et al. [35] showed that the more the interest rate converges towards a tangible social rate, the more the Sharia law is verified, and the conventional and Islamic banks' efficiency improves.

Islamic sustainable development has been tested in countries of the Islamic Conference organisation. Gabbasa et al. [36] showed that energy consumption is positively connected to economic growth. This energy is mainly natural gas and crude oil. Islam urges the preservation of resources. Alternative energy utilisation, such as hydropower, solar power, wind power, geothermal power and biomass power, is encouraged. The use of renewable energy can enhance economic growth in Muslim countries and thus promote a more sustainable development of the economy.

The effect of oil shocks on the profitability of Islamic and conventional banks has been discussed by Esmail et al. [37]. They showed that oil shocks are more quickly absorbed by Islamic banks than by conventional ones and that Islamic profit against these shocks is more stable and resistant. This study leads us to conclude that Islamic systems of banking reduce the transmission of oil shocks.

On the other hand, Hossain [38] have shown that by adopting a real interest rate, the Islamic system is developing the economic growth which is reducing the inflation. Choirruzad [39] have shown that sustainable economic has been ensured in Indonesia by the interaction between Islamic economic movement, Islamic scholars, and the state and business actors. Widiastuti et al. [40] have given importance to human quality in the organisation of Islamic corporation countries. They have shown that the Islamic human quality can reduce poverty through Zeket mechanism. Ozdemir et al. [41] have demon-

strated that Islamic participation financing and microfinance can ensure development in Turkey. Alshater et al. [42] have shown that the fintech can ensure a sustainable nation by Islamic Finance mechanisms. Azmi [43] have shown that investing in sustainable and Islamic equity conjointly more profitable than investing only in sustainable equity.

Mensi et al. [44] have studied the Islamic system in Muslim countries. They have shown that the adoption of an Islamic banking system can ensure economic growth whereas all conventional systems have no significant impact on economic growth as human development index, the education and the rule of law regardless of regime failure.

Rizvi et al. [45] have pointed out the importance of green bond and Islamic bond financing in choosing investors in the financial market. They found that the investors used the green and Islamic bonds in the stable period. However, they used crypto money and bonds during the unstable period. Doruk [46] have proven the effectiveness of the Islamic system in managing the crisis in Turkey during the COVID-19 pandemic. In the same context, Bakkouche et al. [47] have pointed out that Islamic values have no effect on stability and thus cannot ensure sustainability in Muslim countries.

### 3. Data and Methodology

Our methodological approach is based on the empirical work of Nasir et al. [48] and Oloko et al. [17]; they examined the link between oil shocks and inflation, according to the pass-through policy. The authors used an ARDL model that tested the effects of inflation on its past values and on a set of macroeconomic factors.

In this paper, we will use the ARDL model by integrating supplementary factors to ensure that sustainable development can slow the inflationary phenomenon caused by oil shocks. To this end, we integrate a series of sustainability indicators that were chosen by Bovar et al. [28], such as GDP per capital, employability rate, quality of governance and renewable energy consumption.

Our choice of the ARDL model is supported by Anyars and Adabor [13]. The model is suitable for analysis because it takes into account all the factors and computes the asymmetric shocks. Alekhina and Yoshino [49] demonstrated that the model can calculate the reaction of inflation to oil shocks and give a variation of the most popular change (increase or decrease). This is contrary to the VAR model, which does not solve the asymmetric reaction. The VAR model has been used by Celik and Akgul [50] in the Turkish context and by Skakun [51] and Renou-Maissant [52], who used the augmented Phillips curve. This method allows to test the stability of oil shocks. However, the ARDL model describes the long- and short-run relationship between sustainable factors and inflation and not just between price and inflation. Zivkov et al. [53] employed the wavelength-based Markov switching model to test the dynamic change of oil price due to inflation. In contrast, in our study, we measured the dynamic change using the autoregressive model as oil shocks.

