Studying and Identifying the Effective Factors on Tax Evasion by Fuzzy DEMATEL-Method

Meysam Zanganeh [a], Elham Ashouri Sheikhi [b], Ahmad Abdollahi [c,*]

[a]*Department of Industrial Management, Sharg-e Golestan Institute of Higher Education, Gonbad-e Kavous, Iran.*
[b]*University of Applied Science & Technology, Gonbad-e Kavous Branch, Golestan Province, Iran.*
[c]*Department of Accounting, Golestan Institute of Higher Education, Gorgan, Golestan Province, Iran.*

Abstract

The main goal of this research is to identify the effective factors on tax evasion by fuzzy DEMATEL-method in Iran. At the present time tax evasion is one of the economic problems in developing countries. Our country has had in this problem for several decades. In this paper, we attempted to determine effective factors in tax evasion, and the relational structure of these factors is examined by fuzzy DEMATEL-method, and meanwhile to recognize their interaction, the hierarchy of the influence of these factors should be known, too. research results showed that among the effective factors, lack of law-makers, of dominance interference institutions which are not charge and the vast exemptions have the highest impact on tax evasion.

Keywords: Tax evasion, fuzzy DEMATEL- Method, Fuzzy Logic, Economic

1. Introduction

tax is a means of making economic policies that meets aims such as expanding social justice, fair distribution of wealth, counterbalancing consumption, and increasing the rate of investment in the gross national products, besides its main role in providing resources for the enforcement of governmental programs. So, collecting tax by the government and paying it by taxpayers are merely rational and common a collaboration and cooperation, to supply the public costs and social necessities. nowadays, as a most total definition, tax is a kind of social cost that should be incurred by all members of a nation in order to provide abilities of replacing these possibilities and resources . Some taxpayers avoid paying tax, this it is called tax avoidance , in such a case the taxpayer avoids paying tax illegally. On the other hand tax evasion which is the illegal adjustments made by people to evade paying tax. accomplishes through illegal actions and media such as falsifying accounts, bribery and false information [9]. It should be showed that in a justly economic system that there is no discrimination, and that is utilizes more economic possibilities, and has more contributions to economic costs, too. Tax evasion has short-term and long-term effects on economic variables, and if correct policies for control of taxpayer's evasion aren't made, condition of the economic variables will be exacerbated. Providing enough capital to supply finance for investment is one of the important factors in the economic development and growth. It seems quite impossible that a government can stop tax evasion ways and close it completely. Tax evasion is a significant subject which has been considered in the long-term academic researchers in many developed countries. All tax principles and programs in the word include a set of conditions in relation to levying tax [1]. So in order to expedite the process of development and growth it is essential that the statesmen reduce tax evasion through the economic and noneconomic media, in order to promote economic development.

2. Literature

Richardson (2006) has pointed to 14 factors in tax evasion concluded that, noneconomic factors have a greater effect on tax avoidance in comparison with the economic ones. In this study, complexity as the most of the important factor in tax evasion was recognized as a noneconomic factor. Conclusions show that the public training has a reverse relation with the tax evasion, and governments attempt to reduce tax evasion in the society [11]. Jelis (2009) considered the effective factors on tax evasion of business with a specific emphasis on the government role. Conclusions revealed that obedience to the government is a determinant factor in tax bribery. Also analysis of data revealed that tax evasion increases by bribing tax officials [11]. Mc Gee (2007) studies the relation between age and theories of tax evasion, and concluded that there isn't a significant relation between them [10]. Ellingham and Sandman (1972) performed their discussion about recognizing ways of tax evasion and through broad researches, that is, undoubtedly, the most influential theory of tax evasion [5]. The first important written work about tax evasion is by Jackson and Midiron at 1968,in which fourteen factors in tax evasion have been mentioned. Angel and Hani's (1999) have considered the significance of experimental relation between recognition

*Corresponding author Email address: ahmabdollahi@gmail.com

and researches in reports [6]. Anderoni ET all (1998) and Tan and Savir (2003) emphasized that there is an urgent need for international measurement in this regard. Studies reveal that older taxpayers are more obedient in comparison with younger ones. [4]. Tatil (1980), Wait and Woodbury (1985), and also a research at Australia by Freeman (1970) reveal that the culture and the region affect obedience to tax laws, and finally, an international research in 2000 has supported the effect of culture and region on tax evasion [5].

