The Investigation of Value Added Tax on Fluctuations in State Tax Revenues

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Abstract

Because of the broadness in tax bases, Value Added Tax (VAT) is amongst taxes which have a high income for governments and service distribution for people welfare. In our country, VAT was enforced in order to reform the tax structure and to increase the government income. Hence, the purpose of this study is to investigate the effect of VAT on fluctuations in state tax revenues. Using econometric techniques in the form of panel data, statistical data of years 2008-2013 are evaluated in this paper. Multiple linear regression is used in this study. Findings show that more than half of the tax revenues’ fluctuations are explained through the VAT growth variable. In the investigation of coefficients’ significance, results indicate that the positive and significant effect of the VAT growth, is in both legal and real persons so that the increase in VAT growth in legal and real persons will be 6.8\% and 4.5\%, respectively. Generally, research findings confirm the considered assumptions, and there is a significant positive correlation between the growth rate of VAT and tax revenues’ fluctuations.

Keywords: Value Added Tax, Tax Revenues’ Fluctuations, Panel Data, Econometrics.
1. Introduction
Value added tax (VAT) has been a concern in many countries as a new method of taxation by establishing a widespread tax base. In our country, after a fairly long process, VAT was approved by parliament in order to reform the tax structure and increase government revenues, and was conducted in mid-2008. Since this rule has been implemented on a 5-year trial basis, the study of the effect of this tax on macroeconomic variables is of great importance.
At the time being, our country is in the transition from purely oil economy and a traditional tax system to an economic based on transparent economic relations and a modern tax system, in the form of VAT. Taxes are considered as an important source of government revenue which, from ancient times up to now, due to the transformation of government functions have been increasingly important (Vidal et al., 2014). Stability and continuation of tax collection leads to stability in government planning to provide the services needed by the country in various fields. Taxation is a natural matter in all societies and is based on financial policy. In some industrialized countries of the world, 90 to 98 percent of the public budget is funded through taxes and people also do not have any negative reaction against it. VAT implementation in more than 120 countries around the world demonstrates the acceptability and effectiveness of the system in providing a reliable and secure source of income for governments. The implementation of this tax at a consistent rate, projected government revenue and therefore provides the possibility of better planning on one hand, and short courses of its receipt, guarantees the provision continuity of the state treasury funding, on the other hand (Pazhuyan, 2005). VAT in most modern countries and the developing world, has been a principal concern of the tax agency and tax policy makers have been always looking for ways to prevent this type of tax evasion (Fasiue, 2006). One of the main strategies to reduce tax evasion related to VAT, is the use of modern technology in order to provide tax services and to prove trustworthy to manufacturers (Hanlon et al., 2005). Optimal and actual tax collection not only increases government revenues, but also leads to social justice, which is one of the objectives of the master plan tax (Hall, 2002).
In recent years, governments determine the tax target according to the current inflation rate offer in order to perform careful planning. Target tax based on inflation rate fluctuations reflects the government's plans in relation to their income and expenditure, and achievement of this goal is more rooted in accurate social and cultural structures (Minik & Nuga, 2010). Experience has also shown that other taxes can be widely replaced by VAT. Another advantage of the VAT which makes its evaluation more important is that due to the expansion of the tax base, it can be constituted with lower rates compared with other taxes, this means that in order to collect a certain amount of tax income using VAT, a lower tax rate is required compared with other types of taxes. This can decrease the escape incentives of taxpaying on one hand, and make the realization of target tax revenue more possible.
Another benefit of the VAT is that the exertion of personal interests and opinions, whether of the taxpayers and the tax authorities, in calculation and taxation will be minimized, since tax rates are specified on one hand, and factors identified in documents provided by sellers and services (assuming they are true) are the basis for tax calculation on the other hand. Besides, VAT can be construed as tax transfer from income to consumption and by providing greater resources to form investment leads to the growth in domestic production and reduction in unemployment and inflation rate in the society. A considerable point in VAT system is that there is no double
counting as well as the lack of difference between domestic and imported goods, such as capital or ultimate.

