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Modeling Tax Evasion across South Asia: Evidence from Bangladesh, India, Pakistan, Sri Lanka and Nepal

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Mobilization of domestic revenue is of paramount importance in the context of the South Asian region since most of these regional countries are dependent on multidimensional development assistance which are expected to exhibit a decreasing trend in future. However, the low ratio of tax revenue to GDP scenario across South Asia is a major area of deep concern for the associated countries that have been ineffective in making remarkable improvements in their respective tax-GDP ratio. Thus, this paper aims to fill the gap in existing literature by modeling the tax evasion phenomenon across Bangladesh, India, Pakistan, Sri Lanka and Nepal. The authors employ annual data of relevant macroeconomic variables for the time period between 2001 and 2015. As part of the regression model, the authors express the tax-GDP ratio as a function of macroeconomic factors attributing to tax compliance in these countries. Fixed effects panel estimation techniques along with Vector Error Correction Model approach and Granger Causality test were also considered for robustness of the findings. Moreover, the authors also consider an additional model to investigate the linearity of the relationship between tax-GDP ratio and macroeconomic aggregates of national income. The results reveal that political stability and the existing conditions of the public services have positive impacts on the tax-GDP ratio. Moreover, the findings also confirm a non-linear relationship between tax-GDP ratio and per capita GDP and GDP growth rate since the estimated slope coefficients are found to be negative initially but they become positive following the inclusion of the squared terms of GDP and GDP per capita. In light of the estimations, it is found that the threshold levels of per capita GDP and GDP growth rate are 14, 563 US$ and 5.1% respectively and political instability is found to attribute to tax evasion in South Asia.

Keywords: tax evasion, SDG, South Asia, causality

Field of Research: Economics

1. Introduction

Tax evasion refers to the act of paying less tax than you are legally obliged to pay as per the tax structure set by the state (Bishop, 2001). It involves deliberately taking illegal footsteps to manipulate tax authorities in order to minimize or completely eliminate the burden of paying taxes. Tax evasion as a phenomenon has existed as long as taxes themselves. It is so obvious that it can be found in every country and at every juncture of human history, carried out both by individuals and by corporations. Honest and

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hardworking ordinary people, who religiously pay their taxes, find the notion of tax evasion to be highly unpalatable, if not deeply disturbing. However, in low and Lower Middle Income Countries (LMIC), the frequency of such law-abiding people is heavily outnumbered by those practicing the unlawful act of tax evasion. The evasion of taxes violates the principle of horizontal equity, since people earning the same income may end up paying different amounts of taxes triggering wealth and income inequalities to some extent (Shom, 1993). Moreover, tax evasion narrows down the tax base which may induce a rise in tax rates that lead to a greater tax burden on those who pay tax. This creates a vicious cycle, since high tax rates may inspire a new round of tax evasions and become a reason behind the Laffer curve (Hillman, 2003). In the aftermath of the global financial crisis tax evasion by the social elites has generated widespread public outcry and substantial political condemnation.

Meanwhile, tax evasion is increasingly gaining the reputation as a major impediment to the attainment of the Sustainable Development Goals (SDGs). Several SDG goals and targets are directly or indirectly related to tax evasion (United Nations). For example, in some of the targets enlisted under GDG 17, the issue of tax evasion is has been addressed by stating that domestic capacity for tax collection must be improved which should be reflected through increment in the government's overall revenue share of the GDP and via enhancement of the proportion of domestic budget financed by domestic tax revenue. Domestic revenue mobilization, especially through the effective generation and utilization of the government's tax revenue, has been extensively referred to as one of the prioritized public agendas in meeting the prerequisite of worldwide SDGs attainment by 2030. Accordingly, SDG 1 and SDG 15 demand increased domestic revenue mobilization for poverty reduction and biodiversity conservation, respectively. At least 14 of the 17 SDGs require fiscal soundness of an economy, which is invariably jeopardized through high precedence of tax evasion behavior, especially in the low and LMIC. Although, the developing countries usually rely on inflow of foreign financial assistance to support their respective shortfall in government revenue, such reliance may exert debt servicing burden exchange rate volatility on the assistance-recipient economies which in turn can also negatively affect the SDGs attainment (Amin and Murshed 2018; Amin and Murshed, 2017).

