Tax Evasion, Tax Rate and Economic Stability

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ABSTRACT

The issue of tax evasion has become a major problem for governments. Nowadays, governments are actively trying to reduce the possibility that people misrepresent their income. Tax evasion refers to all illegal ways that people employ in order to avoid paying taxes. Underreporting income, profit or over reporting the amount of tax deductions are some well-known ways of misrepresenting tax liabilities. This paper attempts to study the relationship between tax evasion and tax rates and economic stability. Is higher taxes leads to more unreported activities? How does higher tax evasion affect economic stability? Is the causality run from tax evasion to economic activity or the other way around? This study attempts to examine the relationship between economic stability with tax evasion and tax rates using a fixed panel data model for a selected number of countries including OECD countries based on data comprised of the period of 1990 – 2013, by using Panel data technique. The main contribution of this paper will be the study of the relationship between tax evasion and economic stability. Results show that dominant negative relationship between taxes and output volatility, our estimation results show that tax ratio is positively and significantly related to economic stability and tax evasion is negatively and significantly related to tax income.

Keywords: Tax revenue; Tax evasion; Economic stability; Panel data
1. INTRODUCTION

The issue of tax evasion has become a major problem for governments. Nowadays, governments are actively trying to reduce the possibility that people misrepresent their income. Tax evasion refers to all illegal ways that people employ in order to avoid paying taxes. Underreporting income, profit or over reporting the amount of tax deductions are some well-known ways of misrepresenting tax liabilities.

There have been opposing views on how one government can deal with this problem. The classical view is that the increase in the tax rates will lead to increase in the size of underground economy. Gutmann (1977) estimate the size of underground economy or subterranean economy as large as 9.4 percent of U.S GNP, which caused a lot of attention to the issue of tax evasion. Also, he mentions that underground economy is a product of government regulations and policies and suggest revising them in order to not motivate unreported activities. However, Feige (1979) estimates of irregular economy was far bigger than Gutmann estimation. He finds that the size of irregular economy is 22 percent of GNP in 1976 and 33 percent of GNP in 1978.

His recommendation is to reduce tax rates in the legal sector, increase the punishment for participation in the illegal activities and also legalizing currently illegal activities such as gambling and use of marijuana. Clotfelter (1983) using the Internal Revenue Service’s Taxpayer Compliance Measurement Program (TCMP) survey for 1969 finds that marginal tax rates affect the amount of tax evasion significantly. Progressive taxes are one that is said to have a big contribution to a bigger underground economy. An alternative view finds no evidence regarding the positive relationship between tax rates and tax evasion (Friedman et al., 2000). They claim that businesses and people may be derived to underground economy because of weak institutions which are responsible for protecting people’s rights. According to this view, Weak jurisdictional system, bureaucracy and corruption are the primary reasons that lead people to underground and unreported economy.

Another issue is the relationship between the tax evasion and economic stability. Increase in the size of the underground activities implies that there are less reported taxable income which means that the government may confront a budget deficiency. Also, higher unofficial activities will decrease the legal GDP which can be interpreted as a sign of recession and increase the uncertainty and the risk of investment. Therefore, tax evasion lead to instability of the economy. Hence, it is expected that the increase in the amount of tax evasion causes the economy to become more instable.

This paper attempts to study the relationship between tax evasion and tax rates and economic stability. Is higher taxes leads to more unreported activities? How does higher tax evasion affect economic stability? Is the causality run from tax evasion to economic activity or the other way around?

As a measure for economic stability, the standard deviation of GDP is employed in which higher standard deviation of GDP implies a less stable economy. Income tax rate is used as the measure of tax rate. To estimate the rate of tax evasion, Gutmann monetary approach is applied which is the ratio of currency in circulation to demand deposit. Control variables are GDP, inflation and worldwide governance indicator (WGI) (to control for institutional quality). A dummy variable is considered to capture the effects of big shocks on GDP (such as wars and economic crisis).
This study attempts to examine the relationship between economic stability with tax evasion and tax rates using a fixed effect panel data model for a selected number of countries including OECD countries and developing countries. The main contribution of this paper will be the study of the relationship between tax evasion and economic stability. Also, by controlling for the effects of institutions, inflation, GDP (and more controls which is not yet certain like controlling for the governments revenue over natural resources on a number of developing countries) we hope to investigate the interaction between these three stated variables.

