

Factionalized democracy, oil and economic growth in Iran: Where is the curse?

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Summary

This study examines the phenomenon of the “natural resource curse” in the rentier economy of Iran. The paper shows that an increasing factionalized democracy in an oil economy is a curse for economic growth. We find a positive and significant direct association between natural resource wealth and economic growth in Iran from 1960-2007. However, this positive effect is moderated by the factional politics. For the maximum level of factionalized democracy, one standard deviation increase in the share of oil rents in the government budget reduces real economic growth per capita by 9 percentage points.

Key words: natural resource curse, factionalized democracy, economic growth, Middle East, Iran

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1. INTRODUCTION

Political power struggles among reformers, conservatives, and dozens of other factions are a main characteristic for Iran after the Islamic Revolution of 1979. The lack of political organization to manage the struggles of power among the revolution leaders led to the emergence of factional politics. Oil rents in Iran are the major factor in the calculations of political factions in their competition for executive power. The arising question is to what extent competition among the political factions shapes the role of oil revenues in the context of economic growth in Iran. We aim to re-visit the natural resource curse hypothesis in a highly politically factionalized country such as Iran. The Iranian political environments before and after the Islamic revolution and the existence of significant oil rents in both periods provide a unique opportunity to test Bjorvatn and Selvik's (2008) theoretical predictions empirically (see section 2). This paper is the first empirical effort to re-examine the natural resource curse hypothesis, taking into consideration the structural changes in political power and the factionalized democracy in Iran, providing empirical support for the predictions of Bjorvatn and Selvik. This study analyses the link between oil revenues and economic growth in Iran from 1960s up to the present. The main finding is that there is a positive effect of oil revenues on economic growth. However, this effect is moderated by the factionalized democracy.

Iranian political history observed a significant event in the 1979 when the autocracy of Pahlavi changed to an Islamic Republic. While in the former system, the Shah was the most powerful person and the head of the political and economic system, the latter does not carry the same significance in political life. Kenneth Pollack, former director of Persian Gulf affairs at the US National Security Council, illustrates the situation in the factionalized Islamic Republic as follows: *“There are fourteen dozen different positions on each issue, and it is*

very difficult to say with any certainty which of the insiders support which position” (see Klein, 2002). Such factionalism of course needs a certain degree of democracy which was lacking in the autocracy system of Pahlavi.¹

The struggle for power is greater when there is some improvement in democracy indicators such as Polity for the case of Iran. A clear example is the period of 1997-2004 which was associated with the governance of reformists and the improvement of democracy indices of Iran. Gheissari and Nasr (2006) highlighted the main properties of political factions after the revolution in Iran: informality, absence of real organization, charter, rule or clear platform for defining their political and economic views and memberships, and lack of any party structure. These factions with changing boundaries and missions behaved like semi-parties within revolutionary powers. The battlegrounds of these factions have been the parliament, government agencies, media and different religious ceremonies such as the Friday prayer ceremony. Gheissari and Nasr believe that factionalism dominated Iranian politics in the 1980s.

The contemporary political economic history of Iran shows that the economic system had performed better during strong autocracies. More specifically, the GDP per capita increased at an exceptional rate of 8% per year from 1963-1976. The non-oil GDP per capita growth was 8.6% per year (Esfahani and Pesaran, 2009). Esfahani and Pesaran discussed that one of the main reasons behind this economic success was the concentration of power in the hands of the Shah. This politically monopolized system implemented the constructive economic policies such as the Second Seven Year Plan (1956-1962), limiting the power of landlords (White Revolution), and rapid industrialization and investments in human resources. The Polity index of Iran from 1955-1978 was -10, indicating a maximum degree of autocracy.

Figure 1 shows the trend of GDP per capita growth and Polity index under autocracy and Islamic Republic governments in Iran. We have divided this time span over four sub-periods, e.g. 1965- 1978 (autocracy of Shah), 1979-1988 (Islamic revolution and Iraq-Iran war), 1989-1996 (presidency of Hashemi Rafsanjani and reconstruction of the economy), 1997-2005 (presidency of Khatami and social-political reforms). The highest records of GDP per capita growth are observed under the strong autocracy of the Shah from 1965-1978 in Figure 1. Oil rents have existed in all of these different polities and have played an important role in the economic system (see Appendix A for the trend of oil revenues and share of oil revenues in total revenues, and growth rate of oil revenues in Iran). However, the system's outcomes are different. Destructive competition, especially in the post-revolutionary factionalized system, has eroded the effectiveness of oil revenues in economic growth process. Figure 2 also shows the relative superior performance of autocracy in a term of industrialization and investment compared to the post-revolutionary factionalized system.²

Figure 1 here

Figure 2 here

The post-revolutionary period in Iran has been the ground of competition among different conservative and reformist factions (see Bjorvatn and Selvik, 2008 and Gheissari and Nasr, 2006 for an excellent discussion on this issue). The political power structure and competition of different political factions in a rentier economy³ is a critical issue for the transformation of resource wealth to a curse or blessing. This study focuses on the case of Iran to investigate the role of natural resource wealth in economic growth, taking into consideration the development of factionalism and political competition.

The paper is organized as follows. In section 2, we discuss the natural resource curse debates in literature. The main hypotheses, data and empirical model are presented in section 3. Section 4 presents the empirical results. Finally, section 5 concludes.

2. REVIEW OF LITERATURE

Our study is mainly related to natural resource curse literature. The disappointing performance of resource rich economies (especially those with a point resource such as oil) draws our attention to the natural resource curse hypothesis. Resource curse literature is about the puzzling role of natural resources in economic growth. It is a common wisdom that those countries rich in natural resources, especially oil, are suffering from a lower economic growth compared to those without such resources (see Sachs and Warner, 1995⁴ and 2001). The question is what really causes such disappointing results from richness in natural resources? Do oil revenues and resources in themselves hinder economic growth? The blessing and the curse of oil wealth needs to be analyzed in both a realistic and practical way. *“To an optimist, the possession of oil reserves is an unqualified blessing. To a pessimist, the possession of oil is a predictable curse. To a realist, oil, as anything else in life, can be blessing or curse, it all depends what is done with it”* (Askari, 2006, p.8). What is done with oil should be traced through the political economy of oil exporting countries. Political factionalism in young and fragile democracies and destructive competition among these factions for oil rents in oil rich economies might be a key for a “resource curse” black box.

Besides examining the direct effect of resource wealth on growth, economists have also paid attention to interactions between institutions with resource wealth in their analysis of the natural resource curse. In their theoretical model, Robinson et al. (2006), show that the final impact of the resource booms on the growth depends on the quality of institutions. Based on

their model, the lack of institutions promoting accountability and state competence is the main cause of the natural resource curse.

Bjorvatn and Selvik (2008) explicitly modeled the role of the political power structure in a rentier economy using descriptive evidence of the Iranian society. The theoretical model of Bjorvatn and Selvik (2008) which explains the role of political power distribution and factionalism on oil-growth nexus has inspired the empirical strategy of our paper. Their theoretical model predicts that resources are wasted during competition for rents and the structure of a political system or factionalism significantly affects the allocation of oil rents among entrepreneurs. Indeed, in their model, the combination of political power structure and oil rents is critical for explaining growth. They conclude that given a high level of oil rents, an increasing dominance of one political group reduces welfare loss. This is because of a fall in rent-seeking intensity with asymmetry in political power. Thus, in their analysis, higher political competition reducing the dominance of one group in the politics of a rentier economy is not an optimum. They emphasize the lack of state autonomy after the Islamic Revolution of 1979, in contrast to the autocracy of Mohammad Reza Shah which intensified rent-seeking among different political factions. Such destructive competitions for oil rents have transformed the oil wealth into a curse in Iran. They conclude that to improve the economic performance of Iran, it is necessary to move toward a more autonomous state. Our empirical investigation provides evidence for their theoretical predictions in the case of Iran.

There are several empirical studies on the growth-natural resource nexus which take the institutional quality into account. Most of these studies are cross-country analyses (see, for example, Boschini et al., 2007; Mehlum et al., 2006; Brunnschweiler and Bulte, 2008; Brunnschweiler, 2008 and Iimi, 2007). However, how the institutions influence the relationship between natural resources and growth is country specific (Bjorvatn and Selvik,

2008). After all, oil rich economies vary considerably in terms of their institutions, political economy structure, demographic and social norms which make it difficult to address in cross-country analyses.⁵

Theoretically, natural resource abundance could increase growth because it provides necessary funds for investment in infrastructures and human development (Sachs and Warner, 1999 and Murphy et al., 1989). Negative side-effects of natural resource abundance or dependence may not crowd out completely the positive effects on growth.⁶ However, most cross-country studies, even after controlling for interaction terms, have estimated a negative and significant association between a natural resource abundance or dependence variable and economic growth (see, for example, Sachs and Warner, 2001 (using natural resource exports in GDP as a proxy for resource abundance), and Iimi, 2007 (using mineral exports per capita as a proxy for resource abundance). Boschini et al. (2007) and Mehlum et al. (2006) show that this negative association is stronger for minerals than general resources. Furthermore, based on their estimations, the role of institutions is more important for the effect of minerals than other resources on growth. Boschini et al. (2007) discussed the concept of appropriability of natural resources. By appropriability, they mean the likelihood that natural resources lead to rent-seeking, corruption or conflicts. Determinants of appropriability of a resource in their view are the type of resource and the quality of institutions.