Attraction of investors in the capital market due to the new character of our capital markets compared with developed countries is of great importance in management point of view, and in order to achieve this goal, identification of factors such as: growth rate of VAT and its impact on tax revenues fluctuations of the country, can be the fundamental solution in achieving the ultimate goal.

The VAT rule, if fully implemented with intelligence and context, can reduce the cost of great design of economic development, and on the other hand, can significantly increase economic, social and developmental use of tax system. According to studies, the implementation of the VAT law, is a good way to increase government revenue which is one of the objectives of the master plan and the modernization of tax systems of countries. Today, VAT is applied approximately in more than 120 countries, and more than a quarter of global tax revenues is collected by this method.

Concerning the main objective of this study, the researcher seeks to answer the question whether the VAT influences on tax revenues’ fluctuations during years 2008 to 2013 (with an emphasis on financial approach) or not?

2. Literature review
2-1. History of VAT
VAT does not have a long history so that until 50 years ago it was just a theory, but nowadays it is accepted in more than 120 countries.
1918 (Von Siemens) planning and introduction to the German government in order to overcome financial problems.
1948 first implementation by France.
1965 Brazil the first country to implement VAT in its comprehensive form.
1967 Denmark was the second country which implemented VAT in a comprehensive form in national level.
1970 In Asia, by South Korea in cooperation with the International Monetary Fund.
Nowadays, more than 120 countries use VAT at 50% of which VAT is single-rate and in the others the rate is 2 to 5. In 48% of countries tax rate is 15 to 20%, in 24% of them between 10 to 15%, in 22% of them more than 20% and in 6% is less than 10% (where in year 92 Iran with the rate of 6% had the lowest rate in the world).
In Iran: in 1991 the finance department of the International Monetary Fund proposed VAT policy as one of the main factors of efficiency and improvement of the system in order to reform the tax system. From September 2008, VAT rule was approved for a trial period of 5 years until the end of 2013, and during the review of the bill, deputies decided to completely remove the aggregation rule of tax.

2-2. Value Added Tax (VAT)
VAT is a multi-stage tax that in various stages of import chain, production and distribution based on percentage of value added of sold goods or provided services at each stage, is extracted; but the tax is collected at every stage of the import, production and distribution chain to the element
of the next stage of the chain in order to be paid by the final consumer. According to the provisions stipulated in the law: the VAT is a tax that all goods and service suppliers (payers of the tax system) should deposit periodically (seasonal) to the state Tax Organization beside the cost of goods or services supplied at the time of sales as a percentage of the price of selling goods or services. In fact, VAT is a multi-stage tax on the sale of goods and services, which is applied during the import / production / distribution / consumption chain in a constant tax rate (non-exponential) to the final consumer, but ultimately the final consumers are the only real payers, and makes the interface goods and services tax-exempt. In this type of tax, unlike the on-sales tax, there is no stage accumulation and the tax is calculated apart from the original price of goods and services. The principle for this tax calculation is the price of goods and services that are either produced in or imported into the country and vendors or service providers draw bill for them. Each of the providers of goods and services in this tax system which are considered as taxpayer from the perspective of the government, are obliged to maintain accounting books and on sales are obliged to prepare and draw bill. In the issued statements, the specification of parties, the full name of the commodity with prices and taxes must be registered in the relevant columns in several versions (Naderan, 2003).

2-2-1. Types of VAT

Generative/manufacturing: In manufacturing VAT, general tax is applied to the sale, this type of is exerted on consuming goods as well as capital. Namely it does not belongs to the purchase of capital goods by tax credit enterprise.

Income: in the income type, the tax is on goods sale. In the income type VAT, the tax is on the net production sale of goods. In this type of VAT, amortization is subtracted from tax basis and net investment is included in the tax. Compared with the previous one, this method has smaller tax base, but it is likewise imposed to the manufacturing and investment sector in the economy.