The paper is organized as follows: In Section 2.3 we provide a brief discussion of the panel unit root test and the panel cointegration procedure. Empirical results are provided in Section 3. Final section contains the conclusions and policy implications.

2. DATA AND METHODOLOGY

2.1. Model specification

We first start estimating the effects of each independent variables and tax evasion on tax revenue in first section and the effects of each independent variables and tax evasion and the ratio of tax revenue to government expenditure on the dependent variable “standard deviation of GDP as a proxy of economic stability” in second section by using pooled ordinary least squares model. We create a pooled data by combining time series and across section data for OECD countries. The pooled regression model doesn’t estimate the impact of variables separately on each country, but instead yields an overall measure of each variables on the group of country. If we find large standard errors for variables, the next step is testing the fixed and random effect which are more advanced models if the pooled one was not appropriate.

Panel data provide a large number of point data, increasing the degrees of freedom and reducing the collinearity between regressors. Therefore, it allows for more powerful statistical tests and normal distribution of test statistics. It can also take heterogeneity of each cross-sectional unit into account, and give “more variability, less collinearity among variables, more degrees of freedom, and more efficiency” (Baltagi, 2001).

In this paper, regressions are based on data concerning a group of 24 OECD countries over the period 1990 - 2013. Data for tax revenue (TAX), gross domestic production (GDP), volume of money (M1), liquidity (M2), inflation (INF), the ratio of currency in circulation (CU), velocity of money (V1) come from the OECD data bank website base.

2.2. Estimation Procedure

In order to investigate the possibility of panel cointegration, first, it is necessary to determine the existence of unit roots in the data series. For this study we have chosen the Im, Pesaran and Shin (IPS, hereafter), which is based on the well-known Dickey-Fuller procedure. Im, Pesaran and Shin denoted IPS proposed a test for the presence of unit roots in panels that combines information from the time series dimension with that from the cross section dimension, such that fewer time observations are required for the test to have power. Since researchers have found the IPS test to have superior test power for analyzing long-run relationships in panel data, we will also employ this procedure in this study. IPS begins by
specifying a separate ADF regression for each cross-section with individual effects and no time trend:

$$\Delta y_{it} = \alpha_i + \rho_i y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it}$$  \hspace{1cm} (1)

Where $i = 1, \ldots, N$ and $t = 1, \ldots, T$

IPS use separate unit root tests for the $N$ cross-section units. Their test is based on the Augmented Dickey-fuller (ADF) statistics averaged across groups. After estimating the separate ADF regressions, the average of the $t$-statistics for $p_1$ from the individual ADF regressions, $t_{iT}(p_i)$

$$\bar{t}_{NT} = \frac{1}{N} \sum_{i=1}^{N} t_{iT}(p_i) \hspace{1cm} (2)$$

The $t$-bar is then standardized and it is shown that the standardized $t$-bar statistic converges to the standard normal distribution as $N$ and $T \to \infty$. IPS (1997) showed that $t$-bar test has better performance when $N$ and $T$ are small. They proposed a cross-sectional demeaned version of both test to be used in the case where the errors in different regressions contain a common time-specific component (Nor’Aznin and et al, 2010).

The next step is to test for the existence of a long run relationship among the variables. A common practice to test for cointegration is Johansen’s procedure. However, the power of the Johansen test in multivariate systems with small sample sizes can be severely distorted.

To this end, we need to combine information from time series as well as cross-section data once again. In this context three panel cointegration tests are conducted.