In addition, the efficiency of our chosen model was proven when the sample size was relatively shorter, as pointed out by Shin et al. [8], and it could solve the endogeneity inherent to the variables.

Our contribution in this empirical study is to provide an Islamic ethical scope to sustainable development in accordance with the classical one. In other words, we are trying to test whether applying the economic standards and Sharia principles of society and governance will make it possible to slow down the transmission of oil shocks into inflation and accordingly allow the Islamic system to play a sustainable development role.

The Islamic mechanisms that we are considering are issued from the work of Askari and Mohammed Khan [54], Askari [55,56] These authors created a set of Islamic indices reflecting the economic and social law in Islam.

#### 3.1. Data

We chose a sample of MENA countries, mainly the Arab-Muslim countries that went through a phase of economic and political revolutionary transition during the period from



2000 to 2018: Algeria, Egypt, Lebanon, Libya, Syria, Tunisia and Yemen. The data were obtained from the World Bank and the International Monetary Fund databases. This period was chosen due to the events that transpired during it, such as the Arab revolutions in 2011, the Syrian crisis and the inflation phenomenon in Tunisia (according to National Institute of Statistics in Tunisia). In addition, the Islamic indices were collected from the Islamic Foundation database [57].

### 3.2. Econometric Model

The model we are going to propose is an NARDL model (Oloko et al. [17], Pesaran and Shin [58], Pesaran et al. [59], Shin et al. [51]). It aims to explain inflation by a set of sustainable development factors and by the Islamic indices designed by the Islamic Foundation. These indices show how Islamic sustainable development can play a complementary role to classic development.

$$y_{i,t} = \alpha_0 + \alpha \sum_{j=1}^n \varnothing_j y_{i,t} + \beta \sum_{j=0}^n \varnothing_j X \times Shocks_{i,t} + \vartheta \sum_{j=0}^n \varnothing_j Y \times Shocks_{i,t} + \varepsilon_{i,t}$$

The inflation rate (y) is explained by its past values, its historical oil shocks and a vector of variables (X) representing both sustainable development and the Islamic indices. The ranks are determined using the AIC information criterion.

The purpose of the model is to test the effect of classic sustainable development in comparison with Islamic governance in stabilising the transmission of oil shocks into inflation. As a result, and in order to simultaneously test these three factors, we have decided to integrate into this model combined variables between classical sustainable development indicators (X\*shocks) and oil shocks and between these last and Islamic indices (X\*Shocks).

#### 3.2.1. Measurement of Oil Shocks

The oil shocks are measured by the errors function of oil price as demonstrated by Salisu and Oloko [60]. We choose the autoregressive model, AR(p), to predict the oil price. The difference between expected and realized value constitute the residual term. These residues are considered as the innovations that affect the oil price at each time. They show an unexpected variation caused by a wide array of factors. The price of oil is the price of a barrel in USD.

After checking the stationarity of the oil price, the optimal order of delay is 1. Table 1 reports this lag using the Akaike Information Criterion (AIC):

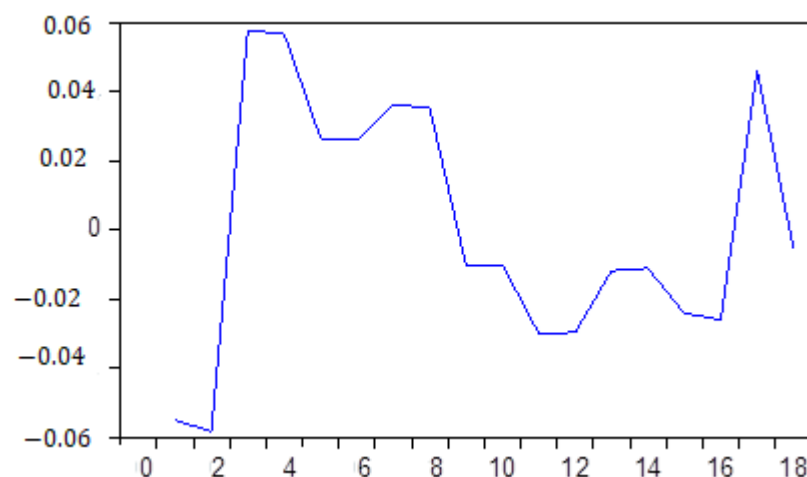
$$OP_{i,t} = \beta_0 + \beta_1 \sum_{j=1}^p \varnothing_j OP_{i,t} + \varepsilon_{i,t}$$

