ANALYZING THE EFFECT OF ECONOMIC VARIABLES ON TOTAL TAX REVENUES IN IRAN

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ABSTRACT

As the government's source of revenue, taxes play a major role in the construction and economic development of a country. Accurate knowledge of factors affecting tax revenues provides the policymakers with a clear horizon for economic planning. This study mainly aimed to examine the effect of economic variables on total tax revenues between 1974 and 2011. Accordingly, the Auto regression Distributed Lag (ARDL) Model was used. Results indicated that exchange rate with 0.71398, import with 0.53781, and the value-added of industry sector with 1.0841 had a positive significant relationship with total tax revenues. Moreover, the value-added of agriculture sector with 1.1801 had a negative significant relationship with total tax revenues.

1. INTRODUCTION

As the most common and important financial source of public revenue, tax is considered among the most efficient and effective tools of fiscal policy in the world through which a government is able to supply a variety of social and welfare services and lead many social and economic activities and trends.

Unfortunately, some people believe that taxes are received in Iran to earn more and use to manage governmental organizations. Yet, what is ignored is that the high share of revenues obtained from oil and low share of tax revenues in the government's earning composition not only have undesirable consequences (such as the dependency of country's income on export), but also

have deprived the country's economy of the opportunity to apply financial instruments. Rather, the application of the instrument can lead much economic disorganization toward the right direction.

In Iran's economy, similarly, one of the key components of government's budget is tax revenue. Knowledge of the amount of tax revenues that can be obtained from different tax sources not only provides the chance for optimal allocation of the sources, but also assists the government in accurate financial planning and determines the degree of people's participation in financing the government's public expenditures.

In the meantime, the main questions which are raised by politicians and statesmen are as follows: what are the factors affecting tax revenues? How much of the country's tax capacity is used? And, has the country's tax effort been enough to realize tax revenues? (Abrishami and Mohsen, 2002).

As the government's source of revenue, tax plays a major role in the construction and economic development of a country. Accurate knowledge of factors affecting tax revenues provides the policymakers with a clear horizon for economic planning. Scientific anticipation of incomes also increases tax officers' accuracy and attempt in collecting taxes (Monjazeb and Soleimani, 2004).

Analyzing tax revenues as well as determining the susceptibility of macro variables can be effective in reducing the government's budget disorders that are caused by exogenous changes of these variables. They can also be useful in modifying the structure of tax revenues to stabilize the government's incomes. The origin of tax revenues is domestic economy and a stable economic leads to the stability of income. However, in the structure of Iran's economy, the direct relationship between tax revenues and the income from oil sales – as the government's main source of income that is directly related to exogenous factors – is crystal clear. The relationship is so close that making any changes in the income obtained from oil sales can directly influence tax revenues (Khodavirdi, 2001).

In the present manuscript, the effect of macroeconomic variables (including exchange rate, import, the value-added of industry sector, the value-added of oil sector, and the value-added of agriculture sector) on total tax revenues is studied. This manuscript is composed of six sections. Following the introduction, the second section presents the theoretical principles of calculating tax revenues; the third section focuses on the related literature review (both national and international studies); the fourth section shortly describes the ARDL method; the fifth section examines the reliability of variables by means of the Augmented Dickey-Fuller (ADF) test, and then estimates the short-term and long-term effects of economic variables on tax revenues; in the end, the sixth section presents conclusion and suggestions.

2. THEORETICAL PRINCIPLES

2.1. Tax Principles from the Classists' View

Adam Smith is the most well-known classical economist. Accordingly, his four principles are taken as the classists' tax principles. For him, the first principle is justice and equality based on which tax load must be fairly divided among people. It depends on tax payers' affordability and

Smith regards proportional tax as rightful tax. The second principle is the specificity and certainty of taxes. Based on this principle, the amount, origin, payment time and method must be accurately determined. The third principle is convenience based on which individuals' relative consent and different facilities are considered for taxation. The conditions and means of payment must be arranged with the least pressure possible as well. The last principle is about conservation. In tax collection, maximum saving must be done and collection costs must be minimized (Dadgar, 1999; Pazhoyan and Jamshid, 2012).