First, we use a test due to Levin and Lin (1993) in the context of panel unit roots, to estimate residuals from (supposedly) long run relations. Levin and Lin (1993) consider the model

$$y_{it} = \rho_i y_{i,t-1} + z_{it}'y' + u_{it} \hspace{1cm} (3)$$

Where $z_{it}$ are deterministic variables, $u_{it}$ is iid(0,$\sigma^2$) and $\rho_i = \rho$. The test statistic is at $t$-statistic on $\rho$ given by

$$t_{\rho} = \frac{(\hat{\rho} - 1) \sqrt{\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\gamma}_{it}^2}}{s_{e}} \hspace{1cm} (4)$$

Where

$$\hat{\gamma}_{it} = y_{it} - \sum_{s=1}^{T} h(t,s)y_{is}, \hspace{0.5cm} \tilde{u}_{it} = u_{it} - \sum_{s=1}^{T} h(t,s)u_{is} \hspace{0.5cm} h(t,s)$$

$$= \begin{pmatrix} z_{t} \end{pmatrix}' \left( \sum_{t=1}^{T} z_{t}z_{t}' \right) z_{s}, \hspace{1.0cm} s_{e}^2 = (NT)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \tilde{u}_{it}^2,$$

And $\hat{\rho}$ is the OLS estimate of $\rho$. 

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Finally, to overcome the problem of heterogeneity that arises in both tests we use Fisher’s test to aggregate the p-values of individual Johansen maximum likelihood cointegration test statistics, see Maddala and Kim (1998). If $p_i$ denotes the p-value of the Johansen statistic for the $i$th unit, then we have the result $-2 \sum_{i=1}^{N} \log p_i \sim \chi^2_{2N}$. The test is easy to compute and, more importantly, it does not assume homogeneity of coefficients in different countries (Christopoulos and Tsionas, 2004).

The next step is to test for the existence of a long-run cointegration market share and the independent variables using panel cointegration tests suggested by Pedroni (1999 and 2004). We will make use of seven panel cointegration by Pedroni (1999), since he determines the appropriateness of the tests to be applied to estimated residuals from a cointegration regression after normalizing the panel statistics with correction terms (Nor’Aznin and et al, 2010).

The procedures proposed by Pedroni make use of estimated residual from the hypothesized long-run regression of the following form:

$$y_{i,t} = \alpha_i + \delta_t t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \cdots + \beta_{Mi} x_{Mi,t} + \epsilon_{i,t}$$ \hspace{1cm} (5)

For $t = 1, \ldots, T$; $i = 1, \ldots, N$; $m = 1, \ldots, M$,

Where $T$ is the number of observations over time, $N$ number of cross-sectional units in the panel, and $M$ number of regressors. In this set up, $\alpha_i$ is the member specific intercept or fixed effects parameter which varies across individual cross-sectional units. The same is true of the slope coefficients and member specific time effects, $\delta_t$.

Pedroni (1999 and 2004) proposes the heterogeneous panel and heterogeneous group mean panel test statistics to test for panel cointegration. He defines two sets of statistics. The first set of three statistics $Z_{\bar{\rho},N,T}$, $Z_{\bar{\rho},N,T}^1$ and $Z_{tN,T}$ are based on pooling the residuals along the within dimension of the panel. The statistics are as follows

$$Z_{\bar{\rho},N,T} = T^2 N^{3/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\ell}_{11i}^2 \hat{\epsilon}_{i,t}^2$$ \hspace{1cm} (6)

$$Z_{\bar{\rho},N,T}^1 = T \sqrt{N} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\ell}_{11i}^2 \hat{\epsilon}_{i,t}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\ell}_{11i}^2 (\hat{\epsilon}_{i,t} \Delta \hat{\epsilon}_{i,t} \hat{\lambda}_i)$$ \hspace{1cm} (7)

$$Z_{tN,T} = \hat{\sigma}_{N,T}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\ell}_{11i}^2 \hat{\epsilon}_{i,t}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\ell}_{11i}^2 (\hat{\epsilon}_{i,t} \Delta \hat{\epsilon}_{i,t} \hat{\lambda}_i)$$ \hspace{1cm} (8)

Where $\hat{\epsilon}_{i,t}$ is the residual vector of the OLS estimation of Equation (5) and where the other terms are properly defined in Pedroni. The second set of statistics is based on pooling the residuals along the between dimension of the panel. It allows for a heterogeneous autocorrelation parameter across members.

