

## The Relationship Between Tax Effort and Oil Revenue in Selected Oil Countries

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**Abstract:** The study is aimed at an examination of the relationship between tax effort and oil revenues. So, data from five oil exporting countries including Iran, Bahrain, Kuwait, Qatar and Algeria are used in the study. Accordingly, a regression model of suitable tax ratio is extracted for the period 2000-2009 using panel-data method. In this study, potential tax revenue and potential GDP are first calculated based on Hodrick-prescott filter. Then the proposed model were estimated. *The* results support a negative relationship between tax effort and oil incomes; that is, as oil incomes increase, tax effort decreases. Also, there is a positive relationship between economic growth and tax effort. As economic growth increases, tax effort enhances as well. There is negative and significant relationship between two variables tax effort and corruption control. As corruption control enhances, tax effort decreases as well. Furthermore, we can imply the positive relationship between consumer price index and tax effort. As consumer price index enhances, tax effort enhances as well. *By* studying the ratio of tax to GDP in Iran and comparison of this with the ratio in other countries including European countries, we can find out that the ratio is considerably low in Iran and this adds to the significance of the study. *Tax* effort in Iran is ranked as the lowest among 5 countries under consideration. Based on the results, it can be seen that there are idle tax capacities in Iran and it is required to adopt suitable tax reform to increase tax effort of the country.

**Key words:** Tax effort • Control of corruption • Panel data model • Hodrick-prescott filter

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### INTRODUCTION

Government activities require reallocation of production resources from private sector to public sector. In such allocation, individuals must delegate the right of using their production sources to government. So, governmental officials gain the rights for provision of governmental goods and services.

Tax incomes are considered to be among the main sources of financing governments and an effective tool for financial policy making.

Paying tax in fact is taken into account as participating in society's costs and as a result individuals must participate in providing the costs in proportion with their share of society's facilities. More income and wealth of real or legal entities show their more share of the society's facilities and more purchase power and less difficulty in paying more tax by the group. Accordingly, usually direct tax rate ascends based on income and wealth.

Despite the significance of tax incomes as the government potential income sources, unfortunately these types of incomes do not have their real status in our economic structure. One of the main reasons of the issue is too much reliance on oil incomes and problems existing in tax system structure of our country.

**In Present Study, it Is Attempted to Answer Following Question:** Is there less tax effort in countries with high oil income? First section is allocated to theoretical principles and the second to a review of related literature (both domestic and foreign studies), third to a review of trend of variables under discussion, forth model estimation and finally conclusion and suggestions.

**Theoretical Principles:** In general, tax shares in developing countries tend to be lower than in industrialized countries. In fact, shares in some Arab countries such as Tunisia, Algeria and Morocco were higher on the average than in Asia and African countries

in recent years [1]. In this section, we state different types of taxes based on new concepts and tax classifications in developed countries.

In a classification, tax incomes are divided into five groups:

**Income Taxes:**

- Real persons income tax
- Company income tax (legal entities)
- Insurance right

**Expenditure Taxes:** Consumption tax imposed like income tax but in proportion with the individual's consumption-Tariffs, sales income and special taxes like tobacco tax and the like imposed on importers of goods and brokers are considered as consumption tax

**Property or Wealth Cession Tax:**

- Equity tax
- Property tax
- Land tax
- Capital tax
- Natural value (of wealth) tax

**Business Activities Tax:** Such taxes are imposed on received sources, stock, capital and ... and or special type of business activity

**Export Taxes:** Resources of supplying expenditures are divided into two major ones:

- Oil and gas incomes
- Non-oil incomes

The second class includes tax incomes and other incomes.

What can be said is that direct allocation of resources plays more important role in government incomes.

Company tax, income tax, wealth tax, import tax, consumption tax and sales tax comprise tax incomes. Other incomes include income from monopolies and ownership of the government, income from services and sales of goods and miscellaneous incomes mainly can be stamp right, fines and the like. In every country, the most important source of income or the main government expenditures supply is tax. It is seen that in Iran the most important government income is from the place of oil and gas export [2].

One of the discussions examined here is tax capacity. Discussion of tax capacity and knowledge of how society can pay the tax are of considerable importance. Attempt to increase taxes will be fruitful only when tax capacity of the society is more than the amount of tax received.

