

Impact of Tax Evasion on Total Tax in Pakistan

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Abstract

The main objective of this study was to check the effect of tax evasion on tax in Pakistan for the period of 1980-2014. Total Tax is taken as dependent variable and Export, Tax evasion and GDP are taken as independent variables in this study. Data was taken from World development Indicators (WDI), Handbook of Statistics and International Financial Statistics (IFS). ADF test was used to check the integrated order of the variables. Johansen Co-integration and error correction models were used to find out the long run and short run relationship among the variables. The empirical results showed that there is a statistically significant long-run negative relationship between total tax and tax evasion (illegal money) in Pakistan.

Key Words: Total Tax, Tax Evasion, ECM, Co integration, Pakistan

1. Introduction

Tax rate is the percentage of an individual's taxable income or a corporation's earning that is payable to the state, federal and in some cases, municipal governments. The term tax rate can also refer to other occasions where taxes are imposed. Examples include sales tax on goods and services, real property tax, short-term capital gains tax rate and long-term capital gains tax rate.

Tax revenue in a country serves as life blood for the government: whereas the ratio between average revenue and gross domestic product (GDP) in developing countries was almost 35% in 2005 (Mughal, 2012). The uselessness of current tax system in Pakistan is basic reason of government revenue inadequacy in Pakistan. The Central Board of Revenue (CBR) institution converted into Federal Board of Revenue (FBR) is responsible for government revenue collection. CBR has the authority to prepare fiscal policy and it administers more than 90% of total taxes in Pakistan. Tax revenue is the chief source of revenue for the government of Pakistan as it accounts for 80% of the total government revenues (Akram, et, al. 2012).

Tax evasion can be defined as the activity in which they badly behaved and premeditated violation of law for the purpose of escaping tax payments that has been indisputably inflicted by the tax authority (Mughal, 2012). Tax evasion is an activity commonly associated with the informal economy. One measure of the extent of tax evasion (the "tax gap") is the amount of unreported income, which is the difference between the amounts of income that should be reported to the tax authorities and the actual amount reported (Becker, 1968).

Tax evasion and tax avoidance are universal phenomenon existed since the existence of taxation itself, which are being practiced by each social class, each industry and each economic system and it is function of various factors i-e level and type of income, political structure and social behavior (Akram, et al. 2012).

The practice of tax evasion has been a common phenomenon in the tax system of Pakistan since 1947. After 1991, government of Pakistan experienced consistent reduction in tax revenue as a percentage of Pakistan's annual gross domestic product (GDP). The current issue in public finance of Pakistan is that the collection of government revenue in Pakistan composed of income tax, sales tax, property tax, corporate tax and administrative fees etc. are sufficient to meet the desired fiscal expenditures.

The main objectives of the study are following

- i) To construct the Tax Evasion Variables.
- ii) To find the long run and short relationship between Total tax and tax evasion.

2. Literature Review

Chiarini, et al. (2013) conducted a study on tax rates and tax evasion in Italy. The objective of the study was to investigate empirically the long run characteristics of tax evasion and the relationship with the tax burden. For this purpose, official time series of the Italian evaded VAT base (Ministry of Finance) for the period of 1980:1 to 2006:4. The data on tax evasion was provided by the Revenue Agency of the Ministry of Finance, which has recently estimated a yearly time series of the non-reported value added tax base. The results showed complex dynamic interaction between the tax burden tax evasion to ascertain whether in the Italian experience there is evidence for any vicious circle between them.

Epaphra (2012) examined tax rates (tariff plus VAT rates) as the determinants of customs revenue evasion across products, based on a systematic analysis of discrepancies in trade declarations for trading partners, United Republic of Tanzania, Republic of South Africa and China. The purpose of the study was to examine the relationship between official tax rates and tariff in Tanzania. The data for trade flow for studying tax evasion was taken from the World Bank's World Integrated Trade Solution (WITS) data base, which in turn was derived from the United Nations Comtrade database. The results indicated that trade gap is highly correlated with tax rates that is, much more value is lost for products with higher tax rates.

Mughal and Akram (2012) observed a study on reasons of tax avoidance and tax evasion with respect to Pakistan. The relationship between variables of reasons/causes of tax avoidance and evasion were also examined. A questionnaire was developed after reviewing literature to collect responses. Data was analyzed using percentages, arithmetic mean, standard deviation, variance, central limit theorem, cumulative normal distribution calculator, factor analysis and correlation technique. The results indicated that all variables of reasons/causes of tax avoidance and evasion in Pakistan are correct. Furthermore, there exists a highly significant positive relationship between individual variables of reasons/causes of tax avoidance and evasion in Pakistan at 100% significance level.