**Table 1.** Estimates of AR (1) oil prices.

Oil Price	Coefficient	Std. Error	t-Statistic	Prob.
AR (1)	0.971991 ***	0.020302	47.87556	0.0000
R-squared		0.827037		
Akaike Information Criterion (AIC)		−1.221666		
Durbin–Watson stat (DW)		2.059112		
Schwarz criterion (SC)		−1.167554		
Hannan–Quinn criterion		−1.199809		

\*\*\* Represents 1% significance level.

Figure 1 reports the variations in oil shocks across all period from 2000 to 2018.



**Figure 1.** Evolution of oil shocks.

We note that the MENA countries have been affected by negative oil shocks during 2009–2016. These last shocks are mainly linked to the subprime crisis in 2008 and the Arab revolution in 2011.

The positive shocks occurred from 2003 until 2008 and then in 2017–2018. They were mainly caused due to the US oil supply crisis in the Middle East in 2003, and hence the effect continued until 2008. On the other hand, the Arab revolution of 2011 led to a decrease in oil price until 2016, and thus it resumed intensively towards a bullish shock in 2017.

### 3.2.2. Description of the ARDL Model: Sustainable Development Variables and Islamic Indices

The dependent variable chosen for this model is inflation (**INF**) (Mehra and Herrington [61], Fuhrer [62], Lagoa [63] and Marfatia [64], Nasir et al. [48,65,66]). Using the World Bank database, we measured inflation using the evolution of the consumer price index (CPI).

We divide sustainable development into four factors: socioeconomic development, labour value creation, public governance quality and the importance of alternative energy compared to oil energy. Our methodology for choosing these variables is inspired by the EU and the OECD agreements.

In addition, we aimed to give a corresponding Islamic value for each sustainable factor included in this model. To that end, we used the Islamic indices created by Askari and Rahmen [67], updated by Askari and Khan [54,68] and Askari and Mirakhor [69] and published by the Islamic Foundation. We have found that these indices are a sound judge of economic durability and political and social Islamic life.

To reflect socioeconomic development, we chose the GDP per capita rate as an indicator of sustainable development of economy and society, whereas for the Islamic economic index, we opted to use the Islamic indices of the Islamic Foundation.

- The GDP per capita rate (**GDPC**). This variable measures the distribution of income of the households of each country. We can also refer to the GINI index which better describes the social equity of wealth distribution. The lower the GINI index, the more validated is the social equity. However, this variable in the World Bank database is not calculated for all years. It was therefore decided to retain the variable growth rate GDPC. **The Islamic analogue variable of GDP per capita rate is the Islamic economic index.**
- Islamic economic index (**IEI**). This index is made up of several indicators: the degree of an economy's compliance with Sharia principles (prohibition of money speculation [*riba*], prohibition of arbitrage money operations, prohibition of fictitious sales, prohibition of debt trades, financing only tangible goods and services and no financing money without tangible counterparts). In addition, gender, regional and social equity

are also considered in this index. Similarly, education and public healthy quality are part of this index.

Labour value creation is ensured by the stability and duration of work. For this reason, we followed the work of Mehra and Herrington [61] and used employment as a variable describing this field. Employment ensures wealth allocation and money creation. To establish an equilibrium between the natural sphere and financial sphere needs, the wages and production need to be equal. Since the economic value of work is measured by total wages, work contributes systematically to this equilibrium and hence to economic sustainability, which reduces inflation and economic shocks.

