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The Role of Institutions in the Dynamic Effects of Oil Revenues in Oil Economies

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The purpose of this paper is to investigate the system of oil revenues effects on the production performance of oil-rich countries in both short and long-run. To reveal new insight, a macroeconomic model is designed to hypothesize long-run structural relations in the economies of the oil-rich countries including three long-run relationships of real output, real money balance, and the adjusted purchasing power parity and short-run dynamics of variables within the framework of a Vector Error Correction Model. The model is estimated based on the annual data of 33 oil-rich countries during the period of 1992 to 2016. The existence of three long-run relationships in the economies of oil-rich countries is confirmed. Based on the estimated model, the net effect of oil revenues changes on production is directly related to the institutional quality index. In countries with the institutional quality lower than the threshold, the net effect of increasing oil revenues on production in the long-run is negative, and in contrast, in countries with higher institutional quality, this effect is positive and will be strengthened by increasing institutional quality. The institutional quality threshold is estimated to be 0.23.

Keywords: Oil Revenue, Institutional Quality, Oil Producing Countries, Production, Vector Error Correction Model.
JEL Classification: C50, E02, Q30

1 Introduction

The income of natural resources such as oil have positive effects on economic performance through different channels, specifically, the reinforcing of the procedure of capital accumulation and supply of public goods. In contrast, these revenues can negatively affect economic performance through other channels such as long-run depreciation of exchange relations, fluctuations in natural resource revenues, Dutch disease, rent seeking, and increasing the role of government and the sovereignty of rentier state.

Some studies confirm a decisive role of institutional quality in transferring the effect of oil revenues on the economic performance of different countries

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(Mehlum, Moene & Torvik, 2006; Abrishami, Mehrara & Zamanzadeh, 2013). In this paper, a macroeconomic model is designed to study the role of institutions in transferring the effect of oil revenues on the economic performance of oil-rich countries. The long-run structural relations of the oil-rich economies offers three long-run relationships of real production, real money balances and adjusted purchasing power parity and the short-term dynamics of variables in the framework of a Vector Error Correction Model (VECM). The model is estimated based on the annual data of 33 oil-rich countries during the period of 1992 to 2016. The results confirm the existence of three long-term relationships in the oil-rich countries, also reveals the specific role of the institutional quality in the manner and magnitude of oil revenues effects on economic performance, especially on production.

In the next section, the literature and theoretical foundations are examined. In the third section, the econometric modeling is presented and in the fourth section, the model estimation is performed. Finally, section five summarizes and concludes the paper.

2 Literature Review

The evaluation of the effects of natural resource revenues on the economies has long been the subject of economic theory. Many studies have examined channels of natural resource revenues on economic performance in different countries and have introduced the positive and negative effects of natural resource revenues.

Massive revenues from natural resources such as oil have a positive effect on economic performance through various channels, in particular strengthening the process of capital accumulation and supply of public goods. Some of the old ideas of the development economics (Rosenstein-Rodin, 1961) as well as some new studies confirm this conclusion.

Korhonen & Mehrotra (2009) study the effects of oil price shocks on four major oil and gas producers (Iran, Kazakhstan, Venezuela and Russia) using a structural vector autoregressive model, according to which higher oil prices accompanied by higher production. Salehi Esfahani, Mohaddes & Pesaran (2009) investigate the effect of oil revenues on Iran's economic performance by a Vector Error Correction model with exogenous variables. According to their results, increasing oil revenues will have a positive effect on the production over time by influencing capital stock. Behboudi, Motefakker Azad & Rezazadeh (2009) examine the effect of oil price and its instability on Iran's gross domestic product using the vector autoregressive method based on seasonal information during the period of 1988- 2005. According to the results, in the long-run oil prices have a positive impact on GDP, while instability of oil prices has a negative impact on GDP.

But what happened in practice raised the notion that huge oil revenues may have adverse consequences for the development of oil exporting countries (Neary & Van Wijnbergen, 1986; Mabro & Monroe, 1974; Mabro, 1980). In recent years, there is a growing literature on "Resource Curse" that is the effects of natural resources incomes on the economies with rich natural resources. The basic idea is that rich countries generally have lower economic growth in terms of natural resources than non-rich countries (Sachs & Warner, 1995). There are many studies that have confirmed the negative relationship between the abundance of natural resources and poor performance of gross domestic product, including Auty (2001) and Sachs & Warner (1998).

