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The potential impact of oil sanctions on military spending and democracy in the Middle East

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Abstract*

This study examines how negative oil shocks (due to the oil boycotts) could affect the military expenditure and the quality of democracy in the oil rentier states of Middle East by applying the annual date from 1990 to 2017. I use both economic and political variables in a panel vector autoregressive (PVAR) model of oil boycotts. The estimated PVAR models show significant impacts of oil boycotts both on key economic factors (government revenues, defence and non-defence expenditures) and on the different indicators of the political system.

Using panel impulse response functions (PIRFs) and a panel variance decomposition analysis (PVDC) based on the estimated PVAR model, the findings indicate that the responses of political institutions and different indexes of democracy such as electoral, liberal, participatory, deliberative, and egalitarian democracy to decreases in oil rents are positive and statistically significant, whereas the response of military spending is negative and significant. Moreover according to the results of the variance decomposition analysis the variations in oil rents and political situation explain considerable parts of the variation of defence expenditures in the Middle Eastern countries implying that defence expenditures are considerably influenced by oil rents fluctuations and the quality of political system in the Middle East. These results are not sensitive to different proxies for oil abundance (such as fuel exports and amount of oil production) and different indicators of political institutions (V-DEM democracy indexes and polity2), as well as different orderings of variables in the panel VAR system.

Keywords

Middle East, oil rents, democracy, sanctions, military expenditures, Panel-Vector Autoregressive model.

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F51, F13, F14.

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1 Introduction

In the post-Cold War world, sanctions have become a common foreign policy tool. Sanctions act as an alternative or a complement to military action to impel change in the political behavior of a target country. However, only a third to half of sanctions are successful. What determines the success or failure of sanctions is little understood. How do government budget and political conditions change during sanction episodes? The empirical evidence on the economic and political effects of sanctions is contested and inconclusive (Pape 1997, Bapat et al. 2013, Dizaji and Bergeijk 2013) and different answers are provided by different disciplines. Drezner (2011) argues that we need to pay more attention to the "inner workings" and political economy of autocratic states that have increasingly refuted Western-based assumptions about how the reaction of a rational actor could be to the imposed sanctions. This paper aims to contribute to the literature by investigating the economic and political impact of a simulated oil sanction against Middle East oil rentier states.

The Middle East is located in a particular geographical and strategic position. Additionally it is the greatest single reserve of oil. Due to its geopolitical importance, any inter- and intra-state conflict in the Middle East has the potential impact not only on the political stability of the region as a whole but also on the global stability. Several countries in the Middle East have experienced sanctions pressure imposed by US, EU and UN aimed at reaching a range of foreign policy goals such as counterterrorism, nonproliferation, democracy and human rights promotion, and conflict resolution. This includes sanctions against Iran, Iraq, Yemen, Syria, Libya, and Sudan among others.

Oil rent is an important driver of military spending and political system because of its impact on the national budgets of oil-exporting countries. As Bellin, (2004) argues, Middle East rentier states are more likely to spend on military relative to other state budgets because rents can easily buy the military loyalty. Some of the Middle East oil rentier states are listed among the 10 countries with the highest ratio of military expenditures to GDP in the world in 2017: Oman (12 per cent of GDP), Saudi Arabia (10 per cent of GDP), Kuwait (5.8 per cent of GDP), and Bahrain (4.1 per cent of GDP). The overall military expenditure of those Middle Eastern countries for which data is available in 2017 inflated continuously from 2009 to 2015, leading to a total increase of 41 per cent (SIPRI, 2017). According to the World Bank (2017), the average of the military burden (i.e. military expenditures to GDP ratio) in the MENA region between 2000 and 2014 was 5.1%, which is higher than the average of this indicator for the North America (3.6%), Europe and Central Asia (1.9%), East Asia and Pacific (1.6%), Sub-Saharan Africa (1.5%) and Latin America and Caribbean (1.3%).

Saudi Arabia has the highest military spending in the Middle East and was the third largest spender in the world in 2017. Its military spending considerably increased by 74 per cent from 2008 to 2015 and reached a pick level of $90.3 billion. Iraq experienced the highest increase in the military expenditures in the world for the period 2006-2015. Its military spending was $13.1 billion in 2015 which shows a 35-per cent increase from 2014 and a 536-per cent increase from

2006. The available data for the UAE's military spending is $24.4 billion in 2014 which introduces it as the second largest military spending in the region. Iran's military expenditure decreased continuously (by 31 per cent) between 2006 and 2014. This was mostly because of the comprehensive sanctions on Iran's oil revenues imposed by US and European countries to control its nuclear programs. However, in 2014 and after a nuclear deal with world powers, the Iranian economy benefited from the gradual removal of European Union and United Nations sanctions, which in turn resulted in a 37 per cent increase in military spending between 2014 and 2017 reaching a higher level of $14.5 billion in 2017.

The Middle East countries also suffer from poor political institutions, and many of them are frequently involved in conflict. Oil revenues can become a political curse when oil-abundant autocrats prevent democratic development to maintain their power. As is evident from Fig. 1 the Middle East and North Africa region shows the worst performance regarding the democracy index compared with the average of world and other regions. Ross (2001) discusses that oil rents provide two mechanisms through which governments supply goods that alleviate social pressures against the authoritarian regime. First, natural resource rents enable governments to satisfy citizens by imposing lower tax rates and patronage (a "rentier effect"). Second, resource rents enable governments to fortify the military and security forces to preserve social order (a "repression effect"). Therefore oil rents may influence the democracy through both defence and non-defence expenditures (pp. 327-28).

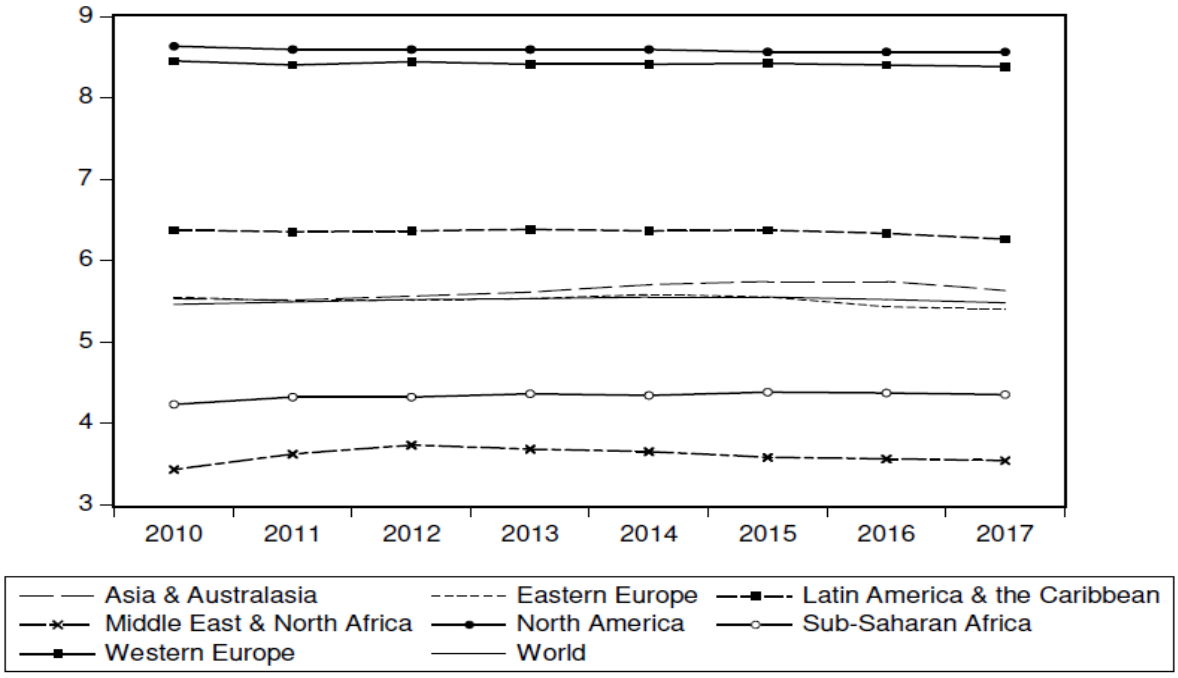


Fig. 1 Regional average of democracy scores in different geographical regions of the world (for the period 2010-2017) according to the Economist Intelligence Unit's Democracy Index. Note: This score ranges from 0 to 10 where higher score indicates the higher level of democracy. Source: https://www.statista.com/statistics

I simulate the economic and political dynamics of oil export-based countries that hit by oil boycotts since this enables us to uncover the dynamic impacts of oil sanctions on their military and non-military capabilities, and political system. I design a panel vector autoregression (PVAR) model for the oil-exporting countries of the Middle East that focuses on dynamic economic and political adjustment and thereby enables us to examine how oil rents affect political variables through influencing government revenues and expenditures. The VAR modelling is an econometric method (Sims, 1980) which is also identified as a useful approach in political science (Freeman,Williams&Lin, 1989), especially when we aim to investigate the dynamic and simultaneous interactions among economic and political variables (Dizaji and Bergeijk 2013, Dizaji et al 2016, Dizaji 2018). Since VAR models include current and lagged values of multiple time series, they capture comovements that cannot be investigated in univariate or bivariate models (Stock and Watson, 2001).

The contributions of this paper are threefold; first, it develops a dynamic panel VAR model of economic and political fluctuations in the context of oil boycotts. Second, it links variations in government financial capabilities with regime evolution. Third, is provides an econometric model in order to analyse how negative shocks to oil exports affect macroeconomic and political conditions of Middle East oil exporters. I simultaneously investigate the impacts of a simulated oil boycott on key economic variables (government revenues to GDP ratio, defense expenditures to GDP ratio and non-defence expenditures to GDP ratio) and indices for the political institutions (as presented by polity2 index and changes in the level of liberal, participatory, deliberative, and Egalitarian democracies, as operationalized by V-Dem indices).

A significant innovation is that I apply both government revenue/spending and democracy elements in a panel VAR model of Middle East rentier states. The estimated panel VAR models find significant impacts of the simulated oil sanctions both on key economic variables and the indicators of democracy. The impact of an oil boycott on the Middle East oil producers could be considerable: oil rents and exports are important drivers of the Middle East governments' revenues, defence and non-defence expenditures and ultimately of their political system. A reduction of oil exports decreases the government's revenues and its capability to spend on military and non-military sectors and thereby weakens the autocratic characteristics of the government. The empirical analysis in this paper is based on the historical responses of defence and non-defence expenditures and the political system of the Middle East rentier states to the negative oil rent shocks.