Based on this idea, we found that this variable plays a fundamental role in Islamic economic development. Work is a crucial element in the economy according to Sharia principles. Work makes it possible to create money through the production of tangible goods. Without work, fictitious money is created instead of real money. According to religious Islamic jurisprudence, any increase in money without a real counterpart (tangible goods and services) is considered a fictitious money supply called *riba*. Hence, work limits this last speculative component and ensures sustainable production. Labour has been studied by Magd and McCoy [70] on a sample of Islamic financial institutions in Oman. They showed that the availability of the labour pool with relevant industry knowledge will be a vital factor for sustainable growth and development.

- Employability rate (**EMP**). Employment is defined as the proportion of people in the labour force to the total number of working age people.
- Islamic labour index (**ILI**). This index combines several Islamic social indicators, including the development of humanity, the presence of women in work, democracy, job satisfaction and freedom of work and expression.

The quality of governance can also ensure sustainable development. As a result, we introduced three variables measuring the quality of public governance in each country: the quality of governance index, the public assistance to development index, and the Islamic governance index.

- Quality of governance index (**GOV**). This index captures the quality of public services, the degree of its independence from political pressures and the credibility of the government's commitment to policies chosen by each country.
- Public assistance index (**PUB**). This variable refers to the amount of public loans granted to the economy at concessional rates for development.
- Islamic governance index (**IGI**). This index is derived from the Islamic Foundation according to the work of Askari and Mohammed Khan [67]. This index is an indicator that considers green and environmental factors. It is calculated based on the following concepts.
  - Legal integrity
  - Managing natural resources (water, renewable energy, and oil quality)
  - Governance (political stability, fighting against violence, and fighting against corruption)
  - Public subsidy actions for the poor and protection of the environment.

To reflect the role of renewable energy as a sustainable development mechanism to address macroeconomic shocks, we have included the following variable.

- The consumption of renewable energy in total energy consumption (**REN**) indicates the intensity of the use of alternative energy compared to oil and natural gas. This variable has been used by Maghyereh and Abdoh [29], Kumar et al. [30] and Mehrara et al. [71] in their work on oil shocks and oil company returns.



All of the variables discussed above are then combined with the oil shock variable, and the final model is written as follows.

$$\begin{aligned} INF_{i,t} = & \alpha_0 + \alpha \sum_{j=1}^n \varnothing_j INF_{i,t} + \beta \sum_{j=1}^n \varnothing_j SHOCKS_{i,t} + \delta \sum_{j=1}^n \varnothing_j Shocks * GOV_{i,t} \\ & + \theta \sum_{j=1}^n \varnothing_j SHOCK * IGI_{i,t} \\ & + \mu \sum_{j=1}^n \varnothing_j EMP_{i,t} + \pi \sum_{j=1}^n \varnothing_j SHOCKS * ILI_{i,t} \\ & + \rho \sum_{j=1}^n SHOCKS * IEI_{i,t} + \sigma \sum_{j=1}^n SHOCKS * GDPC_{i,t} \\ & + \tau \sum_{j=1}^n \varnothing_j SHOCKS * PUB_{i,t} + \varphi \sum_{j=1}^n SHOCK * RE_{i,t} + \varepsilon_{i,t} \end{aligned}$$

The variables of the model are described as follows: inflation (**INF**) and its past values of order (n), oil shocks (**Shocks**), the combination of oil shocks and the quality of governance (**Shock\*GOV**), the combination of shocks and employability rate (**Shock\*EMP**), the combination of shocks and public assistance index (**Shocks\*PUB**), the combination of shocks and the Islamic labour index (**Shocks\*ILI**), the combination of shocks and the Islamic governance index (**Shocks\*IGI**), the combination of shocks and GDP per capita (**Shocks\*GDPC**), the combination of shocks and Islamic economic index (**Shocks\*IEI**) and the combination of oil shocks and renewable energy consumption (**Shocks\*RE**).

