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Can Corruption be Prevented by Increasing Tax Auditing in Turkey?[1]

Burcu Gediz Oral[2] and Ferhan Sayın[3]

Aiming to determine the relationship between corruption and tax auditing during the period of 1985-2011 in Turkey, our study determines the relationship between the variables using the Vector Autoregressive (VAR) Analysis. The results from VAR Granger Causality Test indicate that audit rate variable has an impact on the corruption index and also corruption index variable on the share of the tax revenues in the general budget revenues. The Variance Decomposition Analysis results used in order to determine the most effective of the variable on those in the model show that corruption variable acts as an exogenous variable in the short-term. In other words, corruption is not affected by other variables in the short term. Changes in index of corruption are largely due to the corruption itself and audit rate in the long term. However, results of Impulse-Response Analysis to show whether the effective variable could be used as an effective policy instrument indicate that variable likely to be in audit rate could be positively effective for the mid-term while it could decrease in the long run. In other words, the tax audit reduces corruption in the long term.

1. Introduction

The necessity for states to function in economic, social and cultural fields has caused importance of taxes to be felt. The most important financial source is taxes in sustainability of public services with ability to provide them for highest quality and most available prices. Major reason why tax revenues cannot achieve to desirable levels is losses and evasion of tax. State is entitled to prevent tax evasion and losses to increase tax revenues.

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[2] School of Applied Sciences, Celal Bayar University, Campus of Muradiye, Manisa, E-mail: burcu_gediz@hotmail.com

[3] Faculty of Economics and Administrative Sciences, Celal Bayar University, E-mail: sayinf@gmail.com

Tax revenues in modern economies require that tax payers should determine their own levels of taxes which have to be then supervised by Revenue Administration upon declarations which they have presented, which is called procedure of declaration. Because such a procedure can cause part of revenues subjected to taxation to be excluded from declaration, it bears a significant risk of evasion. Failure to reflect reality in declaration of tax could be attributable to the fact that some tax payers do not have good willing, tax-related regulation and laws are hardly understood and taxation is forgotten or substantial mistakes made. Therefore, the necessity inevitably appears that declaration or tax payers on their tax revenues should be inspected by the tax administration for tax revenues.

Due to corruption, targets of both fiscal and extra fiscal taxation processes cannot be achieved, with decreased tax revenues. Losses of revenues caused by tax evasion in the consequence of corruption itself can be compensated for with minimization of infrastructural services, transfer payments and higher borrowing or taxation. Such choices lead to significant allocation changes coupled with negative effects on employment and economic growth as well as gradually increasing budget deficit (Edling, 2007: 12- 13).

The corruption within the field of taxation, otherwise called fiscal corruption emerge in tax legislation and tax management spheres. Considered within the framework of tax legislation, the effects of this state stem from the statements (gaps) in the law. From a tax administration perspective the traces of corruption could be viewed in tax exemptions and definition of tax items. Different steps in the process of taxation could be affected from corruption by varying degrees. Among those steps are; identification and registration of the taxpayers, evaluation and collection of the overdue taxes, auditing of the incoming payments, tax refund, and investigation of tax offenses by tax auditors. Each step could be affected by corruption, though by varying degrees (Edling, 2007: 16).

The relationship between tax and corruption is most apparent in tax evasion and shadow economy. The tax structure could be corruption-promoting as well. Indeed, these two problems are individually and deeply elaborated in the economy literature. The gap lies in a joint

analysis of the concepts in both empirical and theoretical senses (Gediz Oral; Sayın, 2009: 143-144).

The necessary measures in preventing fiscal corruption encompass all the measures considered to be relevant for preventing corruption in public administration: increased transparency, restriction of the authority for appraisal, standardized practices, and procedures minimizing personal interaction, personnel rotation, a clear determination of the responsibilities, an effective internal and external auditing, stronger sanctions, rewards and fair wages, a greater number of participants in the fight against corruption, enforcement of comprehensive reforms and etc. The fight against corruption in tax administration means, above all a fight against tax evasion (Gediz Oral, 2011: 425).

Our study is to analyze relationship between tax auditing and corruption during the period from 1985 to 2011 in Turkey. For this purpose, the first section of the study focuses on definition of corruption, the second on tax auditing, the third on relationship between auditing and corruption based on theoretical and empirical studies and forth and fifth on empirical analysis of the relationship between corruption and tax audit rate described as one of indicators of tax auditing efficiency. Conclusion of the study outlines findings that we acquired.

2. Corruption

The phenomenon of corruption is a universal problem for all nations. Function of corruption which leads to unfair profits under unfair competitive conditions appeals to those who would like to earn easily and thus spreads across all social strata. Frequency of corruption in community life causes it to become chronic, leading to devolution (Akgül, 2004: 2). Corruption is not only a behavior unique to politicians and bureaucrats but also to those with economic power who do not have public power but can become corruptive (Çulpan, 1990: 34).

Corruption is a concept used in common by many social scientists, regarding which a wide range of literature exists from sociology to political science to jurisdiction and to public administration. However, since 1980 on, studies on economics and public finance have had an agenda in which to comprehensively discuss the above matter (Çelen, 2007: 23).

Considerable difficulties can appear in definition of corruption as it includes a variety of complicated elements, processes and associations. In addition, it is difficult to make a universally valid definition of corruption since it also varies across nations, regions, cultures and economic systems (Lamour, 1997: 3- 4). In a most general definition, corruption implies that wielders of powers can take advantage of it in such a way to provide a given interest for themselves, the concerned individuals or groups of individuals. However, in this sense an institutionalized and thus authoritative use of power is in question rather than imposition of force. In this connection, although corruption can be variously studied such as private or public sector, voluntary-forcible, high level-low, level etc., its essence is almost the same in terms of provision of unfair profits (Cingi, 1994: 3).