Using natural resource wealth data of the World Bank (1997, 2005), Brunnschweiler (2008) carried out a cross-country analysis, showing a positive direct association between the World Bank measure of resource wealth and economic growth, even after controlling for the quality of institutions. She suggests that the findings are highly significant when concentrated on mineral resources. Brunnschweiler concludes that the results are in contrast to most of the natural resource-growth literature. She suggests that the frequent observed negative

association can be due to the use of a specific natural resource abundance variable (i.e. a share of primary exports in GDP).

In a theoretical model, Mehlum et al. (2006) introduced the concepts of “production friendly” and “grabber friendly” institutions in the natural resource-growth nexus. They test their model empirically by using the Sachs and Warner (1997) natural resource variable (a share of primary export in GNP). Their institutional quality index is an unweighted average of six indicators of ICRG: a rule of law index, a bureaucratic quality index, a corruption in government index, a risk of expropriation index, and a government repudiation of contracts index. Their resource abundance coefficient is always negative and significant which is moderated by the quality of institutions. They conclude that the natural resource curse can only be observed in the countries with “grabber friendly” institutions. Torvik (2002) theoretically investigated the effect of natural resources on entrepreneurs’ activities. He suggests that increasing natural resource rents motivates the entrepreneurs’ activity in rent-seeking, diverting them from the productive part of the economy. He concludes that fall of income due to this re-allocation of entrepreneurs outweighs the benefits of natural resource rents.

The role of natural resources on domestic instability and civil war among different factions has been investigated as well. For instance, Collier and Hoeffler (1998) show, that the ownership of natural resources has a non-linear effect on the initiation and the duration of a civil war. The effect of natural resources on growth is more crucial in polarized societies. Montalvo and Reynal-Querol (2005) show that polarized societies with large rivalling groups have a greater potential for rent-seeking, corruption, and conflict.

Esfahani (2007) emphasizes the negative indirect effects of democratization and factionalism for countries rich in natural resources. He discusses that since in these countries the public

knows about the direct access of the government to resource rents, they expect and demand to have a share in these rents. This usually leads to inefficient mass subsidies with negative market distortion effects. In a republic state with rich oil resources such as Iran, the local interest groups put pressure on the elected government to distribute these oil rents through different protectionist policies and subsidies.⁷ Torvik (2009) has summarized more details on the recent developments in the resource curse literature.

3. EMPIRICAL MODEL AND DATA

The main hypothesis of this study is that the “oil resources revenues” have a direct positive effect on economic growth.⁸ However, the interaction of a factionalized democracy with oil rents has a negative effect on economic growth. The final impact of oil rents, therefore, varies with changes in the factionalized democracy. These hypotheses will be tested by using different factionalized democracy indicators, and oil dependency and abundance variables.

(a) Econometric specification

We modified the cross-country specification of Boschini et al. (2007), applying the following specification for our time series analysis:

$$G_t = \alpha_1 \cdot G_{t-1} + \alpha_2 \cdot X'_t + \beta_1 \cdot nr_t + \beta_2 \cdot fac_t + \beta_3 \cdot (nr_t \times fac_t) + \varepsilon_t \quad (1)$$

where G is the real per capita GDP growth rate, X is a vector of control variables including investment as a ratio of the real GDP (Inv_gdp), changes in oil prices (Oil_g ; as a proxy for changes in terms of trade), inflation rate (Inf ; as a measure of macroeconomic instability), real government consumption as a ratio of real GDP ($Govex_gdp$; a proxy for size of government distortions in the economy), real per capita GDP growth rate of OECD countries ($OECD_GDPPCG$; a proxy for external demand of Iran major trade partners), a dummy variable for Iran-Iraq war ($Wardummy$; for period of 1980-1988), and the lag of the dependent

variable (G_{t-1} ; to control for the dynamic path of economic growth).⁹ nr is the natural resource abundance and dependence.

The main proxy for oil dependency in this study is the share of oil revenues in total revenues of government ($oilrev_trev$). The proxy for oil abundance is per capita daily oil production ($pcoil_produc$).¹⁰ The fac variable refers to factionalism and the degree of political groups' competition. $nr_t \times fac_t$ is an interaction term of oil dependence and/or abundance variable with an index of factionalism and ε is the error term which is assumed to be independent from other regressors.

The model will be estimated with Dynamic Ordinary Least Squares (DOLS) and 2SLS methods. The marginal impact of a unit increase in the oil rent variable on economic growth is $\beta_1 + \beta_3 fac$. Based on the theoretical predictions of Bjorvatn and Selvik (2008), the sign of β_1 should be positive and the sign of β_3 should be negative. This means that increasing factional politics (increasing fac) and oil rents lead to “*destructive competition*” and intensive rent-seeking. Thus, the final effect of oil rents on growth is conditional on the level of factionalized democracy.

The expected effects of control variables are straightforward. The share of real investment in real GDP in the neoclassical growth model is an indicator of saving rates. A higher level of this ratio, therefore, has a positive effect on growth. An increase in government consumption in the economy is expected to result in crowded-out private investment and increases of the regulatory burden. This argument is more significant considering the role of the state in the Iranian economy. Thus, it should have a negative effect on growth. Improving terms of trade (export prices/import prices) which is proxied by the growth rate of oil prices is expected to have positive effects on growth. Since the major export products of Iran are oil and refinery products, this variable is a valid indicator in the fluctuations of the terms of trade. We also

expect that a higher growth in the major trading partners of Iran (OECD region) will positively influence the economic growth of Iran.

In summary, the main hypotheses are as follows:

H1: The direct effect of oil revenues on the real growth rate of Iranian economy is positive, *ceteris paribus*.

H2: The final (overall) effect of oil revenues on the real growth rate of Iranian economy depends on the degree of factionalized democracy. A higher symmetry of political power (i.e. higher factionalized democracy or lower degree of dominance of one group) besides higher oil rents has a negative effect on real growth rates. Table 1 shows the hypothesized effects of independent variables on the real per capita GDP growth rate of the Iranian economy.

Table 1 here

(b) Measuring factionalized democracy

Factionalism is not directly observable. Zariski (1960, p.33) defined a faction as “*any intra-party combination, clique, or grouping whose members share a sense of common identity and common purpose and are organized to act collectively – as a distinct bloc within the party – to achieve their goals*”. Beller and Belloni (1978, p.419) defined factions as “*any relatively organized group that exists within the context of some other group and which (as a political faction) competes with rivals for power advantages within the larger group of which it is a part*”. Factionalism usually happens in new democracies and in the transit period from autocracy to democracy. Young partial democracies usually have weak party systems and political participation is realized through traditional and factional networks (Goldstone et al., 2005). Goldstone et al. believe that factionalized democracies arise as a part of transition from autocracy to partial democracy. Based on their study, the most unstable environment is a

partial democracy with a high degree of factionalism, while the most stable system is a strong autocracy.

Türsan (1995) investigated factionalism in Turkey, mentioning that factionalism is a product of frequent interruptions to democracy and it is the main cause of party system instability. Corkill (1995) explains the key factor for emergence of factionalism in theory. He emphasizes that “*a nascent and weakly institutionalized political system, where party discipline and organization are weak, should provide optimum conditions for boosting factionalism*”. Marshall and Jagers (2007, p.3) have separated fragmentation from factionalism. They explain that “*factionalism occurs inside the political arena of a polity, whereas fragmentation occurs when groups operate outside the political system and in direct opposition to state authority*”.

Basedau and Köllner (2005) summarized the main characteristics of political factions. In their analysis, a faction is any intra-party grouping which exists for a certain period of time, has an organization, shares common goals and pursues them actively. All these approaches to factionalism show that it requires a certain degree of democracy to flourish. It is mostly a phenomenon of countries in transit from an autocracy or dictatorship to an established democracy. Factionalism is in close tie with political instability. We can call such systems under transition factionalized democracies.¹¹

There are some quantified indices which we can use as proxies for factionalized democracies.

We consider the following variables as indicators of factionalized democracy in Iran:

- *Polity2* (Marshall and Jagers, 2007): As measured by Polity (*Parcomp*; the competitiveness of participation), factionalism happens when the political competition is dominated by ethnic or other parochial groups that regularly compete for political influence in order to promote particularistic agendas and favor group members instead

of national favors. The *Parcomp* index categorizes the competitiveness of participation¹² in different groups: (1) repressed, (2) suppressed, (3) factional, (4) transitional and (5) competitive. The “repressed” category refers to those countries in which no significant oppositional activity is permitted outside the ranks of the regime or ruling party. Systems such as totalitarian party systems, military dictatorships, and despotic monarchies are in this category. In the second category, the suppressed systems, some organized political competition happens outside of the government without serious factionalism. However, these political competitions are under the control of the regime and censorship is a common practice. In this category, the government prohibits some kinds of political organization and some political actions. The opposition leaders are under strict monitoring or frequent political pressures by the ruling government. The third category is the factional system (see above definition). The next stage is the transitional system. These are any arrangements for transit from a factional system to a fully competitive system. Finally, the competitive system closes these categories. It is relatively stable and enduring. In this stage, small parties and groups may be restricted in the competitive pattern.