Since 2015 military expenditure, in real US dollars, has decreased for the vast majority of Middle East oil-exporting countries due to the reduction in oil revenues. With the reduction in oil prices, military spending of these countries declined by 16 per cent between 2015 and 2016.

I make use of this experience to investigate an exogenous shock that imitates the impacts of oil restrictions against oil-reliant economies of the Middle East. The empirical findings are presented applying Panel impulse-response functions and Panel variance decomposition to explain the changes of the variables and their interconnections over time. The rest of the paper is organised as follows: Section 2 provides a literature review on the linkages between oil rents,

democracy, military spending and economic sanctions. Section 3 introduces the data and applied methodology. Section 4 provides the empirical findings and related implications. Section 5 presents the concluding remarks.

2 Review of literature and theoretical underpinning

2.1 Oil rents and democracy

Since the 1970s and following the first oil price shocks, a significant attention have paid to the effects of natural resource wealth on the economy of oil-producing countries in the literature.

Most recent studies have found that developing resource-rich countries usually have lower growth rates and worse economic and political performance compared with non-resource-intensive countries. This phenomenon is known as the "Natural Resource Curse" (e.g., Auty, 1993; Sachs and Warner, 1997, 1999, 2001). Political resource curse literature expresses that oil rents encourage autocracy and impede democracy (Anderson, 1987; Ross, 2001; Jensen and Wantchekon, 2004). Tsui (2011) argues that oil windfalls motivate the autocrats to protect their power – and they use fear as a tool to discourage the other political rivals.

Ross (2001, 2008) introduces three mechanisms to explain how oil rents discourage democracy: First, a "rentier effect", through which government imposes low tax rates and increases its spending to dampen citizens' demand for democracy. Rentier states derive sufficient revenues from oil and don't need to impose higher tax rates on their population. In turn, the citizens do not demand for much accountability from the government. Oil revenues will also help the governments to spend more on patronage, which depress the potential pressures for democratization. Second, a "repression effect", by which government constructs its internal security forces. Rentier states spend more on defence and security sectors which control the population's democratic aspirations. Cotet and Tsui (2011) find that oil-abundant autocratic regimes have higher military expenditures. Third, a "modernization effect"; the rentier states use the oil wealth to impede the formation of social groups which are not dependent on the government support and follow their political rights by demanding democracy. Inglehart (1997), Lipset (1959) and Deutsch (1961) argue that democratization is often accompanied by better education levels, urbanization process, the evolvement of modern communications, and higher occupational specialization. If oil revenues prevent these social transformations then they will also dampen the democracy.

Sala-i-Martin and Subramanian (2003) argue that resource revenues have a considerable damaging effect on the quality of institutions and, thereby, on long-run economic growth. Ahmadov (2013), applying meta-regression analysis confirms a significant negative impact of oil wealth on democracy across the world. He argues that there is a meaningful variation in this association across the different world regions and institutional settings. Some other scholars also point out that the negative association between oil wealth and democracy is inconclusive and varies over the different geographical regions. While Herb (2005) discusses about the hindering impact of oil wealth on democracy for specific regions such as the Middle East and North Africa

(MENA). Gurses (2009), and Haber and Menaldo (2011) discuss that oil wealth may not prevent democracy and even be a favour in other areas. Dunning (2008), uses a regression analysis of time-series cross-sectional data for18 Latin American countries and shows that oil rents have positive and significant impact on democratization process. Haber and Menaldo (2011) use historical data from 1800 and further challenge the resource curse hypothesis as they could not find any evidence regarding the negative impact of oil wealth on democracy. However, Andersen and Ross (2012) discuss the resource curse hypothesis could be valid for the period after the 1970s when the transformative events enabled the developing oil-rich states to benefit from the oil revenues that were previously taken by foreign-owned firms. Dizaji and Bergeijk (2013), using an extended vector autoregressive (VAR) model for the case of Iran's sanctions, show significant impact of negative oil shocks both on economic factors (government consumption, imports, investment, GDP) and the indexes of the political institutions. They argue that oil and gas rents play an important role in forming the Iran's economic and political situation. The decreases in oil and gas rents create economic costs that may impel the Iranian government to change its political behavior.

Caselli and Tesei (2016), use a panel of 131 countries over the period 1962-2009 to study the impact of resource windfalls on the political system of those countries. They apply 32 principal commodities in their study where oil has the highest frequency and it is the main commodity in their 30 sample countries. Their theoretical consideration and empirical examination indicates that the political impact of natural resource windfalls within democratic countries as well as countries with extreme autocracies is almost insignificant. Nevertheless, they show that in the countries with moderate levels of autocracy the increases in resource windfalls worsen the autocratic characteristics of the government. Moreover, their further econometrics analysis confirm this negative and heterogonous impact of resource windfalls on political regime of the point source producing countries, while they could not confirm this heterogonous impact within the diffuse commodity producers.

2.2 Oil rents and military spending

The rentier states that are deeply dependent on oil revenues may develop authoritarian regimes whose survival relies more on keeping control of the revenue-generating infrastructure than on encouraging the general economic progress of the people (Perlo-Freeman and Brauner, 2012). Thus, the military may find special importance to guarantee the regime survival. Varisco (2010) indicates that there is a significant linkage between armed conflict and natural resources. Oil revenues prepare a direct source for financing 'potentially controversial expenditures' such as large foreign arms purchases, and, in contrast to taxes, does not lead to a costly political pressure (Ali and Abdellatif, 2015). Oil resources may also contribute to international tension and geopolitical conflict. Such conflict will increase the military expenditures among the involved states. Moreover, even resource-rich countries which don't face conflict may have to increase the military expenditures in order to preserve their resources from internal and external rivals (SIPRI, 2010). Perlo-Freeman and Brauner (2012) argue that there is lack of accountability and

transparency with revenues obtained from natural resources so that leads to wide off-budget military expenditures and corruption in arms trade.

Ali and Abdellatif (2015) investigate the impact of natural resources on military expenditures, applying the data for the rentier states of the Middle East and North Africa (MENA) over the period 1987-2012. Their results show that the 'resource curse' caused by oil and forest resources, increase military spending. Contrarily, the rents obtained from coal and natural gas influence the military spending negatively, while the rents from minerals do not affect military spending significantly.

Farzanegan (2018) discusses that the level of corruption is important in determining the final impact of oil rents on military spending. He applies a panel data approach for the Gulf Cooperation Countries (GCC) from 1984 to 2014 and finds that oil rents have negative impact on military spending. However, the higher levels of corruption mitigate this negative impact.

Dizaji (2014) investigates the dynamic relationship between government revenues and government expenditures in Iran. By estimating the impulse response functions and variance decomposition analysis, he finds that the share of oil revenue shocks in explaining the variations in government expenditures is larger than the share of oil price shocks. Additionally, both estimated vector autoregression (VAR) and vector error correction (VEC) models, indicate that a strong causality is running from government revenues to government current and capital expenditures while the reverse causality is powerless. He concludes that the sanctions imposed on Iran's oil export revenues can influence the government total expenditures and its financial capabilities negatively and increase the inflation rate. All in all these will dampen the development process of the country and damage the people's living standards.

Chun (2010) estimates the elasticity of demand of military expenditures in five oil abundant countries, namely Iran, Saudi Arabia, Kuwait, Nigeria, and Venezuela over the period of 1997-2007. His finding reveals that the demand for military expenditures in these countries is inelastic with respect to changes in oil revenues. He highligths that "attempts to limit military expenditures in these countries by restricting their oil revenues can not be a successful policy".

Farzanegan (2011) examines the dynamic impacts of oil shocks on different categories of the government expenditures in Iran for the period 1959-2007. The results of impulse response functions (IRF) and variance decomposition analysis (VDC) indicate that military and security expenditures show statistically significant responses to oil shocks, while social expenditures (such as health and education expenditures) do not significantly respond to such shocks. He indicates that current international sanctions on Iran's oil production capacity can dampen its military expenditures without causing significant impacts on Iranian government's social spending.

2.3 Sanctions and military spending

The previous researches have mostly concentrated on the questions of whether and under which economic and political circumstances sanctions can be successful. Economic sanctions might cause negative impact on the social conditions and the people's living standards in target countries (e.g., Weiss et al. 1997; Weiss 1999; Allen and Lektzian 2013; Dizaji 2014). The economic coercion may also induce the government to execute political repression and restrict democratization process to protect their current position (Wood 2008; Peksen 2010; Peksen and

Drury 2010; Dizaji 2018). Some other researches discuss that economic coercions may threaten the political stability of the target countries by activating antigovernment protests (Allen 2008; Grauvogel et al. 2014). Dizaji and Bergeijk (2013) discuss that economic sanctions in the form of oil boycotts might change the political behavior of the government (in order to be more democratic) by imposing significant costs on the target economy.

Despite the growing body of research on the possible socioeconomic and political impact of sanctions, there is lack of research on the dynamic impacts of the sanctions on the conflict and military expenditures specially in oil rentier states. Dizaji (2018) examines the potential impact of lifting Iran's sanctions on its political indexes and defence expenditures. His results show that lifting the sanctions provides sufficient financial sources for the government which increases its military expenditures through strengthening its autocratic characteristics. He also discusses that lifting the sanctions will improve the economic well-being of the populace by making the financial sources available for the non-military expenditures.

Gershenson (2002) argues that sanctions that hurt the target economies significantly may motivate their governments to terminate conflict. However, those sanctions that impose negligible damage on target economy may be counterproductive inspiring more aggressive response by the target country. Strandow (2006) investigates the impacts of the UN-targeted sanctions on civil conflict in Liberia and Ivory Coast. His results indicate that arms embargoes are likely to decrease the likelihood of conflict, while the threatened and imposed nonmilitary sanctions may not resolve the conflict.

Hultman and Peksen (2017), investigates the impacts of threat and imposition of sanctions on the intensity of civil war in Africa for the period 1989-2005. Their findings reveal that imposed arms embargoes are likely to reduce conflict violence. Contrarily, the threats of economic sanction and arms embargo are likely to intensify the conflict violence. Similarly, imposed economic sanctions are likely to contribute to raise the conflict violence.