The statistics are as follows:

$$Z_{\bar{\rho},N,T} = \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\epsilon}_{i,t}^2 \sum_{t=1}^{T} (\hat{\epsilon}_{i,t} \Delta \hat{\epsilon}_{i,t} \hat{\lambda}_i)$$ \hspace{1cm} (9)
These statistics compute the group mean of the individual conventional time series statistics. The asymptotic distribution of each of those five statistics can be expressed in the following form:

\[
\tilde{Z}_{N,T} = \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{e}_{i,t}^2 \left( \frac{1}{T} \sum_{t=1}^{T} (\hat{e}_{i,t} \Delta \hat{e}_{i,t} \hat{\lambda}_{i}) \right)
\]

\[\text{(10)}\]

Where \(\tilde{Z}_{N,T}\) is the corresponding form of the test statistics, while \(\mu\) and \(\nu\) are the mean and variance of each test respectively. They are given in Table 2 in Pedroni (1999). Under the alternative hypothesis, Panel \(v\) statistics diverge to positive infinity. Therefore, it is a one sided test were large positive values reject the null of no cointegration. The remaining statistics diverge to negative infinity, which means that large negative values reject the null (Al-Awad and Harb, 2005).

### 3. ESTIMATION RESULT

#### 3.1. Estimate the underground economy size (Tax evasion)

The underground economy flourishes when cash transactions such as construction, illegal sale, smuggling, and drug trafficking are common. High tax rate, recession, high unemployment, and negative public attitudes towards government and taxes are some of the factors that lead to the spread of the underground economy, tax evasion, as well as tax avoidance. The existence of a large underground economy results in high tax rates, reduction in government services, unfair competition, and an uneven playing field for honest business. Mainly, self-employed persons are involved in tax evasion and underground economic activities because there is no formal system of documentation for self-employed persons and their activities. Tax evasion is a significant determinant of underground economy largely due to the loopholes in tax policy. Farming community exempted from taxation is part of the underground economy. Even industrialists and traders are known to have shown their income as their farming income and have been exempted from taxation. For example, industrialists invest in purchase of land and then report the incomes from industrial and trade activity as farm income, which is tax exempt. Similarly, another type of community works both in the formal as well as the informal sector (cash economy) and reports only formal income. Again, the tax policy provides the opportunity to conceal income because income in the informal sector is not recorded by government officials. Since these earning persons work only in the cash economy, they can evade or avoid taxes (Kemal, 2003).

Tax evasion and tax avoidance are two significantly different terms. Tax evasion refers to illegal way of avoiding taxes and tax avoidance is a lawful arrangement or planning in order to reduce the tax liability. For example, if we publish a book and fail to declare any royalties that we might obtain from writing the book, this implies as tax evasion. On the other hand, if we declare royalties but in order to have relief from taxation i.e., claim various expenses incurred in writing a book, then it is tax avoidance. Defining and differentiating tax evasion from tax avoidance may be easy theoretically but it is hard to
distinguish while calculating it. Cowell (1985) argues that distinction is based on moral criteria and is not helpful for the economic analysis. Lewis (1982) terms it as “Avosion”. It is difficult to estimate the exact number of tax evasion and the size of underground economy (Kemal, 2003).

To estimate the underground economy monetary approaches are based on the premise that the safe motive to hold currency is either to finance various kinds of illegal activities, or as a means of storing the proceeds of one’s ill-gotten gains. This implies that the transactions in the black economy are funded largely by cash in order to reduce the chances of detection. Guttmann (1977) assumed that the ratio of currency in circulation to demand deposits remained unchanged in the absence of a growing black economy. He assumed that there was no black economy during the period 1937–41, therefore, the ratio of currency in circulation to demand deposits was constant during this period. However, the general perception about this period was opposite. Guttmann used demand deposits as divider to the currency in circulation. This implies that the increase in the ratio forced people to withdraw their money from demand deposits and hold more currency. However, this may not necessarily be the case; people might shift their money from demand deposits to time deposits.