In economic literature, many studies have examined the channels of negative influence of natural resources rents on economic performance. This includes the long-run weakening of the terms of trade (Prebisch, 1964), the income fluctuations of natural resources (Auty, 1998), Dutch disease (Fardmanesh, 1991; Corden & Neary, 1982), rent seeking (Mehlum, Moene & Torvik, 2006; Abrishami & Hadian, 2004; Khezri, 2008) and the increasing role of the government and the sovereignty of rentier state (Auty, 1998; Mahdavi, 1970; Beblawi & Luciani, 1978; Haj Yousefi, 1999).

Therefore, theoretically and experimentally, the increase in oil revenues has both positive and negative effects on economic performance, especially on production. An important issue recently emphasized in the literature is the attention given to the special role of institutions in this process. Institutions are governed by a set of laws, procedures, and legal, political and economic norms, and in the economic literature, institutional quality is measured by various indicators. The nature of the institutions makes the empirical studies in this area comparatively problematic. Kuncic (2012) states that it is very difficult to find a variable that properly represents institutional quality, even when we divide the institutions into different contexts. In his view, a hybrid indicator, including a large number of institutional variables, is a better solution. He divides institutional variables into three institutional groups, including legal, political, and economic entities.

Isham, Woolcock, Pritchett and Busby (2005) use variables such as rule of law, political stability, government effectiveness, absence of corruption, regulatory framework, property rights, and rule-based governance as indicators of institutional quality measurement. These variables have been used in various studies as an indicator of institutional quality measurement, including Knack and Keefer (1995), Rodrik (1999), Easterly (2001), and Dollar and Kraay (2003).

In the studies of the role of institutions in transferring the effect of natural resources income, there are three main approaches. The first approach is that institutions do not play a role in this regard. The rent patterns proposed by Lane & Tornell (1996) and Torvik (2002) suggest that there is a non-conditional negative relationship between resource rents and poor economic performance, and institutions do not play a role in this.

The second approach is that institutions play a mediator role in transferring the effects of natural resource revenues. Mehlum, Moene and Torvik (2006), based on a rent seeking pattern, emphasize the role of institutions in determining the impact of natural resources on the performance of the economy, and conclude that countries with rich natural resources have both positive and negative effects on economic performance. The main factor of the difference in the natural resources influences on economy is the difference in the quality of institutional structure of different countries. As an empirical evidence of this claim, they examine the relationship between the average economic growth (from 1965 to 1990) and natural resource inventories in countries where natural resources exports exceed 10% of GDP. In the sample of 42 countries, there is a strong indication of the negative relationship between economic growth and resource availability. However, by dividing this general sample into two samples of equal size with regard to institutional quality, it is seen that there is a negative relationship between economic growth and resource availability in countries with low institutional quality, while in countries with top institutional quality, this negative relationship is not observed.

The third approach is that institutions themselves are undermined by natural resource-related revenues and affect economic performance in this direction. The institutional weakening as one of the channels for transferring the negative effects of natural resource revenues on economic performance has a long history in economic literature. Because of its nature, it tends to be obscure and dispersed research on the matter, and there has been no tendency to empirical work. Although there are increasing efforts to measure the various transmission mechanisms. Empirical studies state that, on average, rich economies have lower quality institutions than poor economies in terms of resources. This is confirmed by Karl (1997), Sala-i-Martin and Subramanian (2003), Isham et al. (2005) and Collier and Hoeffler (2005). Also, Abrishami, Mehrara & Zamanzadeh (2013) suggest that a positive oil boom, although in the short-run, from the increase in total demand and the increase in the supply of public goods, would increase non-oil production, but in the long-run, the rent-seeking and institutional weakening will reduce non-oil production.

3 Econometric Modeling

A Vector Error Correction Model (VECM) that consists of a long-run relationship set representing a steady-state and a short-run relationship set demonstrating the dynamic transfer processes of variables to long-run values.

3.1 Long-Run Relationship Pattern of VECM

The existence of a certain number (i.e., r) of long-run relationships among the I(1) variables means that there is a β matrix containing r cointegrated vector such that:

$$\psi_t = \beta' Z_t + C_0 \quad \sim I(0) \tag{1}$$

Where ψ is the vector of disturbance components (long-run error correction term) and the vector Z contains the variables I (1). In the matrix β, a set of constraints is applied based on an economic theory.

In this research, we assume that the long-run structural relations of the economies of the oil-rich countries include three relations of real output, real money balance and the adjusted purchasing power parity. In this section, we examine each of these long-run relationships.