Dizaji and Farzanegan (2018) examine short and long-term impacts of sanctions on Iran's military spending applying the annual data between 1960 and 2017. They consider the effects of unilateral sanctions (where only the United States imposes sanctions on Iran) and multilateral sanctions (where, other countries also cooperate with the United States to impose sanctions on Iran) separately. They find that unilateral sanctions do not influence Iran's military expenditures significantly while multilateral sanctions reduce the military spending of Iran.

3 Research design

3.1 Data description

I consider a panel of annual data from 14 Middle East oil rentier states that covers the period 1990-2017 with respect to the availability of their data. The list of countries is presented in Appendix (table 6). To analyse the dynamic interrelations among oil restrictions, political institutions, and the military expenditures, the following variables are applied: the oil rents to GDP ratio (*oilrent*), defense spending to GDP ratio (*def*), non-defense spending to GDP ratio

(*nondef*), real government revenues to GDP ratio (*reven*), and the polity 2 index (*polity*). In order to do more robustness check regarding the impact of oil shocks on government expenditures and political system I also employ two alternative variables namely fuel exports to GDP ratio (*fuelex*) and oil production in barrels (*oilprod*) instead of oil rents to GDP ratio[1]. The data on economic variables are collected from World Bank's World Development Indicators (WDI) online database (World Bank, 2018), BP Statistical Review of World Energy (June 2018), International Monetary Fund's World Economic Outlook Database (October 2018). The Polity*2* indicator (*polity*) is used as a measure of political system which ranges from −10 (full autocracy) to 10 (full democracy). This index represents combinations of autocratic and democratic features of the institutions of government for different years (Marshall et al. 2017). For robustness tests, I also use different high level indexes for electoral democracy (*elecdem*), liberal democracy (*liberdem*), deliberative democracy (*delibdem*), egalitarian democracy (*egalitdem*), and participatory democracy (*participdem*), reported by the Varieties of Democracy (V-Dem) project, version 8. The V-Dem data set is highly dynamic capturing changes in politics and the quality of various aspects of democracy from year to year.

Table 1 represents the descriptive statistics of the variables (i.e. the range of data (minimum-maximum), the mean and standard deviation) and their related correlation matrix. According to the results of this table, the polity index is positively correlated with non-defence expenditures while the correlation coefficients between polity and other variables such as oil rents, defence expenditures and government revenues are negative. The ratio of oil rents to GDP changes within a relatively broad scope. The lowest and highest rates of oil rents are 0 and 60.18%. These amounts are 0 and 62.87% for the fuel exports to GDP ratio respectively. The similar situation is observed for the defence expenditure which its lowest and highest ratios as percentage of GDP are 0.84 and 117.34. The electoral democracy index ranges from the lowest amount of 0.016 to the highest amount of 0.75.

Table 1: Descriptive statistics and related correlation matrix

Variable	Mean	Std. Dev.	min	max	oilrent	reven	def	nondef	polity
oilrent	18.69	14.13	0.00	60.18	1				
reven	30.43	13.21	6.69	72.34	0.73	1			
def	5.47	7.65	0.84	117.34	0.20	0.31	1		
nondef	25.12	8.49	4.38	86.82	0.23	0.60	0.52	1	
polity	-5.43	3.70	-10.00	7.00	-0.29	-0.21	-0.28	0.04	1
fuelex	26.31	17.31	0.00	62.87					
elecdem	0.22	0.13	0.016	0.75					

[1] - The number of countries in my sample increase to 15 and 17 countries when I am using oil production (in barrels) and fuel exports to GDP ratio respectively to capture the impact of negative oil shocks. The lists of these countries are available in Table 5 (see in appendix).

3.2 Methodology

This paper applies a Panel Vector Autoregressive (PVAR) model to estimate the possible interrelationships among the variables. PVAR models provide useful methodology for the purpose of this research. First, dynamic simultaneous effects can be investigated using VAR approach. For instance, the model captures the long run variations of political institutions and military expenditures over time as influenced by oil shocks. Second, some interactions between the oil rents, military spending and political changes can be tested in the model. Considering the absence of a priori theory regarding the simultaneous relationships among oil rents, political institutions and military spending, VAR methodology is quite helpful as it deals with all variables as jointly endogenous and does not force any priori restrictions on structural relationships among the variables. PVAR model merges the standard VAR method, with the panel-data approach (Love, Zicchino, 2006). The VAR model defines the dependent variables based on the predetermined lagged variables; therefore it is a reduced-form model (Filippaki, Mamatzakis 2009). The econometric reduced form model is given by the following:

$$Z_{it} = \Gamma(L)Z_{it} + \mu_i + \mathcal{E}_{it} \qquad (1)$$

Where i denotes the country, t=1,…T, Z_{it} includes a vector of stationary variables, $\Gamma(L)$ denotes a matrix polynomial in the lag operator with $\Gamma(L) = \Gamma_1 L^1 + \Gamma_2 L^2 + \cdots + \Gamma_P L^P$, μ_i is the vector of country specific effects and $\mathcal{E}_{it}$ represents the error term. Simultaneity is not a problem in VAR models and OLS estimations are consistent as only lagged values of the endogenous variables are appeared on the right-hand side of the model. In the standard VAR models, the disturbance terms are generally characterized by simultaneous correlations which it allows the reaction of the system to the changes in a particular variable be the response of all those variables that have contemporaneous correlation with it. However, this simultaneous correlation is absolved by the Cholesky orthogonalization mechanism. The Impulse response functions (IRFs) and the variance decomposition analyses (VDC) are two practical instruments of VAR models. The dynamic changes of variables in response to changes in a special variable are illustrated by impulse response functions (IRFs). Thus, the IRFs enable us to investigate the dynamic impacts of shocks to a particular variable (for example oil rent) on the other economic and political variables in model. The IRFs allow us to see the magnitude and statistical significance of such responses to one standard deviation decrease (or increase) in oil rents (see Stock and Watson 2001). An examination of the whole system is considered by using the variance decomposition analyses. Variance decomposition attributes the variance of forecast errors in a particular variable to its own shocks and the shocks to the other variables in the system (Brown and Yücel 1999).

4 Empirical results

To avoid the spurious regression results, it is essential to test the stationarity of the variables before performing panel-VAR analysis. Therefore, the series are tested to check the existence of unit roots. Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) have offered different tests for unit root within the context of panel data. Levin, Lin and Chu (2002) suggest a common unit root under the null hypothesis against the alternative of stationarity of all individuals, whereas the other tests assume individual unit roots under the null hypothesis. The results of panel unit root test are presented in Table 2. I include a constant but not a time trend (see Dickey and Fuller, 1979). The results of Table 2 reveal that almost all of the variables are stationary in their level with respect to Im, Pesaran and Shin, and ADF-Fisher tests (the electoral democracy index is stationary according to ADF-Fisher and PP-Fisher tests). When the variables are stationary in levels, an unrestricted VAR model is employed.

Table 2: Panel Unit Root Tests

Variables	Levin, Lin & Chu	Im, Pesaran and Shin	ADF-Fisher	PP-Fisher
oilrent	-5.63*	-5.69**	90.96**	91.04**
fuelex	-2.94**	-2.19**	73.29**	71.27**
reven	-3.38**	-3.67**	60.54**	56.19**
def	-0.96	-3.02**	56.13**	58.61**
nondef	-4.78**	-3.65**	62.41**	41.41*
Polity2	14.81	-5.28**	287.13**	30.07
elecdem	0.69	-0.44	49.73**	46.52*

Note: Automatic lag length selection (Schwarz Information Criteria) is used. The null hypothesis for the Levin, Lin and Chu test is a unit root which assumes a common unit root process. For the other three tests, the null hypothesis is a unit root which supposes an individual unit root process. ** indicate significance at the 1%. * indicate significance at the 5%.

The ordering of the variables in VAR models is essential as different orderings may result in different responses within a VAR system. The common strategy is that the variables with more exogenous features come earlier in the system, while the more endogenous variables come later. I suppose that oil rents/exports depend on the amount of production and global oil prices. Global oil prices are generally determined by the international oil markets, but the level of oil production relies to some deal on the new extractions, the amount of investments in oil fields, and the capacity of the current production. Hence, oil shocks to a great extent have exogenous nature. It is expected that significant shocks in oil rents influence simultaneously the other variables in VAR model (Dizaji, 2014, Dizaji and Bergeijk 2013, Farzanegan, 2011). Government revenues and expenditures on defence and non-defence follow the oil rents in my Cholesky ordering. The Middle Eastern Economies rely heavily on fuel export revenues, representing about 25% of their GDP, on average and 66% of their merchandise exports for the sample of this study (WDI, 2018). The restrictions on oil exports affect the government revenues and damage its financial capability. Decreases in government revenues affect the government

spending decisions on defence and non-defence sectors (Dizaji, 2014 and 2018)[2]. Finally fluctuations in government financial resources and its spending capacities may influence the political system of the Middle Eastern countries (see Dizaji and Bergeijk 2013). Therefore the index of political system is assumed to be the most endogenous variable which is influenced by the economic factors in the model.

Furthermore, in order to justify the appropriateness of the mentioned ordering strategy, I pursue Block exogeneity tests, as a test for the endogeneity/exogeneity of the variables in the system. A variable Granger causes another one if we can reject the null hypothesis that the coefficients on the lags of the vector of variables Z_{it-j} in the PVAR equation (1) where $i \neq k$, are all equal to zero. The results of Table 3, provide evidence that fuel exports (% of GDP) is Granger caused by none of the other variables in the system while it Granger causes government revenues (% of GDP) and electoral democracy index in this PVAR system. Fuel exports (% of GDP) may affect defence and non-defence expenditures (% of GDP) indirectly and through influencing the government total revenues (% of GDP). Therefore the results of table 3 confirm my early assumption regarding the more exogenous nature of fuel exports compared to the other variables in system.

Table 3: Block exogeneity/Granger-causality tests

	Dependent variable				
Excluded variable	fuelex	reven	def	nondef	elecdem
fuelex	-	11.63***	0.11	0.16	4.37**
reven	1.01	-	8.92***	24.99***	1.76
def	2.50	2.03	-	1.85	0.27
nondef	0.24	2.41	4.00**	-	2.43
elecdem	0.70	0.14	3.26*	11.05***	-
All variables	6.41	14.50***	22.21***	53.17***	10.56**

Note: The numbers in the table are the Chi-square block exogeneity Wald tests. The null hypothesis states that the excluded variables do not Granger-cause the dependent variable. *, ** and *** denotes significance at the 10%, 5% and 1% level respectively.