The *Parcomp* index for the most years of Mohammad Reza Shah codes as 1 (repressed), while for the most years of post-revolution codes as 2 (suppressed). The exception is the reformist government of Khatami period which shows the value of 3 (factional). Since *Parcomp* has some missing values for the initial years of Islamic Republic system, we use the *polity2* as an alternative indicator. *Polity2* scores are between -10 and +10. A +10 refers to “strongly democratic” state and -10 to “strongly autocratic”. The *Polity2* and *Parcomp* indices are perfectly correlated.¹³ Thus, using *polity2* instead of *Parcomp* captures the concept of factionalized democracy adequately.

- *Van_index*: This index combines two basic dimensions of democracy – competition and participation – measured as the percentage of votes cast for parties other than the largest (competition) times the percentage of the population who actually voted in the election (participation). This product is divided by 100 to form an index that in principle could vary from 0 (no democracy) to 100 (full democracy). Higher levels of this index reflect more competition of factions within political power and the participation of their supporters. This index seems to show the symmetric or asymmetric degree of political power better. As Marshal and Jagers (2007) mentioned, in the final stage of transit toward an established democracy (e.g. stage 5: competitive system) small parties or political groups may be restricted in the competitive pattern. Thus, an increasing *Van_index* shows a transit way toward the last stage of the democracy cycle. Increasing the percentage of votes cast for parties other than the largest means higher competition of smaller parties or factions in a country showing more characteristics of a factionalized democracy than an established one.
- *Van_comp*: This variable portrays the electoral success of smaller parties, i.e. the percentage of votes gained by the smaller parties in parliamentary and/or presidential elections. The variable is calculated by subtracting from 100 the percentage of votes won by the largest party (the party which wins most votes) in parliamentary elections or by the party of the successful candidate in presidential elections. The variable thus theoretically ranges from 0 (only one party received 100 % of votes) to 100 (each voter cast a vote for a distinct party).
- *Van_part*: The percentage of the total population who actually voted in the election. The group of *Van* indicators introduced by Vanhanen (2000).

More details on variables and sources are presented in Appendix A. Table 2 shows the correlation among different proxies of factionalized democracy. The correlation among these indicators is statistically significant.

Table 2 here

4. EMPIRICAL RESULTS

The first step before running regressions is checking the time-series properties of the variables in the model. Since the time period of our study covers different political regimes before and after the Islamic Revolution of 1979, then structural break is a possibility within our variables. In such a case, the most common unit-root tests, namely Augmented Dickey-Fuller (ADF) and Phipps-Perron (PP) tests may not be efficient.¹⁴ We should control for the possibility of structural breaks. Thus, we apply the ZA unit root test introduced by Zivot and Andrews (1992). Through the Zandrews test we have examined for a single structural break in the intercept and/or in the trend of the time series. The optimal lag length was selected by a t-test. There are some minor contradictions between ZA unit-root results with those not controlling for a structural break. Thus, we relied on the outcome of the ZA unit-root tests for further analysis of our hypotheses.

The ZA test results show that, except for *van_part* (Vanhanen participation index), *inf* (inflation), *pcgdp_g* (per capita GDP growth rate), *oil_g* (growth rate of oil prices), and *oecd_gdppcg* (per capita GDP growth of OECD) which are I (0) at 1% or 5% levels, the remaining variables are I (1). Thus, the I (1) variables are entered into regression models after taking the first difference. The unit root tests of variables without controlling for structural break (ADF and PP tests) and with controlling break (ZA test) are presented in Tables B1 and B2 (Appendix B), respectively.

In order to examine the effects of different natural resource abundance and dependence variables on the Iranian economic growth and role of a factionalized democracy, we set up a dynamic ordinary least squares (DOLS). In this framework, it is also possible that factionalism and natural resource related variables are affected by economic growth. Thus, the independent variables may be contemporaneously correlated with the error term. To address this problem, we use 1 to 4 years' lags of independent variables as instruments. Usually, there is no significant correlation between lagged variables and disturbance. Furthermore, there can be another concern about the effect of "oil-rent" specific variables and factionalism which in turn influence economic growth. In this case, we still have a correct model but it may not be an efficient specification. We can show that this issue is a not a source of concern for our case. The correlation of "oil-rent" dependency and abundance variables with factionalism variables is not statistically different from zero.

Tables 3 and 4 show the direct and indirect effects of "oil dependency and abundance" on real economic growth. We have separated these tables by using different natural resource variables in order to provide more insight into specific differences in the interaction of factionalized democracy with resource rents.

As is evident in Tables 3 and 4, even after controlling for the most important variables in growth literature and interaction effects, we cannot identify a direct negative effect from higher oil rents on the economic growth of Iran. The oil rent in itself is not a curse for the economy, but a blessing. It provides necessary resources for financing the process of economic growth. Nevertheless, the final effect of oil dependency and abundance depends on the changes of factionalized democracy indicators.

The negative and significant sign of interaction terms (β_3) in most specifications shows that an increasing struggle of political groups for power and increasing oil rents reduce economic

growth. Destructive competition of factions and directly unproductive activities aiming to capture a part of oil revenues increases inefficiency and consequently wastes scarce resources within the economy. This can be compared with the classification of institutions to “grabber friendly” and “productive friendly” as discussed by Mehlum et al. (2006). Benevolent autocrats design economic institutions to increase the economic growth and consequently the size of their own benefits (see Lambsdorff, 2007, p.86). These productive friendly institutions were weakened significantly under a factionalized democracy in post-revolution. Grabber friendly institutions boosted during this period and are reflected in historical black market premium, illegal trade, and the increasing presence of military bodies in the national economy (Farzanegan, 2009).

It seems, at least in the short term, that young democracies with a fragile and factional nature in a rentier economy experience poor growth. Of course, this observation does not undermine the long term benefits of an established democracy. The main puzzle is how a government in an oil economy should manage the transit path from a fragile and factional democracy to an established one with minimum negative side effects on the economy.

The effects of other control variables are consistent with our expectations and economic theory. The share of investment in GDP has a positive, significant and stable effect on growth over all specifications. An increase in government consumptions in GDP has a negative and significant effect on growth in most specifications, especially in 2SLS estimations. Inflation as an indicator of macroeconomic instability has negative effects on growth. The lagged term of real economic growth has a positive effect on current growth, but it is not statistically significant in most specifications. It seems that its effects are reduced by contributions from other main control variables. The oil price growth rate has positive and significant effects on growth when we use an oil abundance variable. It seems that the growth rate of OECD

economies has no significant effect on the Iranian economy when we control for other variables. This might be due to a lower degree of integration of the Iranian economy in the global markets. In order to control for the effects of eight years' war with Iraq on growth rates we included a dummy variable. The effect of a war dummy is significantly negative in all specifications.

The Ramsey test indicates that we do not have a serious problem with an omitted variable bias in any specifications. Also based on the LM test, we can accept that in most specifications our main findings are immune to the possible autocorrelation of residuals. Normality assumption is required in order to conduct single or joint hypothesis tests about the model parameters. The Jarque-Bera tests in all specifications cannot reject the null hypothesis of residual normality, increasing the confidence in the inferences that we make about the coefficient estimates. The R-squared criteria show that a significant portion of changes in the real economic growth of Iran can be explained by included explanatory variables in specifications.¹⁵

Table 3 here

Table 4 here

Since natural resource dependence variables have a different unit of measurement (%) than natural resource abundance variables (per capita daily production of oil), comparing their direct and indirect effects may not be very precise. To get a better picture of the size and interpretation of effects, we calculate the marginal effects of one standard deviation increase in a related natural resource variable at different levels of factionalized democracy on the real per capita GDP growth. For illustration, we use coefficients in Tables 3 and 4 for *Van_index* variable (S1 (2SLS), and S5 (2SLS)). Using Eq. 2, we calculate these marginal effects.

$$\Delta G = (\beta_1 + \beta_3 \cdot Dfac) \times stdD(nr) \quad (2)$$

Where G is the real per capita GDP growth rate, fac is Van_index , and $std(nr)$ is a standard deviation of the first difference of natural resource abundance (per capita daily oil production) and dependence (share of oil revenues in total revenues of government) and D is the differencing operator. Table 5 presents the effect of one standard deviation increase in the natural resource variables, taking into consideration the maximum, minimum and mean value of $D(van_index)$ on the real GDP per capita growth rate.