Table- 1. Tax System Principles from the Classists' View

Tax System Principles from the Classists' View	
Principle of Justice	The fair distribution of tax load
Principle of Specificity	The clear organization of taxes
Principle of Convenience	Individuals' consent in tax collection
Principle of conservation	Optimizing tax system

2.2. Tax Principles from Keynesians' View

Table- 2. Tax System Principles from Keynesians' View

Tax System Principles from Keynesians' View	
Principle of personalizing tax	The fair distribution of tax load and difference between various tax bases
Principle of intervention	Augmenting wellbeing and social services system
Principle of income desirability	The fair distribution of income and reduction of consumption tax

2.3. Modern Views toward Tax Principles

With the development of Information Technology and the movement of endogenous economies towards globalized economies, taxes have also undergone changes and evolutions. Taxes have turned out to be one of the main tenets of election systems which own social, political, and information characteristics – except for economic effects. Although the principles cited in the classists' statements and Keynesian theory still prevail and many tax systems are organized based on them, some new principles are added to the previous tax principles (*ibid*).

Table-3. Modern Views on Tax System Principles

Modern Views on Tax System Principles	
Principle of distinguishing where to spend	The specificity of where to spend taxes
Principle of convenience in voluntarily pay tax	Accepting and arranging the voluntary tax payment
Principle of participation	Civil organs and public participation

3. LITERATURE REVIEW

Sharif (2010) have studied determinants of taxation in Pakistan between 1994 and 2009. Results of their study showed that the openness of economy, money volume, foreign debt and political stability are the determinants of taxation in Pakistan. In addition, the weak tax base, the further dependency of agriculture sector, foreign supports, and also the low level of literacy are considered to be among the main factors of low taxation in Pakistan.

In an article, Farazmand and Ahmadi (2007) studies the factors affecting tax capacity in Lorestan Province. Results indicate that the relationship of the value-added in industry, service sectors and literacy rate with the province's tax capacity is positively significant. Yet, variables associated with the value-added of the mining sector, income per capita, inflation rate and population have no significant relationship with tax revenues. Moreover, the tax capacity and tax efforts of the province were also calculated using the pattern estimated parameters. Based on a comparison between received taxes and estimated tax capacity in respective years, it can be concluded that the tax system has not acted effectively in receiving actual tax.

In an article titled "estimating tax effort in Iran and its comparison with selected developing countries", Ghamtari and Eslamlouian (2007) studied Iran's tax capacity and compared it to 14 other selected developing countries. In the same article, tax ratio pattern was estimated using the Seemingly Unrelated Regression (SUR) method between 1994 and 2002. Based on the results, there is a positive significant relationship between tax ratio and the value-added share of industry, services, and foreign trade sectors' share of GDP (Gross Domestic Product). Moreover, the share of the agriculture sector's value-added of GDP, the ratio of foreign loans to GDP, and inflation rate leave negative effects on tax ratio.

Pourmoghim and Sayyed (2005) studied factors affecting the amount of tax revenues receivable in Iran's tax system using the OLS model from 1959 to 2001. Results indicated that statistical and social-organizational factors as well as tax policies play a key role in receiving tax revenues. Due to the lack of tax indexation for the inflation structure of Iran's economy, tax revenue is translated into tax loss. Hence, to address the problem, tax revenues must be indexed (disinflation) in proportion to the general level of prices.

Ahsan and Wu (2005) examined the tax share of GDP in developing countries between 1979 and 2002. Results showed that the share of agriculture, GDP per capita, and population growth has a negative significant relationship with tax revenues, while the share of commerce in GDP has a positive significant relationship with tax revenues.

In a study, Gura (1997) explored the effects of economic policies and corruption on tax share in GDP using panel data and statistical information about 39 African countries from 1986 to 1995. Results indicate that – upon reforming political structure and reducing corruption, the relative reduction of agriculture sector share in production, the reduction of inflation, and the increase of economy's openness – the relative share of government's tax revenues in GDP significantly increases.