One definition for tax capacity is, "the amount of tax people can pay". Determination of tax capacity of people is difficult, because to a great extent it is related to the matter what for government receive the tax. Tax capacity limit may be taken as the point over which extra taxing brings about adverse economic results (e.g. reduction of national income) (Manouchehr Farhang, Encyclopedia of Economics).

Tax capacity is in fact the information required regarding the capacity of a country or zone for equipping tax sources in order to meet financial and executive problems of economic policies and determines firstly the amount of tax effort a country or zone has incorporated in equipping its tax sources and secondly the amount of power it requires to enhance the sources [3].

**Based on the above Definitions, Now We Can Define Tax Effort:**

Tax effort or attempt is the ratio of total taxes gathered to tax capacity and comparison of countries based on this index in fact determines the ground for further increase of tax incomes. If we suppose tax effort index as follow:

$$\text{Tax effort} = \frac{\text{tax function}}{\text{tax capacity}} \tag{1}$$

Indeed, the amount of tax effort in a country is gained via dividing real tax ratio by potential tax ratio. Real tax ratio is calculated by dividing received taxes in a country in a year by GDP of the same year. Potential tax ratio is gained via dividing tax capacity by GDP of a country. Tax capacity can be estimated with respect to effective factors in tax ratios. So, researchers use the following relation as an index for calculation of tax effort:

$$\text{TE} = \frac{T_i^* / \text{GDP}_i}{T_i^P / \text{GDP}_i} \tag{2}$$

where TE<sub>i</sub> is tax effort in ith country

- T<sub>3i</sub> : Really received tax in ith country
- T<sub>pj</sub> : Potential tax or tax capacity in ith country which must be estimated
- GDP<sub>i</sub> : Gross domestic production in ith country

Real values are in numerator and the potential in denominator. The closer the above ratio to 1, the closer the tax effort of the country (comparing to tax capacity or potential of that country); the further the ratio from 1, the better the performance of the country regarding tax effort; it must be noted that tax effort index shows the estate of tax function in a period. So, using the index, we can examine the possibility of increasing potential tax in a country [4].

## CONCLUSION

If we divide countries into high income, mean income and low income (regarding income per capita), then we will find out that there is higher tax income in countries with high income per capita.

In high income countries, tax to GDP ratio has increasingly enhanced from %21 to %30 and consequently tax effort level also increased. But in low and mean income ones not so much changes are observed. In low income countries, tax has remained fixed at %14, while in mean income countries, tax income has increased from %20 to %21. The observed trend in tax collection shows that low income countries are stuck in structural problems. They usually have low tax capacity which most of the time accompanies inefficient tax regime, while these countries have huge resources to reach development [5].

In two last decades, many Arab countries have started taking actions including reforming plans of economic and financial structures some of which are done by the aid of international monetary fund.

These reformation plans usually include actions for increasing tax incomes and restructuring tax system [7].

In general, tax share in developing countries is less than the share in developed countries [8]. In recent years, tax share in some Arab countries is higher than the mean share in Asia and Africa [7]. On the other hand, Arab countries use less amount of tax. Moreover, there are several reasons for relatively low tax income in GDP in Arab countries. However, any generalization is difficult regarding different political and economic structures in these countries. Some Arab countries like Algeria have experienced recursive challenges and civil wars resulted in disturbances in creating incomes.

Aside from economic and political weakness, tax structures have generally interfered with exploitation and allocation of resources in Arab countries and affected the incentive for growth and competence and as a result increase of incomes [9,10].

**Literature Review:** Numerous studies are carried out on tax effort among which the study of global bank [5] as, "developing tax capacity and reaching potential income- an inter-country analysis" can be implied. In the study, tax capacity of 104 countries across the world is studied. Results show that countries with high income level have lower population growth rate, more trade openness, lower share of agriculture sector in GDP and high quality of organization and higher tax capacity. In addition to traditional factors determining tax capacity, in the study official corruption is statistically significant and has considerable effect on tax capacity. Davoodi and Grigorian [6], in an article, "potential tax versus tax effort, an analysis for Armenia by tax data collection with low rigidity", seek for justifying low tax to GDP ratio in Armenia. Results of the study show that, despite double economic growth in 2002 on, tax to GDP in Armenia is stable at %14.5. Results approve the presumption that Armenia's persistence in keeping ratio of tax to GDP leads to sustaining weak organization and big shade economy. Gupta [11], in an article as "measuring income from tax effort in developing countries", examines determinants of tax effort of 105 developing countries using an extensive data bank. Results show that in all regressions with fixed and random effects, logarithm of GDP per capita has negative effects on tax. Moreover, results of the model show that there is strong negative significant relationship between agriculture share of GDP and tax capacity. Finally, results demonstrate that countries with the best reliance on goods and services tax have better performance.