Table 5 here

Table 5 shows that an increase of one standard deviation in the share of oil revenues in the total revenues of the government ($D(oilrev_trev)$) has a significant dampening effect on the real growth when we have the maximum level of factionalized democracy ($D(van_index)$). In other words, *ceteris paribus*, with a maximum level of factionalized democracy, the Iranian real per capita income growth rate decreases by about 9 percentage points, if the shares of oil revenues in the total revenues of state increase by one standard deviation.¹⁶ By having the minimum level of factionalized democracy or higher dominance of one political group, the Iranian real per capita income growth rate increases by about 8 percentage points, if $D(oilrev_trev)$ increases by one standard deviation. This result supports our initial hypothesis, asserting that factionalized democracy and the reduction of dominance of one political group intensify political struggles for oil rents in the government budget. The share of oil revenues in the total revenues of the government in annual budgets shows exactly the available oil rents for political groups.

On the other hand, per capita daily oil production, more or less, shows the abundance of oil resources. Yet we see that by a maximum level of factionalized democracy, the positive effects of oil abundance on growth are significantly lower than the minimum level of

factionalized democracy option. However, it is still positive. In other words, by having a maximum factionalized democracy, Iranian real per capita income growth rate increases just by 0.88 percentage point, if daily oil production per capita increases by one standard deviation. Such a low positive effect could be changed to a more significant rise of about 5 percentage points if we were in the minimum level of factionalized democracy.

5. CONCLUSION

This paper re-examines the phenomenon of the natural resource curse, using the Iranian economy as a case study. The paper discussed that oil rents are not *de facto* harmful for the economy. What is detrimental is the “*destructive competition*” within the political power structure for these rents. The pre-revolution monopolized political power was more growth friendly than the post-revolution factionalized semi-democracy. Controlling for indirect effects of oil rents on the economic growth through changes of political competition, we conclude that higher levels of factionalism in the political system and bolder competition among different political factions in a semi-democracy system like Iran reduce the positive effects of oil wealth on growth. This is mainly due to instability of the system under a factionalized democracy. The period of reformist government from 1997-2004 is a clear example of the severe tension and confrontation between reformist and conservative factions. According to one of Khatami’s famous statements at the end of his first term, his government faced a crisis every nine days.¹⁷

Our findings are robust after controlling for possible endogeneity. The empirical results of this study are in line with the theoretical predictions of Bjorvatn and Selvik (2008). It is important to recall that the unstable nature of a factionalized democracy is a curse for an oil rich economy. In those countries such as Norway with a long history of established

democracy we should not expect such an outcome. It will be interesting to examine the effect of factionalized democracy on the economic growth in other resource rich countries in future.

NOTES

¹ “*Within the modernization paradigm, factionalism precedes the formation of modern parties which develop as channels of mass participation and thus act as important agencies of eventual democratization*”.(Lewis, 1995, page 105). Indeed, factionalism may refer to a primitive and immature form of democracy which is a property of political systems in transition to democracy.

² It is obvious that a change in the Polity index is not the only factor behind fluctuations of economic growth in Iran for the past decades. The Islamic revolution of 1979, eight years war with Iraq (1980-1988), fluctuations of oil prices, macroeconomic instability and volatile inflation, the government interventions in the economy, the size of investment in domestic economy and the economic growth of the Iran’s main trading partners should also be taken into account (see section 3 for further details).

³ Rentier economies are those in which resource wealth provides a high proportion of government revenue; e.g. a high resource-to-revenue ratio (see Herb 2005, p.8). Not any kind of resource wealth makes such a rentier state. Usually, oil resources which are geographically concentrated where the extraction is highly capital-intensive and requires complex and expensive technology. This imposes severe barriers for entrance of private companies in this industry providing the flow of rents to the state (see Farzanegan and Markwardt, 2009 for detailed analysis of the Iranian oil-based economy).

⁴ Sachs and Warner (1995) made a major contribution when they showed a negative link between natural resource abundance and growth in a cross-country analysis.

⁵ The approach of this paper is in line with a collection of case studies in Rodrik (2007), shedding light on the critical role of factionalism for economic growth by studying country specific experiences. “*I believe in the need for both cross-country regressions and detailed country studies. Any cross-country regression giving results that are not validated by case studies needs to be regarded with suspicion...*” (Rodrik, 2007, p.4).

⁶ These negative side-effects such as the Dutch disease, the lack of economic diversification, rent-seeking and civil conflicts, corruption and weak political institutions are well documented and explained in the literature (for more details see Iimi, 2007). We thank an anonymous referee for raising this point.

⁷ The mass subsidies and inefficient protectionism through popular macroeconomic policies in post-revolutionary Iran resulted in a significant amount of smuggling. For more details see Farzanegan (2009).

⁸ The positive role of natural resources in economic growth is discussed by Habakkuk (1962). In his analysis, one of the main reasons behind the surpassing of England by the United States in the 19th century was the greater natural resource endowment.

⁹ According to Sachs and Warner (2001), it might be difficult to observe the omitted variable affecting growth. Thus, they suggest as a solution that one should control for previous growth rates in regressions. Based on those, the lagged growth rates would be correlated with the omitted variables and therefore also be a proxy for them.

¹⁰ Besides oil production per capita, we can use oil reserves per capita as a measure of oil abundance. These two measures capture exogenous oil wealth. We use oil production because of its availability for a longer period. Another reason motivating us to use production data rather than reserve figures is the uncertainty about the accuracy and reliability of oil reserves within the OPEC countries. Oil dependency, on the other side, captures materialized rents in the government budget. Political factions are more interested in these more tangible rents rather than oil reserves or production.

¹¹ Factionalism is a post-revolutionary characteristic of the political economy of Iran. Currently, there are 240 legal political groups, communities and factions in Iran competing inside the Islamic Republic's accepted norms (see Iranian Ministry of Interior list of political groups, communities or factions at: <http://www.moi.ir/Portal/File/ShowFile.aspx?ID=10446318-e7d0-436c-8e57-18dc55b5245d>).

¹² “The competitiveness of participation refers to the extent to which alternative preferences for policy and leadership can be pursued in the political arena.” (Marshall and Jaggers, 2007, page 25).

¹³ The correlation between *polity2* and *Parcomp* from 1959-2007 is 0.96 with a t statistics of 24.1, implying a high comovement between these two indicators. This correlation from 1800-2008 is 0.66 with t statistics of 12.08.

¹⁴ We thank Daniel Meierrieks for raising this point.

¹⁵ For the robustness test, we have also excluded the observation under the Shah monarchy (1959-1979). It might be interesting to see whether the interaction term remains significant with the post-revolution observations. In addition, it may be also important to control for human capital. Investment in basic and higher education has increased significantly since the revolution (see Jbili et al., 2007). However, as Farzanegan (2009), Pritchett (2001) and Benhabib, and Spiegel (1994) have shown, higher education levels may have no effect on aggregates, so long as other bottlenecks remain. The results of these estimations are presented in Appendix C.

¹⁶ For example, this figure is obtained through specification 1(2SLS) of Table 3: $(0.32-0.22*6.1)*8.79= -8.98$. Since we are using the differenced transformation of *fac*, *nr*, and *G* in our calculations, thus the unit of standard deviation is in percentage points and not percent.

¹⁷ <http://www.rferl.org/content/pressrelease/1499795.html>

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Table 1. Hypothesized effects of independent variables

Independent variable	Expected sign
Natural resource (nr) proxies:	
<i>Oil revenues / total revenues</i>	+
<i>Per capita daily oil production</i>	+
Factionalized democracy variables (fac)	
<i>Van_index</i>	+/-
<i>Van_comp</i>	+/-
<i>Van_part</i>	+/-
<i>Polity2</i>	+/-
fac × nr	
<i>Investment /GDP (Inv_gdp)</i>	+
<i>Gov_expenditure/GDP (Govex_gdp)</i>	-
<i>Inflation (inf)</i>	-
<i>Oil price growth (oil_g)</i>	+
<i>OECD_gdppcg</i>	+
<i>Wardummy</i>	-
<i>Lag of dependent variable (G_{t-1})</i>	+

Table 2. Correlation Matrix

Correlation	<i>van_comp</i>	<i>van_index</i>	<i>van_part</i>	<i>polity2</i>
<i>van_comp</i>	1.000			
<i>van_index</i>	.94 (18.3)	1.000		
<i>van_part</i>	.61 (5.22)	.76 (7.92)	1.000	
<i>polity2</i>	.67 (6.13)	.81 (9.47)	.85 (10.8)	1.000