Consuming: VAT of consuming type is based on consuming goods and services. In this method, all gross investment expenditures will be deleted from the tax base. Investment and amortization will exclude from the tax base, it means that in this case, the tax burden has shifted from production to consumption. This increases the incentive for investment and production in the economy. Therefore, most of the countries implementing VAT use this method (Tahmasebi, 2004).

2-2-2. different rates of VAT

Tax rates can be divided into four categories:

1. Standard rate, is applied to the general tax rate that most of the goods and services are included in tax with this rate.
2. Sub-standard rate, sub-standard rate is less than standard and is applied in case of support
3. Super-standard rate, super-standard rate is higher than standard rate and is considered for luxury goods and services.
4. Zero rate, refers to the cases where besides exclusion of sale tax, the previous incurred taxes subjected to the zero rate are refunded. This rate is usually used for exporters.

The government financial need of VAT, general condition of the state economy, income of vulnerable segments of the society and items exempt from this tax determine the limit of VAT rate.
2-2-3. Advantages and disadvantages of VAT

2-2-3-1. Advantages
1. Transparency in economic activities
2. Creating a stable and flexible sources of revenue for government
3. Wide tax base
4. Prevention of tax evasion
5. Neutrality
6. Facilitate entry into regional and global alliances
7. Increase of social justice
8. Low cost recovery
9. A very short certainty time
10. Improvement of trade balance
11. Avoid extra taxation

2-2-3-2. Disadvantages
1. Inflationary effects
2. Descending effects
3. Operating expenses
4. The possibility of fraud in bills

2-3. Survey of study background
Wue and Yue (2012), investigate how China's listed companies on the Stock Exchange reform their capital structure in response to an increase in the tax rate. They examined the tax rate increase on the capital structure of companies that have already paid the tax breaks granted by the Chinese government. Results show that these companies increase their financial leverage by increasing tax rate. It is evidenced that the highest in the leverage of the companies that have a high access to bank loans.

Fernandez (2011), conducted a study to examine the relationship between economic added value and created wealth for shareholders. The sample consisted of 269 companies. He concluded that the correlation between economic value added and wealth was 17 and in 60 companies that have negative economic value, the created wealth for shareholders only 66% have positive created wealth and 64 company which have positive value added economic, have negative created wealth; finally he concluded that value added economic does not have the ability to measure the created wealth for shareholders.

Hamidi, Chue and Gupta (2008), studied the distribution of income and taxation in developing countries and countries in transition in their article. Results indicate that in developing countries, the distribution of income before taxes, is more equal compared with the industrialized countries. However, unlike industrial countries, developing countries in general, are not able to reduce income inequality by the use of the tax and transfer policies.

Pazhuyan (2005), in an article has pointed out that given the role and impact of tax system on Iran economy, value added in the increase of government revenues and fix the deficit, using this tax system in terms of inflation and price levels has a neutral effect. The reduction in the government budget deficit can even have a depressing effect. Finally, he concluded that the key point in the design and implementation of the tax system, is the degree of preparation and the
initial formation of the tax system and the implementation of pilot and trial, and described that as the operating system activates, basic supplies to avoid some false expectations will be provided. Naderan (2005), in his investigative reporting entitled “solutions for the success of the VAT rise in Iran”, investigated instruments, facilities and the necessary basis for further success of the implementation of VAT in Iran, and according to the identification of the effective factors on its successful implementation concluded that since at the time being essential bases and situations for implementing VAT is not provided in our country, individual and short-term implementation of this tax is not appropriate in Iran and requires a medium-term planning. Besides explaining the favorable scenario, Naderan expressed the need for skilled manpower and creative requirements as the effective factors for efficient and capable executive organization.

2-4. Research Hypotheses
- There is a significant relationship between the growth rates of VAT on revenue fluctuations (legal entities).
- There is a significant relationship between the growth rates of VAT on revenue fluctuations (real persons).