Table 2, which reports the descriptive statistics of all the variables included in the model.

**Table 2.** Statistical summary of variables.

Variable	SHOCKS	PUB	EMP (%)	ER (%)	GOV	IEI	ILI	IGI	Oil Price	GDPC (%)
Mean	0.000738	$1.40 \times 10^9$	37.3238	4.03522	−0.61685	0.69779	0.51888	0.54635	0.34800	1.18201
Median	−0.003000	$4.75 \times 10^8$	39.5712	2.61415	−0.59718	0.45658	0.28854	0.32200	0.24031	1.30007
Max.	0.143247	$2.21 \times 10^{10}$	51.3000	16.0719	0.64352	4.19737	4.98355	5.14706	0.94000	121.779
Min.	−0.081911	7,610,000	0.00000	0.05900	−1.69147	0.31425	0.07951	0.06400	0.06000	−62.3781
Std. Dev.	0.048804	$2.70 \times 10^9$	9.25422	4.17990	0.53100	0.83701	0.82586	0.79291	0.26362	13.7468
Skewness	1.078078	4.371541	−2.64368	1.38531	0.31894	2.98167	3.66985	3.82983	0.87343	3.78132
Kurtosis	4.593302	27.67806	11.1129	3.90714	2.79671	10.6949	16.3709	18.3057	2.28226	44.5151
J-Bera	16.17213	4198.370	203.179	53.8282	2.07305	600.229	1473.46	1855.25	13.96930	11,277.74
Prob.	0.308	0.1487	0.35468	0.4579	0.35469	0.89745	0.5487	0.54781	0.92600	0.547210
Obs.	152	152	152	152	152	152	152	152	152	152

#### 4. Validation and Estimation of the ARDL Model

After validating the stationarity and the cointegration, the ARDL model showed the following ranks: 1, 1, 0, 0, 3, 4, 3, 3, 0, and 0. The ranks were obtained using the AIC, and SIC information criteria and HQ, while admitting the smallest amount of information possible.

The stationarity test used was the Levin and Lin Test. The result is described in Table 3. All variables are stationaries in level, except the Islamic economic index (IEI) and the public development loan index (PUB), which became stationary after the first difference.

**Table 3.** Stationarity of variables ARDL.

Variables	t-Statistic	p-Value
Shocks ***	−3.0985	0.001
INF ***	−7.1400	0.000
GDPG ***	−5.8124	0.000
IEI	3.53	0.999
IEI (d1) ***	−12.4516	0.000
EMP **	−2.1017	0.0178
ILI **	4.5203	0.014
GOV ***	−2.3748	0.0088
PUBDEV	1.2708	0.8989
PUBDEV (d1) ***	−8.9566	0.000
IGI ***	−12.1155	0.000

\*\* Represents 5% significance level, and \*\*\* Represents 1% significance level.

In order to have a common sample with unique specificity, we used the one-way ANOVA test. The results are described in Table 4 and they show a significant value of Fisher, indicating that the sample is homogenous.

**Table 4.** One-way ANOVA test of endogeneity test of sample.

Country	SS	MS	F	Prob > F	chi2	Prob > chi2(b)
<b>KSA</b>						
Between groups	0.0564	0.0214	0.74	0.69	19.35	0.000
Within groups	0.745	0.0421				
Total	0.8014	0.0635				

**Notes.** The null hypothesis of the test is the equality of the means of Inflation of each country.

The data is panel data. It is necessary to verify the specificity of the variables effect of the ARDL model in order to arbitrate between common effect through the sample or heterogenous effect. In this sense, we used the Hausman Test to arbitrate between fixed and random effect. The result of the Hausman test is described Table 5. The test retained the fixed effect for the estimation of the model.