Note: t statistics are in parenthesis. Adjusted sample is from 1959-2004

Table 3. OLS & 2SLS results for oil revenues/total revenues

Variable	S1(OLS)	S1(2SLS)	S2(OLS)	S2(2SLS)	S3(OLS)	S3(2SLS)	S4(OLS)	S4(2SLS)
<i>D(oilrev_trev)</i>	0.20 (3.10)***	0.32 (2.66)***	0.23 (3.15)***	0.47 (2.31)**	0.47 (1.70)*	0.99 (1.94)*	0.24 (3.32)***	0.42 (2.98)***
<i>D(Van_index)</i>	1.13 (1.24)	0.94 (0.87)						
<i>D(Van_comp)</i>			-0.02 (-0.22)	0.04 (0.30)				
<i>(Van_part)</i>					-0.15 (-1.37)	-0.10 (-0.46)		
<i>D(polity)</i>							-0.41 (-1.79)*	-0.75 (-1.72)*
<i>D(van_index)*D(oilrev_trev)</i>	-0.26 (-2.17)**	-0.22 (-1.72)*						
<i>D(van_comp)*D(oilrev_trev)</i>			-0.02 (-2.24)**	-0.01 (-0.91)				
<i>(van_part)*D(oilrev_trev)</i>					-0.01 (-0.99)	-0.04 (-1.48)		
<i>Dpolity*D(oilrev_trev)</i>							-0.05 (-1.55)	-0.09 (-1.81)*
<i>D(inv_gdp)</i>	0.42 (2.11)**	0.46 (2.09)**	0.43 (2.20)**	0.54 (1.86)*	0.44 (2.42)**	0.42 (1.31)	0.38 (1.85)*	0.49 (2.31)**
<i>D(govex_gdp)</i>	-1.36 (-2.66)***	-1.05 (-1.34)	-1.45 (-2.57)***	-1.00 (-1.16)	-1.64 (-3.22)***	-1.89 (-2.92)***	-1.47 (-2.83)***	-1.36 (-1.75)*
<i>Inf</i>	-0.19 (-2.09)**	-0.18 (-1.56)	-0.18 (-2.04)**	-0.15 (-1.10)	-0.15 (-1.78)*	-0.14 (-1.04)	-0.19 (-2.15)**	-0.24 (-1.58)
<i>G_{t-1}</i>	0.22 (1.93)*	0.22 (1.41)	0.20 (1.60)	0.25 (1.41)	0.13 (1.17)	0.12 (0.77)	0.15 (1.29)	0.07 (0.49)
<i>Oil_g</i>	0.02 (1.49)	0.003 (0.16)	0.01 (1.00)	-0.004 (-0.08)	0.004 (0.25)	0.03 (0.75)	0.02 (1.47)	0.005 (0.26)
<i>OECD_gdppcg</i>	0.83 (1.20)	1.05 (1.24)	1.09 (1.32)	1.29 (1.24)	0.77 (1.06)	0.64 (0.62)	1.02 (1.31)	1.17 (1.14)
<i>Wardummy</i>	-4.03 (-1.84)*	-4.02 (-1.45)	-5.77 (-2.65)***	-4.40 (-1.38)	-6.63 (-3.92)***	-6.49 (-2.54)***	-6.69 (-3.92)***	-6.88 (-2.36)**
R²	0.71	0.70	0.68	0.62	0.69	0.60	0.69	0.61
LM	0.45	0.09	0.47	0.01	0.04	0.04	0.13	0.01
Jarque-Bera P-value	0.66	0.46	0.88	0.66	0.95	0.80	0.78	0.43
RESET	0.74	0.68	0.97	0.95	0.74	0.56	0.93	0.50
Obs (after adjustments)	41	37	41	37	41	37	41	37

Note: Dependent variable: real per capita GDP growth rate. Period: 1959-2007 (effective sample: 1968-2004); t value within () brackets; Newey-West HAC standard errors & covariance, LM is Breusch-Godfrey Serial Correlation LM Test (F form, p-value for OLS & Obs*R², p-value for TSLS) which shows the probability of null hypothesis (no autocorrelation in residuals) acceptance (p-values larger than 0.05 means acceptance of null hypothesis); Jarque-Bera P-value shows the acceptance probability of null hypothesis of residual normality; RESET is Ramsey test (using powers of the independent variables) for omitted variables. The p-value of RESET tests the H0: model has no omitted variables (p-values larger than 0.05 means acceptance of null hypothesis (model has no omitted variables). Instruments consist of 1-4 years lagged values of “oil dependency”, different factionalism proxies, government expenditures /GDP, investment/GDP, and interactions terms, as well as 2 year lagged values of inflation and oil price growth rate. Constant term is included but not reported.

***: Significant at 1%, **: Significant at 5%, *: Significant at 10%.

Table 4. OLS & 2SLS results for per capita daily oil production

Variable	S5(OLS)	S5(2SLS)	S6(OLS)	S6(2SLS)	S7(OLS)	S7(2SLS)	S8(OLS)	S8(2SLS)
<i>D(pcoil_produc)</i>	337.8 (6.77)***	378.2 (6.70)***	348.0 (5.04)***	390.1 (5.66)***	394.3 (2.68)***	682.7 (3.46)***	352.4 (5.99)***	451.07 (6.42)***
<i>D(Van_index)</i>	-0.02 (-0.06)	-0.43 (-0.57)						
<i>D(Van_comp)</i> (<i>Van_part</i>)			-0.06 (-0.80)	-0.13 (-0.88)				
<i>D(polity)</i>					0.06 (0.76)	0.17 (0.93)		
<i>D(van_index)*D(pcoil_produc)</i>	-38.7 (-3.28)***	-47.55 (-2.76)***						
<i>D(van_comp)*D(pcoil_produc)</i> (<i>van_part</i>)* <i>D(pcoil_produc)</i>			-11.3 (-2.60)***	-12.5 (-2.19)**				
<i>Dpolity)*D(pcoil_produc)</i>					-7.29 (-1.00)	-22.2 (-2.15)**		
<i>D(inv_gdp)</i>	0.60 (4.84)***	0.67 (5.18)***	0.60 (4.20)***	0.56 (2.92)***	0.49 (3.59)***	0.59 (4.17)***	0.59 (5.26)***	0.66 (3.38)***
<i>D(govex_gdp)</i>	-0.36 (-1.03)	-0.79 (-1.67)*	-0.38 (-1.05)	-0.79 (-1.44)	-0.63 (-1.62)	-0.59 (-0.86)	-0.28 (-0.81)	-0.37 (-0.43)
<i>Inf</i>	-0.08 (-1.37)	-0.15 (-1.25)	-0.07 (-1.33)	-0.13 (-1.01)	-0.10 (-1.56)	-0.13 (-0.89)	-0.07 (-1.33)	-0.04 (-0.32)
<i>G_{t-1}</i>	0.07 (0.96)	-0.01 (-0.08)	0.07 (0.96)	0.01 (0.08)	0.05 (0.67)	0.02 (0.26)	0.07 (0.95)	0.07 (0.83)
<i>Oil_g</i>	0.02 (3.73)***	0.03 (2.95)**	0.02 (3.38)***	0.03 (2.38)**	0.03 (4.44)***	0.03 (2.21)**	0.02 (3.44)***	0.01 (0.86)
<i>OECD_gdppcg</i>	0.18 (0.36)	0.24 (0.40)	0.30 (0.58)	0.38 (0.60)	0.38 (0.70)	0.46 (0.64)	0.19 (0.40)	0.15 (0.25)
<i>Wardummy</i>	-4.10 (-2.89)***	-4.77 (-3.11)***	-4.64 (-3.20)***	-5.35 (-3.11)***	-5.31 (-4.09)***	-4.77 (-3.95)***	-4.33 (-3.16)***	-3.97 (-3.01)***
R²	0.82	0.81	0.81	0.81	0.80	0.75	0.82	0.77
LM	0.11	0.28	0.15	0.40	0.16	0.65	0.08	0.007
Jarque-Bera P-value	0.92	0.37	0.99	0.48	0.83	0.38	0.93	0.21
RESET	0.23	0.49	0.04	0.27	0.02	0.21	0.12	0.85
Obs (after adjustments)	43	40	43	40	43	40	43	40

Note: Dependent variable: real per capita GDP growth rate. Period: 1959-2007 (effective sample: 1965-2004); t value within () brackets; Newey-West HAC standard errors & covariance; LM is Breusch-Godfrey Serial Correlation LM Test (F form, p-value for OLS & Obs*R², p-value for TSLS) which shows the probability of null hypothesis (no autocorrelation in residuals) acceptance (p-values larger than 0.05 means acceptance of null hypothesis); Jarque-Bera P-value shows the acceptance probability of null hypothesis of residual normality; RESET is Ramsey test (using powers of the independent variables) for omitted variables. The p-value of RESET tests the H0: model has no omitted variables (p-values larger than 0.05 means acceptance of null hypothesis (model has no omitted variables). Instruments consist of 1- 4 years lagged values of “oil abundance”, different factionalism proxies, government expenditures /GDP, investment/GDP, and interactions terms, as well as 2 year lagged values of inflation and oil price growth rate. Constant term is included but not reported.

***: Significant at 1%, **: Significant at 5%, *: Significant at 10%.

Table 5. Marginal effects of oil rents on growth (at different levels of factionalised democracy)

Factionalised democracy	D(<i>Oilrev_Trev</i>)	D(<i>pcoil_produc</i>)
Mean D(<i>van_index</i>)	2.68	3.75
Maximum D(<i>van_index</i>)	-8.98	0.88
Minimum D(<i>van_index</i>)	8.22	5.11

Note: Mean (*dvan_index*): 0.06, Max (*dvan_index*) = 6.1 Min (*dvan_index*) = -2.80, std (*doilrev_trev*) = 8.79, std (*dpcoil_produc*) = 0.01. D is differencing operator. Thus descriptive statistics of, for example, *dvan_index* are different than *van_index*.

