Human Development and Iranian Economy; Rethinking about Resource Curse Hypothesis

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ABSTRACT

Background: Iran’s economy is highly dependent on the production and export of crude oil to finance government spending, and consequently is vulnerable to fluctuations in international oil prices. Objective: The aim of this paper is considering the impact of oil revenue on HDI in Iran. This paper uses threshold regression model to study whether a non-linear relationship between oil revenue and HDI exists in Iran. Results: Results indicate that since the oil revenue is low (the threshold value is less than 0.125) in two-regime model, oil revenue divided by GDP and HDI have a significantly positive relationship, but when the oil revenue is high (the threshold value is larger than 0.125), oil revenue divided by GDP and HDI have not a significantly relationship. Conclusion: These results confirm the resource curse hypothesis in Iran. It is necessary for Iranian economy to decrease its dependent to oil revenue.

INTRODUCTION

Iran’s economy is highly dependent on the production and export of crude oil to finance government spending, and consequently is vulnerable to fluctuations in international oil prices. Although Iran has vast petroleum reserves, the country lacks adequate refining capacity and imports gasoline to meet domestic energy needs.

Bjorvatnet et al (2012) examined the role of political fractionalization in understanding the “resource curse”. Using panel data for 30 oil-rich countries, they found that the income effect of resource rents is moderated by the political power balance by Bjorvatn et al (2012). With a strong government, resource wealth can generate growth even in an environment of poorly developed institutions, while adding oil revenues to a weak government may have damaging effects on the economy (Bjorvatn et al 2012). These results have important implications for the economic prospects of the oil-rich countries in the Middle East, which are currently undergoing profound political changes (Bjorvet al et al 2012).

Esfahani et al (2012) developed a long-run output relation for a major oil-exporting economy where the oil income-to-output ratio remains sufficiently high over a prolonged period (Esfahani et al 2012). It extends the stochastic growth model developed in Binder and Pesaran (1999) by including oil exports as an additional factor in the capital accumulation process (Esfahani et al 2012). Their paper distinguished between the two cases where the growth of oil income, go, is less than the natural growth rate (the sum of the population growth, n, and the growth of technical progress, g), and when go ≥ g + n. Under the former, the effects of oil income on the economy’s steady growth rate will vanish eventually, while under the latter oil income enters the long-run output equation with a coefficient which is equal to the share of capital if it is further assumed that the underlying production technology can be represented by a Cobb–Douglas production function (Esfahani et al 2012). The long-run theory is tested using quarterly data on nine major oil economies. Overall, the test results support the long-run theory, with the existence of long-run relations between real output, foreign output and real oil income established for six of the nine economies considered (Esfahani et al 2012).

Esfahani et al (2012) in another paper, presented an error-correcting macroeconometric model for the Iranian economy estimated using a new quarterly data set over the period 1979Q1–2006Q4 (Esfahani et al 2012). The core variables were real output, real money balances, inflation, exchange rate, oil exports, and foreign real output, although the role of investment and consumption are also analysed in a sub-model (Esfahani et al 2012). Their paper founds clear evidence for the existence of two long-run relations: an output equation as predicted by the theory and a standard real money demand equation with inflation acting as a proxy for the
(missing) market interest rate (Esfahani et al 2012). Their results showed that real output in the long run is influenced by oil exports and foreign output. However, it is also found that inflation has a significant negative long-run effect on real GDP, which is suggestive of economic inefficiencies and is matched by a negative association between inflation and the investment-output ratio (Esfahani et al 2012). Finally, their results of impulse responses showed that the Iranian economy adjusts quite quickly to the shocks in foreign output and oil exports, which could be partly due to the relatively underdeveloped nature of Iran's financial markets (Esfahani et al 2012).

Farzanegan and Schneider (2009) examined the common wisdom of “natural resource curse” in rentier economy of Iran. Contrary to existing belief that higher oil rents are harmful for economic growth, they instead show that increasing political factionalism in an oil economy is a curse for economic growth (Farzanegan and Schneider 2009). They found a dampening effect of higher symmetry of political power structure on growth for the case of Iran. For the maximum level of factionalism, one standard deviation increase in the share of oil rents in the government budget reduces real economic growth by 9% due to rent-seeking efforts (Farzanegan and Schneider 2009).

Frankel (2010) considers six aspects of commodity wealth, each of interest in its own right, but each also a channel that some have suggested could lead to sub-standard economic performance. They are: long-term trends in world commodity prices, volatility, crowding out of manufacturing, civil war, poor institutions, and the Dutch Disease. He concludes with a consideration of promising ideas for institutions that could help a country that is rich in, say, oil overcome the pitfalls of the Curse and achieve good economic performance. They include indexation of oil contracts, hedging of export proceeds, denomination of debt in terms of oil, Chile-style fiscal rules, a monetary target that emphasizes product prices, transparent commodity funds, and lump-sum distribution.

Nademi et al (2010) and Abounoori and Nademi (2010) applied threshold regression model for considering nonlinear relationship between government size and economic growth. We have used their idea for considering nonlinear relationship between HDI and the share of oil Revenue in GDP.

This paper is organized by four sections. The next section introduces model specification. Section 3 is devoted to empirical results and in final section, we conclude.