According to the definition by the World Bank which has been popularized in various studies, corruption is that public power is used for personal interests only (World Bank, 1997: 7). Those administrators who have monopolistic powers in using means and resources, abuse their powers to make decisions and thus have no mechanisms of accountability consider their own interests and finally lead to an inevitable corruption. Therefore we can formulate corruption as below;

$$C = M + D - A \qquad (1)$$

,where C is corruption, M monopolistic structure, D discretionary power and A accountability (Klitgaard, 1998: 4), according to which extent of corruption depends on rates of using discretionary power by means of monopolistic power that the administrator wields or claims. Moreover, insufficiency of responsibility in accountability can increase likelihood of corruption.

Because corruption cannot be determined or easily measured in all respects due to its variability caused by secrecy, illegality and economic processes, it is rather difficult to achieve a convincing knowledge of degree of corruption in a given nation (Wei, 1998: 4). Actually it is obscure what is to be measured conceptually. Ability to measure amount of bribe given could inevitably lead to the fact that countless corruptions tend to be ignored (Tanzi, 1998: 20). On the other hand it seems possible to indirectly calculate to what extent corruption has spread in any

country. Such calculations would be approximate values. The World Bank defines four approximate measurements to determine corruption:

-Arrests and convictions,

-Survey Methodology,

-Macroeconomic empiric studies,

-Microeconomic empiric studies in given sectors (Bayar, 2007).

There are four basic parameters for valid corruption indicators:

-Reliability: Objectivity of those to provide indicators and reflection of the general view in corruption index.

-Validity: Accurate measurement of data of corruption.

-Accuracy: To increase number of samples to reduce standard deviations in measurement errors.

-Certainty: Avoidance of subjective assessments (Çelen, 2007: 77).

Indicators most frequently used in international comparisons and empiric studies are surveys by various international institutions and private researchers, from which consequences are obtained to turn into indices which will then be utilized by investors and researchers. Indices concerned generally enable corruption conceptions of individuals, institutions and organizations in any nation to measure conceptions of corruption. They not only aim to find out whether individuals and institutions have been involved in any corruptive activities but also cover corruptions which they have conceived or encountered in many respects in their own daily life although they have not directly engaged in them.

These indicators are generally valid and reliable but their accuracy and certainty maybe discussable. First of all, conceived corruption may follow actual one therefore it has a minimal sensitivity to political fluctuations. Moreover, conceptions may be endogenous; media-induced agenda, great scandals etc. can influence conception much more than experience. Indicators assume that public opinion is aware of level of corruption in the country. However, profound corruptions are secretly staged behind closed doors. Surveys often tend to measure bureaucratic

corruptions, with political ones remaining behind the stage. Definition of corruption is closely related to the culture in which it lies for this reason what is considered corruptive in any country could be regarded as acceptably non-corruptive. In addition, judgments of value and prejudices of experts who have prepared surveys can have a remarkable impact on consequence of that survey (Bayar, 2007).

Corruptions present in the tax system could affect and reduce tax revenues which have a significant share in public revenues thus increasing the risk that the state could encounter heavy budget problems. Preventing tax from spreading across all social layers, corruption causes few tax payers to give higher rates of taxes, eroding sense of justice in community.

3. Tax Auditing

Tax auditing can be defined as all sorts of processes performed by taxing administration in order to comprehend tax payers and transactions subjected to taxes by tax laws and determine whether tax payers and tax administrators appropriately comply with principles and rules in the present tax collection system (Association of Accounting Professionals, 2004: 131). Tax auditing is to survey whether rules and principles are appropriate or not (Arıca, 1985: 2). The state is compelled to enable tax laws to be enforced as it has rendered them obligations, which does project power and reverence of the state itself, causing all related laws and acts to be equally and fairly applied to citizens in the direct consequence of being a state of law (Bodur, 1995: 7).

Activities conducted in the context of tax auditing are discussed in two major headings namely, tax examination and tax inspection. Achievement of information and records, discovery and research on tax payers is all defined as tax examination by the article 127 of Tax Procedural Law, within which tax payers, their related phenomena, records and issues are studied and conducted under the responsibility of tax offices. Such procedures are all conducted under the inspection of tax offices. (Karakoç, 2004: 222). The process of examination can be seen as a process by which auditing is roughly performed only through daily revenue sums, inspection of cash register, draw up deed, delivery notes and transfers and declarations.

Tax auditing cannot be properly performed and unrecorded activities cannot be decreased without implementing examination process and determining place of business and economic activities. The most important function of the examination process is ability to include potential tax payers in the status of official tax payers following establishment of tax paying for those without any tax payer registration. Making the examination process active is of great importance in terms of preventing tax losses and evasions, which requires a serious planning (Koban, 1998).

Inspection is a process in which the auditing, declarations of tax payers and accuracy of taxes being paid should be sought is called an inspection and the study on tax payers' declarations, booking and inventories is named tax inspection (Article 134 of Tax Procedural Law). Collection of information (Article 148-150 of Tax Procedural Law) and establishment of informative archive (Article 152 of Tax Procedural Law) can contribute to more active auditing, which can provide sound information flows to tax auditors to make tax auditing and therefore controlling power of the administration on tax payers can increase.