3. Research Methodology
In order to collect the needed data to calculate the research variables, database of the State Tax Organization and the State Tax Administration of Khuzestan province will be used. In the cases that the data in these databases are deficient, it will be referred to the manual archiving in libraries and on the website of the State Tax Administration, development and Islamic Studies Organization of Tax Affairs (www.intamedia.ir). Data are through observation with participation (active) and test. First stage: For the development of history, literature and theoretical foundations, documents and dissertations in the libraries of Economic Affairs and Finance, State Tax Organization as well as articles and scientific search databases on the Internet are used. Second stage: in order to collect theoretical information and literature review, library method is used in this research, which can be obtained from Persian and Latin books, dissertations, especially Latin journals. Given that the project is sponsored by State Tax Organization, information are available through the Department of Statistics and Research of the State Tax Administration, by visiting the manual archives of the Library of the tax affairs Research websites, Islamic development and studies and site of Tax Administration (www.intamedia.ir).
Data collection tools include:
- Jack to summarize the literature
- Observation tool to extract values of the identified variables of documents and information of real and legal person's case study
- Information discharge table to summarize the values of the variables
Due to the interoperability to the entire country, statistical population is the deputy tax payers of Khuzestan province.
The required actual data for this study are compiled from real information and statistics of State Tax Administration of Khuzestan. Using the research variables, the sampling method is stratified random sampling. This statistical population consists of real and legal persons of those subjected
to the first to fifth stage of VAT system which consists of 1900 dossiers (population size=1900), 1400 dossiers of which relate to legal persons and 500 dossiers relate to real persons. This calculation is estimated at confidence level of 95%

200 cases relate to legal entities and 120 cases relate to real persons. Criteria to determine the sample size will be based on the following criteria:

\[
 n = \frac{Z^2pq}{d^2} \left( \frac{1}{N} \right) = 319/69 \approx 320
\]

1. In terms of capability increasing the financial period ends on 19 March.
2. Taxpayers subjected to the first stage be selected.

4. Research findings
4-1. Model Assessment/Estimation
Data which are a combination of time series and cross-sectional data are very common in economics. For example, statistics published by the firms listed in Tehran Stock Exchange include daily, monthly and even yearly time series, observed for each firms (sections). In practice, researchers use temporal-cross-sectional series’ data when they aim to examine issues that cannot be addressed cross-sectional or in the form of temporal series. Besides, the use of a series of panels, allows the researcher to be more flexible in difference modeling in behavior of variables. Therefore, in this study multiple linear regressions are used the equation of which is as follows:

\[
 \Delta TAX_{t,A} = \beta_0 + \beta_1 LOBBY TAX_{t,A} + \varepsilon_{t,A} \\
 \Delta TAX_{t,B} = \beta_0 + \beta_1 LOBBY TAX_{t,B} + \varepsilon_{t,B}
\]

In the equation above, \( \Delta TAX_{t,A} \) and \( \Delta TAX_{t,B} \) are fluctuations in tax revenues of legal and real entities respectively, which are calculated by Hodrick-Prescott filter technique. \( \varepsilon_{t,j} \) indicates the disturbance component of the model. \( LOBBY TAX_{t,A} \) and \( LOBBY TAX_{t,B} \) are VAT growth rate of legal and real entities, respectively

1. Those subjected to the first stage of registration in the VAT system, are all eligible real and legal persons with at least one of the following conditions:
   a) All importers
   b) All exporters
   c) All economic actors the total services and goods sales of whom in 2007 was 3 billion or more
   d) All economic actors the total services and goods sales of whom in the first 5 months of 2008 was one billion and two hundred fifty million and riyals or more.

Note: Those businesses that only are employed in supplying goods and services exempt from the tax system (based on the provisions of Article 12 of the law) are exempt from registration at this stage. Obviously, activists who were employed in supplying goods subjected to and exempt from and at least have one of the above conditions are not covered by this provision and are required to register at this stage.
in previous chapters. The figure below demonstrates the result of Hodrick-Prescott filter for Khouzestan province tax for legal entities during the period 2007 to 2014.