In this study I employ an unrestricted panel-VAR model comprising five variables to analyse the impact of negative oil shocks on the government's budget and political system in the Middle East. The vector of endogenous variables in my PVAR model is given by[3]:

$$y_t = [(oilrent/fuelexl/oilprod), reven, def, nondef, (polity2/elecdem)] \qquad (2)$$

[2] - Dizaji (2014) also finds a strong causality from government revenues to government expenditures (both current and capital) for the developing oil exporting countries like Iran, while there is a very poor evidence of the reverse causality.

[3] - To capture the oil shocks, I use the oil rents, fuel exports and oil production variables alternatively. Also to show the changes in the quality of democracy I use polity2 and electoral democracy indexes alternatively.

4.1 Impulse response functions with oil rents and polity2 index

The impulse response functions (IRFs) capture the effects of a one-time shock to oil rents on current and future values of the variables in VAR model. If the disturbance terns ε_t are contemporaneously uncorrelated, the interpretation of the results of impulse response functions is straightforward. The *i*th innovation ε_{it} is interpreted as a shock to the *i*th endogenous variable Z_{it}. The statistical significance of the impulse responses are judged by the confidence bands around them (Runkle, 1987). In this study, 68% confidence intervals for the IRFs are estimated by operating 1000 Monte Carlos simulations (see Sims and Zha 1999). In the estimated IRFs in Fig.2, the middle line display the response of the variables to a one standard deviation negative shock in oil rents. The dotted lines are confidence bands. The impulse responses are judged to be statistically insignificant wherever the horizontal line lies between two confidence bands. In this case we cannot reject the null hypothesis of "no effects oil rents" on the particular variable (Berument et al. 2010). The horizontal line in IRFs displays the time line and the vertical line presents the magnitude of responses to shocks.

The results of the estimated VAR may also be sensitive to the selected number of lags for the variables in model. The statistical criteria such as LR, FPE (final prediction error), AIC (Akaike information criterion), SC (Schwarz information criterion), and HQ (Hannan–Quinn information criterion) are mainly applied to decide on the optimal lag length in VAR models. I select the lag length of 1 on the basis of the SC and HQ criteria[4] as these are often known to be more Parsimonious (Pesaran and Smith, 1998) and our relatively small data sample further encourages this decision.

Fig.2 provides the panel impulse responses of polity2 index and government revenues (% of GDP) and expenditures (% of GDP) to a one standard deviation negative shock in oil rents to GDP ratio for a period of 1990–2017 among the Middle Eastern countries. The oil rents shock is the first variable in my PVAR followed by government revenues (% of GDP), defense expenditure (% of GDP), non-defense expenditures (% of GDP) and democracy index. I suppose that oil rent is the most exogenous variable in the model and can be used as an index to mimic the effects of oil restriction (for example due to the sanctions) on Middle Eastern economies. Decreases in oil rents (due to oil boycotts) lead to lower government revenues and this likely affects the government spending on military and non-military sectors. Both fluctuations in government revenues and expenditures may change the political behavior of the Middle Eastern rentier states.[5]

[4] - These results are available upon request.

[5] - Dizaji and Bergeijk (2013) similarly discuss this issue for the case of Iran: The decreases in Iran's oil and gas rents influence the government budget and its expenditures negatively, and finally this will improve the quality of political institutions in Iran.

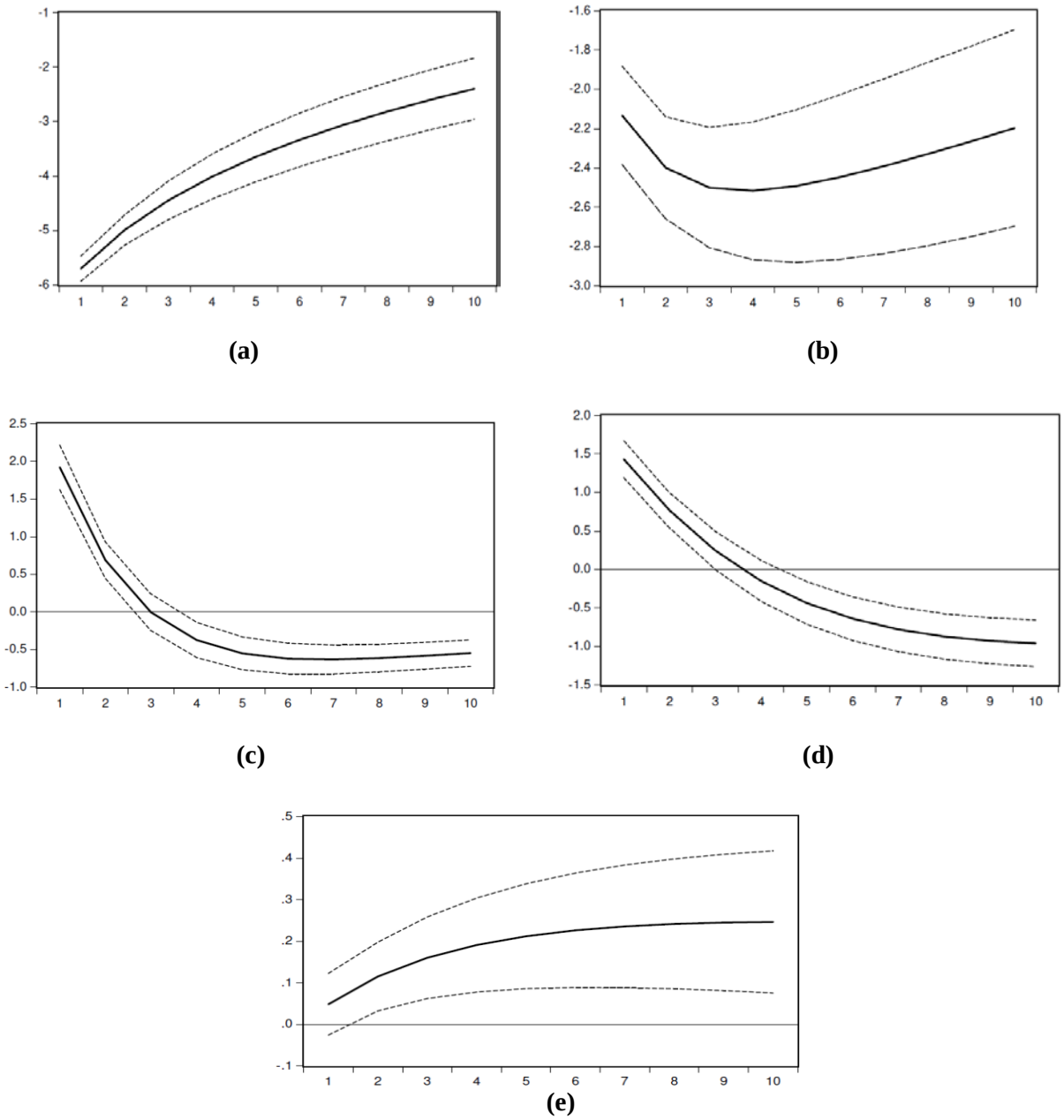


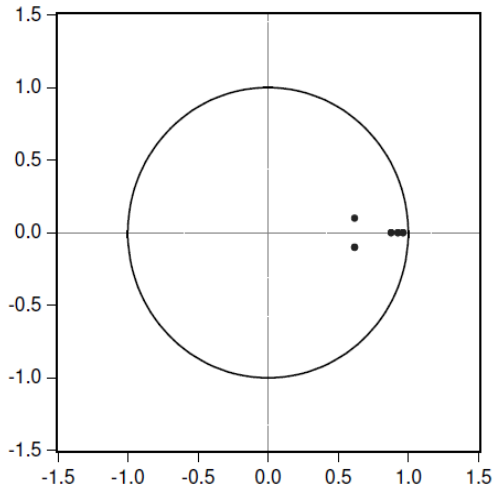
Fig. 2 Impulse response functions related to a one standard deviation negative shock in oil rents (% of GDP). **a** Response of oil rents (% of GDP). **b** Response of government revenues (% of GDP). **c** Response of defense expenditure (% of GDP). **d** Response of non-defense expenditure (% of GDP). **e** Response of Polity2. *Notes*: The dotted lines represent ±1 standard deviation. The horizontal axis shows the time periods (years) after the initial shock. The magnitude of the responses is presented on the vertical axis.

The results of Fig.2 show that the decreases in oil rents to GDP ratio have negative and statistically significant impact on government revenues to GDP ratio during the entire period. Also, oil rents variable responds negatively to its own negative shocks.

The responses of defense expenditures (% of GDP) and non-defense expenditures (% of GDP) to the negative shocks in oil rents (% of GDP) are negative and statistically significant after 2 and 3 years of initial shock respectively.[6] The minimum negative response of Defense expenditure to negative oil rents shocks is reached 10 years after the initial shock. Imposing the oil boycotts will decrease the oil exports as the main source of financing government revenues and expenditures in the oil rentier states. The rents resulted from oil in resource-abundant economies of Middle East will motivate their elites to have more control on ordinary citizens and display more autocratic features. Contrarily, it is expected that restrictions on rent-seeking activities will improve the level of democracy in those countries. The responses of Polity2 to decreases in oil rents (% of GDP) are positive. This positive response of democracy index conserves its statistical significance during the entire period. Political index reaches its maximum amount after 10 years.

Generally, these results imply that decreases in the share of oil rents in GDP, for example, due to the imposing the sanctions will create, on the one hand, negative impacts on government budget and thereafter its defence and non-defence expenditures and, on the other hand, positive impact on political institutions in the Middle East. These findings confirm the results of the previous studies about Iran (Dizaji and Begeijk 2013 and Dizaji, 2018), indicating that decreases in government revenues, particularly due to the reductions on oil exports, change the political

Fig. 3 Inverse roots of AR characteristic polynomial



[6] - The responses of the ratios of defence and non-defence expenditures to negative shocks in oil rents (% of GDP) are positive within the first 2-3 years after initial shocks. This is because the government expenditures tend to be sticky downward in the short run. When oil rents go up, the government increases its spending on military and non-military sector. However when the oil rents go down the government does not reduce its expenditures immediately leading to the budget deficit in the short term. Therefore in short run, the decreases in government defence and non-defence expenditures are lower than decreases in their denominator (GDP) resulting in the positive responses of government defence expenditures (% of GDP) and non-defence expenditures (% of GDP) in first 2-3 years of imposing sanctions. However after this short period government has to decrease its defence and non-defence expenditures significantly to avoid further budget deficits.

situations positively, shifting them toward a more democratic setting. Also, these findings are consistent with the results of Farzanegan (2011), who discusses that decreasing shocks to Iranian oil exports, as the important source of the Iran's government revenues, discourages the military spending. Fig. 3 presents the AR graph which reports the inverse roots of the characteristic AR polynomial (see Lütkepohl 1991). According to this figure, all roots in the PVAR model are located inside the unit circle and have modulus less than one and the PVAR model is stable.