Estimates of the underground economy have been subject of intense interest in the literature. In some of literature the authors have adopted the monetary approach and followed Tanzi’s methodology to estimate the size of the underground economy. Therefore in this paper we use Guttmann approach to calculate the underground economic a proxy of tax evasion in this approach use the below formula, For each year predicted values of currency ratio including tax variables \( \frac{CU}{M2} \) and without tax variables \( \frac{CU}{M2} \) are calculated by next estimated regression equation (Kemal, 2003).

\[
\frac{CU}{M2} = \alpha + \beta \left( \frac{TAXREV}{GDP} \right)_t + \gamma growth_t + \theta inflation_t + \delta \left( \frac{CU}{M2} \right)_{t-1} + \varepsilon_t \tag{12}
\]

The difference between the two terms gives us an indication that how much currency holding is tax induced. This difference is then multiplied with M2 to get illegal money. Subtracting illegal money from M1 gives legal money in the economy. Velocity of money is calculated by dividing national income with legal money. Assuming velocity of money same in both legal and illegal money, multiplying velocity of money with illegal money gives underground economy. Tax evasion is calculated by multiplying underground economy with total tax to GDP ratio. Mathematically, we can write it as,

\[
\text{Illegal Money (IM)} = \left( \left( \frac{CU}{M2} \right)_t - \left( \frac{CU}{M2} \right)_{wt} \right) * M2 \tag{13}
\]

\[
\text{Legal Money (LM)} = M1 - IM \tag{14}
\]

\[
V\text{Legal Money (LM)} = M1 - IM \tag{15}
\]

\[
\text{Underground Economy (UE)} = IM * V \tag{16}
\]

\[
\text{Tax Evasion (TE)} = UE * \left( \frac{\text{Total Tax}}{GDPN} \right) \tag{17}
\]
If we have log linear equation, the expression (13) is obtained by the following procedure and rest of the procedure is same.

\[ IM = \text{anti} \log \left\{ \log \left( \frac{CU}{M2} \right)_t \right\} - \text{anti} \log \left\{ \log \left( \frac{CU}{M2} \right)_{wt} \right\} * M2 \]  

(18)

For estimate the tax evasion base on equation (12) we use pool OLS approach. Results of the model are reported in Table 1.

Table 1. Results of Estimates of Regression Equation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.131302</td>
<td>0.113634</td>
<td>1.155480</td>
<td>0.2482</td>
</tr>
<tr>
<td>LCUM2(-1)</td>
<td>0.243121</td>
<td>0.081123</td>
<td>2.996942</td>
<td>0.0006</td>
</tr>
<tr>
<td>LTAXREVGDG</td>
<td>1.213095</td>
<td>0.069887</td>
<td>17.35794</td>
<td>0.0000</td>
</tr>
<tr>
<td>GROWTH</td>
<td>-0.032321</td>
<td>0.001425</td>
<td>-22.68140</td>
<td>0.0000</td>
</tr>
<tr>
<td>INFLATION</td>
<td>-0.012432</td>
<td>0.002156</td>
<td>-5.766237</td>
<td>0.0001</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.685650</td>
<td>Adjusted R-squared</td>
<td>0.683213</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>63.26559</td>
<td>Durbin-Watson stat</td>
<td>1.719965</td>
<td></td>
</tr>
<tr>
<td>Prob(F-statistic)</td>
<td>0.000000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Coefficient of the tax to GDP ratio is positive and significant at 5 percent level, which implies that higher the tax rate, higher will be the currency holdings. Coefficient of tax to GDP ratio shows that one percent change in the tax to GDP ratio leads to a change in currency...
ratio by 1.213. Negative and significant association between the inflation and currency ratio implies that on percent increase in inflation rate lead to decrease in the demand for currency holdings by 0.012. Coefficient of growth rate is negative, which implies that higher level of economic growth is expected to decrease the demand for currency holdings.

Value of t-statistic shows that its impact is significant and we can use it for predicting (estimating) the size of the underground economy. Coefficient of the lagged dependent variable is positive and significant at seven percent, which indicates that it is significantly capturing the impact of inertia. $R^2$ is 0.68 and the F-statistic is also significant, which shows that the variables in specification explain significantly variations in the dependent variable. Value of h-Durbin statistic is $-1.78$ which lies inside the critical range, thus there is no serious autocorrelation problem.