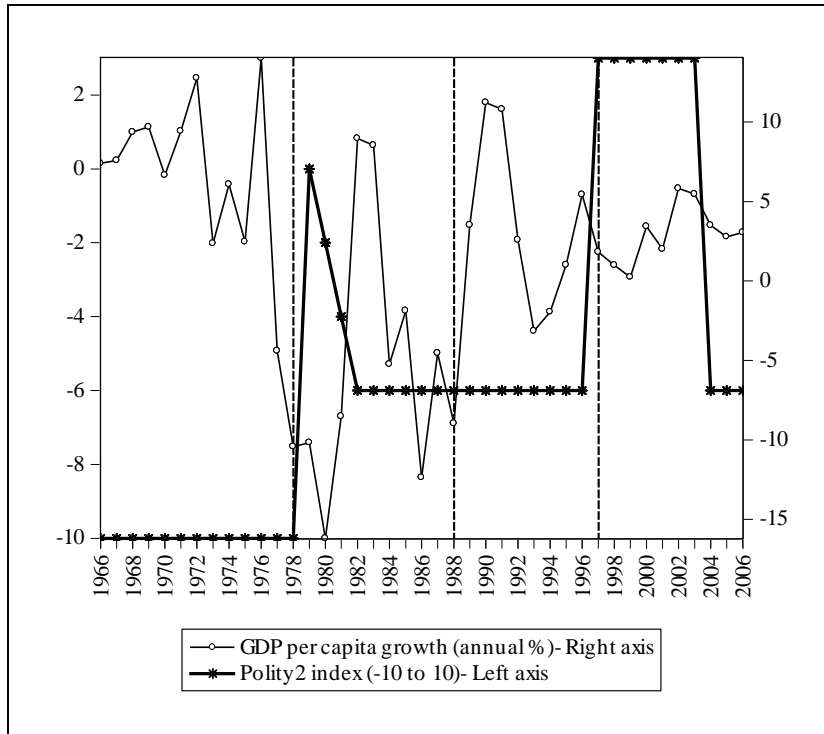


Figure 1. GDP per capita growth of Iran under different polities (1965-2006)
 Source: World Bank (2008), Marshall and Jagers (2007)

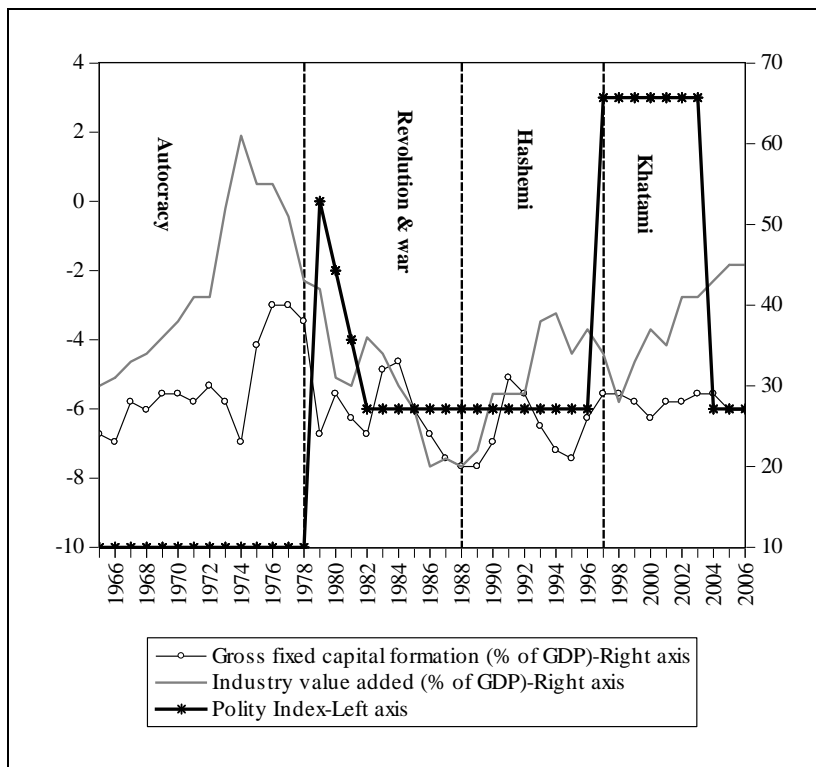


Figure 2. Industry value added and fixed investment of Iran under different polities (1965-2006).
 Source: World Bank (2008), Marshall and Jagers (2007)

Appendix A

Table A. *Data description and sources*

Variable	Description	Source
<i>G</i>	Real per capita GDP growth rate %	CBI (2009)
<i>Oilrev_trev</i>	Share of oil revenues in total revenues of government (oil dependency)	CBI (2009)
<i>Pcoil_produc</i>	Per capita daily oil production (oil abundance)	EIA. http://www.eia.doe.gov
<i>Polity2</i>	Polity2 index, -10: fully non-democratic, 10: fully democratic	Marshall and Jaggers (2007)
<i>Van_index</i>	Index of democratization	Vanhanen (2000)
<i>Van_comp</i>	Index of political competition	Vanhanen (2000)
<i>Van_part</i>	Index of participation in elections by people	Vanhanen (2000)
<i>Inv_gdp</i>	Share of real investment in real GDP	CBI (2009)
<i>Govex_gdp</i>	Share of real government expenditures in real GDP	CBI (2009)
<i>Inf</i>	CPI inflation	CBI (2009)
<i>Lit</i>	Literacy rate (%)	CBI (2009)
<i>Edu_tex</i>	Share of education expenditures in total government expenditures (constant prices, %)	CBI (2009)
<i>Oil_g</i>	Growth rate of global average oil prices	IFS (2009)
<i>Gt-1</i>	Lag of per capita GDP growth rate	
<i>OECD_gdppcg</i>	Real growth rate of OECD per capita GDP	World Bank (2008)
<i>Wardummy</i>	Dummy variable for Iraq-Iran war	1=1980-1988; otherwise 0

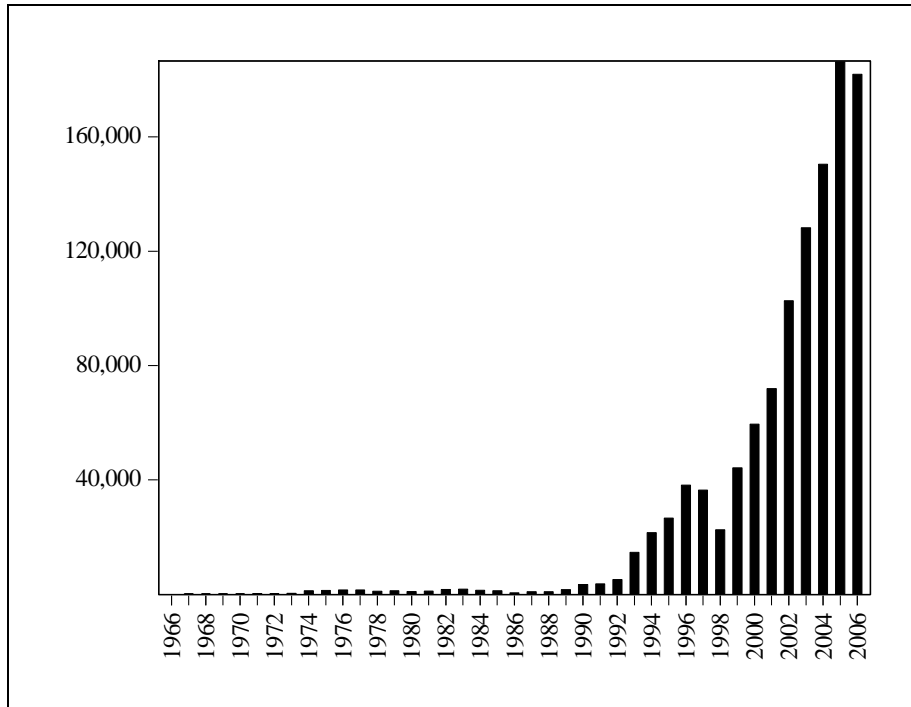


Figure A1. Trend of oil revenues in Iran (billion Rials)
Source: CBI (2009)