4.2 Variance decomposition analysis

Variance decomposition is helpful tool to associate the variation of each variable with the shocks in all variables in the model. This informs us about the relative importance of each variable in causing the changes in a particular variable for different years after shock. According to Table 4, the biggest part of changes in each variable is described by its own shocks during the entire period implying that the historical trend of each variable is important in explaining a large portion of its changes. The results of variance decomposition analysis are in line with the results of IRFs; it points out that the main part of variation in oil rents to GDP ratio (more than 97%), in all years, is determined by this variable itself demonstrating more evidence of its exogenous feature comparing to the other variables. This further supports my initial decision to put it as the first variable in Cholesky ordering. Also, the role of oil rents shocks are very important in determining the changes of the other variables in the model which reflects the high dependency of government budget, defense and non-defense expenditures, and political circumstances on oil rents in Middle Eastern countries.

The biggest parts of the variations in the ratios of government revenues and defence expenditures to GDP are explained by the shocks to the ratio of oil rents to GDP after their own shocks, implying that restrictions on oil rents may significantly influence government revenues and spending on defence among the Middle East oil dependent states. The contribution of oil rents (% of GDP) shocks to defence expenditures (as % of GDP) shocks was almost 12% in the first year rising to about 13% in the tenth year. Also the role of shocks to polity index in explaining the variations in defence expenditures (as % of GDP) is increasing over time[7]. Therefore oil rents and political situations are very important drivers of military expenditures in the Middle East. The contribution of oil rents (% of GDP) in explaining the changes in defence expenditures is bigger than their contribution in explaining the changes in non-defence expenditures. This implies that military expenditures are more sensitive to oil shocks compared with non-defence expenditures. The most important contributor to the polity index variations after its own shocks

[7] - The variance decomposition analysis over a longer period of 30 years show that the share of polity2 index shocks in explaining the shocks in defence expenditures (% of GDP) increases to about 7% after 30 years. These results are available upon request.

are oil rents (% of GDP) shocks after 10 years, indicating that political system is also influenced by oil rents in the Middle East.[8]

Table 4 Variance decompositions of economic indicators and polity2 index

Year	oilrent	reven	def	nondef	polity2
oilrent					
1	100.00	0.00	0.00	0.00	0.00
2	99.73	0.00	0.25	0.00	0.01
5	98.66	0.03	1.14	0.00	0.16
8	97.87	0.05	1.55	0.03	0.50
10	97.42	0.06	1.66	0.05	0.81
reven					
1	21.42	78.58	0.00	0.00	0.00
2	26.64	72.89	0.17	0.29	0.01
5	37.45	60.49	0.26	1.75	0.06
8	44.06	53.01	0.21	2.63	0.09
10	47.23	49.55	0.25	2.87	0.11
def					
1	12.36	1.59	86.05	0.00	0.00
2	10.63	2.38	86.62	0.31	0.05
5	10.39	3.52	84.00	1.38	0.71
8	12.46	3.58	80.59	1.64	1.73
10	13.54	3.52	78.87	1.66	2.41
nondef					
1	11.13	4.40	23.87	60.59	0.00
2	9.18	8.33	23.63	58.78	0.08
5	6.68	19.42	20.33	52.90	0.66
8	8.93	25.01	17.39	47.42	1.25
10	11.30	26.52	16.05	44.58	1.56
polity2					
1	0.14	0.06	0.05	0.80	98.95
2	0.48	0.09	0.04	0.92	98.47
5	1.70	0.21	0.12	1.12	96.86
8	2.77	0.35	0.15	1.23	95.51
10	3.36	0.43	0.15	1.29	94.76

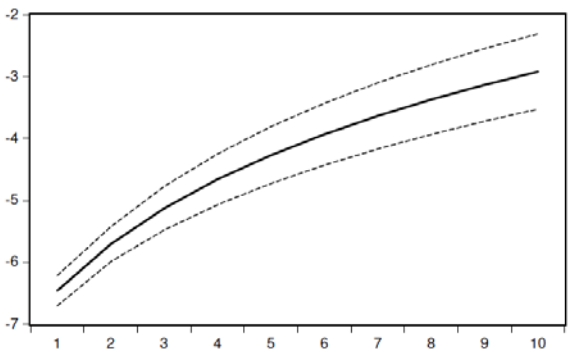
4.3 Alternative definitions for oil shocks and democracy index

In order to further test the robustness of the empirical results, I use an alternative new measure of democracy called electoral democracy. This index is on the basis of data from a large number of indexes gathered through the Varieties of Democracy (V-Dem) project. These data are collected from country experts, mainly academics from each country. Moreover the latent country coding unit characteristics are estimated by Bayesian ordinal item response theory (IRT) modeling techniques from the collection of expert ratings (see Pemstein et al. 2017). The electoral part of

[8] - The role of oil rents (% of GDP) shocks in explaining the variations in polity2 is increasing over time. It explains about 6% of variations in polity2 after 30 years. This finding is available upon request.

democracy expresses the core value of making rulers responsive to citizens through competition for the approval of a broad electorate during periodic elections. In the V-Dem concept, electoral democracy is considered as the base of any other conception of representative democracy- liberal, participatory, deliberative, egalitarian, or some other. This index is from 0 to 1.The higher scores mean a higher extent of the ideal electoral democracy is achieved (Coppedge et al. 2015, p.3).

Since considering the effects of oil restrictions on government revenues and defence expenditures and thereby political institutions is an important issue in this research, I also examine the impacts of shocks to fuel exports to GDP ratio (Fig. 4) and the shocks to the amount of oil production (Fig.5) on the government revenues and expenditures and the electoral democracy index of Middle Eastern countries. Therefore, I re-estimate two other PVAR models applying the same Cholesky ordering (replacing in one hand electoral democracy index with Polity2 indictor and on the other hand fuel exports to GDP ratio or oil production with oil rents to GDP ratio) as in previous PVAR model. The panel impulse response analysis, using fuel exports to GDP ratio as the shock variable and electoral democracy index as the measure of political system, is provided in Fig. 4. The optimal lag length is decided to be 1 after considering the different lag criteria. The panel VAR stability condition test (roots of characteristic polynomial) confirms the stability of the estimated model. The results of Fig. 4 confirm my previous findings. The negative shocks to fuel exports (% of GDP) cause negative and statistically significant effects on government revenues to GDP ratio (during the entire period), and defense and non-defense expenditures to GDP ratios (after 3 years of initial shock). The response of the index of electoral democracy to one standard deviation negative shock in fuel exports (% of GDP) is positive and significant after one year of initial shock. These findings imply that decreases in the share of fuel exports (for example due to imposing the oil sanctions) will decrease the financial sources of the Middle East oil exporting countries, and this may decrease the government abilities to spend on defence and non-defence sectors, and thereby encourage their government to improve the quality of electoral democracy.



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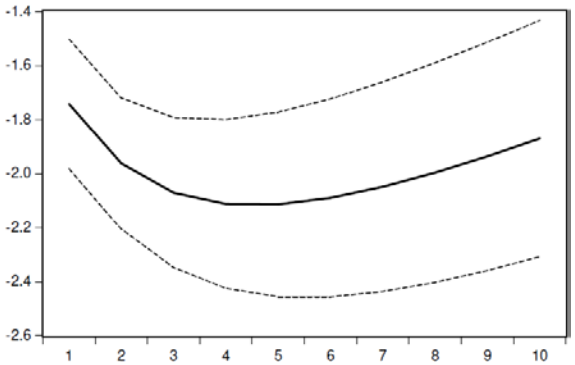

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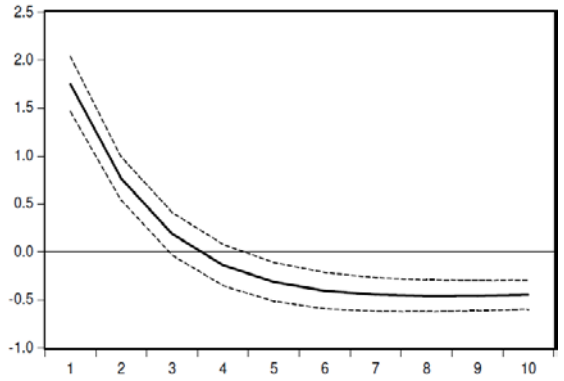

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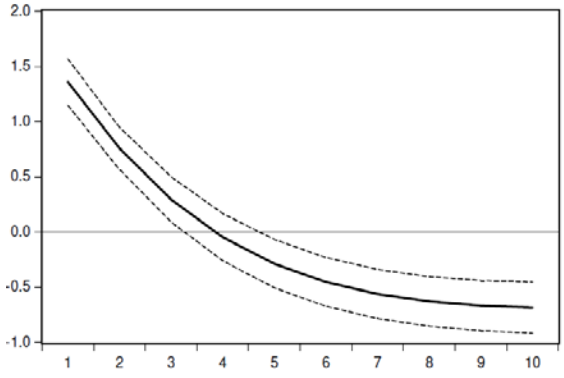

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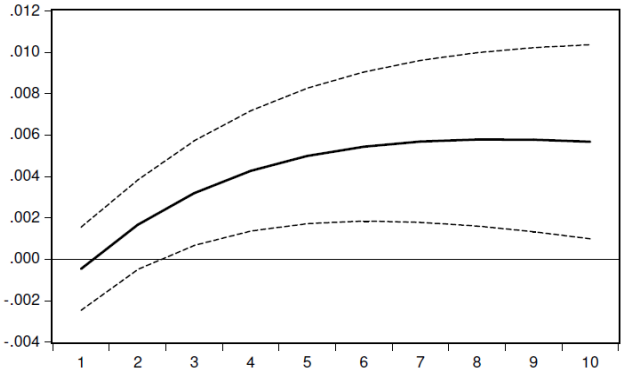
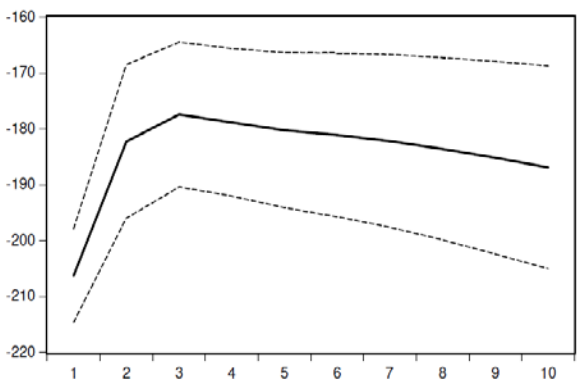


(e)

Fig. 4 Impulse response functions related to a one standard deviation decrease in fuel exports (% of GDP). **a** Response of fuel exports (% of GDP). **b** Response of government revenues (% of GDP). **c** Response of defense expenditure (% of GDP). **d** Response of non-defense expenditure (% of GDP). **e** Response of electoral democracy. *Notes*: The dotted lines represent ±1 standard deviation. The horizontal axis shows the time periods (years) after the initial shock. The magnitude of the responses is presented on the vertical axis.