In a study, Komijani and Yahyaii (1994) examined tax capacity. A direct relationship was observed between income per capita and other independent variables with tax ratio. The significance of independent variables coefficients in determining tax capacity became evident as well. Of the results of the estimation of the tax capacity function is that the estimated coefficient of the model shows that the industry and services sectors play the most effective roles in earning tax revenues in developing countries. Regarding services sector, tax mainly includes employment tax, real estate tax, and service companies' tax.

Leuthold (1991) and Stotsky and Wolde (1997) studied the tax share of African countries with respect to the agriculture sector's share in earnings, mine share, income per capita, and export ratio as factors affecting them. Their results demonstrated that agriculture has a negative share yet mining has a positive share. Moreover, foreign trade and financial aids as well as foreign loans have positive and statistically significant shares.

4. RESEARCH METHOD

The data for this research are gathered using desk research method. Moreover, in order to answer the research questions and to test the hypotheses, econometrics methods were used. In other words, after identifying the proper model (through resorting to the available statistics), the coefficients were estimated in the form of elasticity using econometric methods and Microfit4 software. Then, using the coefficients and taking into account the magnitude of their effects on handmade Carpet Exports in the target function, and also through analysis of the obtained results, efforts were given to present appropriate strategies.

In order to investigate the short- and long-term relations between the dependent variable and other explanatory variables of the model, Autoregressive Distributed Lag (ARDL) was used after ensuring an accumulative vector. Since estimates provided by ARDL method avoid problems such as autocorrelation and endogeneity, they are unbiased and efficient. ARDL method includes two steps. In the first step, the presence (or absence) of a long-term relationship among the considered variables is tested. The maximum frequency of lags is incorporated based on the number of observations, and because of the inclination of Schwarz Bayesian Criterion (SBC) towards shorter specification, the criterion delivers better results in observations less than 100 , Immediately after estimating the dynamic (short-term) equation, the test of the presence (or absence) of long-term relation should be performed. In order to test whether the long-term relation obtained from this method is false or not, the following is undertaken and tests the concerned hypothesis .The null hypothesis indicates the absence of a long-term relation, because the convergence of the short-run dynamic relation towards the long-term relation requires the sum of coefficients to be less than one. The t value to be used in the test is calculated by subtracting one (1) from the sum of the coefficients of dependent variable lags and dividing the obtained value by the sum of the standard deviation of coefficients (Tashkini, 2005).

$$H_{\circ} = \sum_{i=1}^{P} \phi - 1 \geq 0$$

(1)

$$H_1 = \sum_{i=1}^{P} \phi - 1 < 0$$

$$t = \frac{\sum_{i=1}^{p} \hat{\phi}_i - 1}{\sum_{i=1}^{p} S\hat{\phi}_i}$$

(2)

In this equation, *s* represents the standard deviation of lagged coefficients of the dependent variable. If the absolute value of *t* is larger than the absolute value of the critical quantities provided by Banerjee, Dolado and Master, the null hypothesis is rejected and the presence of a long-term relation is accepted. Once the existence of the long-term relation among the variables is established, Error Correction Model (ECM) can be used.

The second step of this analysis includes the use of ARDL options for estimating the long-term relations and the statistical inference with respect to their values. It should be noted that the use of this step is appropriate only when it is ensured that the falseness of the relation among the variables is rejected (Tashkini, 2005).

5. THE EMPIRICAL RESULTS OF THE STUDY

5.1. A Introduction to the Model

In this section, the function selected for studying variables affecting total tax revenues is introduced and evaluated. The model applied here relies on the Sharif Chowdari's model used in 2010 to study Pakistan's economy between 1973 and 2009. The basic regression equation for the study is as follows:

LTTAX= (LMANF , LAGRI , LVO , LEXR , LIM)

LTTAX: Total Tax Revenues Logarithm (at current prices in billion Rls)

LMANF: Industry sector value-added of GDP (at current prices in billion Rls)

LIM: Annual import Rls value logarithm (at current prices)

LEXR: Exchange rate logarithm

LVO: Oil sector value-added logarithm (at current prices in billion Rls)

LAGRI: Agriculture sector value-added logarithm (at current prices in billion Rls)

5.2. Studying the Statics of Variables

The use of econometrics methods in empirical works is based on the fact that the respective time series variables are static. A time series variable is static when its mean variance and autocorrelation coefficients are fixed in time. Accordingly, before using the variables, we must ensure their static and/or non-static nature. In the present study, the unit root test is performed to examine the statics of the variables.