**Table 5.** Homogeneity test of panel and Hausman test.

Hausman Test: Fixed Effect against Random Effect	Chi2(10) = 31.18 ***
Mean Group via Pooled Mean Group	Chi2(10) = −4.19
Pooled Mean Group via Fixed Estimator	Chi2(10) = 17.56 ***
Mean Group via Fixed estimator	Chi2(10) = 29.15 ***

\*\*\* Represents 1% significance level.

In addition, we wanted to know the homogeneity of this estimation. Hence, we used a comparison between the mean group estimator and the polled mean group against the fixed effect. We found that the fixed effect is the better estimator because the panel is homogenous, and the countries shared the common effect. The result of the homogeneity test is described in Table 5, Homogeneity and Hausman Test.

It was necessary to verify the cointegration relationship of the ARDL model. From Table 6, we noted that there is no cointegration relationship between the variables. Therefore, it was not necessary to estimate the model with a long-run effect. We then limited to test only the short-run effect. The cointegration test is that of Peersman et al. [26]. This test compares the Fisher statistic bond and the Fisher calculated. The test shows that Fisher is lower than the lower bond; thus, there is no cointegration.

Finally, the estimation of the ARDL model with fixed effects is included in Table 5 as well. See Table 7, ARDL Estimation.

**Table 6.** Cointegration test.

Statistics-Fisher 6.57		
Critical Value	I0 Bond	I1 Bond
10%	10.56	12.14
5%	8.45	10.89
1%	7.18	9.01

**Table 7.** ARDL Model Estimate (Dependent variable = INF).

Variables	Coef.	t-Statistic	p-Value
INF (−1)	0.1681	1.8643	0.0768
SHOCK	−67.2965	−1.02564	0.3141
SHOCK (−1)	12.2618 **	2.1912	0.02661
SHOCK*GOV	20.7297 *	1.7659	0.0907
SHOCK*IGI	−17.636 **	−2.0637	0.0505
SHOCK*EMP	7.6657	1.3146	0.2016
(SHOCK*EMP) (−1)	21.8218 ***	3.7433	0.0011
(SHOCK*EMP) (−2)	29.005 ***	3.6358	0.0014
(SHOCK*EMP) (−3)	28.3062 ***	2.6797	0.0134
SHOCK*ILI	23.094 *	1.8494	0.0773
(SHOCK*ILI) (−1)	−37.6602 *	1.8494	0.0773
(SHOCK*ILI) (−2)	−26.3719 *	−1.6655	0.1094
(SHOCK*ILI) (−3)	−41.6192	−1.5615	0.1320
(SHOCK*ILI) (−4)	−16.3679 **	−2.1266	0.0444
SHOCK*IEI	24.0966	0.4255	0.6736
(SHOCK*IEI) (−1)	−16.8363	−1.6250	0.1150
(SHOCK*IEI) (−2)	−62.3460	−0.7048	0.4865
(SHOCK*IEI) (−3)	−15.0446 **	−2.0362	0.0509
SHOCK*GDPC	12.4315 **	1.9746	0.0623
SHOCK*GDPC (−1)	30.4442 ***	4.1266	0.0005
(SHOCK*GDPC) (−2)	34.1528 ***	3.7155	0.0014
(SHOCK*GDPC) (−3)	37.7649 ***	2.6884	0.0141
SHOCK*DPUB	2.5608	3.6422	0.0887
SHOCK*ER	−0.2105 ***	−3.1018	0.0051
Constant	5.4936 ***	3.64220	0.0005
R-squared		0.57800	
AIC		7.70100	
DW		2.32610	
p-value (Fisher)		0.08206	
Hausman Test: Fixed			
Effect against		Chi2(10) = 31.18 ***	
Random Effect			
Mean Group via			
Pooled Mean Group		Chi2(10) = −4.19	
Pooled Mean Group			
via Fixed Estimator		Chi2(10) = 17.56 ***	
Mean Group via			
Fixed estimator		Chi2(10) = 29.15 ***	

\* Represent 10% significance level, \*\* Represent 5% significance level, and \*\*\* Represent 1% significance level.