The panel impulse response analysis, using the amount of oil production (in barrels) as a shock variable and electoral democracy index as the measurement of the political outcome, is displayed in Fig. 5. The different lag criteria suggest 2 lags as the optimal lag length for this model. Fig.5 shows that the negative shocks to oil production will cause negative and statistically significant impacts on government revenues to GDP ratio (during the entire period), defence expenditures to GDP ratio (after 1 year of the initial shock) and non-defense spending to GDP ratio (after 6 years of the initial shock). The response of electoral democracy index to decreases in oil production is positive and statistically significant after 2 years of the initial shock. Therefore the limitations on government budget may improve the quality of democracy in the Middle Eastern oil producing countries.



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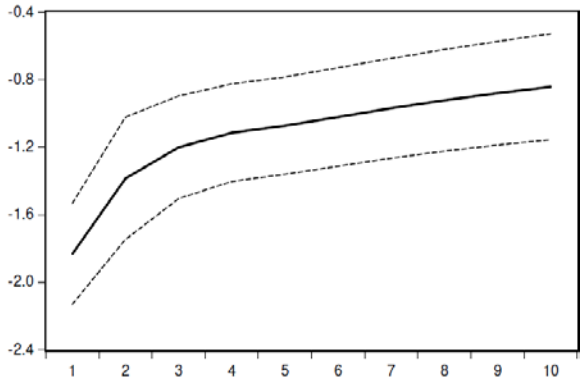

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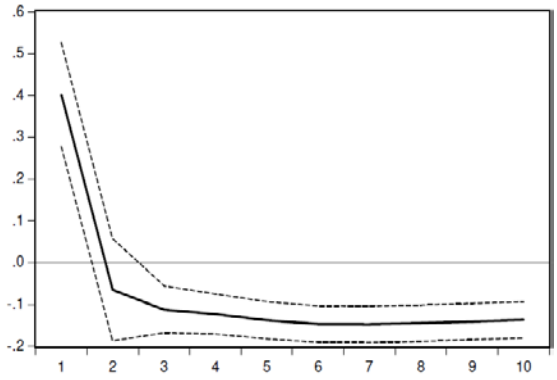

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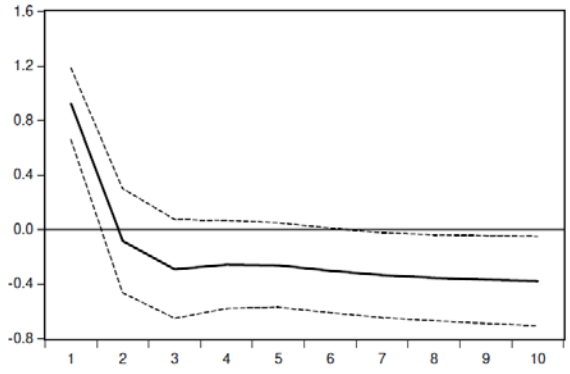

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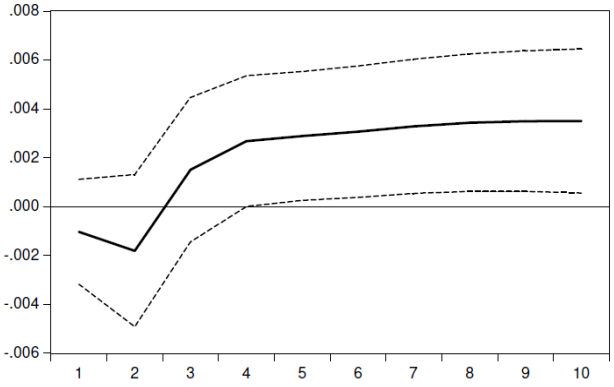


(e)

Fig. 5 Impulse response functions related to a one standard deviation decrease in oil production (in barrels). **a** Response of oil production (in barrels). **b** Response of government revenues (% of GDP). **c** Response of defense expenditure (% of GDP). **d** Response of non-defense expenditure (% of GDP). **e** Response of electoral democracy. *Notes*: The dotted lines represent ±1 standard deviation. The horizontal axis shows the time periods (years) after the initial shock. The magnitude of the responses is presented on the vertical axis.

4.4 Panel generalized impulse responses and variance decompositions using V-DEM democracy indexes

The electoral element is essential part of the V-Dem conceptual scheme; A democratic regime has necessarily the electoral component. However, holding the elections lonely is not adequate, and also countries may pretend "democratic features" without being electorally democratic (Coppedge et al 2015). Then I will focus also on the indexes of other components of democracy that propose different approaches for defining democracy—liberal, participatory, deliberative, and egalitarian democracy beside electoral democracy.

• "The *liberal* component of democracy embodies the intrinsic value of protecting individual and minority rights against a potential "tyranny of the majority." This is achieved through constitutionally protected civil liberties, strong rule of law, and effective checks and balances that limit the use of executive power.

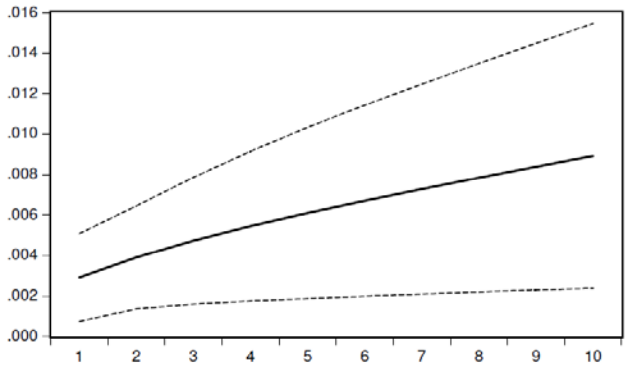
• The *participatory* component embodies the values of direct rule and active participation by citizens in all political processes; it emphasizes non-electoral forms of political participation such as through civil society organizations and mechanisms of direct democracy.

• The *deliberative* component enshrines the core value that political decisions in pursuit of the public good should be informed by respectful and reasonable dialogue at all levels rather than by emotional appeals, solidary attachments, parochial interests, or coercion.

• The *egalitarian* component holds that material and immaterial inequalities inhibit the actual exercise of formal rights and liberties; hence a more equal distribution of resources, education, and health across various groups should enhance political equality" (Coppedge et al 2015, p.5).

Ordering of these democracy indexes in the PVAR system is crucial and different setting may result in different panel impulse response functions (PIRFs). Ideally, economic theory should help us to choose the most reasonable ordering so that changes in some variables follow the changes of other variables rather than leading them. Wherever the economic theory is not clear about the appropriate ordering of the variables; we have to take some other logical setting for sensitivity analysis. The panel generalized impulse response function (PGIRF) analysis, which is based on Koop et al. (1996) and Pesaran and Shin (1998), provides a useful solution when theory is mute regarding the possible linkages between the variables. The PGIRFs offer an orthogonal set of innovations that is independent of the ordering of the variables in the PVAR model. Therefore, I estimate the panel generalized impulse responses of the mentioned democracy indexes (electoral, liberal, participatory, deliberative, and egalitarian democracy), government revenues (% of GDP), defence expenditure (% of GDP) and non-defence expenditures (% of GDP) to a one standard deviation negative shock in oil rents (% of GDP). The responses of oil rents (% of GDP), government revenues (% of GDP), defence expenditure (% of GDP) and non-defence expenditures (% of GDP) are similar to those which were obtained before; therefore to

save space, I have not reported them here.[9] As it is clear from Fig.6 the responses of electoral democracy index (during the entire period), egalitarian democracy index (during the entire period), liberal democracy index (after 1 year of initial shock), deliberative democracy index (after 1 year of initial shock), and finally participatory democracy index (after 1 year of initial shock) are positive and statistically significant to the negative shocks in oil rents (% of GDP). The overall results indicate that the restrictions on oil rents will decrease the government revenues and the spending on defence and non-defence sectors and finally will encourage all electoral, liberal, deliberative, egalitarian, and participatory democracies in Middle East oil rentier states.[10]



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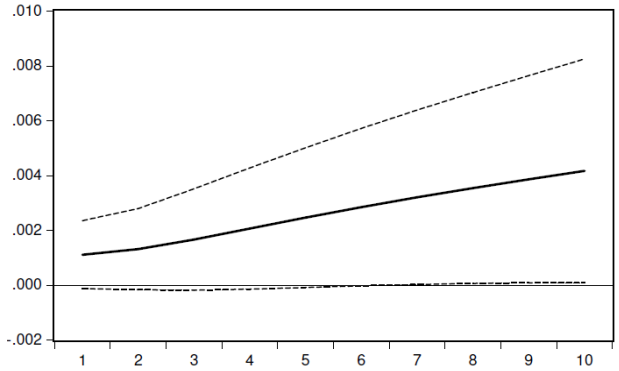

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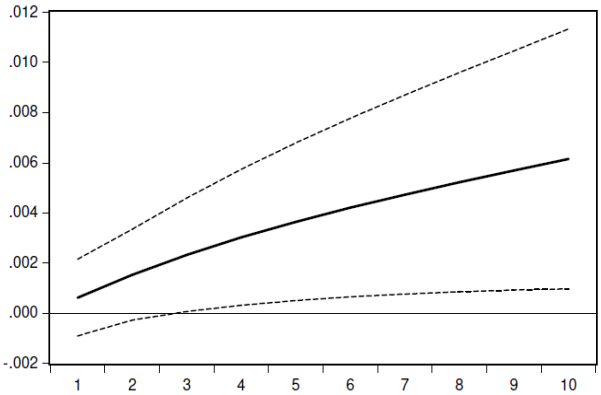