3.1.1 Long-Run Relationship of Output

In this study, the production of oil-rich countries with oil revenues and global production is assumed to have a long-run relationship. The domestic production of oil-rich countries has a long-run relationship with global production. Based on the study by Salehi Esfahani, Mohaddes and Pesaran (2009), the relationship between domestic production and foreign production in the long-run is based on the relationship between domestic and foreign technology. In fact, based on the study of Garratt, Lee, Pesaran and Shin (2003), the internal technology (A_{t}) and the foreign technology $\left(\mathrm{A}_{\mathrm{t}}^{\mathrm{f}}\right)$ are also cointegrated:

$$\ln A_{\mathrm{t}} - \theta \ln \mathrm{A}_{\mathrm{t}}^{\mathrm{f}} \sim \mathrm{I}(0) \tag{2}$$

In addition, it is shown that the foreign production level $\left(Y_{\mathrm{t}}^{\mathrm{f}}\right)$ has a cointegration relationship with the external technology:

$$\ln Y_t^f - \theta^f \ln A_t^f \sim I(0) \quad (3)$$

Therefore, given that domestic production with domestic technology has a long-run relationship, it can be concluded that domestic production with foreign production has a long-run relationship.

Given the above discussion over the positive and negative impact of oil revenues on production and the special role of institutions, oil revenues have an impact on domestic production in the long-run, but the impact depends on institutional quality. Therefore, it can be concluded that the domestic production of oil producing countries with oil revenues and foreign output has a long-run relationship (co-integration), which is the long-run production relationship for oil-rich countries:

$$\psi_t^y = -\ln Y_t + \alpha_1 \ln Y_t^f + (\alpha_2 + \alpha_3 Iq_t) \ln O_t^r + \alpha_0 \quad (4)$$

Where ψ_t^y is the error correction term of the long-run production relationship, Y_t represents the domestic production of oil-rich countries, Y_t^f is the global production, O_t^r is the real income of oil to foreign currency and Iq_t is the institutional quality. Equation (4) can also be expressed as (5).

$$\psi_t^y = -\ln Y_t + \alpha_1 \ln Y_t^f + \alpha_2 \ln O_t^r + \alpha_3 Iq_t \ln O_t^r + \alpha_0 \quad (5)$$

3.1.2 Long-Run Relationship of the Real Money Balance

The long-run relationship of real money balance in this study is based on the theory of money. According to the theory of money, the velocity of money is fixed in the long-run. Therefore, the real money balance with production has a long-run relationship (cointegration), which is the long-run real-money relationship:

$$\psi_t^{mp} = -\ln(MP_t) + \beta_1 \ln Y_t + \beta_0 \quad (6)$$

Where ψ_t^{mp} is the error correction term of the long-run relationship of the real money balance and MP_t is the real value of money.

3.1.3 Long-Run Relationship of Adjusted Purchasing Power Parity

In the theoretical literature and empirical studies, different approaches have been proposed to determine the exchange rate. In this study the purchasing power parity approach is emphasized. The purchasing power parity approach in determining the exchange rate is basically a long-run approach to the currency exchange rate mechanism. Based on the purchasing power parity approach, the nominal exchange rate between the two countries in the long-run is based on changes in the general level of prices in both countries, so that the real exchange rate will be fixed in the long-run. The existence of a long-run equation for purchasing power parity in econometric terms indicates that the exchange rate variables and the internal and external price indices are first order cointegrated, that is, the real exchange rate is a stationary variable:

$$\ln(RER_t) = \ln(ER_t) - Ln(P_t) + Ln\left(P_t^f\right) \sim \text{I}(0) \tag{7}$$

Where RER is the real exchange rate, ER is the nominal exchange rate (the value of one foreign currency in terms of domestic currency), P^f is equal to the foreign prices, and P is equal to the domestic prices.

Even with strong theoretical support and extensive empirical literature, the empirical backbone for the equation of purchasing power parity is ambiguous, and the idea that the real exchange rate is non-stationary is expanded, so then the relation of the purchasing power parity is rejected. (See Froot & Rogoff, 1995). Various factors can be the reason for the non-stationarity of the real exchange rate, but for the countries exporting the raw materials (such as oil), the price and the income of raw materials is one of the main factors affecting the real exchange rate and, as a result, the relation of the purchasing power parity cannot exist in these countries. Chen & Rogoff (2003) show that the price of exported goods has a strong effect on the real exchange rate.