Tax payers who are aware of an active tax auditing and feel that they could be instantly inspected can declare real income levels and cause total tax revenues to be increased. On the other hand, without such an active tax auditing system, tax payers tend to evade taxes or at least try to find ways of evasion, with the state having to resort one of the ways of borrowing, emission, new taxation or increasing present tax rates in order to compensate for decreased tax revenues (Edizdoğan, 1986: 77). However, such procedures could increase tax load on tax payers, creating both economic and psychological negativity in community. Tax auditing can prevent tax losses and evasions and therefore tax revenues can be increased by determination of loss of tax and related penalties, thanks to which tax, punishment and secondary receivables from tax payers subjected to the tax auditing can become an additional revenue source. The auditing process allows tax payers' declarations to be increased by tax payers not subjected to any auditing and therefore significantly positive differences emerge in the levels of documentation and its related system. We consider that when the auditing process and documentation system are not efficient enough, present tax evasion can create potential evasions (Akdoğan, 1979: 6).

The lower rates of tax losses and evasions through appropriate tax auditing, the higher rates of fair income distribution and the more social peace and wealth in community would emerge. The fact that tax loads concentrate on those who cannot evade taxes or enjoy significantly lower income levels could make already negative situation much more unavailable in terms of income distributions for the above-mentioned individuals. Therefore, more active application of tax auditing to stop tax evasion of tax payers can become a factor to provide social justice for all walks of social groups.

Tax auditing in Turkey is not performed by a nation-wide planning to cover all audit units or mechanisms but under auditing plans prepared for audit units, which causes tax auditors to be far cry from being reasonable in man power planning and determining priority of tax payers to be particularly inspected, leading to tax auditing considerably losing efficiency and effectiveness. The present institutional structure of tax auditing system in which audit units are independent of each other, auditing plans are separately prepared, any given division of labor is not present among tax auditors and a necessary coordination cannot be created inevitably leads to some task repeats and deficiency of auditing force. Such vicious circles significantly erode efficiency of tax auditing process (Saraç, 2005: 138).

Ratio of tax payers to total population in Turkey is approximately 2%. The remaining declarations of 98% which cannot be inspected can hardly reflect the real picture (Yakut, 2005: 170).

Reasons for the lack of efficiency in tax auditing are as follows:

-Failure to collect information likely to be used in choosing and auditing tax payers to be examined.

-Inability to analyze and use collected data in assessments and inspections.

-Failure to organize and coordinate auditing force.

-Deficiency of auditing force.

-Failure to develop auditing standards in auditing unit.

-Inefficiency of taxing administration in compulsory tax collection.

-Lack of deterrence in the taxation- related punishment system due to occasionally attitude of the current judicial system (Unakıtan, 2005).

One of the major problems in Turkey is that there are deficiencies in administrative organization. In administration, unavailable phenomena exist such as complication of bureaucracy, failure of auditing caused by multi-supervision and lack of coordination between related units. Because tax auditing is not sufficient quantitatively, tax payers rarely dread tax auditing and their associated sanctions. The fundamental reason for poor percentage of tax auditing in Turkey is that there are insufficient tax auditors in number who can hardly find enough time for tax inspections as they have to manage various different processes in addition to their own tasks at the same time.

The main purpose of auditing encourages or even compels individuals and institutions to comply with legislation and laws involving taxation. The very idea that tax payers could someday be inspected in any way would be able to increase their tendency to comply with laws, for tax auditing poses a serious risk for those who do not pay for their taxes at the right time in the right way. Criteria to promote right or fair declarations on the part of tax payers is the magnitude and sanction power of the above risk (Çelikkaya, 2002).

4. Tax Auditing - Corruption Relationship

Among the factors to create corruption is the taxation system established by a nation. Empiric studies on the matter have found that one of the major corruption processes appear in tax administrations in both developed and developing nations. Corruption tends to decrease sense of ethics by weakening willpower of honest tax officials, with the result that number of bribers among officials increases and quality of tax administration become morally eroded. For example, studies have shown that 94% of tax administrators claim to have been bribed in Taiwan while 76% of all tax auditors admit that they have take bribes in India (Hindriks at all, 1999: 396).

Tax return by tax payers is a dysfunctional or failed decision without any direct or automatic penalty system in case of any mistaken declarations. Tax payers are to decide on whether to declare fairly or unfairly, the latter of which depends on whether tax auditors would

make an inspection or not. It is the prior condition what is the cost finding and expected benefit from tax payers.

$$E[U] = (1 - P)\, U(W - \theta X)\, PU[(W - \theta X) - \Pi(W - X)] \quad (2)$$

E[U]=Expected Benefit

W= Actual income (supposed to have been known by the tax payer but not known by tax administration as an exogenous element),

II= Rate of tax,

X= Declared income,

(1-P)=Likelihood of tax auditing,

θ = Rate of penalty.

If $E[W - X] > E[W - \theta X]$, tax payers are likely to tax evasion. For the tax payer to declare (W - X), it must be ($\theta > \Pi$). Evasive tax payers means to maximize his net income lest he could be captured and considering the degree of penalty he may be exposed to. A tax payer would afford to meet the risk of fine payment in any risk as well as tax obligations whenever he is found to have evaded or misinformed (Allingham; Sandmo, 1972: 325). In the study in which he examined any effects of income and tax rate changes on tax evasion, Eide concluded similar consequences to support Allingham-Sandmo Model (Erling, 2002: 2).