**Model Specification:**

We have used the following model for considering the effect of oil revenue on human development indicator (HDI):

\[
HDI = c(1) + c(2)Ot + \epsilon,
\]

Regression (1) is a traditional linear economic growth model, but we alter the linear model into the two regime TAR model of Hansen (1996, 2000). The model can be shown as follows:

\[
HDI = \begin{cases} 
   c(1) + c(2)Ot + \epsilon & [q_t \leq \gamma] \\
   [c(4) + c(5)Ot + \epsilon] & [q_t > \gamma] 
\end{cases}
\]

The threshold value \(\gamma\) can be found by estimating the regression (2) through finding the minimum Error Sum of Squared in a re-order threshold variable. The threshold variable can be set by the exogenous variables out of the theoretical model. In this paper we set oil revenue as the threshold variable. We can also apply the statistic coming from the threshold variable. For instance, we adopt the heteroskedasticity-consistent Lagrange Multiplier (LM) of Hansen (1996) to test the null hypothesis of the linear assumption.

Once the estimator can be found, we then start with the statistical test, but the test procedure of Eq. (2) is different from the traditional test. Under the null hypothesis of no threshold effect, the threshold parameters will be unidentified. This will cause the traditional test statistic in a large sample distribution to not belong to the \(\chi^2\) distribution, but rather to a non-standard and non-similar distribution which is affected by nuisance parameters. This will cause the critical value of the distribution to not be estimated through simulation. In order to overcome the difficulty, Hansen (1996) uses a statistic of his own large sample distribution function to transfer and calculate the asymptotic \(p\)-value of a large sample. Under the null hypothesis, the distribution of the \(p\)-value statistic is uniform, and this kind of transformation can be calculated through bootstrap. The null hypothesis to test Eq. (2) is as follows:

\[H_0: c(2) = c(5)\]

If \(H_0\) is not rejected then the relationships between oil revenue and the human development indicator would be the linear regression as the regression (1). This means there exists no threshold effect. Otherwise, if \(H_0\) hypothesis is rejected, it means that there exist different effects between the two regimes. The \(F\)-test statistics is as follows:
In which $\text{RSS}_0$ and $\text{RSS}_1$ are the residual sum of squares under the null hypothesis and the alternative, respectively.

**Empirical Results:**
This paper uses Hansen (1996, 2000) threshold regression model to study whether a non-linear relationship between oil revenue and HDI exists in Iran. As Table 1 shows, we adopt Hansen (1996, 2000) advice to use the bootstrapping model. While the threshold variable is “oil revenue divided by GDP”, we find that $F$-statistic is (3.4), which is significant at 1% level. The threshold value is 12.5%, and this means that one threshold exists. After making sure that the threshold effect and achieve the threshold regimes, we analyze the linear and non-linear oil revenue effects in different oil revenue regimes and discuss how the oil revenue affects the economic growth in different threshold regimes.

**Table 1:** Threshold Tests

<table>
<thead>
<tr>
<th>Threshold Variables</th>
<th>Oil Revenue/GDP</th>
<th>$P$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F value of threshold test</td>
<td>3.40</td>
<td>0.00</td>
</tr>
<tr>
<td>Threshold regime (%)</td>
<td>0.125</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2:** Oil Revenue and HDI

<table>
<thead>
<tr>
<th>Variables</th>
<th>Linear Model</th>
<th>Oil Revenue/GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold value (%)</td>
<td>Coefficient</td>
<td>prob</td>
</tr>
<tr>
<td>Interception</td>
<td>0.69</td>
<td>0.00</td>
</tr>
<tr>
<td>Oil Revenue/GDP</td>
<td>-0.14</td>
<td>0.66</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.07</td>
<td>0.39</td>
</tr>
</tbody>
</table>

As table 2 shows, while “oil revenue divided by GDP” is the threshold variable, oil revenue divided by GDP has not a significantly relationship with HDI in the linear model. Since the oil revenue is low (the threshold value is less than 0.125) in two-regime model, oil revenue divided by GDP and HDI have a significantly positive relationship, but when the oil revenue is high (the threshold value is larger than 0.125), oil revenue divided by GDP and HDI have not a significantly relationship. Thus, we can make sure that the non-linear situation of the oil revenue and HDI exist in Iran when “oil revenue divided by GDP” is the threshold variable.

**Conclusion:**
Human development is the prerequisite of long-term and constant growth, and any country needs a threshold of human development to attain economic growth. This is what distinguishes human development from human capital in growth models; since modifications in human capital is necessary for economic growth while the level of human development determines the direction of constant growth for society. As a result government policies should improve human development which is necessary for constant growth.

This paper uses Hansen (1996, 2000) threshold regression model to study whether a non-linear relationship between oil revenue and HDI exists in Iran. Results indicate that since the oil revenue is low (the threshold value is less than 0.125) in two-regime model, oil revenue divided by GDP and HDI have a significantly positive relationship, but when the oil revenue is high (the threshold value is larger than 0.125), oil revenue divided by GDP and HDI have not a significantly relationship. Thus, we can make sure that the non-linear situation of the oil revenue and HDI exist in Iran when “oil revenue divided by GDP” is the threshold variable.

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