Accordingly, in oil economies, global oil prices and consequently, foreign oil revenues could cause the real exchange rate be non-stationary in the long-run, and thus the conventional relationship of purchasing power parity does not exist. Since the elimination of the relationship of purchasing power parity causes burst in the econometric model, in the present study, according to Chen & Rogoff, an adjusted purchasing power parity for oil economies is presented. The existence of a long-run relationship of the adjusted purchasing power parity for the oil economies indicates that the real exchange rate and real oil revenues $(\mathrm{O}_\mathrm{t}^\mathrm{r})$ are also first order cointegrated:

$$\ln(RER_t) - \delta_1 \ln(\mathrm{O}_\mathrm{t}^\mathrm{r}) \sim \text{I}(0) \tag{8}$$

According to Equation 8, the long-run relationship of the adjusted purchasing power parity is:

$$\psi_t^{ppp} = -\ln(RER_t) + \delta_1 \ln(\mathrm{O}_\mathrm{t}^\mathrm{r}) + \delta_0 \tag{9}$$

Where, ψ_t^{ppp} represents the error correction term of the long-run relationship of purchasing power parity.

These three long-run relationships can be put into a vector error correction panel. Long-run relationships depict a long-run equilibrium as follows:

$$\psi_{it} = \beta' Z_{it} + C_0 \tag{10}$$

Where,

$$\psi_{it} = \left[\psi_{it}^{y}, \psi_{it}^{mp}, \psi_{it}^{ppp}\right]'$$
$$Z_{it} = \left[\mathrm{lny_{it}}, \ln(\mathrm{MP_{it}}), \ln(RER_{it}), \ln Y_{\mathrm{it}}^{\mathrm{f}}, \ln O_{\mathrm{it}}, \mathrm{Iq_{it}} \ln O_{\mathrm{it}}\right]'$$
$$C_0 = [\alpha_0, \beta_0, \delta_0]'$$
$$\beta' = \begin{bmatrix} -1 & 0 & \alpha_1 & \alpha_2 & \alpha_3 & \alpha_4 \\ \beta_1 & -1 & 0 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & \delta_1 & \delta_2 \end{bmatrix}$$

The matrix β' contains theoretical constraints in long-term relationships.

3.2 Short-Run Dynamics of Vector Error Correction Method

Short-run dynamics between variables is specified by a structural vector error correction model[1]:

$$\Delta Z_{it} = \alpha \psi_{it-1} + \sum_{j=1}^{s-1} \delta_j^z \Delta Z_{it-j} + \delta^I I_{it} + \varepsilon_t^z \tag{11}$$

In which I represents the exogenous variables I(0) and s is the number of lags of variables in the short-run relationships.

4 Estimation of Macroeconomic Model of Oil-Rich Countries

4.1 Data

The Vector Error Correction Model for the macroeconomic scenario of the oil-rich countries uses the annual data of 33 oil-rich countries[2] for variables of real output, real money balance, real exchange rate, real oil income, global real production, and institutional quality indicator. The VECM is estimated over the period of 1992 to 2016. Institutional quality indicator in this study is a composite index computed from the average of the six governance indicators

[1] See also Garratt, Lee, Pesaran and Shin (2006)

[2] Oil-rich countries include selected countries whose oil revenues account for more than 5 percent of their gross domestic product, including Algeria, Argentina, Azerbaijan, Bahrain, Bolivia, Cameroon, Chad, Colombia, Congo, Ecuador, Egypt, Guinea. Saudi Arabia, Sudan, Syria, Trinidad and Tobago, United Arab Emirates, Venezuela, Vietnam, Yemen, Gabon, Indonesia, Iran, Kazakhstan, Kuwait, Malaysia, Mexico, Nigeria, Norway, Oman, New Guinea, Qatar, Russia, Saudi Arabia, Sudan, Syria, Trinidad and Tobago.

provided by the World Bank, including the index of voice and accountability, the political stability index, the government effectiveness index, the regulatory quality index, the rule of law index, and the control of corruption index.

The unit root test of the panel, presented by Levin, Lin and Chu, confirms that real output, real money balances, real exchange rates, real oil revenues, global real production, and institutional quality index all have unit roots and have first order integration; i.e., are I(1).