Table-4. The results of Dickey-Fuller reliability test generalized on the variables level and difference.

Variable name	Test results at variables level				Test results in variables difference			
	The presence of intercept and absence of linear trend in data				The presence of intercept and absence of linear trend in data			
	SBC measure	ADF statistic based on SBC	The critical value of ADF at %95	Variables reliability	SBC measure	ADF statistic based on SBC	The critical value of ADF at %95	Variables reliability
LTTAX	3.80	0.490	-2.9825	unstable	6.54	-4.762	-2.9558	stable
LMANF	19.26	0.514	-2.9825	unstable	20.71	-3.775	-2.9558	stable
LIM	-4.20	0.106	-2.9825	unstable	-2.60	-4.582	-2.9558	stable
LEXR	23.24	-4.418	-2.9825	stable	23.24	-4.418	-2.9558	Stable in level
LVO	-20.67	0.431	-2.9825	unstable	-20.63	-5.124	-2.9558	stable
LAGRI	27.74	-1.410	-2.9825	unstable	25.70	-5.296	-2.9558	stable

As a result, based on the unit root test, all variables except exchange rate were non-static. To determine the variables' statics, the non-statics variables are differentiated and the total non-static variables are shown to be static after making the deduction.

5.3. Estimation of the Short-term Equation

Based on Pesaran *et al.* (2001), it is possible to gain long-term adaptation coefficients for the variables of a model by applying the ARDL method and including suitable lapses. In Johansson's method, the same lapse is chosen for all variables while, in ARDL, optimal lapses are chosen for each variable using criteria like the Showarts-Bizin, and Akaik and Hanan criteria. Then, the Microfit 4 software chooses ARDL (1,0,2,0,0,1) as the best model based on the Showarts-Bizin test carried out for total tax revenues.

Table-5. Results from the dynamic relationship

Variables	Coefficients	Statistic t
LTTAX (-1)	0/42285	4/8978 (0/000)
LMANF	0/62569	2/9052 (0/007)
LAGRI	-0/68111	-3/6250 (0/001)
LVO	-0/080854	-1/1851 (0/247)
LVO(-1)	-0/13473	-1/7545 (0/091)
LVO(-2)	0/21191	3/4095 (0/002)
LEXR	0/41207	4/0193 (0/000)
LIM	0/10310	1/0423 (0/307)
LIM(-1)	0/20729	1/8746 (0/072)
C	-0/46794	-3/0568 (0/005)
R^2	0/99820	
F	1599/9	(0/000)
D.W	1/8430	

In estimating the F-statistic, the LM test performed for determining autocorrelation 0.16933 with probability of less than %5 (prob=0.684) shows the absence of autocorrelation between disruptive terms. F-statistic for distinguishing the correct or incorrect functional shape is 4.0041 with probability of less than %5 (prob=0.395) indicates that the model is specified properly. F-statistic for determining the normality of residual terms' distribution is 1.3155 with probability of less than %5 (prob=0.259) indicates that disruptive terms distribution is normal. F-statistic for determining the variance of difference is 1.3155 with probability of less than %5 (prob=0.259) indicates that disruptive terms are identical.

In the ARDL method, the presence of a long term co-integration relationship is approved when the absolute root of t-statistic is larger than its critical quantity (to conduct this test, the sum of coefficients and dependent variable lapse must be subtracted one and divided by its SD).

$$\frac{\sum_{i=1}^{p} \hat{\alpha}_i - 1}{\sum_{i=1}^{p} s\hat{\alpha}_i} = \frac{\hat{\alpha}_1 - 1}{s\hat{\alpha}_1} = \frac{0/42285 - 1}{0/086336} = -7/25$$

By comparing calculative statistic (-7.25) and the critical quantity of test at the %99 level (-5.04) which is presented by Banerjee *et al.* (1992), the hypothesis of the existence of long term relationship (existence of co-integration) between model's variables is approved. To test the existence of long term relationship, the Hashem Pesaran's test was also conducted, and test statistic was 5.6503 which was higher than top limit 4.54 at reliability level %99 indicating the existence of long term equilibrium relationship between variables. Hence, the long term model is estimated.