Also, we test between pooled regression and OLS fixed effect in which null hypothesis states fixed effect is redundant. Regarding to dataset which was available, F-stat and Chi-square cannot reject the null hypothesis so we don’t have need to consider the individual effect of OECD countries.

3. 2. Unit root test

In next step when we estimate the tax evasion, In order to investigate the possibility of panel regression and consideration the relationship between the tax evasion and tax revenue and also the relationship between the tax evasion and tax revenue with economic stability. In the presence of unit root variables, when nonstationary time series are used in a regression model one may obtain apparently significant relationships from unrelated variables. This phenomenon is called spurious regression. Therefore it is first necessary to determine the existence of unit roots in the data series. Panel unit root tests are similar, but not identical to unit root tests carried out on a single series. The literature suggests that a panel-based unit root test enhances the power of the unit root test as it allows for greater efficiency by providing more degrees of freedom and for heterogeneity across individual series. For this study we have chosen the Im, Pesaran and Shin (IPS), which is based on the well-known Dickey-Fuller procedure. Investigations into the unit root in panel data have recently attracted a lot of attention.

Table 2 presents the panel unit root tests. At a 5% significance level. The p-values corresponding to the IPS value calculated for the ratio of tax revenue to government expenditure (TAXGOV), tax evasion (TAXEV), openness (OPEN) and size of government (SIZE) are less than 0.05. This indicates that these series of variables are non-stationary at 5% level of significance and thus these variables are non-stationary. At first differences, however, the null is strongly rejected in this cases and we conclude that these series are integrated of order one $I(1)$ in the constant plus time trend of the panel unit root regression and other variable is stationary in level. At levels with intercept and trend the p-values corresponding to the IPS value calculated for the standard deviation of GDP (SDGDP), inflation (INF), economic growth (GROWTH) are larger than 0.05.

This indicates that these series of variables are stationary at 5% level of insignificance and thus these variables are stationary. Therefore, we can conclude that some of the variables are non-stationary and some of this variable in stationary specifications at level by applying the Panel unit root test which is also applied for heterogeneous panel to test the series for the presence of a unit root.
Table 2. Panel unit root tests.

<table>
<thead>
<tr>
<th>Variables</th>
<th>IPS Statistic</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of tax revenue to government expenditure</td>
<td>0.18</td>
<td>0.57</td>
</tr>
<tr>
<td>Tax evasion</td>
<td>0.38</td>
<td>0.65</td>
</tr>
<tr>
<td>Openness</td>
<td>-0.005</td>
<td>0.49</td>
</tr>
<tr>
<td>Size of government</td>
<td>1.33</td>
<td>0.90</td>
</tr>
<tr>
<td>Standard deviation of GDP</td>
<td>-5.21</td>
<td>0.00</td>
</tr>
<tr>
<td>Inflation</td>
<td>-4.19</td>
<td>0.00</td>
</tr>
<tr>
<td>Economic growth</td>
<td>-8.29</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note: Levels and first order differences denote the IPS t-test for a unit root in levels and first differences respectively. Number of lags was selected using the AIC criterion. We use the Eviews software to estimate this value.

We can conclude that the results of panel unit root tests reported in Table 1 support the hypothesis of a unit root in some variables across countries, as well as the hypothesis of zero order integration in first differences.

3.3. Cointegration test

The linear combination of the integrated series was tested for co-integration to show if a long-run relationship exists among the variables of interest. The result of the pedroni panel cointegration test is shown in Table 3.

Table 3. The Pedroni Panel Cointegration Test.