3. Method

Purpose wise this study is practical, and method wise it is descriptive – survey. In order to we used the fuzzy DEMATEL technique in order to recognize the effect of each factors on other factors.

4. Modifying Factors

At this stage, indexes of the tax avoidance are extracted from the relevant and existing documents in the references and also from the interviews with an authority, which is given to twenty general auditors' chief auditors and auditors in the form of a questionnaire. For each question in the questionnaire there are seven answers in the fuzzy state according to the likert seven choice scale, as you can see in table 1:

Table 1
Likret seven choice scale

Extremely low			Very Low			Low			Medium			High			Very High			Extra		
Lower Limit	Average	Upper Limit	Lower Limit	Average	Upper Limit	Lower Limit	Average	Upper Limit	Lower Limit	Average	Upper Limit	Lower Limit	Average	Upper Limit	Lower Limit	Average	Upper Limit	Lower Limit	Average	Upper Limit

The experts are requested to express their ideas about each index by giving a grade between 0 and 100, and for each index three mathematical averages are calculated from the following 1 to 3 relations:

$$EL_j = \frac{1}{n} \sum_{i=1}^{n} EL_{ij} \tag{1}$$

$$EM_j = \frac{1}{n} \sum_{i=1}^{n} M_{ij} \tag{2}$$

$$EU_j = \frac{1}{n} \sum_{i=1}^{n} U_{ij} \tag{3}$$

Through 1 to 3 relations, three averages are obtained for each choice, that is in fact the triangle phase number, and for equation 4 is used de-phasing

$$B.N.P_j = \left[(EU_i - EL_j) + (EM_i - EL_j) \right]/(3 + EL) \tag{4}$$

Which B.N .P j is the fuzzy de-fuzzy value of choice j. As, the two fuzzy theories of 0.5 value are considered a passage of the fuzzy number, the index whose BNP value is less than 0.5 , is laid aside [3] .
3-3 the fuzzy DEMATEL approach:
Steps of the method[8]:
1. The factors of measurement are distinguished according the committee of experts' opinions and the literature review.

2. The effects each factor on all of the system are distinguished in agree with the experts. opinions For this purpose we use speech phrases, and through CFC method (equations 1 to 9) we obtain the de-fuzzy of phase number.

Standardizing of the fuzzy numbers:

$$XL_{ij}^k = (L_{ij}^k - \min_{1 \le k \le k} L_{ij}^k)/\Delta_{min}^{max} \tag{5}$$

$$XM_{ij}^k = (M_{ij}^k - \min_{1 \le k \le k} L_{ij}^k)/\Delta_{min}^{max} \tag{6}$$

$$Xr_{ij}^k = (r_{ij}^k - \min_{1 \le k \le k} L_{ij}^k)/\Delta_{min}^{max} \tag{7}$$

$$\Delta_{min}^{max} = \max r_{ij}^k - \min L_{ij}^k \tag{8}$$

Calculation of the right and left normalized value

$$Xls_{ij}^k = \frac{Xm_{ij}^k}{(1 + Xm_{ij}^k - Xl_{ij}^k)} \tag{9}$$

$$Xrs_{ij}^k = \frac{Xr_{ij}^k}{1 + Xr_{ij}^k - Xm_{ij}^k} \tag{10}$$

Calculation of the total normalized value

$$X_{ij}^k = \left[Xls_{ij}^k \left(1 - Xls_{ij}^k\right) + Xrs_{ij}^k . Xrs_{ij}^k \right] / \left(1 + Xrs_{ij}^k - Xls_{ij}^k\right) \qquad (11)$$

Calculation of the integrated grade from K expert viewpoint

$$BNP_{ij}^k = minL_{ij}^k + X_{ij}^k \Delta_{min}^{max} \qquad (12)$$

$$a_{ij} = \frac{1}{k} \sum_{k}^{1 \leq k \leq k} BNP_{ij}^k \qquad (13)$$

Lamei has mentioned the barriers of job- creation in five areas: the type of occupation, working laws, bank credits, import and export laws , laws relating to taxes and duties.[7]

In another research, Zanjani (2008) has examined the barriers of work- creation, and has divided them into two parts of organizational and inner barriers.