Kleven et al. (2008) analyzed a randomized evaluation of tax enforcement and tax evasion in Denmark carried out in collaboration with Danish Inland Revenue (SKAT). The data was a

stratified and representative sample of over 40,000 Danish individual tax filers. It was found that threat-of-audit letters have significant effects on self-reported income adjustments and that these effects are larger for tax filers not audited in the previous year. Prior audits also significantly increase the likelihood of self-reporting higher incomes the following year, implying that individuals update their beliefs about audit probability based on experiencing an audit.

Molero and Pujol (2004) observed an empirical study on the determinants of psychological costs of tax evasion based on the theoretical taxonomy proposed by Lagares (HPE 1994). The dependent variable was the percentage of students considering acceptable to evade taxes. The data was taken from a questionnaire filled by 705 university students. Binomial logit model was used for estimation. The results showed that the justification of tax evasion is statistically related with the percentage of grievance in absolute terms, grievance in relative terms, the sense of duty and the level of solidarity.

Panades (2004) analyzed the relationship between tax rate levels and tax evasion in a context where the utility of a taxpayer depends on both his or her own consumption and relative position with respect to the average declared income of the economy. The objective of the study was to present another natural framework in which it is possible to obtain a negative relationship between declared income and tax rate levels in equilibrium. The results showed that if the externality from the others declared income is taken into account, several equilibrium arise in the economy.

Caballe and Panades (2001) investigated the relationship between tax rates and tax evasion in a Multi-period economy. They have used capital accumulation model where government spending is totally unproductive. They concluded negative theoretical relationship between unreported income and tax rates is preserved in a multi-period economy when fines are imposed on the amount of evaded taxes.

Fisman and Wei (2001) examined the responsiveness of tax evasion to tax rates in China. The data for trade flow was taken from the World Bank's WITS (World Integrated Trade Solution) database which in turn is derived from the United Nations Comtrade database. Using the data in 1998 the result was striking, that on average a 1 percent increase in the tax rate results in a 3 percent increase in evasion.

Crane and Nourzed (1990) examined the effect of marginal tax rates on income tax evasion using data from the California Tax Amnesty Program. The results showed that after correcting for the selectivity bias, evaders respond to higher tax rates by increasing their evasion activity. It was also found that individuals with higher levels of income tend to evade more. Finally, evasion is generally inelastic with respect to changes in both marginal tax rates and income with the former elastic tending to be larger.

3. Data and Methodology

Annual time series data was used from 1980-2014 of Pakistan. The sources of the data were World Development Indicators (WDI), Handbook of Statistics and International Financial Statistics (IFS).

Total Taxes/Revenues was used as dependent variable while tax evasion, exports and Gross Domestic Product (GDP) were used as explanatory variables.

3.1 Theoretical Framework

Chiarini et. al, (2013) were proposed following model:

Total Taxes= f (tax evasion, exports, gross domestic product)

$$TT = \int(TAV, EXP, GDP)$$

$$TT = \beta_0 + \beta_1 TAV + \beta_2 EXP + \beta_3 GDP + \mu_t \dots\dots\dots 1$$

Where

TT= Total Tax TAV= Tax Evasion EXP=exports GDP= Gross Domestic Product

Tax evasion was calculated by following Cagan (1958) and further developed by Tanzi (1980). Employing a number of these determinants of currency ratio, we develop and estimate a currency demand equation in order to determine the size of the shadow economy and tax evasion. Ordinary Least Squares (OLS) technique use to estimate a currency demand equation.

Where:

$$\ln\left(\frac{C}{M2}\right) = \alpha_0 + \alpha_1 \ln(ATR) + \alpha_2 \ln(ir) + \alpha_3 \ln(PCI) + \alpha_4 \ln(EDU) + \alpha_5 \ln(URPOP) + \varepsilon$$

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where

C/M2= Currency-M2 ratio ATR= Tax rate ir = Interest rate PCY = real per capita income

EDU= Education level (measured as educational attainment in terms of the average years of schooling for the total population over the age of 15 years);

URPOP = Urbanization (measured as percentage of the population living in cities).

ε = Error term

Ln = Natural Logarithm

The above equation estimated first with Tax rate and after it estimated without Tax rate. By using the results from the estimated currency-M2 model, we proceed to find estimates for the size of underground economy and tax evasion through the following steps as applied in studies such as Tanzi (1980, 1983), (Schneider, 2007) and Schneider and Enste (2000, 2002). First we find the amount of illegal money in the economy, followed by legal money, then, velocity of money, the underground economy and finally tax evasion as follows:

$$Illegal\ Money\ (IM) = \left[\left[\frac{C}{M2} \right] - \left[\frac{C}{M2} \right]_{wt} \right] * M2 \dots\dots\dots 3$$

Where:

$\left[\left[\frac{C}{M2} \right]_t \right]$ = the currency-M2 equation with the tax rate;

$\left[\left[\frac{C}{M2} \right]_{wt} \right]$ = the currency-M2 equation without the tax rate;