Corruption in tax auditing process has perhaps the strongest and longest term effects of all on tax revenues. This way of corruption could appear when a tax payer has been found to evade but try to deal with the tax auditors so as to avoid pay for prospective fines or interests of tax depts. The following could be regarded as proofs that corruption does or will exist:

- Absence of transparency in criteria of choosing tax payers to be audited,

- Closure of tax auditing case without any corrections or any penalty or fines for the tax evaded,

- Failure to inform tax payers on their rights and or missions involving taxation,

- Erroneous decisions against tax administrator and officials following objection procedures by related courts,

- Likelihood of threats of unfair interrogation or inquiry against tax official by audit units,

- No penal interrogations or inquiry despite evidence of tax evasion,

- No auditing of tax auditors concerning basic decisions such as tax incentives, report and choices of individual tax payers for tax auditing processes (Edling, 2007: 17-19).

Literature has little or no discussions on corruption and tax auditing. United Nation Office for Drug Control and Crime Prevention in Vienna leads campaigns against corruption. Guide for Politics against Corruption was published which defines means and strategies and 30 procedures to fight corruption, among which tax auditing was not even mentioned. The Guide only has a page for the tax auditing as a later step. INTOSAI International Journal of Government Auditing, the prestigious journal of tax auditors across the world published only 2 articles on corruption from 2000 to 2005. To conclude, there is a general negligence in development of means and strategies of tax auditing profession (Özsemerci, 2009: 85).

Part of theoretical studies deal with effects of tax auditing and related sanctions such as penalties and fines on tax evasion. Torgler found in his study that the higher rates of tax auditing including deterrent processes, the more tax compliance, would occur, adding that states maintain low their penal and tax auditing levels and therefore most tax payers evade taxes because there is little possibility that they could ever be caught evading and penalized (Torgler, 2002: 658). Torgler concluded from his another study that it is reasonable for tax payers to evade taxes considering poor tax auditing and likelihood of penalty (Torgler, 2003: 284). Alm, Jackson ve Mckee also found that the higher rates of tax auditing, the more tax declarations emerge (Alm at all, 1992: 108). Snow and Warren inferred from their studies in which tax payers correlate previous tax auditing experiences with prospective tax auditing expectations that they shape up or change their own conceptions

regarding future auditing possibilities (Snow, Warren, 2007: 557). Hindriks et al focused on behaviors and attitude of tax auditors to consider bribes and abuses or exploitations. The study considered also discussed ways of preventing arbitrary power or decisions of tax auditors as well as incentives to be applied in order for tax auditors and administrators to avoid bribes (Hindriks, 1999: 421).

If citizens maintain their corruptive behaviors together with state officials, corruption and thus tax evasion could be continued without auditors noticing what is going on. For example, when tax auditor has taken or accepted bribe from a businessman on condition that his tax obligation should be reduced or removed, then there proves to be an agreed deal whose existence would otherwise be concealed or denied by either party. Tax auditors of such institutions have hard time doing their task of auditing to find out any potential corruption or tax evasion (Özsemerci, 2009: 87).

5. Econometric Model and Database

This chapter is to analyze the relationship between corruption and tax auditing in Turkey using time series analysis. In this respect, data of the study will be first introduced and then used to assess the relationship concerned, with the methodology being revealed. Data of the study will be later presented and interpreted.

The period of 1985-2011 was chosen for econometric analysis in the study. Tax revenues involving tax auditing was taken from online database of Revenue Administration. Efficiency of tax auditing is measured using ratio of number of tax auditing to a total number of tax payers subjected to real sum taxation in Turkey.

Index of corruption was obtained from online database of International Country Risk Guide (ICRG) prepared by Political Risk Service, a private institution. Each period is equivalent to one year in the analysis.

The method to be used in the study is Vector Autoregressive (VAR) Model which has been widely used among time series models recently. VAR Model processes all chosen variables together and studies them in a system of integrity in which endogenous and exogenous variables are in no way discriminated. In the process of forming econometric model,

presence of a given or any rigid or inflexible economic theory to have impact on the model can in no way be accepted. Constraints and assumptions which the economic theory proposes are not allowed to spoil model definition. Any prior constraints are not put forth on correlations therefore present or potential negative effects of presumption that econometrician have to make during modeling process could be greatly eliminated. Statistical and econometrical tests of a variety of hypotheses that economic theory has suggested are performed later using numeric economic data.

VAR Models are used to study relationships between macroeconomic variables and analyze dynamic effect of random shocks on system of variables. Even many economists conclude that Unrestricted VAR Model would present better results than classic structural modeling for prediction. Because location of endogenous variables on both right and left on the equations of the model makes it difficult to conclude any results there from, it would sometimes present better results to establish correlations using nonstructural techniques. Two-variable VAR Model can be expressed in a standard way as follows:

$$y_t = a_1 + \sum_{i=1}^{p} b_{1i}\, y_{t-i} + \sum_{i=1}^{p} b_{2i}\, X_{t-i} + v_{1t} \quad (3)$$

$$x_t = c_1 + \sum_{i=1}^{p} d_{1i}\, y_{t-i} + \sum_{i=1}^{p} d_{2i}\, X_{t-i} + \mathrm{v}_{2t} \quad (4)$$

where P implies length of the lags and V shows random error terms whose means is zero, covariance zero with its own lagged values, variances constant and random error terms with normal deviation. The assumption that errors in VAR Model have nothing to do with their lagged values does not create any constraint because increasing lag lengths of variables can eliminate the problem of autocorrelation. If errors are correlated with each other on a given point of time, that is, correlation between them is different from zero; any change in one of the errors can affect another on a given point of time. Moreover, error terms are not related to all variables on the right of the model.

Since right side of the model has only lagged values of endogenous variables, any problem of simultaneity does not appear, in which case each equation on the model can be estimated with the classic The Least

Squares Method. Optimal lag length in VAR Model can be established using information criteria such as Akaike, Schwarz, Hannan-Quin etc.