<table>
<thead>
<tr>
<th>Test</th>
<th>Constant trend</th>
<th>Constant + Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel γ-Statistic</td>
<td>0.002</td>
<td>0.001</td>
</tr>
<tr>
<td>Panel ρ-Statistic</td>
<td>0.999</td>
<td>1.000</td>
</tr>
<tr>
<td>Panel t-Statistic: (non-parametric)</td>
<td>0.999</td>
<td>0.809</td>
</tr>
<tr>
<td>Panel t-Statistic (adf): (parametric)</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Group ρ-Statistic</td>
<td>0.890</td>
<td>0.888</td>
</tr>
<tr>
<td>Group t-Statistic: (non-parametric)</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td>Group t-Statistic (adf): (parametric)</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note: All statistics are from Pedroni’s procedure (1999) where the adjusted values can be compared to the N(0,1) distribution.
By using the cointegration test, results show that the variables move together in the long run. That is, there is a long-run steady state relationship between our variables for a cross-section of countries. The next step is an estimation of such a relationship. In first section the main goal of the paper is to measure the effect tax revenue on tax evasion using an available panel dataset.

3.4. Estimate the model

For our panel data pooled OLS, fixed and random effect estimation techniques will be used. However, there are few important econometric issues which need to be addressed. First, having proxies of economic stability may result in the multi-collinearity in the explanatory variables. However, this issue can be tackled by computing the correlation between the corresponding variables. If the correlation is large, it means that these explanatory variables contain similar information and should not be both included in the regression.

Another more important problem is the possible problem of endogeneity between the variables, as we cannot state for sure which variable determines which. Even though the regressions are very likely to have country- or region specific effects, we will start the estimation from the OLS procedure. The coefficients for the Pooled OLS regression have the expected sign. However, we know that the Pooled OLS is very restrictive. Choosing between Pooled OLS and fixed effect procedure is based on F test, we analyzed the statistics from the F-test for common intercept, which favored the fixed effect estimation.

The main results about the relationship between tax revenue and tax evasion are presented in Table 4. As we have noted earlier, all explanatory variables are taken in level. As was noted above, we discuss the results, obtained with the fixed effect model. After we estimate the model by using Pooled and fixed effect we use F test. These are “pooled regression” (pooled OLS) and “fixed effects”. The first phase in choosing the correct method is carrying out the F test which tests the homogeneity of the country’s effects. The null hypothesis in which fixed effect model is redundant versus pooled regression model. According to the result, the model is predicted through Pooled OLS method first, the hypothesis that presents that fixed affects are invalid altogether is also rejected in F tests. According to the results of test, fixed effects model provides are not reliable predictions and we use Pooled model.

Table 4. Pooled Regression Results (Dependent Variable: Tax Evasion).

<table>
<thead>
<tr>
<th>Dependent Variable: TAXEV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method: Pool Least Squares</td>
</tr>
<tr>
<td>Date: 04/24/15  Time: 13:26</td>
</tr>
<tr>
<td>Sample: 1990 2013</td>
</tr>
<tr>
<td>Periods included: 24</td>
</tr>
<tr>
<td>Cross-sections included: 29</td>
</tr>
<tr>
<td>Total panel (unbalanced) observations: 687</td>
</tr>
</tbody>
</table>
As mentioned earlier, we use the shadow economy a proxy for tax evasion. Though the shadow economy measures that portion of a country’s parallel economy, we find it a suitable proxy for tax evasion due to the following reasons. To the best of our knowledge, no estimates of the amount of tax revenues evaded are readily available for our set of countries. Table 4 shows that all coefficients are significant at 95% level of confidence (5% level of error). According to the coefficient the LTAXGOV an increase in the ratio of tax to government expenditure by 1 percent reduces the tax evasion by 0.10 percent. This result is consistent with other studies. Also the coefficient the squared of the ratio of tax to government expenditure is negative and significant which implies that higher tax rates and tax revenue can lead to more tax evasion.

The coefficient of determination (or $R^2$) is 0.74 and the F-statistic is also significant, which shows that the variables in specification explain significantly variations in the dependent variable. Value of Durbin-Watson statistic is 1.89 which means that there is no serious autocorrelation in the sample. Also, we test between pooled regression and OLS fixed effect in which null hypothesis states fixed effect is redundant. Regarding to dataset which was available, F-stat and Chi-square cannot reject the null hypothesis so we don’t have need to consider the individual effect of OECD countries.