M2 = Broad definition of money (M1 plus time deposits)

$$Legal\ Money\ (LM) = M_1 - IM \dots\dots\dots 4$$

Where

M1 = Narrow Definition of money (currency plus demand deposits)

IM = Illegal money obtained from equation (3)

$$Velocity(V) = \frac{GNP}{LM} \dots\dots\dots 5$$

Where

GNP = Gross National Product

LM = Legal Money obtained from equation (4)

$$\text{Underground Economy}(UE) = IM * V \dots\dots\dots 6$$

Where:

IM = Illegal Money

V = Velocity of Money derived from equation (5)

$$\text{Tax Evasion}(TE) = UE * \left[\frac{TTaxes}{GNP} \right] \dots\dots\dots 7$$

Where:

UE = Underground Economy derived from equation (6)

GNP = Gross National Product

3.2 Augmented Dickey Fuller (ADF) test:

This test was be used to check the stationary of the variables. The advantage of ADF test is that it adjusts the problem of autocorrelation by adding the lagged values of the dependent variable.

The general form of ADF test is:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha \sum \Delta Y + \mu t$$

Null hypothesis $H_0: \delta = 0$ Non-stationary

Alternative hypothesis $H_1: \delta \neq 0$ Stationary

3.3 Johansen Co integration technique

The innermost idea for co-integration test is related to the functional forms of model. This is based on the long run relationship of one endogenous variable with other exogenous variables. More clearly, co-integration defines the presence of long run stable relationship between the variables. If the time series variables are non-stationary at I (0) then they can be integrated at I(1) order of integration and their first differences are stationary. These variables can be co-integrated if they have one or more linear combinations among themselves and they are stationary. Nevertheless, if these variables are co-integrated then there occurs a constant long-run linear relationship among these variables.

The co-integration method was first used by Engel and Granger (1987). Afterwards, it was additional developed and changed by Stock and Watson (1988), Johansen (1988) and Johansen and Juselius (1990). This test is very easy and useful to check the long run equilibrium relationships between the explanatory variables. In this study, Johansen maximum likelihood (ML) approach is pragmatic to examine the co-integration among variables. The main reason is that Johansen co-integration is the most stable one. The main benefit of this approach is that, one can estimate several co-integration relationships among the variables at the same time. Two statistical tools are used for co-integration, namely the Trace (Tr) test and the Maximum Eigen value (λ max) test.

3.4 Error Correction Model (ECM):

To check the short run relationship between variables Error Correction Model was used. The error correction mechanism (ECM) was first used by Sargan and later popularized by Engle and Granger corrects for disequilibrium. An important theorem, known as the Granger Representation theorem states that if two variables Y and X are co integrated then the relationship between the two can be expressed as ECM. Now consider the following model:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t - \alpha_2 \mu_{t-1} + \epsilon_t$$

Where Δ shows the first difference operator, ϵ_t is a random error term and $\mu_{t-1} = (Y_{t-1} - \beta_1 - \beta_2 X_{t-1})$ shows the one period lagged value of the error term.

The above equation shows that ΔY_t depends on ΔX_t and also on the equilibrium error term. If the latter is non-zero then the model is out of equilibrium. If ΔX_t is zero and μ_{t-1} is positive it means that ΔY_{t-1} is too high to be in equilibrium that is ΔY_{t-1} is above the equilibrium value of $(\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_{t-1})$. Since if α_2 is expected to be negative the term $\alpha_2 \mu_{t-1}$ is negative and therefore ΔY_t will be negative to restore the equilibrium. If ΔY is above its equilibrium value it will start in the next period to correct the equilibrium error hence given the name ECM.

4. Results and Discussion

4.1 Augmented Dickey-Fuller (ADF) Test:

Table 4.1: ADF test statistics at level

Variable	ADF statistics	1% level	5% level	10% level	Prob*	Conclusion
EXP	-1.208559	-3.670170	-2.963972	-2.621007	0.6574	Non-stationary
GDP	-1.808470	-3.679322	-2.967767	-2.622989	0.3691	Non-stationary
TT	-0.729056	-3.670170	-2.963972	-2.621007	0.9908	Non-stationary
TAV	-1.547569	-3.679322	-2.967767	-2.622989	0.2398	Non-stationary

Table 4.2: ADF test statistics at 1st difference

Variable	ADF statistics	1% level	5% level	10% level	Prob*	Conclusion
EXP	-5.909810	-3.679322	-2.967767	-2.622989	0.0000	Stationary
GDP	-5.654302	-3.679322	-2.967767	-2.622989	0.0001	Stationary
TT	-4.524189	-3.679322	-2.967767	-2.622989	0.0012	Stationary
TAV	-3.547569	-3.67932	-2.967767	-2.622989	0.0137	Stationary

The above table 4.1 shows that all variables are non-stationary at level and our null hypothesis is accepted and table 4.2 shows that all variables are stationary at 1st difference. When all the variables are stationary at first difference then we use Johansen Co integration test to check the long run relationship between the variables.