VAR Models can be used in two ways namely, Restricted and Unrestricted ones and VAR analysis can give result in three ways. "F tests which show Granger Causality", "Variance Decomposition to show inter action between variables" and "Impulse-Response functions" are methods used to get results in VAR Analysis (Özgen- Güloğlu, 2004: 96-98).

Data will be used in the following notation:

ci: Logarithm-derived variable of corruption index,

tar: Logarithm-derived variable of tax audit rate,

natp: Logarithm-derived variable of number of auditing tax payer,

trgbr: Logarithm-derived share of tax revenues in general budget revenues,

sitgb: Logarithm-derived share of indirect taxes in general budget,

sdtgb: Logarithm-derived shared of direct taxes in general budget.

6. Econometric Methods and Findings

Macroeconomic time series are generally not stable, series of which are turned into stable ones by deriving first or second differences or logarithms.

If a time series is stable, its means, variance and covariance do not change in time. Stability of means, variance and covariance of a time series in time is defined as a weakly stationary and also as covariance stationary or second-order stationary, which is also known as wide sense stationary. If common and conditional probability deviation of a stochastic process does not change in time, this series is called strong stationary (Yılmaz, 2005: 69).

Granger and Newbold (1974) show that spurious regression problem could emerge if unstable time series have been processed, in which case

the result from regression analysis does not reflect a real relationship for these test statistics do not have a standard deviation and thus lose their validity. Regression analyses processed with non-stationary time series can reflect a real correlation only if there is co-integration relationship among them (Gujarati, 1999: 726).

Therefore, processing time series requires stationary of the series to be tested first. Testing stationary of time series uses a variety of tests, among which Augmented Dickey Fuller (ADF) Test is one of those used most (Kızılgöl, 2006: 4). Because results of unit root test of Augmented Dickey Fuller used to analyze stationary of time series are sensitive to lags, Kwiatkowski, Phillips, Schmidt and Shin (KPSS) Test must be applied to consider the above deficiency in ADF.

Zero Hypotheses (H_0) of ADF and KPSS are converse to each other. Zero Hypothesis (H_0) of ADF test indicates presence of unit root, which means that the serious is non- stationary whereas Zero Hypotheses (H_0) of KPSS test shows stationary of the series.

This study derived natural logarithm of data of variables and applied ADF and KPSS unit root tests to examine their stationeries, the results of which are shown in Table 1. Accordingly, results of ADF and KPSS tests point out that all series include unit root in level data that is, they are non-stationary and therefore they are stationary with first differences of variables taken I(1).

Table 1. Statistics of Unit Root Test

VARIABLES		ADF		KPSS	
		INTERCEPT	**TREND+ INTERCEPT**	**INTERCEPT**	**TREND+ INTERCEPT**
LEVEL	**ci**	-2.50 (0)	-3.44 (3)	0.28 (2) *	0.07 (1) *
	tar	-0.94 (1)	-1.59 (1)	0.36 (3) *	0.17 (3) *
	natp	-1.82 (0)	-2.26 (0)	0.39 (3) *	0.09 (3) *
	trgbr	-2.32 (0)	-2.24 (0)	0.18 (3) *	0.18 (2) *
	sitgb	-0.83 (0)	-2.7 (1)	0.62 (3) *	0.08(2) *
	sdtgb	-0.86 (0)	-2.76 (1)	0.62 (3) *	0.08(2) *
FIRST DIFFERENCE	**ci**	-4.17 (3) *	-4.06 (3)	0.16 (6) *	0.15 (6) *
	tar	-8.34 (0) *	-5.55 (1) *	0.32 (13) *	0.50 (23)
	natp	-6.02 (0) *	-5.89 (0) *	0.11 (1) *	0.11 (1) *
	trgbr	-5.81 (0) *	-5.92 (0) *	0.16 (6) *	0.18 (8) *
	sitgb	-4.79 (0) *	-4.67 (0) *	0.11 (2) *	0.09 (2) *
	sdtgb	-4.56 (0) *	-4.45 (0) *	0.1 (2) *	0.08 (2) *

Note: Natural logarithms of the used variables were derived. Critical values for the ADF test statistics are %1 -3.74, %5 -2.99 and %10 -2,64 as intercept in level; %1 -3.81, %5 -3.02 and %10 -2.65 in the first difference; %1 -4.47, %5 -3.64 and %10 -3.26 as intercept and trend in level and %1 -4.5, %5 -3.66 and %10 -3.27 in the first difference. Critical values for the KPSS test statistics are %1 0.74, %5 0.46 and %10 0.35 as intercept and %1 0.22, %5 0.15 and %10 0.12 as intercept and trend. Values in parentheses show optimum lagged length.

The study established a VAR Model whose optimum lag length is shown in Table 2.

Table 2. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	127.6926	NA	1.02e-12	-10.58197	-10.28575	-10.50747
1	186.0733	81.22523	1.64e-13	-12.52811	-10.45460	-12.00663
2	257.1330	61.79104*	1.71e-14*	-15.57678*	-11.72597*	-14.60831*

* Indicates lag order selected by the criterion.
LR: Sequential Modified Likelihood Ratio (LR) Test Statistic (each test at 5% level).
FPE: Final Prediction Error.
AIC: Akaike Information Criterion.
SC: Schwarz Information Criterion.
HQ: Hannan-Quinn Information Criterion.

Table 2 shows that optimum lag length of the model is 2 according to LR, FPE, AIC, SC and HQ criteria.

From the figure (Appendix 3) to show that all Inverse Roots of AR Characteristic Polynomial are included in unit circle, it follows that VAR Model estimated from established optimum lag length is stationary. In order to study causality relationship between variables in the model, Block Exogeneity Wald Tests was performed, significant results of which are shown in Table 3.