4.2 Estimation of Vector Error Correction Panel

The results of estimation of the long-run relationships of the vector error correction model and the obtained coefficients are presented in Equation 12.

$$\begin{aligned}
\psi_{it}^{y} &= -lnY_{it} + \underset{(2.29)}{0.894} * \mathrm{lnY_{it}^{f}} - \underset{(-2.92)}{0.172} * \mathrm{lnO_{it}} + \underset{(3.58)}{0.748} * \mathrm{Iq_{it}} \ln O_{\mathrm{it}} + \underset{(0.487)}{0.842} \\
\psi_{it}^{mp} &= -lnMP_{it} + \underset{(6.66)}{1.141} * lnY_{it} - \underset{(-7.76)}{5.981} \\
\psi_{it}^{ppp} &= -lnRER_{it} - \underset{(-3.96)}{0.213} * \mathrm{Iq_{it}} \ln O_{\mathrm{it}} + \underset{(48.87)}{4.310}
\end{aligned} \qquad (12)$$

Based on the results, the existence of all three long-run relationships of real output, real money balance and the adjusted purchasing power parity is confirmed. In the long-run relationship of real output, the coefficient of the oil revenue variable on real output is equal to $(-0.172 + 0.748\mathrm{Iq_{it}}$. This relationship confirms the main hypothesis of the study about the determinant role of institutional quality in the mechanism of oil revenue impact on the economic performance. For the zero ratio of this relationship, the institutional quality threshold for the relationship between oil revenues and real production is, on average, equal to 0.23. This means that in oil-rich countries, when institutional quality is less than 0.23, the net effect of increasing oil revenues on real output is negative. Also, when institutional quality is equal to 0.23, the net effect of increasing oil revenues on real output is zero. Finally, when institutional quality is more than 0.23, the net effect of increasing oil revenues on real production is positive and with increasing institutional quality, the positive effects strengthened.

In the long-run equation of the real money balance, the coefficient of production is 1.14 that affects the real long-run money balance, and in the equation of the adjusted purchasing power parity of oil revenues, institutional quality with a negative coefficient of 0.21 affects the real exchange rate in the long-run.

The short-run relationships for the endogenous variables of the model and the corresponding coefficients are also presented in Table 1. As indicated in the table, the growth rate of production is significantly affected by the error correction term of the long-run relationship between real output and purchasing power parity. The growth rate of the real exchange rate also significantly affected by the error correction term between long-run relationships of real output, purchasing power parity and real money balance. The growth rate of the real money balance likewise significantly affected by the error correction term between the long-run relationship of production and the real money balance.

5 Summary and Conclusion

This paper seeks the effects of oil revenues on the economic performance of oil-rich countries. In the literature, it is argued that the increase in oil revenues, simultaneously and from different channels, has positive and negative impacts on the economic performance of oil-rich countries. But the main hypothesis of this study is that the quality of institutions would have a key role in determining the positive and negative effects. Accordingly, an econometric model for the macroeconomic conditions of the oil-rich countries is designed which includes three long-run relationships of real output, real money balance and adjusted purchasing power parity.

The model is estimated using vector error correction method based on the annual data of 33 oil-rich countries during the period of 1992 to 2016. The results confirm the existence of three long-run relationships in the economies of oil-rich countries, and reveals that the net effect of oil revenues changes on production is directly related to the institutional quality index. Based on the results, the institutional quality threshold for the relationship between oil revenues and real production is, on average, 0.23. This means that in oil-rich countries, when institutional quality is less than 0.23, the net effect of increasing oil revenues on real output in the long-run is negative, when the institutional quality is 0.23, this effect is zero and when institutional quality is more than 0.23, this effect will be positive. The results recommend that economic policymakers in oil-rich countries should consider improving institutional quality as a fundamental policy to improve the impact of oil revenues on their economic performance.