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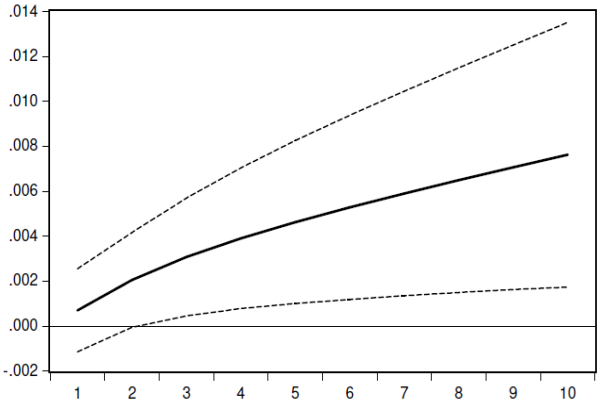
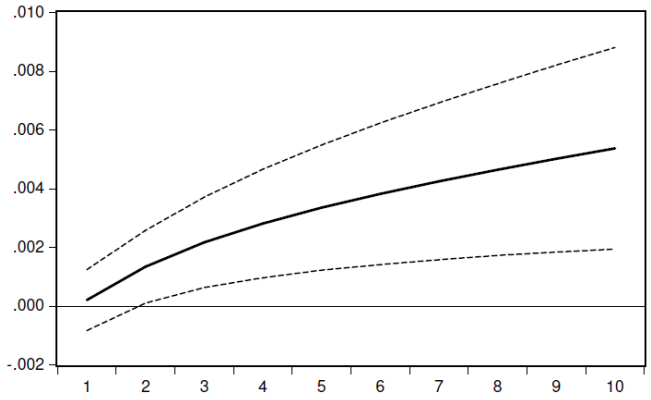


(d)

[9] - These are available upon request.

[10] - In addition, I have calculated Panel VAR models employing the fuel exports to GDP ratio and oil production in barrels to capture the impacts of negative oil shocks. The results of estimated PGIRFs by and large agree, indicating that negative shocks to *fuelex* or *oilprod* cause negative impacts on government revenues, defence expenditure and non-defence expenditures (as their shares of GDP) and positive and significant impacts on democracy indexes (namely electoral, liberal, participatory, deliberative, and egalitarian democracies). These results are available upon request.



(e)

Fig. 6 Impulse response functions related to generalized one standard deviation decrease in oil rents (% of GDP). **a** Response of electoral democracy. **b** Response of egalitarian democracy. **c** Response of liberal democracy. **d** Response of deliberative democracy. **e** Response of participatory democracy. *Notes*: The dotted lines represent ±1 standard deviation. The horizontal axis shows the time periods (years) after the initial shock. The magnitude of the responses is presented on the vertical axis.

Table 5 represents the variance decomposition analysis of different V-DEM democracy indexes including electoral, liberal, participatory, deliberative, and egalitarian democracies within a longer time period of 30 years after initial shocks. As is evident from this table the importance of oil rents (% of GDP) in explaining the shocks to all types of democracy is negligible in short run (after 1 year of initial shock) but this role is increasing overtime. Participatory democracy, liberal democracy and oil rents (% of GDP) are respectively the most important determinants of electoral democracy after 30 years of initial oil shocks. The findings show that among the democracy indexes, the participatory democracy and electoral democracy receive the highest and egalitarian democracy receives the lowest effects from oil rents (% of GDP) shocks after 30 years. The shocks to oil rents (% of GDP) explain respectively about 9%, 8% and 4% of changes in participatory, electoral and egalitarian democracies after 30 years. This implies that oil restrictions may improve mostly participatory and electoral democracies in the long run. The shocks to electoral democracy explain the biggest part of its own variations and also the variations in other types of democracy indexes (liberal, deliberative, egalitarian and participatory indexes) in all years, which highlights the fundamental role of electoral component in establishing other components of democracy.

Table 5 Variance decompositions of different V-DEM democracy indexes

Year	oilrent	reven	def	nondef	elecdem	liberdem	delibdem	egalitdem	participdem
elecdem									
1	0.58	0.15	0.04	0.01	99.20	0.00	0.00	0.00	0.00
10	3.21	0.20	0.22	0.01	87.29	3.30	0.51	0.18	5.04
20	6.09	0.99	0.12	0.00	68.64	9.63	0.57	1.04	12.88
30	8.00	1.80	0.07	0.02	54.01	14.80	0.36	2.78	18.15
liberdem									
1	0.05	0.04	0.04	0.19	82.04	17.60	0.00	0.00	0.00
10	2.08	0.50	0.03	0.59	64.14	24.74	0.08	1.34	6.45
20	4.21	1.38	0.01	0.49	47.78	27.14	0.05	4.32	14.58
30	5.59	2.08	0.04	0.45	37.52	27.38	0.03	7.68	19.19
delibdem									
1	0.04	0.10	0.11	0.14	61.86	8.14	29.57	0.00	0.00
10	2.48	0.23	0.05	0.09	58.49	14.35	17.65	0.89	5.73
20	5.22	1.11	0.02	0.08	48.50	18.99	8.99	3.13	13.92
30	6.91	1.19	0.03	0.12	39.84	21.49	4.82	5.90	18.93
egalitdem									
1	0.26	0.17	0.00	0.03	81.45	2.80	0.70	14.55	0.00
10	1.60	0.44	0.05	0.60	62.55	9.38	1.18	18.11	6.04
20	3.32	1.24	0.08	0.62	45.76	14.83	0.79	19.54	13.78
30	4.50	1.89	0.14	0.61	35.37	18.07	0.44	20.68	18.24
participdem									
1	0.00	0.02	0.18	0.00	76.47	1.40	0.89	0.22	20.77
10	3.73	0.74	0.20	0.04	65.81	6.37	0.60	0.40	22.06
20	7.31	1.74	0.10	0.03	53.33	12.22	0.34	1.21	23.68
30	9.15	2.42	0.06	0.03	43.98	16.52	0.19	2.86	24.76

5 Concluding remarks

This paper has investigated how negative shocks in oil rents/exports of Middle East oil producing countries influence the democracy through affecting the government's budget allocation to military and non-military sectors. The aim is to find out how boycotting the oil exports could reshape the spending behavior of the oil rentier states and affect their political system in the Middle East. Ross (2001) addresses the causal mechanism between natural resources and low levels of democracy within the concept of so called 'rentier state theory'. According to the rentier state theory the governments whose revenues mainly come from selling the natural resources are less likely to be democratic. The existence of considerable rents in the budget motivates the governments to charge low tax rates in order to relieve the citizens' demand for accountability.

Using annual data for the period 1990-2017 and a panel impulse response function (PIRFs) analysis based on an unrestricted Panel VAR (PVAR) model, I find that the response of political system to one standard deviation negative shocks to oil rents (% of GDP), fuel exports (% of GDP), as well as oil production (in barrels) in Middle East is positive and statistically significant. Contrarily, government revenues (% of GDP), military and non-military expenditures (% of

GDP) respond negatively to a negative oil shock. These findings are not vulnerable to the ordering of variables in the PVAR analysis and are robust to the different definition of the democracy indexes namely liberal, participatory, deliberative, egalitarian and electoral democracies. The employed variance decomposition analysis reveals that oil revenues may affect the military spending more than non-military spending within the ten years after initial shocks.

The impacts of oil rents on the political institutions and spending behavior of Middle East oil exporters are considerable: Oil revenues are important drivers of the Middle East rentier states' defence and non-defence expenditures and eventually of their political situation. Reduction in oil exports decreases government revenues and thereafter its spending capabilities specially on the military sector. These act as incentives to move toward a more democratic setting and subsequently alleviate the military ambitions of the Middle East states. The policy implication of this result hints that potential oil sanctions could influence the political behavior of Middle Eastern governments positively and decrease their military spending ceteris paribus.

References

Ahmadov, A. K. (2013) 'Oil, Democracy, and Context: A Meta-Analysis', *Comparative Political Studies* 47 (9): 1238-1267.

Ali, H.E. and Abdellatif, O.A. (2015) 'Military expenditures and natural resources: Evidence from rentier states in the Middle East and North Africa' *Defence and Peace Economics* 26(1): 5-13.

Allen, S. H. (2008) 'The Domestic Political Costs of Economic Sanctions', *Journal of Conflict Resolution* 52 (6): 916-44.

Allen, Susan H., and Lektzian. D.J (2013) 'Economic Sanctions: A Blunt Instrument?' *Journal of Peace Research* 50 (1): 121-35.

Anderson, L. (1987) 'The State in the Middle East and North Africa' *Comparative Politics* 20(1): 1–18.

Andersen, J. J. and Ross, M. L. (2014) 'The Big Oil Change: A closer look at the Haber-Menaldo analysis' *Comparative Political Studies* 47(7): 933-1021.

Auty, R.M. (1993) 'Sustaining Development in Mineral Economies: The Resource Curse Thesis' Routledge, London.

Bapat, N.A., Heinrich, T., Kobayashi, Y. & Morgan, T.C. (2013) 'Determinants of Sanctions Effectiveness: Sensitivity Analysis Using New Data' *International Interactions: Empirical and Theoretical Research in International Relations*, 39(1): 79-98.

Bellin, E. (2004) 'The Robustness of Authoritarianism in the Middle East: Exceptionalism in Comparative Perspective' *Comparative Politics* 36 (2): 139-157.

Berument,M.H., Ceylan, N.B. & Dogan, N. (2010) 'The impact of oil price shocks on the economic growth of selected MENA countries' *Energy Journal* 31(1): 149–176.

Brown, S. and Yucel, M. (1999) 'Oil prices and U.S. aggregate economic activity: a question of neutrality' *Economic and Financial Policy Review* 11: 16-23.

Caselli, F. and Tesei, A. (2016) 'Resource windfalls, political regimes, and political stability' *The Review of Economics and Statistics* 98(3): 573-590.

Choi, I. (2001) 'Unit Root Tests for Panel Data' *Journal of International Money and Finance* 20: 249–272.

Chun, C.K.S. (2010) Do oil exports fuel defense spending?. Strategic Studies Institute (SSI), United States Army War College.