It is clear from the obtained VAR Granger Causality Test results that lagged values of tax auditing rate have impact on corruption index, lagged values of corruption index on share of tax revenues in general budget revenues and number of auditing a tax payer and lagged values of shares of tax revenues in general budget revenues on share of direct and indirect tax revenues in general budget revenues.

Variance Decomposition Analysis was used to determine the most effective variable on the examined variables in the study. According to the results of Variance Decomposition Analysis (Appendix 2) that shows how much of the percentage of the a potential change in the variables of the model results from itself and other variables, corruption variable act as an exogenous variable for the short term but in the long term some 51% of a change likely to be emerge in the corruption index results is affected by itself, some 25% by rate of tax auditing, some 9%

by share of tax revenues in general budget revenues, some 5% by number of auditing tax payer and some 4.5% by share of direct and indirect tax revenues in general budget revenues.

Table 3. Results of VAR Granger Causality/Block Exogeneity Wald Tests

Dependent Variable: ci			
Excluded Variable	**Chi-sq**	**df**	**Prob.**
tar	5.329465	2	0.0696***
Dependent Variable: trgbr			
ci	8.619811	2	0.0134**
Dependent Variable: sitgb			
natp	7.834519	2	0.0199**
trgbr	10.09493	2	0.0064*
Dependent Variable: sdtgb			
natp	7.146115	2	0.0281**
trgbr	5.562362	3	0.0620***

(*) Zero hypothesis (H_0) is rejected in the level of $\alpha = 0.01$
(**) Zero hypothesis (H_0) is rejected in the level of $\alpha = 0.05$
(***)Zero hypothesis (H_0) is rejected in the level of $\alpha = 0.10$

The results also support the causality relationship between variables.

Examination of the results from Impulse-Response Analysis which is a significant function in guiding economics policies and analyzing effects of random shocks to emerge in a variable on other variables in this system shows that response to one standard deviation shocks in the corruption is positive until the third period but then turns into negative in a wavy course. Response of the corruption to one standard deviation in the rate of auditing is always positive in an increasing course except in the fifth period, after which it is however in a wavy tendency.

Impulse-Response functions and Variance Decompositions from VAR Analysis show that the most effective variable on corruption is tax audit rate.

7. Conclusion

Modern tax systems function on the basis of tax declaration, according to which tax payer is to determine the level of tax on his own. However such a tax return system poses a significant evasion risk as well. Success of tax procedure requires the tax administration to inspect tax payers' declarations. The most important problem of tax auditing in Turkey is that tax audit units are various and numerous and lack of coordination appears among them. First of all, national tax audit policies do not exist. In addition, different policies of every different tax audit units can create complications in terms of authority and mission among them. The solution to the problem makes it necessary for central tax auditing to be planned and put into use to prevent undesirable coincidences of mission and authority between the units concerned.

Aiming at establishing relationship between corruption and tax auditing in Turkey in the period from 1985-2011, the study tries to explain correlation between variables using the VAR Model. VAR Granger Causality Test results show that tax audit rate variable has impact on corruption index and corruption index variable on share of tax revenues in general budget revenues. Results of Variance Decomposition Analysis used to determine the most efficient variables on other variables in the model show that corruption variable functions as an endogenous variable in the short term but in the long term changes in the corruption index result from itself and rate of tax audit, which also confirms causality test. Consequences of Impulse-Response Analysis that shows whether an efficient variable could be used as a policy means or not indicate that potential changes in the rate of tax audit could influence corruption positively in the midterm which could however diminish in the long term. In other words, the tax audit reduces corruption in the long term. Fight against corruption requires many inter-related performs to be established from public administration to legislation to nongovernmental organizations and to mass media. Therefore, long term efficient means and mechanisms should be explored to fight corruption, which could of course consist in further studies.

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Appendix 1: Results of Vector Autoregression Model Estimates

Sample (adjusted): 1987 2011						
Included observations: 25 after adjustments						
Standard errors in ( ) & t-statistics in [ ]						
	LNCI	**LNTAR**	**LNNATP**	**LNTRGBR**	**LNSITGB**	**LNSDTGB**
LNCI(-1)	0.611167	0.256831	-0.218431	-0.033384	0.082167	-0.100532
	(0.23566)	(0.40350)	(0.23492)	(0.04007)	(0.05876)	(0.09417)
	[2.59345]	[0.63650]	[-0.92983]	[-0.83320]	[1.39824]	[-1.06759]
LNCI(-2)	-0.383026	-0.252758	0.048206	0.101506	-0.017193	0.010343
	(0.21229)	(0.36348)	(0.21162)	(0.03609)	(0.05294)	(0.08483)
	[-1.80429]	[-0.69538]	[0.22780]	[2.81228]	[-0.32478]	[0.12193]
LNTAR(-1)	0.263401	0.067534	-0.166763	0.033423	0.061363	-0.079815
	(0.18683)	(0.31989)	(0.18624)	(0.03177)	(0.04659)	(0.07466)
	[1.40986]	[0.21111]	[-0.89542]	[1.05219]	[1.31714]	[-1.06912]
LNTAR(-2)	0.356267	-0.183124	0.038212	0.055697	0.050265	-0.106520
	(0.19685)	(0.33705)	(0.19623)	(0.03347)	(0.04909)	(0.07866)
	[1.80987]	[-0.54332]	[0.19473]	[1.66415]	[1.02400]	[-1.35420]
LNNATP(-1)	0.313999	-0.073323	0.149886	-0.023667	-0.154859	0.243812
	(0.27576)	(0.47217)	(0.27489)	(0.04689)	(0.06877)	(0.11019)
	[1.13867]	[-0.15529]	[0.54525]	[-0.50478]	[-2.25200]	[2.21260]
LNNATP(-2)	-0.277241	0.735436	0.338037	-0.074042	-0.095348	0.133025
	(0.32869)	(0.56279)	(0.32765)	(0.05589)	(0.08196)	(0.13134)
	[-0.84348]	[1.30677]	[1.03169]	[-1.32489]	[-1.16330]	[1.01282]
LNTRGBR(-1)	0.189844	3.520696	0.846266	0.360396	-0.190560	0.371311
	(1.17867)	(2.01817)	(1.17496)	(0.20040)	(0.29392)	(0.47099)
	[0.16107]	[1.74450]	[0.72025]	[1.79835]	[-0.64834]	[0.78836]
LNTRGBR(-2)	-1.959663	-1.738631	0.930979	0.094966	-0.861005	0.896414
	(1.43100)	(2.45022)	(1.42650)	(0.24331)	(0.35684)	(0.57182)
	[-1.36943]	[-0.70958]	[0.65263]	[0.39031]	[-2.41284]	[1.56765]
LNSITGB(-1)	-0.822624	-4.682914	1.011012	-0.247143	1.684819	-1.716602