5.4. Estimation of the Long-Term Equation

After estimating the dynamic (short term) model and proving the existence of a long term relationship, measures are taken to estimate the equation. The summary of the long term estimation results is presented in Table 6.

Since the model has a logarithmic shape, the coefficients of independent variables denote the sensitivity and the elasticity of dependent variable.

Table- 6. Results from the long term estimation

Variables	Coefficients	Statistic t
LMANF	1/0841	2/8850 (0/008)
LAGRI	-1/1801	-3/1787 (0/004)
LVO	-0/0063642	-0/046418 (0/963)
LEXR	0/71398	3/5687 (0/001)
LIM	0/53781	2/9521 (0/007)
C	-0/81078	-3/5584 (0/001)

As seen, all the coefficients of the variables – except for the value-added of oil sector – are significant at the reliability level %95. Based on Table 2, the following results were gained:

-    A one – percent increase in the value-added of industry sector leads to a %1.08 increase in total tax revenues. The significant and positive coefficient of the value-added of industry sector indicate that GDP acts as one of the main tax bases and the share of the value-added of industry sector in GDP is of considerable importance as one of the major sectors of GDP. Rather, companies' tax with the mean value of %35 has the highest share of total tax revenues compared to the other types of tax. Yet, as industrialization of a country increases, economic activities are exploited in larger scales and take formal nature followed by the possibility for further taxation. The increase in the share of the value-added of industry sector is a sign of further economic development. The more the country develops economically, the more the domestic consumption and import increase and, as a result, tax revenues enhance.

-    A one – percent increase in the value-added of agriculture sector leads to a %1.18 increase in total tax revenues. It indicates that the higher the share of the agriculture sector in GDP is, the lower the country's tax revenue is. The reason underlying the issue can be sought in the difficulty with receiving tax in the economies having traditional economy where the higher part is allocated to agriculture sector. Accordingly, since the economic activities of these countries are almost done in a small scale and have non-official nature, then, taxation will have further difficulties.

-    A one – percent increase in the exchange rate leads to a %0.71 increase in total tax revenues. As the exchange rate increases, total demand composition changes in terms of tradable and non-tradable goods. The reason is that with the increase of exchange rate, the consumption of tradable goods becomes more expensive – whether they are the substitute goods for import or exportable goods. Total demand will be transferred from the tradable goods to non-tradable ones and consequently the earnings from trade are reduced yet domestic tax revenues increase. Moreover, when exchange rate increases, foreign demand for export increases on one hand, and the production

of substitute goods for import will be more profitable on the other. As a corollary, the production of tradable goods increases and then the earnings from the production tax of tradable goods will enhance.

- A one – percent increase in import rate leads to a %0.53 increase in total tax revenues. The convenience in executing import tax leads to the fact that this type of taxes be counted as attractive earnings source for government when there are low executive capabilities. As a result, there might be a reverse relationship between the import tax – as a source of tax revenue – and economic development. In Iran, again import tax share is about %31 total tax revenues. Accordingly, import is one of the main and effective factors influencing tax revenues.

Studying the coefficients of the model in a long run reveals the realization of the theoretical expectations of variables on total tax revenues in Iran.

5.5. Results of the Structural Stability Test

The stability of coefficients was examined by CUSUM[1] test. Results showed that the coefficients of the estimated model were stable in the period under study.