Figure 1. Hodrick-Prescott filter result for Khouzestan province tax for legal entities

The following table shows the descriptive statistics of the variables under study:

Table 1. Descriptive statistics of research variables

<table>
<thead>
<tr>
<th></th>
<th>TAXA</th>
<th>TAXB</th>
<th>LOBBY_TAXA</th>
<th>LOBBY_TAXB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>-1561519.</td>
<td>-454995.6</td>
<td>1.483510</td>
<td>1.483510</td>
</tr>
<tr>
<td>Mean</td>
<td>-1661471.</td>
<td>-560151.6</td>
<td>0.499750</td>
<td>0.499750</td>
</tr>
<tr>
<td>Maximum</td>
<td>392542.0</td>
<td>42450.19</td>
<td>74.40696</td>
<td>74.40696</td>
</tr>
<tr>
<td>Minimum</td>
<td>-3693714.</td>
<td>-984265.3</td>
<td>-0.966464</td>
<td>-0.966464</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>1502212.</td>
<td>363258.7</td>
<td>6.114635</td>
<td>6.114635</td>
</tr>
</tbody>
</table>
Due to the interoperability to the entire country, statistical population is the deputy tax payers of Khuzestan province. As it was mentioned in previous sessions, the total sample includes 320 dossiers from which 200 dossiers are related to legal entities, and 120 dossiers are related to real persons during the period of 2007 to 2013.

4-2. variables fixity Reviews
Most of the statistical theorems express the long-term relationship between variables in level form. To ensure a long-term relationship between the variables in the model it is necessary that the variables be stationary and of equal integration degree. Thus, to infer the existence of a long-term relationship between variables, their stasis should be examined using appropriate test. Therefore, if we recognize that the residues of the estimated regressions are in the form of I(0) or passive, a long-term relationship between variables can be ensured. Accordingly, in the first step, before the model estimation, variables fixity will be examined. Several articles have suggested that the panel unit root tests compared with time series unit root tests, have more capability. LLC is used for the variables fixity test. This choice is because of the suitability of the test for panels with small time period, additionally, Westerlund & Breitung (2009) show that the ability of LLC is more than IPS. Results are demonstrated in Table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistics</th>
<th>Probability</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAXA</td>
<td>-34.7112</td>
<td>0.000</td>
<td>Fix in level 1%</td>
</tr>
<tr>
<td>TAXB</td>
<td>-32.6373</td>
<td>0.000</td>
<td>Fix in level 1%</td>
</tr>
<tr>
<td>LOBBY_TAXA</td>
<td>-44.8486</td>
<td>0.000</td>
<td>Fix in level 1%</td>
</tr>
<tr>
<td>LOBBY_TAXB</td>
<td>-30.3005</td>
<td>0.000</td>
<td>Fix in level 1%</td>
</tr>
</tbody>
</table>

As is shown in Table 2, all variables are fix in level 1%. In other words, for all regressions in all tests the null hypothesis that expresses the unit root presence is rejected and therefore we can conclude that residuals in all regressions are full of zero degree and the probability of pseudo-regression making in the final model will be resolved.

4-3. Panel data model estimation
Panel method comprises three estimation including Between Groups, Within Groups, which is the estimation using the fixed effects method, and Random Effect estimation. In between group estimation the regression is on averages and it is usually used for the estimation of long-term coefficients. In within group estimation the time dimension is not considered and only the effects that are specified for each units are considered as individual effects. In the estimation of random effects it is assumed that intercepts \( (a_i) \) have common distribution with the average of \( a \) and variance \( \sigma^2 \), and unlike the previous method, are uncorrelated with the distributive model variables. The time factor is considered in this method and the group effect of units over time are separately entered into the model as the explanatory variables. In order to choose between the integrated model (regardless of group effects) and fixed effects approach Limer F-statistic is used.
In F test $H_0$ and $H_1$ are as follows:

$H_0$: Intercept of all companies are equal

$H_1$: At least the intercept of one of the models is different.