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Appendix

Estimated Pattern of Short-Term Relationships

	$dlnY_t$	$dlnRER_t$	$dlnMP_t$	dlnY_t^f	dlnO_t	$\mathrm{d}(\mathrm{Iq}_t \ln O_t)$
ψ_{t-1}^{y}	0.063	0.067	0.085			
	[9.139]	[3.298]	[4.465]			
ψ_{t-1}^{ppp}	-0.014	0.214	-0.016			
	[-2.303]	[11.669]	[-0.907]			
ψ_{t-1}^{mp}	-0.001	0.024	0.101			
	[-0.298]	[1.957]	[8.812]			
$dlnY_{t-1}$	0.244	0.006	0.138	-0.013	0.325	0.008
	[6.136]	[0.056]	[1.292]	[-1.059]	[0.769]	[0.059]
$dlnY_{t-2}$	0.095	-0.155	0.138	0.023	0.685	0.251
	[2.371]	[-1.362]	[1.279]	[1.810]	[1.598]	[1.854]
$dlnY_{t-3}$	0.148	0.128	0.123	0.037	-0.318	-0.078
	[3.712]	[1.140]	[1.153]	[0.958]	[-0.751]	[-0.586]
$dlnRER_{t-1}$	0.002	0.094	-0.032	0.007	0.551	0.083
	[0.170]	[2.681]	[-0.966]	[1.707]	[4.171]	[1.991]
$dlnRER_{t-2}$	-0.007	-0.036	-0.035	0.002	-0.309	-0.049
	[-0.587]	[-1.009]	[-1.045]	[0.599]	[-2.319]	[-1.174]
$dlnRER_{t-3}$	0.019	0.043	0.003	0.005	-0.027	-0.015
	[1.546]	[1.241]	[0.077]	[1.170]	[-0.206]	[-0.360]
$dlnMP_{t-1}$	0.044	-0.188	0.231	0.005	0.107	0.046
	[3.016]	[-4.570]	[5.915]	[1.103]	[0.690]	[0.936]
$dlnMP_{t-2}$	0.017	0.081	-0.007	-0.011	-0.068	-0.019
	[1.210]	[2.028]	[-0.197]	[-2.390]	[-0.455]	[-0.402]
$dlnMP_{t-3}$	0.010	-0.035	0.129	0.001	0.068	0.059
	[0.753]	[-0.973]	[3.736]	[0.248]	[0.501]	[1.359]
dlnY_{t-1}^f	-0.185	0.543	0.843	0.304	0.815	0.462
	[-1.380]	[1.433]	[2.349]	[7.151]	[0.572]	[1.024]
dlnY_{t-2}^f	-0.397	1.156	0.610	-0.136	-7.274	-2.426
	[-2.781]	[2.857]	[1.593]	[-2.992]	[-4.781]	[-5.039]
dlnY_{t-3}^f	-0.158	0.264	0.228	0.110	4.271	1.381
	[-0.886]	[0.521]	[0.476]	[1.941]	[2.242]	[2.291]
dlnO_{t-1}	-0.002	-0.010	-0.081	0.003	0.080	0.001
	[-0.139]	[-0.333]	[-2.727]	[0.901]	[0.682]	[0.024]
dlnO_{t-2}	-0.013	-0.008	-0.008	0.001	-0.186	-0.018
	[-1.194]	[-0.252]	[-0.273]	[0.251]	[-1.563]	[-0.493]
dlnO_{t-3}	-0.026	0.012	0.023	0.003	0.128	0.022
	[-2.374]	[0.382]	[0.779]	[0.843]	[1.090]	[0.579]
$\mathrm{d}(\mathrm{Iq}_{t-1} \ln O_{t-1})$	0.039	0.005	0.232	-0.014	0.130	0.103
	[1.251]	[0.061]	[2.780]	[-1.441]	[0.394]	[0.978]
$\mathrm{d}(\mathrm{Iq}_{t-2} \ln O_{t-2})$	0.043	0.014	0.035	-0.002	0.483	0.037
	[1.377]	[0.156]	[0.422]	[-0.201]	[1.445]	[0.354]
$\mathrm{d}(\mathrm{Iq}_{t-3} \ln O_{t-3})$	0.049	-0.038	-0.065	-0.013	-0.477	-0.100
	[1.588]	[-0.426]	[-0.784]	[-1.278]	[-1.438]	[-0.954]
$\mathrm{d}(\mathrm{Iq}_t)$	0.321	-0.687	0.638	-0.022	-2.099	-1.177
	[2.299]	[-1.737]	[1.703]	[-0.487]	[-1.411]	[-2.500]
R-squared	0.413	0.280	0.310	-0.019	0.142	0.110

Adj. R-squared	0.382	0.241	0.273	-0.075	0.096	0.062
Sum sq. resids	1.280	10.265	9.196	0.129	145.119	14.529
S.E. equation	0.046	0.130	0.123	0.015	0.488	0.154
F-statistic	13.025	7.183	8.307	-0.353	3.066	2.279
Log likelihood	1089	419	454	1828	-434	307
Akaike AIC	-3.278	-1.196	-1.305	-5.570	1.453	-0.848
Schwarz SC	-3.042	-0.960	-1.070	-5.334	1.689	-0.612
Mean dependent	0.023	0.018	0.049	0.014	0.067	0.020
S.D. dependent	0.058	0.149	0.144	0.014	0.513	0.159

Source: Research Findings.