Cont´d

	LNCI	LNTAR	LNNATP	LNTRGBR	LNSITGB	LNSDTGB
	(3.45193)	(5.91053)	(3.44107)	(0.58691)	(0.86079)	(1.37937)
	[-0.23831]	[-0.79230]	[0.29381]	[-0.42109]	[1.95729]	[-1.24448]
LNSITGB(-2)	1.649436	-5.568009	-8.724390	1.265821	-0.129441	-0.105017
	(4.83196)	(8.27346)	(4.81675)	(0.82155)	(1.20492)	(1.93082)
	[0.34136]	[-0.67300]	[-1.81126]	[1.54076]	[-0.10743]	[-0.05439]
LNSDTGB(-1)	-0.689711	-3.575374	0.829549	-0.142036	0.953828	-0.821202
	(2.61852)	(4.48353)	(2.61028)	(0.44521)	(0.65297)	(1.04635)
	[-0.26340]	[-0.79745]	[0.31780]	[-0.31903]	[1.46076]	[-0.78483]
LNSDTGB(-2)	2.195231	-5.708160	-6.000070	0.978668	-0.113002	-0.132598
	(3.67403)	(6.29082)	(3.66247)	(0.62468)	(0.91618)	(1.46812)
	[0.59750]	[-0.90738]	[-1.63826]	[1.56668]	[-0.12334]	[-0.09032]
C	-1.202029	69.22267	43.30782	-4.953830	-0.768429	9.118019
	(34.6570)	(59.3410)	(34.5479)	(5.89256)	(8.64225)	(13.8487)
	[-0.03468]	[1.16652]	[1.25356]	[-0.84069]	[-0.08892]	[0.65840]
R-squared	0.758225	0.711751	0.805525	0.781637	0.953091	0.938391
Adj. R-squared	0.468095	0.365851	0.572155	0.519601	0.896799	0.864461
Sum sq. resides	0.285640	0.837428	0.283845	0.008257	0.017762	0.045610
S.E. equation	0.169009	0.289384	0.168477	0.028736	0.042145	0.067535
F-statistic	2.613394	2.057681	3.451710	2.982940	16.93143	12.69291
Log likelihood	17.83235	5.462925	17.90486	58.58396	49.77559	38.93038
Akaike AIC	-0.420205	0.655398	-0.426510	-3.963823	-3.197877	-2.254816
Schwarz SC	0.221596	1.297199	0.215291	-3.322022	-2.556076	-1.613015
Mean dependent	0.961842	1.252468	0.663214	4.407485	4.051503	3.722847
S.D. dependent	0.231735	0.363394	0.257571	0.041459	0.131191	0.183441

Determinant resid covariance (dof adj.)	1.16E-15				
Determinant resid covariance	7.85E-18				
Log likelihood	257.1330				
Akaike information criterion	-15.57678				
Schwarz criterion	-11.72597				

Appendix 2: Results of Variance Decomposition Analysis

Variance Decomposition of Corruption Index						
Period	**ci**	**tar**	**natp**	**trgbr**	**sitgb**	**sdtgb**
1	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	89.83746	5.975272	4.054889	0.007613	0.033533	0.091232
3	74.00558	19.47015	3.331101	0.064225	2.958872	0.170074
4	72.13270	19.44857	2.588142	0.093017	3.732349	2.005218
5	71.07200	16.27582	2.288009	0.636034	4.703325	5.024819
6	70.37554	16.04966	3.017209	0.617591	5.055018	4.884979
7	60.36159	19.50188	5.397645	5.473119	5.050797	4.214964
8	56.52995	21.51684	5.116562	8.090971	4.793965	3.951716
9	54.88483	22.65191	5.177224	8.481952	4.758428	4.045658
10	52.63353	24.56315	5.093678	8.959888	4.598645	4.151101
11	52.02482	25.43346	5.087468	8.778091	4.529012	4.147140
12	51.11347	25.12754	4.912160	9.749150	4.897837	4.199846