**Domestic Studies (In Persian):** Naghdi, kaghazian, Kakoei [12], in a study as "Global financial Crisis and Inflation: Evidence from OPEC", the effect of 2007 financial crisis on inflation in OPEC based on a panel data are examined. Financial crisis affects economic variables such as economic growth, oil price and stock price index (i.e. financial markets), which in turn change inflation. In other words crisis caused an increase in oil price which in turn had a positive and important influence on the inflation of the OPEC. For example, the study finds as a result of one percent increase in oil price, inflation increase by 0.08 percentage points in these countries.

Barati [13], in a study as "reviewing tax effort and estimating economic capacity of tax in Iran", presents a certain definition of tax economic potential capacity and studied the effective factors from different aspects. Results of the model show that in the period under study, mean tax ratio in Iran (without considering social

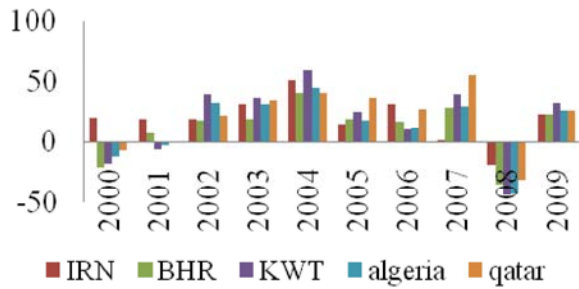


Diagram 2: Tax effort trend

Source: central bank of Iran and IMF

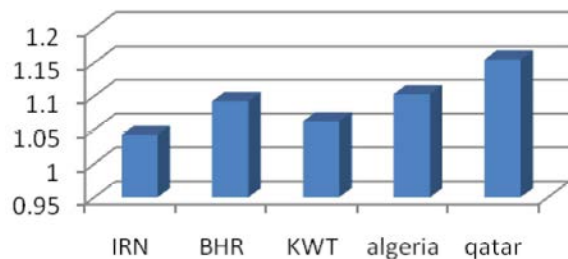


Diagram 1: Oil incomes trend

Source: research calculations

insurance payments) has been %13.89 which higher comparing to tax system mean function in the period (%67). Also, tax effort of our countries has been %48 in the period.

Qatmiri and Eslamboulian [4], in a study as "estimation of tax effort in Iran and comparing it to selected developing countries", tax ratio was estimated for 15 developing countries using superficially irrelevant regression (SURE) and then tax effort of the countries under study was calculated. Results of the study show that there is negative relationship between tax ratio and share of value added of industry, services and foreign trade sectors of GDP, ratio of foreign loan to GDP and inflation rate to tax ratio. Results of the estimation show that Iran has the lowest rank of tax effort among the 15 countries under study.

**Reviewing the Trend of Research Variables:** Here, first we examine the trend of some regressive variables of study including oil incomes, tax incomes and tax effort during the years under study.

**Reviewing the Trend of Oil Income:** Here, we have an attempt to analyze the reasons for oil incomes changes during the years under study (2000-2009). For the sake of easiness, we use diagram:

As seen in the diagram, from 2000 to 2001 we see oil price drop and also oil income fall resulted from east south Asia crises and terroristic attack of September 11. Based on the explanations and oil price fall in 2004 (the year America attacked Iraq), we see oil price rise and oil incomes rise in the countries under study.

Also, by the commence of crisis and oil incomes reduction during years 2005-2007, we see the reduction of oil incomes and then an all-time increase of oil prices led to the increase of oil incomes in early 2008.

**Examining the Trend of Tax Effort:** As seen in the diagram, Iran has had the least tax effort and ranked at 5th grade and Qatar has the greatest tax effort.

Due to the reliance of the government on oil incomes and less attention to tax incomes and also existing tax capacities remained unused, we see the least tax effort for Iran (comparing to the countries under study) [4].

## MATERIALS AND METHOD

Research method is based on information from triangulated data and using Eviews software. Here, to measure tax effort, we need to measure potential GDP and potential tax income. There are a variety of ways for doing so; for example, Kukran, Nelson and Balenchard [14] method. But the most valid method is Hodrick-prescott filter [15], because the filter makes a distinction between permanent and temporal changes in a time series [16].