We used the VIF statistic to verify the multicollinearity effect and autocorrelation between the coefficients. Table 8 shows that all the VIF are lower than 10. Therefore, there is no multicollinearity between the coefficients.

**Table 8.** Collinearity of variables ARDL.

Variables	VIF	1/VIF
Schoks *	4.514	0.221
INF *	6.126	0.163
GDPC *	7.120	0.140
IEI *	9.575	0.104
EMP *	8.125	0.123
ILI *	5.128	0.195
GOV *	3.154	0.317
PUBDEV *	9.453	0.105
IGI *	7.576	0.131
Mean VIF	6.752	0.148

\* Represent the absence of collinearity between the variable and the rest.

## 5. Discussion

The effect of oil shocks on inflation is significant only a year later. Oil shocks in MENA countries do not immediately affect inflation. Instead, oil shocks generate the inflationary phenomenon a year later, and consequently leading to a drop in production. We conclude that this inflationary phenomenon has been repeated in the G7 countries, except for Japan and the United Kingdom and in the EURO, as shown in the work of Cologni and Manera [72] and Peersman and Robays [26], respectively.

The effect of all variables on inflation is significant for one lag period. Thus, the effect of oil shocks on inflation when accompanied by Islamic sustainable factors is not immediate. The effect is delayed for up to four periods. This leads us to conclude that the production and consumption behaviour responds slowly after the shocks. This delay can be caused by the intervention of the authorities to stabilise inflation. If the effect persists, Islamic and sustainable factors will mitigate the oil transmission.

The effect of the combination (**Shocks\*GOV**) on inflation is positive and significant. However, sustainable development through public governance does not slow the transmission of oil shocks into inflation. Hence, a good quality of civil service and independence of countries from foreign political pressures does not solve the problem of inflation against oil shocks. This may be due to the fragility of the civil service in these countries, their weak economy or their dependence on foreign political pressures.

At this point, a question arises: Is there an alternative system of Islamic governance other than the current one that can play a role in sustainable development and prevent inflation due to oil shocks?

We deduce that the effect of (**Shock\*IGI**) on inflation is negative and significant. The introduction of an Islamic governance system instead of the classical one changes the effect of oil shocks on inflation into a positive one. Based on the components of this index, we can affirm that by adopting an Islamic public system that fights corruption, preserves natural resources and develops a renewable energy alternative, a country can cope with inflationary phenomenon and limit the oil shock transmission.

Additionally, developing an ecological system based on renewable energy makes it possible to cope with the inflationary phenomenon caused by oil shocks. This is shown by the positive and significant effect of (**shock\*RE**) on inflation. Maghyreh and Abdoh [23] pointed out the success of the ecological system in slowing down the decline of an oil company's financial returns. This last result can only support our latest findings.

The (**Shock\*GDPC**) has a positive and significant impact on inflation, which remains for three years. As a result, increasing GDPC does not limit the inflationary phenomenon caused by oil shocks. We deduce that the mechanism does not play its social equity role, because in reality the GDP does not return to each person. On the contrary, GDP can be concentrated in a specific social class without distribution among the people. In addition, Gabbasa et al. [36] have found the same result. Hence, the renewable energy can create a stable economic environment in Muslim countries that follow an Islamic system of governance. In other sense, Islam promotes the preservation of natural resources and

discourages their wastage. Thus, such an energy-conscious economy leads to sustainable economic growth.

However, the Islamic economic index had a significant and negative effect three years after the transmission of shocks on the relationship between oil shocks and inflation (**shock\*IEI**). Therefore, an economic improvement according to the Sharia rules must be planned within three years to neutralise the oil shocks transmission and slow down inflation.