$$0 \leq d_{ij} \leq 1 \quad \leftarrow 10, 11 \, D = \left[d_{ij} \right] \qquad (14)$$

$$D = \frac{1}{\max\limits_{1 \leq i \leq n} \sum_{j=1}^{n} a_{ij}} A$$

$$T = D(I - D)^{-1} \qquad (15)$$

4. The linear and column al sum of matrix T is calculated to obtain the more appropriate R_i and C_j output.

$$r_i = \sum_{1 \leq i \leq n} t_{ij} \qquad (16)$$

$$C_j = \sum_{1 \leq i \leq n} t_{ij} \qquad (17)$$

So $r_i + c_i$, i=j indicates all given and taken effects by factors j .in fact $r_i + c_i$ indicates both the effect of factor I on all other factors of the system, and the effect of other factors of the system on factor I.so $r_i + c_i$ shows the degree of factor I importance in the whole system. And on the contrary $r_i - c_i$ shows the effect that I has on the whole system. If $r_i - c_i$ is positive, factor I affect the

3. Obtaining the matrix of the total relations of I-T is the matrix of n*n , and the elements of $T=[t_{ij}]$ indicate the indirect effect of factor I on factor j. so matrix T can show the total relations between each pair of factors in the system. Matrix D is a normalized matrix.

system and if it is negative, factor I is affected by another group of factors.5,we will show the diagram of the effect of other factors based on $r_i + c_i$ and $r_i - c_i$. this diagram of effects is drawn with the coordinates ($r_i + c_i$, $r_i - c_i$) and the complex relations among the factors are easily observable.

3 – 4: determining the effective indices

After researches examinations and interviews with authorities' Many indexes were obtained and summarized with the help of authorities opinions and by combining these ideas about the effective factors tax evasion among taxpayers. These results are briefed at following cases:

➢ the unsuitable tax rate
➢ failure spread the tax culture
➢ the incomprehensiveness laws
➢ lack of the legislators dominance
➢ the escalating tax rate
➢ interference of irresponsible institutions not in charge.
➢ the existing of wide tax exemptions
➢ lack of enthusiasm for delivering Tax Statements'
➢ lack of effective administrative guarantees
➢ inefficiency information systems

Therefore the experts were asked to express their ideas about each index by saving a score between 0 and 100.

Table 2
Conclusions of measuring of effective indexes

Index	Upper Limit	Medium	Lower Limit	Result of
failure to spread the tax culture (A)	90.09	72.73	57.05	0.81
lack of of legislators dominance r(B)	86.18	67.86	52.64	0.88
The escalating tax rate	31.28	27.15	24.53	0.34
Not welcome of Tax Statement Offering (c)	79.65	58.65	46.91	0.89
Lack of enthusiasm for delivering tax statements (D)	84.65	63.85	50.23	0.90
lack of effective administrative guarantees	30.04	24.21	21.82	0.42
The existing of wide tax exemptions (E)	81.89	60.75	48.77	0.87
the escalating tax rate (F)	80.06	60.04	48.09	0.86
the incomprehensiveness of laws	42.38	38.45	32.56	0.44
Inefficiency of information systems	92.86	76.94	57.86	0.89

5. Findings

In table 2, it is brought the conclusions of measuring of effective indexes:

As It is seen the indices of "the escalating tax rates", "the laws incomprehensiveness" , "lack of effective administrative guarantees" whose B.N.P values are less than 0.5 , are laid aside , and the other indices are considered as the main factors .

3-2: The process of calculations of the fuzzy DEMATEL-method:

The matrix of primary direct relations F:

At this stage of the process of calculations, the obtained averages from the last stage are calculated, the result of the calculations are presented in table 3.

In table 4, The Establishment of matrix of total direct relations S is calculated using equation 10.

Table 3
The Establishment of matrix of total direct relations S.

Tax evasion Factors	A	B	C	D	E	F	G
A	0.030	0.698	0.834	0.633	0.7	0.633	0.467
B	0.540	0.030	0.768	0.768	0.598	0.767	0.701
C	0.767	0.834	0.030	0.834	0.698	0.633	0.631
D	0.733	0.601	0.7	0.030	0.534	0.631	0.585
E	0.867	0.733	0.501	0.667	0.030	0.766	0.434
F	0.634	0.7	0.533	0.598	0.6	0.030	0.534
G	0.601	0.533	0.6	0.567	0.298	0.336	0.030

Table 4
Direct Relationship Matrix S

Tax evasion Factors	A	B	C	D	E	F	G
A	0.0068	0.1577	0.1884	0.1430	0.1581	0.1430	0.1055
B	0.1220	0.0068	0.1735	0.1735	0.1351	0.1733	0.1583
C	0.1733	0.1884	0.0068	0.1884	0.1577	0.1430	0.1425
D	0.1656	0.1358	0.1581	0.0068	0.1206	0.1425	0.1328
E	0.1958	0.1656	0.1132	0.1507	0.0068	0.1730	0.0980
F	0.1432	0.1581	0.1204	0.1351	0.1355	0.0068	0.1206
G	0.1358	0.1204	0.1355	0.1281	0.0673	0.0759	0.0068

Step 6: establishment of matrix of final relations M

Matrix of final relations M is obtained using equation 11. In table 5, is presented this matrix expresses the possible intensity of all direct and indirect relations.