HP method includes simple steps for paving the production trend and has drawn great attention recently due to high flexibility of the origin of frequencies made in production trend.

In the literature of macroeconomics, supply-side political shocks like changes in employment levels of production inputs, improvement of technology and changes of productivity of sustainable production factors and demand-side policies are among the effective factors in the process of calculating potential production capacities which have been highlighted by Hudrick-peroscott. On the other hand, in this method, permanent (supply-side) and temporal (demand-side) effects of political shocks on GNP are separated from each other. Although stability has reduced the difficulty to execute demand-side policies and efficiency of the separation in calculating production gap and also determining potential production values, the method is still considered to be a

very useful political tool. Separation of demand and supply shocks by the filter is very important in analysis and variance of effective factors on production, employment and in particular inflation levels and provides the ground for recognizing (potential) natural levels of the above variables and their behavior stability against different (supply-side) and (demand-side) policies. HP filter is gained as follow by the least square of Y variables deviations from its trend:

$$\text{Min} \sum_{t=0}^T (y_t - y_t^*)^2 + \lambda \sum_{t=2}^{T-1} [(y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*)]^2 \quad (3)$$

In the equation, t is the number of observations, λ determines the degree of flatness. Perscott and Kidland [17] considered the optimized values of λ respectively as 1600 and 100 statistical and quarter and annual tests.

The filter is dual and symmetric which removes the problem of the period phase change, but faces problem in the end of period, because future statistic is not available; the larger the λ is selected, the further flattening is required. However, the filter has also pitfalls including optional choice of λ value, ignoring structural breakdown and ignoring consistency which despite the shortcomings, if structure of the economy is stable and national growth is consistent, then filter will gain acceptable estimation of potential production. On the other hand, the method is acceptable for many studies for two reasons:

First, the method separates frequencies related to commercial cycles from production and second the method makes the cycle element gained from time series models too close [18].

**Model Estimation:** Here, we examine respective model. so, first, we introduce pilot model and state the reasons for making changes.

Pilot model of the study is adopted from an article as, "developing tax capacity and reaching potential income-an inter-country analysis". Estimated model is as follow:

$$Y_{it} = f(\text{GDP}_{it}, \text{POP}_{it}, \text{TRADE}_{it}, \text{AGR}_{it}, \text{CORR}_{it}, \text{BUREAU}_{it}) \quad (4)$$

Table 1: F Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.691673	(4,41)	0.0033
Cross-section Chi-square	18.84382	4	0.0008

Source: author findings

Table 2: Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	18.76669	4	0.0009

Source: author findings

Table 3: The estimation results of the model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.632219	1.257959	2.092453	0.0426
OILR?	-0.03196	0.012419	-2.57366	0.0138
CORR?	-3.65625	1.492949	-2.44901	0.0187
GDP?	2.06E-05	1.02E-05	2.013825	0.0506
CPI?	0.270137	0.133553	2.022687	0.0497

Fixed Effects (Cross)

_IRAN--C	-0.83704
_BAHRAIN--C	0.643927
_KUWAIT--C	3.720619
_ALGERIA--C	-4.06313
_QATAR--C	0.535624

Source: author findings

where:

- Y<sub>it</sub> : Tax income (including social insurance aids) or financial income in GDP
- GDP<sub>a</sub> : Gross domestic production per capita in fixed price of year 2000 (in American dollars)
- POP<sub>a</sub> : Population growth rate or age dependence ratio as a percentage of total population
- TRADE<sub>a</sub> : Trade openness (sum export and import of goods and services to GDP)
- AGR<sub>a</sub> : Value added of agriculture sector
- CORR<sub>a</sub> : Corruption index
- BUREAU<sub>a</sub> : Quality of bureaucracy

Due to the concentration of the study on oil incomes and attempts to find the effects of respective income on tax effort, present study is rewritten in following terms:

$$Te_{it} = F(\text{GDP}_{it}, \text{CPI}_{it}, \text{Corr}_{it}, \text{OilR}_{it}) \quad (5)$$

where

- Te<sub>a</sub> : Tax effort
- GDP<sub>a</sub> : Gross domestic production
- CPI<sub>g</sub> : Consumer price index
- Corr<sub>a</sub> : Oil income

Present model is considered for 5 oil countries Iran, Bahrain, Kuwait, Qatar and Aljazeera. Fixed data is used for years 2000-2009 (in proportion with base year 2000). Econometric software (Eviews) was used to examine the model.