Therefore, an Islamic economic system that prioritises social equity plays a role in promoting sustainable development to cope with the inflationary phenomenon resulting from oil shocks. Lattanzio [34] has similarly proved the effectiveness of institutionalising economic Sharia rules in limiting inflation.

Employability combined with oil shocks (**Shock\*EMP**) does not limit inflation. This effect is not significant immediately but was significantly positive three years ago. This means that job creation does not reduce the effect of oil shocks on inflation. In contrast, employability improves the transmission of oil shocks into inflation. In this case, employability does not fulfil its role in sustainable development to fight against the inflationary phenomenon of the oil shocks.

To further determine the effect of this combination, we tested an Islamic index related to employability. This is an index that shows the quality of employability as the workers' humanity rather than the employability rate. The index is called the Islamic labour index. Its effect on the relationship between oil shocks and inflation (**Shock\*ILI**) became significant and positive from the second period of the date of transmission.

Therefore, improving working conditions and freedom of expression can neutralise the effect of oil shocks and help cope with inflation. Sustainable development cannot be achieved by the number of workers but by the quality of work according to the value of work as advocated by Sharia principles. Therefore, our work confirms the results of Magd and McCoy [70] on the importance of working to promote an Islamic economy in Muslim countries.

## 6. Conclusions

This paper was based on two main concepts: the pass-through theory to test the transmission of oil shocks into inflation and sustainable development mechanisms. Our contribution was to draw on the relationship between these two theories in order to test the ability of sustainable development to fight inflation caused by oil shocks. In addition, we have included a third theory about Islamic economic and social mechanisms.

Previous empirical studies have used these macroeconomic factors but without focusing on the phenomenon of sustainable development and its role in reducing the transmission of oil shocks into inflation. By analogy, we wanted to test the effect of Islamic social, economic and political mechanisms as outlined in the Sharia in the fight against inflation and oil shocks.

Our aim was to test the usefulness of Islamic mechanisms compared to sustainable development against inflationary phenomenon resulting from oil shocks, and whether the Islamic mechanisms can play a complementary role to sustainable development.

For this purpose, we used an ARDL model to test the effect of oil shocks on inflation and the interactive effect of the shocks with sustainable development indicators on the one hand and with Islamic mechanisms on the other in Algeria, Egypt, Lebanon, Libya, Syria, Tunisia and Yemen during the period from 2000 to 2018.

The results show that oil shocks immediately affect inflation, generating an inflationary phenomenon. This transmission cannot be solved by sustainable development mechanisms, namely public governance, employability and productivity, except through the creation of renewable energy.

However, it has been proven that Islamic public governance mechanisms, including environmental protection, renewable energy development, quality of humanity and employability conditions can fight against inflation caused by oil shocks.



However, this study can have important political implications. These results make it clear that there is a large discrepancy between the theoretical Islamic system and the applied one. As it was designed by the Islamic Foundation, the Islamic system gives more advantages to the economy in terms of governance, humanity, equity and law. However, when we observe the Muslim countries, we find the opposite scenario. This can be seen in Iran, for example, which is gravely affected by oil shocks and other countries, such as Algeria and Libya. These countries are the producers of oil, but when they apply Islamic law, inflation increases and the social quality decreases.

Hence, we conclude that the Islamic application needs an important and deep revision in terms of the dealings and behaviour of the Muslim society in order to achieve sustainable development for the economy and society. Following Dariah et al. [32], we note that the sustainable development ensured by Islam mechanisms is the result of adequate application of Islamic principles for the equity and well-being of human, and not for the embodiment of spiritual power that leads to negative results.

In summary, we can affirm that Islamic economic, social and political mechanisms can be a sustainable development mechanism complementary to the existing one and even a substitute mechanism, making it possible to combat oil shocks and inflationary phenomenon.

The limitation of this study consist that the model did not take into account the different crises that happened in this period and the ones that happened outside of this period, such as the Ukrainian war. In the future, we can use other developed models considering the contagion effect of crises associated with the oil transmission shocks.

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