Table 5
The Sort of Elements Influence each other

Tax evasion Factors	A	B	C	D	E	F	G
A	0.9944	1.1216	1.1150	1.1051	0.9863	1.0442	0.9266
B	1.1205	1.0118	1.1253	1.1502	0.9852	1.0861	0.9842
C	1.2202	1.2265	1.0427	1.2218	1.0560	1.1211	1.0220
D	1.0825	1.0557	1.0463	0.9363	0.9144	0.9969	0.9037
E	1.1475	1.1205	1.0528	1.1031	0.8497	1.0623	0.9107
F	1.0234	1.0310	0.9765	1.0087	0.8900	0.8401	0.8594
G	0.8705	0.8554	0.8484	0.8587	0.7096	0.7685	0.6356

In fact, this matrix shows the relative intensity of direct and indirect relations. For example, the direct relation intensity from C → B (matrix F) is 0.1351. but the same intensity through indirect E ⟵ D ⟵ B is 0.21=((0.1735)(0.1206)) and is 0.003 = .

((0.1735)(0.1884)(0.1206) through indirect B → C → D → E, and finally the indirect relation intensity through B ⟵ E unlimited from several convergent chains reaches 1.0861 (Matrix M).figure 3 shows the strategy plan of direct and indirect relation of these
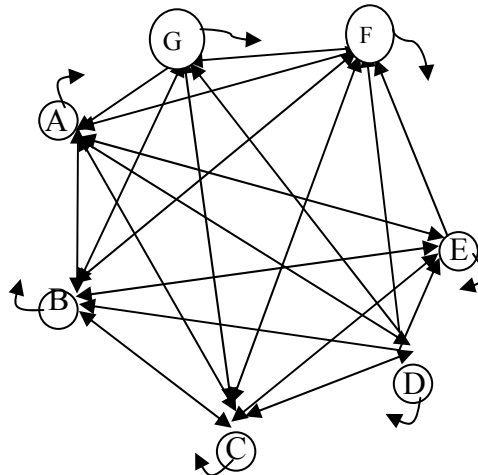
Fig. 1. The diagraph obtained from direct and indirect relations

Step 7: recognition of the hierarchy or the possible structure of factors:

To access the possible structure of direct and indirect relations, we examine both the arrangement of elements for focusing on both their influence on other elements, and their being influenced by them. Note that R is the linear sum of the factors and J the column sum.

Table 6

Hierarchy or the possible structure of factors

Order of Factors	Based on $R+J$	Order of Factors	$R-J$ Based on
inefficiency information systems	15.1172	lack of of legislator dominance	0.8553
interference institutions not in charge	14.8859	interference of not in charge institutions	0.7032
wide tax exemptions	14.7484	wide tax exemptions	0.0408
Lack of enthusiasm for delivering Tax Statement	14.3198	Lack of enthusiasm for delivering Tax Statement Offering	-0.1698
inappropriate tax rate	13.6377	Inefficiency of information systems	-0.2900
Failure to spread the tax culture	13.5484	The inappropriate tax rate	-0.4482
lack of of legislators dominance	11.7851	failure to spread the tax culture	-0.6914

The real location of an element in the final hierarchy is determined by columns (R + J) and (R − J), so that (R − J) shows the situation of an element (along the horizontal axis) that if it is positive, it has certainly been an influential factor and if it is negative, it will certainly be under influence(received).