To achieve an acceptable assertion regarding the estimation of tablet data, we must select suitable test. F test of the estimated model indicated that  $F(4,41)=4.69$  and the statistic was larger than the F-statistic from the table which means the rejection of  $H_0$ . So, different intercepts are used. In Husman test again  $P=0.0009$  (%95 confidence) approves the use of fixed effects method for the model. Results of the test can be reviewed in the appendix.

Reviewing the indices in statistical terms show that all model indices are significant and it shows that all of the variables affect tax effort.

Results of model estimation show %1 increase of corruption and oil income reduce tax effort respectively 0.03196 and 3.6562 units. As expected, with oil price increase and oil income increase, gaining income from the place of tax incomes becomes pale and shifts toward oil incomes which here we have achieved similar results, but observe the reduction tax incomes with the increase of corruption control. The reason can be summarized as follow:

In a society where resources rely on soil incomes, despite taking corruption-control actions, the actions are not effective due to the inefficiency of tax system and monitoring system and most of the actions end in the reduction of official corruption. In such conditions, suitable context is set for illegal actions including escaping tax increase which itself is one of the reason for reduction of tax incomes and as a result reduction of tax effort.

Review of corruption control index trend in previous chapter also demonstrates the descending trend of the index in the countries under study in recent years indicating the increase of corruption in these countries.

1unit increase in GDP and consumer price index increases tax effort respectively as 2.06E-5unit and 0.27013.

Due to reverse relationship between production and inflation, with inflation increase, GDP reduces. In such conditions taxes received from consumer increase and consequently tax incomes increase.

On the other hand, as GDP increases, tax incomes taken from producers and consequently tax effort also increase.

It can be main reason for tax income increase and tax effort as a result. It must be noted that in this study total collected taxes are considered.

Regression power  $(R)^2$  of the model is %90, namely, %90 changes of tax effort is stated by regressive variables of the model.

Watson distance statistic in the model is 2.07 showing the lack of autocorrelation in the model.

## CONCLUSION

The study is mainly aimed at examination of oil incomes and tax effort of 5 oil countries Iran, Bahrain, Kuwait, Qatar and Aljazeera. Panel data is used for years 2000-2009 (in proportion with base year 2000) for calculation of tax effort and the model is extracted and estimated.

Results indicates that there is negative significant relationship between tax effort and oil incomes; as oil price and consequently oil incomes increase, the attentions are given to oil income (rather than tax incomes) which is consistent with the hypothesis posed in the study.

On the other hand, there is positive significant relationship between tax effort and variables of GDP and consumer price index. The reason for reverse relationship between production and inflation is that as inflation increases, GDP decreases. In such conditions taxes received from consumer increase and consequently tax incomes increase. At the same time, as GDP increases (economic growth), tax incomes taken from producers and consequently tax effort also increase.

It must be noted that in this study total collected taxes are considered.

Also, there is negative significant relationship between corruption control and tax effort; of the consequences of ignoring corruption control is the creation of the ground for increasing corruption. As a result, with corruption increase we will witness the reduction of tax incomes and also tax effort. In addition, in a society where resources rely on soil incomes, despite taking corruption-control actions, the actions are not effective due to the inefficiency of tax system and monitoring system and most of the actions end in the reduction of official corruption.

Using tax effort calculated in selected countries, we compared them. Iran has had the least tax effort among the five countries. Also, regarding the matter that tax effort index in Iran is  $<1$ , so there are unused tax capacities here.

It must be noted that due to the structure of oil sector and the estate of registration of oil incomes, tax effort in Iran can be less than the real amount which requires further studies.

**Suggestions:** There are numerous unused tax capacities in Iran which require suitable policy for increasing tax effort.

Considering oil sources as wealth rather than as income and maintaining it for future generations multiplies the necessity of attention toward tax incomes. It must be noted that regarding current conditions of Iran, it is expected that reforming the structure of organs and tax rules and also target of tax exempts for some sectors can be led to the improvement of performance and increase of tax effort. Yet more important is that considering the critical role for corruption in reducing tax incomes, it is recommended that tax incomes and as a result tax effort are enhanced by clarifying tax system and changing the rules and reforming tax collection methods.

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