This test shows that whether there are disparities among different sections or not, in other words, the test investigates using Pool model versus Panel model.

Limer F statistic calculated values for the model and the statistic critical value is as follows:

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Zero hypothesis</th>
<th>Statistic</th>
<th>Probability</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluctuations in tax revenues of legal entities</td>
<td>The cross-sectional and time effects are not significant.</td>
<td>F=1.3394</td>
<td>0.0034</td>
<td>Rejection of the hypothesis $H_0$</td>
</tr>
<tr>
<td>Fluctuations in tax revenues of real persons</td>
<td>The cross-sectional and time effects are not significant.</td>
<td>F=1.3338</td>
<td>0.0191</td>
<td>Rejection of the hypothesis $H_0$</td>
</tr>
</tbody>
</table>

As the table results demonstrate, since the estimated statistic values are higher than the table critical value, and the probability level is lower than 5%, it can be inferred that in all estimating models, the assumption of homogeneity between the sections is not approved, in other words the considered model can be estimated in the form of panel data.

After rejecting the null hypothesis in accepting the constant intercept model, the random effect approach for estimating the model is discussed. The fixed effect approach considers a unique intercept for all units, and transfers the difference of the intercept of each unit except the error of the unit. And then the typical intercept of each unit is obtained by summing up this error component and the intercept of all units.

After estimating the model by two methods, in the final step using Hausman test, one should be chosen between the fixed effect and the random effect approaches.

If the existence of different intercepts for various groups has been approved, then by using the Hausman test, the most effective model between fixed effect and random effect should be selected.

In the Hausman test, the zero hypotheses are as follows:

$H_0$: there is not any correlation between individual effects and explanatory variables.

This assumption is for that the random model assumption is that $\alpha$'s are random, therefore, there should not be any correlation between $X$’s and $\alpha$'s; Hausman also used this and expressed that if there was no correlation between $X$’s and $\alpha$’s, random effect model is more effective. Hausman test is run in software and results are shown in Table 4.
Table 4. Hausman test results

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Zero hypothesis</th>
<th>X² statistic</th>
<th>Probability</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluctuations in tax revenues of legal entities</td>
<td>Using the model with random effects $E(U_a/X_a) = 0$</td>
<td>185.8638</td>
<td>0.000</td>
<td>Rejection of the hypothesis $H_0$</td>
</tr>
<tr>
<td>Fluctuations in tax revenues of real persons</td>
<td>Using the model with random effects $E(U_a/X_a) = 0$</td>
<td>111.7276</td>
<td>0.000</td>
<td>Rejection of the hypothesis $H_0$</td>
</tr>
</tbody>
</table>

In this problem, since the calculated statistic is more than the $X^2$ of the table, and the probability level is less than 5%, $H_0$ hypothesis is not acceptable. Thus, the fixed effect model is more effective.

After testing the model and determining the appropriate research model, estimation of coefficients is done by using software. Following tables show the results of the estimation model:

Table 5. Result of the estimation model A

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>T statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.046781</td>
<td>27.0668</td>
<td>0.000</td>
</tr>
<tr>
<td>LOBBY_TAXA</td>
<td>0.039168</td>
<td>21.8457</td>
<td>0.000</td>
</tr>
<tr>
<td>$F$</td>
<td>447.5038</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.428027</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Result of the estimation model B

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>T statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.049668</td>
<td>23.99882</td>
<td>0.000</td>
</tr>
<tr>
<td>LOBBY_TAXA</td>
<td>0.068186</td>
<td>29.19693</td>
<td>0.000</td>
</tr>
<tr>
<td>$F$</td>
<td>4.669442</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.538920</td>
<td></td>
</tr>
</tbody>
</table>

As it is observed in the Tables above, the independent variables could generally explain more than a half of fluctuations in tax revenues. On the other hand, $F$ statistic with values more than 4 and probability level about zero for both two models demonstrate that totally the coefficients of all variables cannot be zero simultaneously. All the estimated coefficients in the above models are also statistically significant at the reliability level of 95%.