So ″lack of the legislators dominance″, ″interference of institutions not in charge″ and ″tax exemptions″ are barriers which affect other barriers and ″lack of enthusiasm for delivering tax statements″ ,″inefficiency of information system″″inappropriate tax rates″ and ″failure to spread the tax culture″ are barriers influence by others of course (R+J) shows the sum of a factors intensity (along the vertical axis)focusing on both influencing and being influenced.
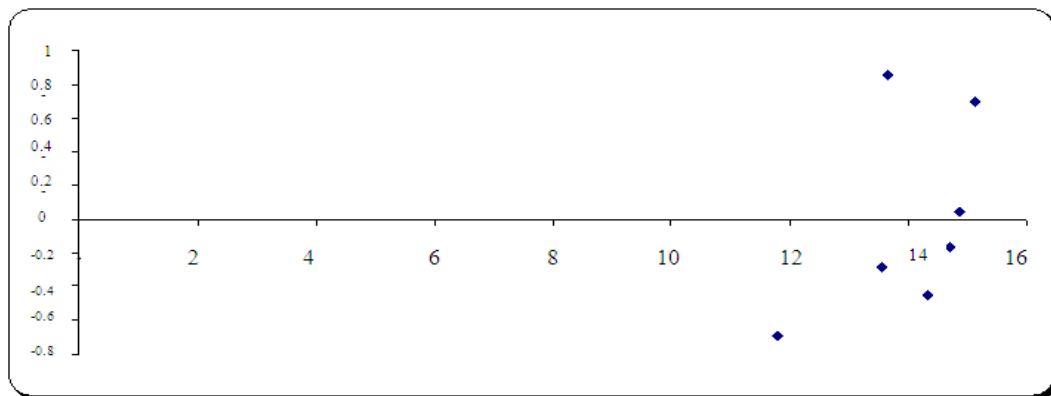

Fig. 2. Diagram of the elements situation in the possible hierarchy

6. Conclusion

In this research, the effective factors on tax evasion were gathered based on the existing literature and opinions of experts, and in order to recognize the critical factors in the factors network, we used the fuzzy DEMATEL-method. So we can divide factors in to two groups: influencing system of factors and influenced by the system of factors. This study recognize the major factors influencing tax evasion, and it draws the strategy diagram that shows among these factors the inner relations through DEMATEL technique. The fuzzy DEMATEL technique was used in this research to analyze and predict the relational structure of and structurally of tax avoidance. This technique can determine the inner relations among these standards and the final direct and indirect hierarchy. Among them, beside eliminating the obscuring and uncertainty of the spoken evaluations of decision-makers Research results show that "lack of the legislators dominance", "the interference of institutions not in charge" and "wide tax exemption" are more influential in tax evasion. Than other factors, for having a creative economy, of course it is not only these few factors that affect tax evasion in the country, based on the analytical results of this research, these factors can affect other factors directly and indirectly and the structural hierarchy of other factors are lack of enthusiasm for delivering tax statements″, ″inefficiency of information systems″ ,″the inappropriate tax rate″ and ″failure to spread the tax cuture″ ,respectively.

Reference

Dirk, N. (2005). Timing Tax Evasion, Journal of

Grant, R. (2006). Determinants of Tax Evasion: Across-country investigation *Journal of international Accounting, Auditing and taxation*, 15, pp.150-169

Jaefari Samimi, A. & Saleh Nejad, H. (1999). Value Added Tax to Replace Taxes on Corporations and its Impact on Government Budgets in Iran, *The Iranian Accounting and Auditing Review*, No.26&27

Jiles, D. & Caragate, P. J. (2009). The Learning Path of the Hidden Economy: the Tax Burden and Tax Evasion in Newzeland,

Jordi, C. & Judith, P. (2004). Inflation, Tax Evasion, and the Distribution of Consumption, *Journal of Macroeconomics*, 26, pp.567-595

Kangoh, lee, Tax Evasion & self-insurance",(2001), *journal of public economics* ,81,73-81

Kluwer Academic Publishers, Boston, Dordrechi,

London.

Mc Gee, R., .w, The Ethics of tax evasion: A survey of Accounting, Business and Economics Students in Hong Kong Barry University. *Simon S.M.H. Hong Kong Baptist University*

Negi, D. S., (1989). Fuzzy Analysis and Optimization, PhD Dissertation, Department of Industrial Engineering, *Kansas State University.*

Richardson, G. (2008). Determinants of Tax Evasion: A Cross-Country Investigation, *Journal of International Accounting, Auditing and Taxation*,Vol,15, pp150-169

Saeedi, P. (2009). Tax Accounting in Iran, Tehran, *Termeh Press.*

Zhou Q,, Huang W. & Zhang Y. (2010). Identifying success factors in emergency Management Using a fuzzy DEMATEL Method, *Safety Science*, 35(3),