As shown by the results of estimation and cumulative residue and square diagrams, confidence interval %5 is not cut by diagrams. So, the null hypothesis referring to the existence of structural stability is approved and its absence is rejected.
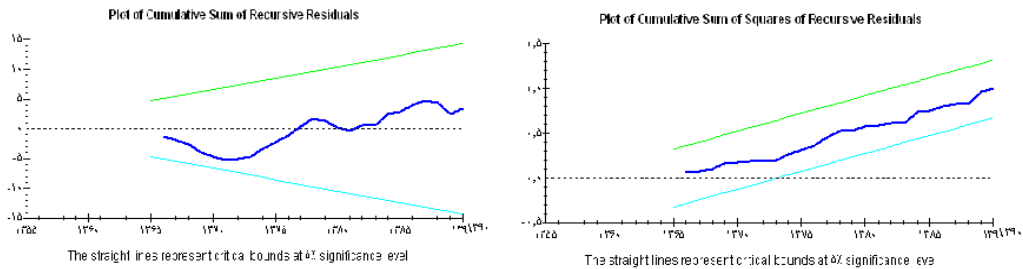
5.6. Estimation of Error Correction Coefficient

Since the Error Correction Model (ECM) relates the short term fluctuations of variables to their corresponding long term equilibrium values, they are widely used in empirical works. Proving the existence of co-integration between the set of variables under study in the model provides the possibility of applying this pattern.

The C coefficient, when appearing with negative notation (expectedly), indicates the speed of error correction and the approach toward long term equilibrium. Now, we examine the presence of co-accumulation between a set of variables statistically using ECM.

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[1] . The cumulative sum (CUSUM) test

Table- 7. The results of Error-Correction coefficient

Variables	Coefficients	Statistic t
DLMANF	0/62569	2/9052 (0/007)
DLAGRI	-0/68111	-3/6250 (0/001)
DLVO	-0/080854	-1/1851 (0/246)
DLVO1	-0/21191	-3/4095 (0/002)
DLEXR	0/41207	4/0193 (0/000)
DLIM	0/10310	1/0423 (0/306)
DC	-0/46794	-3/0568 (0/005)
Ecm(-1)	-0/57715	-6/6849 (0/000)
R^2	0/73087	
F	10/0869	(0/000)
D.W	1/8430	

The t-statistic of the coefficient of the ECM term for total tax revenues is -6.6849. Now, its significance is approved with error probability of less than %5 (prob=0.000). The coefficient of ECM term has negative notation and the co-integration between model variables is approved. The coefficient for total tax revenues is -0.57 which indicates that %57 of an imbalance in a period of total tax revenues in Iran's economy is modified in next period. So, the emergence of a momentum regarding the economic variables in Iran's economy maintains its effect on total tax revenues after almost two years. Accordingly, the effect of fluctuations and imbalances emerged in economic variables will be removed from total tax revenues two years after their occurrence.

6. CONCLUSIONS AND SUGGESTIONS

In this study, the effect of macroeconomic variables on total tax revenues will be examined at current prices (based on Rls) between 1974 and 2011.

The model applied relies on Sharif (2010) used in Pakistan between 1994 and 2009. Based on the results, the coefficient of the value-added of the industry sector is positive and significant (1.08) in the long term. The coefficient of import is positive and significant (0.53) in the long term. The coefficient of exchange rate is positive and significant (0.71) in the long term. The coefficient of oil sector value-added is negative and significant (0.006) in the long term. The coefficient of agriculture sector value-added is negative and significant (1.18) in the long term.

- In the present conditions, value-added tax must be completely executed as indirect tax. And, tax rate must also increase as a par with the minimum effective standard about %15 and the foundations of total income tax and capital return tax which are included in indirect taxes be established and executed.

- The noteworthy point is that people must reach a level of confidence and mental peace and believe that taxes they pay will lead to the improvement of the country's economy and the enhancement of the citizens' social welfare.

- Regarding the negative notation of the share of oil sector's value-added in GDP, an increase in oil incomes leads to a decrease in tax revenues which is resulted from the country's dependency on oil incomes and the reduction of tax revenues when oil incomes increase. Accordingly, it is

suggested that policies be taken in order to reduce the reliance of the country's budget on oil incomes – especially regarding current costs – so that the country's economy be further secured at the time of price momentum resulted from oil sector via reforming tax bases and introducing new ones (e.g. introducing total income tax and cost tax basis), enhancing the efficiency of executive system, removing exemption, preventing from economic activities in non-official sector, and the indication (disinflation) of tax revenues for changes in the general level of prices.

If these conditions are realized, an increase in the tax revenues, which can decrease the economy's dependency on the oil export, can be expected.

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