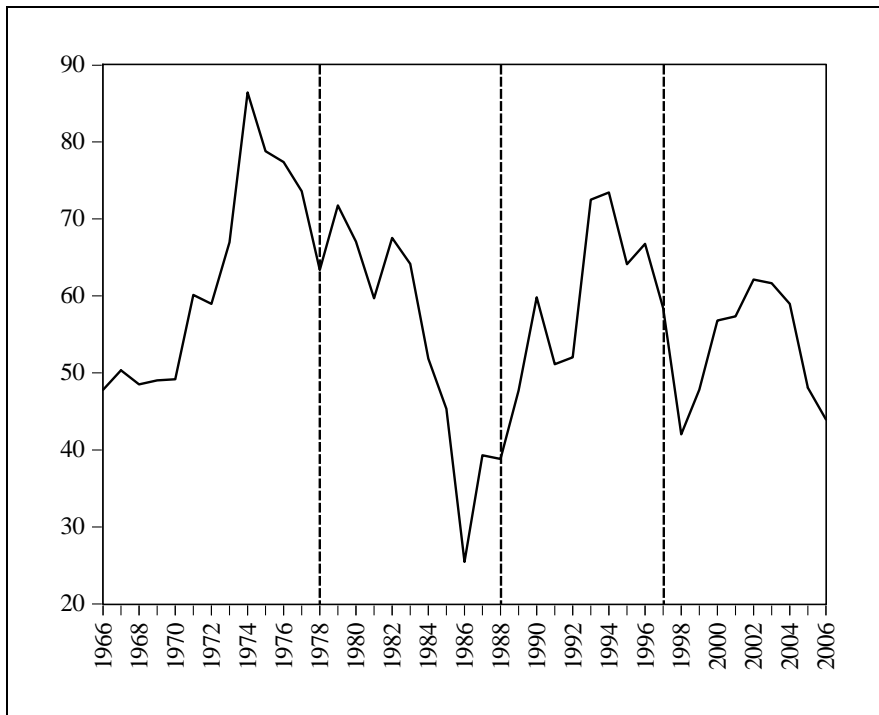


Figure A2. Trend of oil revenues share in total revenues in Iran (%)
Source: CBI (2009)

Appendix B

Table B1. *Unit root tests without controlling structural break (ADF and PP)*

Variable	Included in test equation	ADF		PP	
		Level	First Diff.	Level	First Diff.
<i>Oilrev-trev</i>	Intercept	-2.24	-6.42*	-2.50	-6.42*
	Intercept and trend	-2.33	-6.42*	-2.55	-6.42*
	none	-0.62	-6.48*	-0.62	-6.48*
<i>Pcoil_produc</i>	Intercept	-2.00	-3.65**	-1.59	-3.63**
	Intercept and trend	-2.56	-3.65**	-2.06	-3.63**
	none	-0.95	-3.69*	-0.71	-3.67*
<i>Van_index</i>	Intercept	-2.41	-8.08*	-2.34	-8.12*
	Intercept and trend	-3.39***	-7.98*	-3.46***	-8.03*
	none	-1.41	-8.14*	-1.28	-8.18*
<i>Van-comp</i>	Intercept	-2.40	-6.43*	-2.52	-6.43*
	Intercept and trend	-2.92	-6.36*	-3.05	-6.36*
	none	-1.07	-6.48*	-1.09	-6.48*
<i>Van_part</i>	Intercept	-1.59	-9.49*	-1.74	-12.7*
	Intercept and trend	-4.45*		-4.47*	
	none	0.18	-9.40*	-0.04	-10.08*
<i>Polity2</i>	Intercept	-1.99	-6.93*	-2.01	-6.97*
	Intercept and trend	-2.66	-6.88*	-2.79	-6.92*
	none	-1.36	-7.00*	-1.32	-7.04*
<i>Inv_gdp</i>	Intercept	-2.05	-5.72*	-2.23	-5.75*
	Intercept and trend	-2.53	-5.69*	-2.27	-5.72*
	none	-0.05	-5.76*	0.07	-5.79*
<i>Govex_gdp</i>	Intercept	-1.28	-4.97*	-1.44	-4.91*
	Intercept and trend	-0.96	-5.18*	-1.08	-5.18*
	none	-0.14	-5.02*	-0.25	-4.96*
<i>Inf</i>	Intercept	-2.61***		-2.46	-9.76*
	Intercept and trend	-3.22***		-3.23***	
	none	-1.41	-7.27*	-1.14	-9.18*
<i>Pcgdp_g</i>	Intercept	-3.59*		-3.59*	
	Intercept and trend	-3.61**		-3.61**	
	none	-3.38*		-3.38*	
<i>G_{t-1}</i>	Intercept	-3.59*		-3.59*	
	Intercept and trend	-3.61**		-3.61**	
	none	-3.38*		-3.38*	
<i>Oil_g</i>	Intercept	-6.28*		-6.28*	
	Intercept and trend	-6.21*		-6.21*	
	none	-5.84*		-5.84*	
<i>Lit</i>	Intercept	-3.33**	-3.59*	-2.74***	-3.53*
	Intercept and trend	1.14	-4.49*	1.14	-4.47*
	none	1.77	-1.40	3.51	-1.82**
<i>Edu_tex</i>	Intercept	-2.21	-7.5*	-2.21	-7.6*
	Intercept and trend	-2.17	-7.4*	-2.17	-7.5*
	none	-0.68	-7.6*	-0.63	-7.7*
<i>Oecd_gdppcg</i>	Intercept	-3.96*		-3.86*	
	Intercept and trend	-4.90*		-4.58*	
	none	-1.93***		-1.73***	

Note: Null hypothesis: respected variable has a unit-root. *: rejection of null hypothesis at 1% level, **: rejection of null hypothesis at 5% level and ***: rejection at 10% level.

Table B2. *Zivot and Andrews unit-root tests with structural break in intercept and trend*

Variable	t-statistics	Break year
<i>Oilrev-trev</i>	-2.84	1974
<i>Pcoil_produc</i>	-4.57*	1978
<i>Van_index</i>	-4.58	1996
<i>Van-comp</i>	-4.35	1979
<i>Van_part</i>	-5.62	1979
<i>Polity2</i>	-3.14*	1997
<i>Inv_gdp</i>	-3.62	1985
<i>Govex_gdp</i>	-3.97 **	1976
<i>Inf</i>	-5.14	1993
<i>Pcgdp_g</i>	-5.77	1975
<i>Pcgdp_g(-1)</i>	-5.77	1975
<i>Oil_g</i>	-7.36	1979
<i>Lit</i>	-3.16	1990
<i>Edu_tex</i>	-3.40	1978
<i>Oecd_gdppcg</i>	-6.20	1972

Note: Critical values: 1%: -5.57 5%: -5.08. If the test statistic (e.g. -7.36 for *oil_g* variable) is smaller than the critical values (e.g. for breaks in trend and intercept -5.5 and -5.0), then we have an I (0) series with a trend and a break. If the test reports otherwise, we have an I (1) series. *: break in intercept, (Critical values: 1%: -5.43 5%: -4.80) **: break in trend (Critical values: 1%: -4.93 5%: -4.42).

Appendix C

In this appendix, we test for two issues. First, we exclude the observations before the Islamic revolution of 1979. We aim to examine the significance of interaction of factionalized democracy and natural resource dependency or abundance variable. Second, we include some proxies for human capital and the investment of government in the education system. We use the literacy rate (as a proxy for basic education) and the share of government expenditures on education in total government expenditures.

As we can observe from Tables C1 and C2, the natural resource wealth variables (*oilrev_trev* and *pcoil_produc*) remain positive and significant after controlling for human capital and limiting sample to post-revolution period. The interaction of factionalized democracy (to save the space, just reporting *van_index* and *van_com* indicators) with the natural resource variable stays negative and significant except for the period from 1980-2004 in Table C1 and from 1979-2004 for S15 in Table C2. However, its sign is still negative. The loss of significance for the post-revolution period may be due to a lower number of observation and reduction of power of the test. The sign of other control variables are as expected in theory. A higher share of investment in GDP increases the growth rate and a higher share of government size in the economy crowded out the private investors, leading to lower growth. Higher inflation rates destabilize the macroeconomy. Past growth rates usually explain the current one. The effect of oil price changes is not significant. It seems that most of its effect on growth is absorbed by other control variables. The Iranian economy is not very integrated into the global economy. Thus the business cycles in its main trading partner (OECD region) have no significant effect on it. Basic education (literacy rate) has a positive effect on growth rate but its effect is mostly insignificant. The education expenditures share in total government expenditures has a negative and significant effect on real growth rates. This shows partly the

lack of a strong link between the education system and the productive part of the economy (see endnote 16 for further references). In sum, factionalized democracy has a negative effect on economic growth rate when the country is rich in natural resources. These results are obtained after controlling for the other key factors which have affected the Iranian political economy since 1960s. The diagnostics tests such as R^2 , LM (serial auto correlation test), Jarque-Bera (residual normality test) and RESET (model specification stability test) show the reliability of the results.