4-4. Diagnostic tests

Since the main foundations of all regression equations’ estimation in econometric techniques are classical assumptions, assessment of these assumptions in the final model to ensure the validity and accuracy of the results is necessary.
4-4-1. the normality of model residue (the error terms average being zero)

One of the classic assumptions is that the mathematical expectation of the random variable $\hat{u}_t$ is zero. Since $\hat{u}_t = Y_t - \hat{Y}_t$, when the error average is zero, it means that the estimated value is equal to real value, on average and consequently the average error or the mathematical expectation will be equal to zero. Following figures illustrate the results of statistical features of estimated model residue.

![Figure 3. Investigation of statistical features of model A error terms.](image)

As it is observed and since the statistic Jaque-Bera has the value of 0.8059, and its probability is more than 5%; zero hypothesis based on normality of model A disturbing terms distribution cannot be rejected with certainty of 95%. In other words, estimation value of fluctuations in tax revenues of legal entities by the final model is moderately equal to the real value.

![Figure 4. Investigation of statistical features of model B error terms.](image)

As it is observed and since the statistic Jaque-Bera has the value of 1.6083, and its probability is more than 5%; zero hypothesis based on normality of model B disturbing terms distribution cannot be rejected with certainty of 95%. In other words, estimation value of fluctuations in tax revenues of real persons by the final model is moderately equal to the real value.

4-4-2. Consistency Variance (consistency of the error terms variance)

In order to investigate the model residue consistency variance white test of cross term type is used.
In the above equation $RSS_{UR}$ is total square residual of non-binding model, and $RSS_{R}$ indicates total square residual of binding model.

Model A  
$$F = \frac{n - k}{m} \frac{RSS_{R} - RSS_{UR}}{RSS_{UR}} = 0.8190$$

Model B  
$$F = \frac{600 - 3}{2} \times \frac{0.003477 - 0.003457}{0.003457} = 1.7269$$

Since the calculated statistic is less than its critical level ($F_{0.05,1,3} = 10.1280$) zero hypothesis based on consistency of model variances cannot be rejected with in level 5%.

4-4-3. Absence of autocorrelation

Although in the cross-sectional data the violation probability of autocorrelation assuming is very low, the hypothesis of no autocorrelation between the error terms is evaluated in this section, using graphing techniques:

Figures 5 and 6 display the relation between $e_t$ and $e_{t-1}$ in models A and B, respectively. Results reveal that either a positive or negative relation between $e_t$ and $e_{t-1}$ cannot be explicitly determined in both models, and in other words, there is not any significant relation between disturbance terms.

5. Discussions and conclusions

In considering the significance of all models under review with respect to the F statistics probability is smaller than 0.05 (0.000) and with reliability of 95% the significance of models under consideration is approved. The determination coefficients of both legal and real entities also indicate that more than half of the fluctuations of tax revenues is explained by the VAT growth variable system as an explanatory variable in both real and legal persons. According to
the results presented in the review of factors significance, since the probability of the t-statistic for VAT growth variable factor is less than 0.05 (0.000), consequently, a significant relation between VAT and fluctuations in tax revenues will be approved, so that increase of real or legal entities VATs leads to increase of 8.6 and 5.4 percent in tax revenues, respectively. Overall, results and findings presented in this paper affirm the proposed hypothesis and there is a significant positive relation between the growth rate of VAT and state tax revenue fluctuations. Based on the results, following suggestions are offered:
- According to the results of this study and similar researches, Tax Organization could publish more comprehensive information regarding the impact of VAT.
- Since the increase in the level of tax revenues, can have important effects on policy decisions, offering comprehensive and transparent information in this regard in order to create a widespread legal mechanism, would be very useful.
- To create appropriate administrative infrastructure in order to benefit more from the beneficial effects of the VAT and increase of the state tax revenues.
References


Pazhuyan, J. (2005), Public sector economy (taxes), Tarbiat Modares University, Institute of Economics.