4.2 Johansen Co integration Test:

Table 4.3: Unrestricted Co integration Rank Test (trace)

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistics	Critical value	Prob.**
None *	0.866509	80.97624	47.85613	0.0000
At most 1	0.436596	26.60586	29.79707	0.1116
At most 2	0.325433	11.11437	15.49471	0.2046
At most 3	0.017798	0.484883	3.841466	0.4862

Source (E.views 7.0)

In the above table trace test is performed to check the co integration between the variables. The null hypothesis is that there is no co integration between the variables while alternative hypothesis is that there is co integration between the variables. From the table, trace statistics is 80.97624 while critical value at 0.05 levels is 47.85613 which is less than trace statistics so our null hypothesis is rejected and there is co integration between the variables. In this case, there is one co integrating equation.

Table 4.4: Unrestricted Co integration Rank Test (Maximum Eigenvalue)

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistics	Critical value	Prob.**
None *	0.866509	54.37038	27.58434	0.0000
At most 1	0.436596	15.49148	21.13162	0.2559
At most 2	0.325433	10.62949	14.26460	0.1738
At most 3	0.017798	0.484883	3.841466	0.4862

Source (E.views 7.0)

In the above table Max-Eigen value test is performed to check the co integration between the variables. the null hypothesis is that no co integration between the variables while alternative hypothesis is that there is co integration between the variables. From the table, Max-Eigen statistic is 54.37038 while critical value at 0.05 levels is 27.58434 which is less than Max-Eigen statistic so our null hypothesis is rejected and there is co integration between the variables. In this case, there is only 1-co integrating equation.

Long Run Co-efficient:

Impact of tax evasion on Total Tax (1980-2014)

Table 4.5: Normalized Co integrating Co-efficient (standard error in Parentheses)

Variables	Co-efficient	Standard Error	t-statistic
TAV	-3.8057	0.8736	-4.3563
GDP	2.7891	0.7169	3.8905
EXP	-13.8034	2.9133	-4.7380

Source (E.views 7.0)

The above table shows the results of Johanson co-integration which used to find out the long run relationship among the variables. Total tax used as dependent variable and Tax evasion, Gross Domestic Product and Export used as independent variables.

The Result shows that tax evasion and total taxes are negatively correlated with each other in Pakistan in long run which indicates that 1% increase in tax evasion caused by 3.8057% decrease in total tax and the t-statistic of TAV is -4.3563 that is greater than at 1% 5% and 10% level of significance which shows null hypothesis is rejected, it means that TAV has significant effect on Total Tax in Long run (same as Chiarini, et. al, (2013),). In the same way, an export has also negatively and significant effect on total taxes in long runs. In the above table GDP co-efficient indicate that GDP has positive effect on Total Taxes which shows 1% change in GDP causes by 2.7891% increase in Total Tax in long run.

4.3 Error Correction Model (ECM):

Dependent Variable: Total Tax (1980-2014)

Table 4.6: Short Run Results

Variables	Co-efficient	Standard Error	t-statistic
CointEq1	-0.018126	0.00904	-2.00514
D(TT(-1))	1.23480	0.61986	1.992031
D(TT(-2))	10.0028	9.10893	1.09813
D(TAV(-1))	-0.89651	0.51144	-1.75290
D(TAV(-2))	-2.21098	2.46332	-0.89756
D(GDP(-1))	5.09812	1.66925	3.05412
D(GDP(-2))	0.00102	0.01144	0.08912
D(EXP(-1))	12.0029	9.30291	1.29023
D(EXP(-2))	7.90651	5.10028	1.55021

Source (E.views 7.0)

The above table shows the results of Error Correction Model (ECM). ECM use to find the short run relationship. the model has been estimated up to 2 lags of the variables and one lag of the error term. The table shows presence of significant relationship between Total Taxes and Tax evasion in short run. The estimated co-efficient of ECM is negative and significant at five percent level of significance. The value of Error Correction coefficient is -0.018126 which shows 1.18 % convergence occur towards equilibrium in short run within a year in Pakistan. T-statistic of error correction co-efficient is -2.00514 which shows it has significant effect.

5. Conclusion

This study has been explored the impact of Tax evasion on Total in Pakistan for the period of 1980-2014. Johansen co-integration and error correction model were used to find out the long run and short run relationship between the variables. The empirical results showed that there is a statistically significant and negative relationship between total taxes and tax evasion (underground economy/illegal money) in long run in Pakistan. These findings are same with those as Chiarini, et. al, (2013), who said that there is a negative relationship between total tax and tax evasion.

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