Table C1. OLS & 2SLS results for oil revenues/total revenues (with education variables)

Variable	S9(OLS)	S9(2SLS)	S10(OLS)	S10(2SLS)	S11(OLS)	S11(2SLS)	S12(OLS)	S12(2SLS)
<i>D(oilrev_trev)</i>	0.21 (2.99) ***	0.24 (3.02) ***	0.17 (2.66) ***	0.34 (2.03) **	0.23 (2.41) **	0.25 (2.44) **	0.21 (2.55) **	0.21 (2.65) ***
<i>D(Van_index)</i>	0.17 (1.21)	1.14 (1.13)	1.09 (1.44)	0.82 (1.02)	0.90 (1.32)	0.78 (1.27)	1.10 (1.57)	1.12 (1.57)
<i>D(van_index)*D(oilrev_trev)</i>	-0.25 (-1.98) **	-0.22 (-1.87) *	-0.24 (-2.53) ***	-0.20 (-2.37) **	-0.20 (-2.43) **	-0.18 (-2.20) **	-0.16 (-1.31)	-0.16 (-1.29)
<i>D(inv_gdp)</i>	0.39 (1.88) *	0.42 (2.04) **	0.44 (2.10) **	0.50 (1.79) *	0.23 (1.21)	0.20 (1.15)	0.21 (1.02)	0.22 (1.08)
<i>D(govex_gdp)</i>	-1.43 (-3.06) ***	-1.51 (-2.06) **	-1.43 (-2.72) ***	-0.96 (-1.15)	-1.49 (-1.79) *	-1.60 (-1.93) *	-1.39 (-1.36)	-1.35 (-1.39)
<i>Inf</i>	-0.20 (-1.82) *	-0.20 (-1.36)	-0.21 (-2.17) **	-0.20 (-1.72) *	-0.16 (-1.26)	-0.16 (-1.24)	-0.17 (-1.28)	-0.17 (-1.28)
<i>G_{t-1}</i>	0.23 (1.75) *	0.22 (1.67) *	0.21 (1.72) *	0.21 (1.25)	0.25 (1.74) *	0.25 (1.66)	0.24 (1.77) *	0.24 (1.82) *
<i>Oil_g</i>	0.01 (1.20)	0.01 (0.70)	0.02 (1.90) *	0.005 (0.18)	-0.006 (-0.2)	-0.01 (-0.42)	0.01 (0.17)	0.01 (0.18)
<i>OECD_gdppcg</i>	1.09 (1.36)	1.39 (1.65)	0.64 (0.85)	0.57 (0.60)	1.50 (1.42)	1.39 (1.14)	1.63 (1.34)	1.67 (1.35)
<i>D(Lit)</i>	0.75 (1.03)	0.85 (1.01)			0.89 (1.37)	0.72 (1.10)	0.95 (1.67) *	0.98 (1.88) *
<i>D(educ_tex)</i>			-0.25 (-1.16)	-0.50 (-1.85) *				
<i>Wardummy</i>	-4.27 (-1.89) *	-4.65 (-2.19) **	-3.84 (-1.74) *	-3.16 (-1.09)	-5.4 (-3.1) ***	-5.5 (-3.15) ***	-5.57 (-2.96) ***	-5.54 (-3.02) ***
R²	0.72	0.70	0.72	0.66	0.77	0.77	0.76	0.76
LM	0.64	0.72	0.39	0.05	0.58	0.31	0.68	0.35
Jarque-Bera P-value	0.91	0.78	0.54	0.59	0.15	0.22	0.46	0.50
RESET	0.93	0.30	0.63	0.57	0.83	0.73	0.80	0.78
Sample (adjusted)	1968-2004	1972-2004	1964-2004	1968-2004	1979-2004	1979-2004	1980-2004	1980-2004

Note: a, b, and c imply that the coefficient is significantly different from zero at the 1%, 5%, and 10% levels, respectively. Dependent variable is the real GDP per capita growth rate. The sample period from 1979-2004 and 1980-2004 refer to post-revolution period. t value within () brackets; Newey-West HAC standard errors & covariance; LM is Breusch-Godfrey Serial Correlation LM Test (F form, p-value for OLS & Obs*R², p-value for TSLS) which shows the probability of null hypothesis (no auto-correlation in residuals) acceptance (p-values larger than 0.05 means acceptance of null hypothesis); Jarque-Bera P-value shows the acceptance probability of null hypothesis of residual normality; RESET is Ramsey test (using powers of the independent variables) for omitted variables. The p-value of RESET tests the H0: model has no omitted variables (p-values larger than 0.05 means acceptance of null hypothesis (model has no omitted variables). Instruments consist of 1- 4 years lagged values of “oil abundance”, different factionalism proxies, government expenditures /GDP, investment/GDP, and interactions terms, as well as 2 year lagged values of inflation, education and oil price growth rate. Constant term is included but not reported.

***: Significant at 1%, **: Significant at 5%, *: Significant at 10%.

Table C2. OLS & 2SLS results for per capita daily oil production (with education variables)

Variable	S13(OLS)	S13(2SLS)	S14(OLS)	S14(2SLS)	S15(OLS)	S15(2SLS)	S16(OLS)	S16(2SLS)
<i>D(oilrev_trev)</i>	0.24 (3.14)***	0.25 (2.81)***			0.27 (2.75)***	0.29 (2.72)***		
<i>D(pcoil_produc)</i>			336.5 (4.62)***	410.8 (4.86)***			471.2 (4.92)***	452.5 (4.43)***
<i>D(Van_comp)</i>	-0.006 (-0.05)	0.03 (0.28)	0.001 (0.03)	-0.10 (-0.71)	-0.04 (-0.51)	-0.07 (-0.70)	0.04 (0.45)	0.06 (0.63)
<i>D(van_comp)*D(oilrev_trev)</i>	-0.02 (-2.01)**	-0.02 (-1.81)*			-0.01 (-1.08)	-0.009 (-0.65)		
<i>D(van_comp)*D(pcoil_produ)</i>			-8.90 (-1.82)*	-14.7 (-2.93)***			-12.87 (-2.64)***	-11.26 (-1.96)*
<i>D(inv_gdp)</i>	0.40 (2.01)**	0.56 (2.58)***	0.55 (3.94)***	0.58 (3.06)***	0.31 (1.32)	0.27 (1.15)	0.50 (3.36)***	0.44 (3.25)***
<i>D(govex_gdp)</i>	-1.48 (-2.98)***	-1.47 (-1.80)*	-0.54 (-1.44)	-0.32 (-0.37)	-1.56 (-1.86)*	-1.63 (-1.92)*	0.16 (0.28)	0.07 (0.11)
<i>Inf</i>	-0.19 (-1.81)*	-0.16 (-1.38)	-0.11 (-1.48)	-0.06 (-0.94)	-0.16 (-1.25)	-0.16 (-1.24)	-0.12 (-1.12)	-0.09 (-1.09)
<i>G_{t-1}</i>	0.20 (1.48)	0.17 (1.32)	0.05 (0.63)	0.05 (0.60)	0.17 (0.98)	0.17 (0.95)	0.18 (1.48)	0.19 (1.59)
<i>Oil_g</i>	0.01 (0.70)	0.01 (0.52)	0.02 (3.08)***	0.02 (1.42)	-0.01 (-0.71)	-0.02 (-0.84)	0.04 (1.40)	0.04 (1.42)
<i>OECD_gdppcg</i>	1.36 (1.40)	1.31 (1.32)	0.59 (0.90)	0.34 (0.42)	2.20 (1.66)	1.97 (1.35)	0.76 (0.76)	0.48 (0.46)
<i>D(Lit)</i>	0.51 (0.58)	0.11 (0.08)	0.73 (1.09)	-0.26 (-0.21)	0.85 (1.30)	0.56 (0.77)	1.16 (2.48)***	0.53 (0.65)
<i>Wardummy</i>	-6.0 (-2.64)***	-5.7 (-2.23)**	-5.22 (-3.18)***	-4.5 (-2.31)**	-7.81 (-2.82)***	-7.72 (-2.89)***	-3.54 (-1.40)	-3.26 (-1.39)
R²	0.69	0.67	0.83	0.79	0.74	0.74	0.88	0.87
LM	0.64	0.36	0.42	0.45	0.48	0.24	0.22	0.11
Jarque-Bera P-value	0.90	0.63	0.64	0.77	0.60	0.82	0.96	0.87
RESET	0.95	0.21	0.01	0.11	0.65	0.56	0.60	0.76
Sample (adjusted)	1968-2004	1970-2004	1968-2004	1970-2004	1979-2004	1979-2004	1979-2004	1979-2004

Note: a, b, and c imply that the coefficient is significantly different from zero at the 1%, 5%, and 10% levels, respectively. Dependent variable is the real GDP per capita growth rate. The sample period from 1979-2004 refers to post-revolution period. Dependent variable is the real GDP per capita growth rate. The sample period from 1979-2004 and 1980-2004 refer to post-revolution period. t value within () brackets; Newey-West HAC standard errors & covariance; LM is Breusch-Godfrey Serial Correlation LM Test (F form, p-value for OLS & Obs*R², p-value for TSLS) which shows the probability of null hypothesis (no auto-correlation in residuals) acceptance (p-values larger than 0.05 means acceptance of null hypothesis); Jarque-Bera P-value shows the acceptance probability of null hypothesis of residual normality; RESET is Ramsey test (using powers of the independent variables) for omitted variables. The p-value of RESET tests the H0: model has no omitted variables (p-values larger than 0.05 means acceptance of null hypothesis (model has no omitted variables). Instruments consist of 1- 4 years lagged values of “oil abundance”, different fractionalism proxies, government expenditures /GDP, investment/GDP, and interactions terms, as well as 2 year lagged values of inflation, education and oil price growth rate. Constant term is included but not reported.

***: Significant at 1%, **: Significant at 5%, *: Significant at 10%.