In next step we consider the role of economic stability of tax revenue. There is hardly any established theoretical foundation on the specification of a model that explains the impact of taxation on economic stability. Therefore, emphasis is on identified variables in the extant empirical literature.

The starting point for our specification is the standard analysis of Kent et al (2005) and Martinez-Vazquez et al (2009). Even though they are panel data approach, we modified the models to the OECD countries. The main results about the relationship between tax revenue and standard deviation of GDP are presented in Table 5. These are “pooled regression” (pooled OLS) and “fixed effects”. The first phase in choosing the correct method is carrying out the F test which tests the homogeneity of the country’s effects. The null hypothesis in which fixed effect model is redundant versus pooled regression model. According to the result, the model is predicted through Pooled OLS method first, the hypothesis that presents
that fixed affects are invalid altogether is also rejected in F tests. According to the results of test, fixed effects model provides are not reliable predictions and we use Pooled model.

**Table 5.** Pooled Regression results (dependent variable is standard deviation of GDP).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>1.203941</td>
<td>0.373579</td>
<td>3.222721</td>
<td>0.0003</td>
</tr>
<tr>
<td>LTAXGOV</td>
<td>-0.148374</td>
<td>0.021316</td>
<td>-6.960686</td>
<td>0.0000</td>
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<tr>
<td>SIZE</td>
<td>0.249384</td>
<td>0.120832</td>
<td>2.063890</td>
<td>0.0001</td>
</tr>
<tr>
<td>OPEN</td>
<td>1.283721</td>
<td>0.392876</td>
<td>3.267496</td>
<td>0.0004</td>
</tr>
<tr>
<td>INF</td>
<td>0.928321</td>
<td>0.028374</td>
<td>32.71731</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>R-squared</th>
<th>Adjusted R-squared</th>
<th>Prob(F-statistic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>156.59867</td>
<td>Durbin-Watson stat</td>
<td>0.11996</td>
</tr>
<tr>
<td></td>
<td>0.663940</td>
<td>0.66192</td>
<td>0.000000</td>
</tr>
</tbody>
</table>

Table 5 shows that all coefficients are significant at 95% level of confidence (5% level of error). This is not a surprising indication because OECD countries is a developing nations mostly depends on tax revenue to reach sustainable economic growth. According to the coefficient of LTAXGOV an increase in the ratio of tax to government expenditure by 1 percent reduces the standard deviation of GDP by 0.14 percent. In other word, the results show that changes in taxation does have positive impact on economic stability (reduce the standard deviation of GDP). Therefore a result of this study does support the supply-side hypothesis which emphasizes the effect of tax towards economic stability.
However the strong growth performance helps to boost up the tax revenue collection. Economic stability in the long run and short run cause on positive relationship between both variables. For the other variables, government size is shown to have negative impact on economic stability. This means the larger the size of government, the less instability the economy. Openness is shown to be positively and significantly related to economic stability with a coefficient of (1.28) and a positive t-value of (3.26). The implication of this is that outward oriented economies are more exposed to external shocks and are therefore more volatile. This is because more open economies are prone to global economic crisis. Finally inflation has a positive and significant effect on economic stability. The implication of this is that increase in price level lead to increase the instability in economic.

4. CONCLUSION

This paper attempts to study the relationship between tax evasion and tax rates and economic stability. This study examine the relationship between economic stability with tax evasion and tax rates using a fixed panel data model for a selected number of countries including OECD countries based on data comprised of the period of 1990 – 2013, by using Panel data technique. The main contribution of this paper will be the study of the relationship between tax evasion and economic stability. We use the shadow economy a proxy for tax evasion. Though the shadow economy measures that portion of a country’s parallel economy, we find it a suitable proxy for tax evasion due to the following reasons. According to the results one percent increase in the ratio of tax to government expenditure reduces the tax evasion by 0.10 percent. Also the coefficient the squared of the ratio of tax to government expenditure is negative and significant which implies that higher tax rates and tax revenue can lead to more tax evasion. Finally, results show that dominant negatively relationship between taxes and output volatility, our estimation results show that tax ratio is positively and significantly related to economic stability and tax evasion is negatively and significantly related to tax income.

Reference


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