Coppedge, Michael, John Gerring, Staffan I. Lindberg, Jan Teorell, David Altman, Michael Bernhard, M. Steven Fish, Adam Glynn, Allen Hicken, Carl Henrik Knutsen, Kelly McMann,

Daniel Pemstein, Megan Reif, Svend-Erik Skaaning, Jeffrey Staton, Eitan Tzelgov, and Yi-ting Wang. (2015) *Varieties of Democracy: Codebook v4*. Varieties of Democracy (V-Dem) Project.

Cotet, A. M. and Tsui, K. K. (2013) 'Oil and Conflict: What Does the Cross-Country Evidence Really Show?' *American Economic Journal* 5(1): 49-80.

Deutsch, K. W. (1961) 'Social Mobilization and Political Development', *American Political Science Review*, 55 (3): 493-514.

Dizaji, S.F. (2018) 'Trade openness, political institutions, and military spending (Evidence from lifting Iran's sanctions)' *Empirical Economics*. https://doi.org/10.1007/s00181-018-1528-2.

Dizaji, S.F. (2014) The effects of oil shocks on government expenditures and government revenues nexus (with an application to Iran's sanctions), *Economic Modelling* 40: 299-313.

Dizaji, S. F., and Bergeijk, P.A.G. van (2013) 'Potential early phase success and ultimate failure of economic sanctions: A VAR approach with an application to Iran' *Journal of Peace Research, 50*(6): 721–736.

Dizaji, S.F., Farzanegan, M.R. (2018) 'Do sanctions reduce the military spending in Iran?', MAGKS Papers No. 31-2018, Marburg.

Dizaji, S.F., Farzanegan, M.R., Naghavi, A. (2016) 'Political institutions and government spending behavior: theory and evidence from Iran' *International Tax and Public Finance* 23(3): 522–549.

Drezner, D.W. (2011) 'Sanctions Sometimes Smart: Targeted Sanctions in Theory and Practice' *International Studies Review* 13(1): 96-108.

Dunning, T. (2009) 'Crude Democracy: Natural Resource Wealth and Political Regimes' *Latin American Politics and Society*, 51(3): 167-169.

Filippaki, A. and Mamatzakis, E. (2009) 'Performance and Merton-Type Default Risk Of Listed Banks in The EU: A Panel VAR' *Approach Journal of Banking & Finance* 33: 2050–2061.

Farzanegan, M.R. (2018) 'The Impact of Oil Rents on Military Spending in the GCC Region: Does Corruption Matter?' *Journal of Arabian Studies* 8:87-109.

Farzanegan, M.R. (2011) 'Oil revenues shocks and government spending behavior in Iran' *Energy Economics* 33: 1055-1069.

Freeman, J.R., Williams, J.T. and Lin.T. (1989) 'Vector Autoregression and the study of politics' *American Journal of Political Science* 33(4): 842–877.

Gershenson, D. (2002) 'Sanctions and Civil Conflict' *Economica* 69 (274): 185-206.

Grauvogel, J., Licht, A., and Soest. C. (2014) 'Taking the Streets? Disentangling the Impact of Sanction Threats on Mass Protest' *Working paper*. Binghamton University-State University of New York, Binghamton, NY, USA.

Grauvogel, J., and Soest. C. (2014) 'Claims to Legitimacy Count: Why Sanctions Fail to Instigate Democratisation in Authoritarian Regimes' *European Journal of Political Research* 53(4): 635-53.

Gurses, M. (2009) 'State-sponsored development, oil and democratization' *Democratization* 16(3): 508-529.

Haber, S. and Menaldo, V.A. (2011) 'Do Natural Resources Fuel Authoritarianism?: A Reappraisal of the Resource Curse' *American Political Science Review*, 105(1): 1-26.

Herb, M. (2005) 'No representation without taxation?' *Comparative Politics*, 37(3): 297–316.

Hultman, L., and Peksen, D. (2017) 'Successful or counterproductive coercion? The effect of international sanctions on conflict intensity' *Journal of Conflict Resolution*, 61(6): 1315-1339.

Inglehart, R. (1997) 'Modernization and Postmodernization' Princeton University Press, Princeton.

Jensen, N. and Wantchekon, L. (2004) 'Resource Wealth and Political Regimes in Africa' *Comparative Political Studies*, 37(7): 816–841.

Koop, G., Pesaran, M. H., Potter, S. M. (1996). 'Impulse response analysis in nonlinear multivariate models' *Journal of Econometrics* 74 (1): 119-147.

Im K, Pesaran M, Shin Y (2003) 'Testing for unit roots in heterogeneous panels' *Journal of Econometrics* 115(1):53–74.

Levin A, Lin C-F, Chu J (2002) 'Unit root tests in panel data: asymptotic and finite-sample properties' *Journal of Econometrics* 108(1):1–24

Lipset, S. M. (1959) 'Some Social Requisites of Democracy: Economic Development and Political Legitimacy' *American Political Science Review*, 53(1): 69-105.

Love, I and Zicchiano, L., (2006) 'Financial Development and Dy-namic Investment Behavior; Evidence from Panel VAR' *The Quarterly Journal Review of Economics and Finance*, 46: 190-210.

Lütkepohl, H. (1991) Introduction to multiple time series analysis. Springer, New York

Maddala, G. S. and WU, S. (1999) 'A comparative study of unit root tests with panel data and a new simple test' *Oxford Bulletin of Economics and Statistics*, 61: 631–52.

Marshall, M.G., Gurr, T.R., Jaggers, K. (2017). POLITY™ IV Project. Center for Systemic Peace. Vienna, VA.

Peksen, D. (2010) 'Coercive Diplomacy and Press Freedom: An Empirical Assessment of the Impact of Economic Sanctions on Media Openness' *International Political Science Review* 31(4): 449-69.

Peksen, D. (2011) 'Human security and economic sanctions: The public health impact of economic sanctions' *Foreign Policy Analysis* 7(3): 237-51.

Peksen, D., and A. Drury, C (2010) 'Coercive or corrosive: The negative impact of economic sanctions on democracy' *International Interactions* 36(3): 240-64.

Pemstein, D., Marquardt, K. L., Tzelgov, E., Wang, Y., Krusell, J., & Miriet, F. (2017) 'The varieties of democracy measurement model: Latent variable analysis for cross-national and cross-temporal expert-coded data, *The Varieties of Democracy Institute Working Paper Series 2017: 21*, Gothenburg: University of Gothenburg.

Pape, R. (1997) 'Why Economic Sanctions Do Not Work' *International Security*, 22(2): 90–136.

Perlo-Freeman, S. and Brauner, J. (2012) 'Natural resources and military expenditure: The case of Algeria' *The Economics of Peace and Security Journal* 7(1): 15–21.

Pesaran, M. H., Smith, R. (1998) 'Structural analysis of cointegration VARs' *Journal of Economic Surveys*, 12: 471-505.

Ross, M. L. (2001) 'Does oil hinder democracy?' *World Politics*, 53: 325–361.

Ross, M.L. (2008) 'But Seriously: Does Oil really Hinder Democracy?' UCLA Department of Political Science.

Runkle, D.E. (1987) 'Vector Autoregression and Reality' *Journal of Business and Economic Statistics* 5:437–442.

Sachs, J. D., and Warner, A. M. (1997). 'Natural resource abundance and economic growth' *Working Paper Series WP 5398*, NBER, Cambridge.

Sachs, J. D., and Warner, A. M. (1999) 'The big push, natural resource booms and growth' *Journal of Development Economics*, 59: 43–76.

Sachs, J. D., and Warner, A. M. (2001) 'The curse of natural resources' *European Economic Review*, 45: 827–838.

Sala-i-Martin, X. and A. Subramanian, (2003) 'Addressing the natural resource curse: An illustration from Nigeria' *NBER Working Paper Series, No 9804*, Cambridge, Ma.

Sims, C. A. (1980) ‘Macroeconomics and reality’ *Econometrica* 48(1): 1–48.

Sims CA, Zha T (1999) ‘Error bands for impulse responses’ *Econometrica* 67: 1113–1156.

SIPRI. (2010) Media Background – Military Expenditure: SIPRI Yearbook 2010. Stockholm International Peace Research Institute (SIPRI): Stockholm.

SIPRI. (2017) Military Expenditure: SIPRI Yearbook. Stockholm International Peace Research Institute (SIPRI): Stockholm.

SIPRI. (2016) Military Expenditure Database. Stockholm International Peace Research Institute (SIPRI): Stockholm.

Stock, J.H., Watson, M.W. (2001) ‘Vector Autoregressions’ *Journal of Economic Perspectives* 15: 101–115.

Strandow, D. (2006) ‘Sanctions and Civil War: Targeted Measures for Conflict Resolution’ Uppsala, Sweden: Department of Peace and Conflict Research, Uppsala University.

Tsui, K. K. (2010) ‘Resource Curse, Political Entry, and Deadweight Costs’ *Economics and Politics*, 22(3): 471-497.

Tsui, K. K. (2011) ‘More Oil, Less Democracy: Evidence from Worldwide Crude Oil Discoveries’ *The Economic Journal*, 121(551): 89-115.

Varisco, A.E. (2010) ‘A study on the interrelation between armed conflict and natural resources and its implications for conflict resolution and peace building’ *Journal of Peace, Conflict and Development* 15: 38–58.

Weiss, Thomas G., David Cortright, George A. Lopez, and Larry Minear, eds. (1997) *Political Gain and Civilian Pain: Humanitarian Impacts of Economic Sanctions*. Lanham, MD: Rowman and Littlefield.

Wood, R. M. (2008) ‘A Hand upon the Throat of the Nation: Economic Sanctions and State Repression, 1976-2001’. *International Studies Quarterly* 52 (3): 489-513.

World Bank (2018) World Development Indicators. Washington D.C.

Appendix

Table 6 Countries included in the sample

Sample countries with oil rents						
Algeria	Azerbaijan	Bahrain	Egypt	Iran	Kazakhstan	Kuwait
Mauritania	Oman	Saudi Arabia	Sudan	Tunisia	UAE	Yemen
Sample countries with fuel exports						
Algeria	Azerbaijan	Bahrain	Egypt	Iran	Iraq	Kazakhstan
Kuwait	Kyrgyzstan	Oman	Qatar	Saudi Arabia	Sudan	Syria
Tunisia	UAE	Yemen				
Sample countries with oil production						
Algeria	Azerbaijan	Egypt	Iran	Iraq	Kazakhstan	Kuwait
Libya	Oman	Saudi Arabia	Sudan	Syria	Tunisia	UAE
Yemen						