Variance Decomposition of Tax Auditing Rate						
Period	**ci**	**tar**	**natp**	**trgbr**	**sitgb**	**sdtgb**
1	38.59805	61.40195	0.000000	0.000000	0.000000	0.000000
2	32.60620	58.78148	1.361684	6.428672	0.017713	0.804248
3	37.27624	47.21536	1.028161	7.624452	3.422391	3.433395
4	32.22677	49.26919	5.262069	6.508159	3.218415	3.515398
5	27.90986	54.76194	4.748506	6.474500	2.950723	3.154471
6	26.91527	54.08674	4.591456	7.248239	3.983871	3.174419
7	26.35305	53.97704	4.308903	8.182062	4.184304	2.994636
8	25.69733	54.48661	4.600901	8.185304	4.109004	2.920857
9	25.30734	52.53789	4.403528	10.02617	4.479052	3.246020
10	24.44693	50.88063	4.595790	12.05066	4.890450	3.135536
11	24.15227	50.74028	4.805906	12.36653	4.837244	3.097767
12	23.93106	50.23584	4.866987	12.96345	4.891401	3.111258

Variance Decomposition of Number of Auditing a Tax Payer						
Period	**ci**	**tar**	**natp**	**trgbr**	**sitgb**	**sdtgb**
1	10.48020	26.61678	62.90302	0.000000	0.000000	0.000000
2	9.539804	32.88094	55.27096	2.146783	0.032757	0.128747
3	19.51602	27.35561	45.42204	2.086888	1.723298	3.896148
4	18.51153	25.92385	46.70250	2.495292	1.735376	4.631455
5	17.37343	25.44653	41.22983	9.584308	2.208384	4.157521
6	14.73005	23.68179	35.08824	20.08074	2.701056	3.718122
7	13.74017	24.16175	31.24805	24.77255	2.781654	3.295816
8	12.95866	24.68115	29.56239	26.99222	2.623194	3.182391
9	12.86711	26.77275	28.08100	26.82154	2.466278	2.991314
10	12.68873	29.23019	26.87393	25.96209	2.370503	2.874568
11	13.11821	31.72343	25.44785	24.57791	2.280031	2.852575
12	13.35908	33.45730	24.49171	23.56625	2.283571	2.842081

Variance Decomposition of The Share of Tax Revenues in General Budgetary Revenues						
Period	**ci**	**tar**	**natp**	**trgbr**	**sitgb**	**sdtgb**
1	8.792034	2.914360	0.149116	88.14449	0.000000	0.000000
2	20.02927	13.20571	1.526025	64.90178	0.236684	0.100532
3	20.15358	19.50539	3.588373	54.42743	0.536659	1.788574
4	18.10845	20.78982	5.309091	53.75901	0.475176	1.558443
5	17.34563	22.92046	5.823199	50.95952	1.236043	1.715148
6	16.22308	29.26108	5.290057	46.36301	1.170153	1.692617
7	16.36680	30.06630	5.018778	44.94595	1.263179	2.338998
8	17.91426	27.07297	4.440446	44.85908	2.768151	2.945083
9	17.43986	27.41797	5.506410	44.02658	2.796900	2.812278
10	17.01624	28.22534	6.234827	42.88422	2.722070	2.917299
11	16.84558	27.97074	6.306723	42.86086	3.024669	2.991436
12	16.75254	28.01816	6.344104	42.73271	3.095848	3.056642

Varyans Decomposition of the Share of Indirect Taxes in General Budgetary Revenues						
Period	**ci**	**tar**	**natp**	**trgbr**	**sitgb**	**sdtgb**
1	13.49709	26.93907	0.988018	4.257727	54.31809	0.000000
2	14.13098	36.01592	4.738025	3.557435	39.53016	2.027483
3	11.88766	44.77733	6.536444	11.75715	23.70596	1.335463
4	12.34149	37.84582	5.298698	22.66483	20.79574	1.053436
5	10.37429	29.82833	4.421454	35.49112	18.99656	0.888254
6	8.936361	25.22148	4.191132	44.01821	16.85532	0.777497
7	7.866605	22.94977	4.200277	48.60007	15.21705	1.166226
8	7.073936	23.21494	4.240743	50.07883	14.19046	1.201089
9	7.443565	23.97398	4.438195	49.56871	13.42156	1.153995
10	8.936145	25.24664	4.380909	47.45150	12.78492	1.199885
11	9.576020	27.75337	4.202677	45.17787	12.08849	1.201569
12	10.10775	30.36454	4.107561	42.71276	11.37437	1.333028

Varyans Decomposition of the Share of Direct Taxes in General Budgetary Revenues						
Period	**ci**	**tar**	**natp**	**trgbr**	**sitgb**	**sdtgb**
1	16.06275	38.63867	0.224338	5.270293	38.42125	1.382693
2	12.65272	45.35577	7.286289	5.187066	28.11212	1.406034
3	9.980199	54.24602	8.501156	8.477635	17.73806	1.056924
4	10.35241	50.18473	7.395706	14.55159	16.60927	0.906285
5	9.506253	41.11650	6.351311	26.01402	16.21155	0.800369
6	8.385442	35.53232	5.913884	34.48423	14.98682	0.697301
7	7.538201	32.00143	5.778698	39.73410	13.88348	1.064090
8	6.785996	30.33241	5.667620	42.83792	13.23140	1.144658
9	6.960455	30.01762	5.836152	43.45503	12.63346	1.097283
10	8.131357	30.57156	5.809176	42.23700	12.13279	1.118114
11	8.553987	32.40295	5.567630	40.81156	11.56862	1.095253
12	9.039904	34.41929	5.356487	39.02320	10.95841	1.202719
Cholesky Ordering: ci tar natp trgbr sitgb sdtgb **Standard Errors: Monte Carlo (1000 Repetitions)**						

Appendix 3: Inverse Roots of AR Characteristic Polynomial