Tax evasion is viewed as the outright robbery of government revenue. It is a crime which deprives a nation of the resources required for its development. As a result, it creates a treasury bereft of funds which force the government to "eat into the very vitality of the citizens" (Kautaliya, 2nd century BC). Tax-GDP ratio has been utilized as a useful indicator of the extent of tax evasion within an economy (Cobham, 2005; Chaudhry and Munir, 2010; Yalama and Gumus, 2013; Besley and Persson, 2014; Mehrara and Farahani, 2016; Gaalya *et al*. 2017). The low tax-GDP ratio has been a grueling problem across the South Asian countries. Amongst these nations, Nepal, in recent times, has registered the best tax-GDP ratio despite being a low-income country while Bangladesh, India, Pakistan and Sri Lanka being LMIC, all having lower tax-GDP ratio than Nepal. Over the course of 2001 to 2013, Nepal has experienced an average annual growth in its tax-GDP ratio of more than 73%, handsomely outpacing all the other four aforesaid neighboring countries. In contrast, Bangladesh has been languishing behind in terms of its tax-GDP ratio which has historically been lower than that of its South Asian

counterparts. Sri Lanka, once having the best tax-GDP ratio amongst the South Asian countries, has mostly undergone negative trends in its tax-GDP growth. On the other hand, India managed to attain a steady growth in its tax-GDP ratio until 2007 when its tax-GDP ratio peaked at 12.67%. However, the nation was unable to sustain its tax-GDP ratio which witnessed a sharp fall from then after. Figure 1 (in the appendix) shows a picture of the trends in the tax revenue share of total GDP in context of selected South Asian countries.

Against this backdrop, there exists significant motivation to investigate the determinants of tax evasion, not only to understand tax evasion per se but also to formulate solutions that circumvent the problem altogether. This paper aims to conduct such a study by modeling the macroeconomic and socio-political variables that influence tax evasion. The novelty of this study is its dual emphasis on both macroeconomic indicators and socio-political indicators. This is based on the premise that any explanation of tax evasion that is grounded on only either one of the categories fails to acknowledge the influence of the other and is thus unable to paint a clear picture of the issue. The following questions are specifically addressed in this paper:

1. What are the macroeconomic factors that influencing tax evasion across South Asia?
2. What is the nature of the causal associations between tax evasion and its determinants?

The remainder of the paper is structured as follows. Section 2 reviews similar studies documented in existing literature which is followed by section 3 that provides the empirical model and specifies the data used in the paper. The chosen methodology of the research is given in section 4 while the estimated results and corresponding discussions are reported in section 5. Finally, section 6 expresses the authors' conclusions and sheds light on the policy implications.

2. Literature Review

This section has been divided into two subsections. The first part provides a theoretical framework while the latter presents empirical evidence documented in existing literature in relevance to the research focus.

2.1 Theoretical Framework

Conventional theories of tax evasion originate out of the acknowledgment that tax evasion is a crime. Once this consensus is established, tax evasion can be investigated in the same fashion as any other criminal activity. From an economic perspective, the number of offenses committed by an individual is negatively related to his probability of conviction and punishment per offense (Becker, 1974). An offense is committed by an individual if the expected utility of the offense to him is greater than the expected utility that he could get from other activities. Therefore, the underlying reason behind the crime is not a difference in motivation of different individuals, but rather a difference in expected costs and benefits of different individuals (Becker, 1974).

This idea of expected costs and benefits is used by (Allingham and Sandmo, 1972) in their tax evasion model. In this model, tax evasion is viewed as a strategic situation. A taxpayer's decision to pay taxes is influenced by the corresponding costs and benefits of tax evasion. The taxpayer is assumed to be a rational individual who has full information regarding the costs and benefits of tax evasion and ultimately makes his choice based on the objective of maximizing his utility. From this it can implied that tax evasion occurs when:

E(penalty) < E(benefit)
Or
E(benefit) > E(penalty)

where: E (penalty) = expected value of penalty from tax evasion
E (benefit) = expected value of benefit from tax evasion

Thus tax evasion occurs when the expected value of the benefit from tax evasion is greater than the expected value of the penalty from tax evasion. This analysis implies that any measures designed to tackle tax evasion should be constructed in such a manner that they raise the expected value of the penalty from tax evasion above and beyond the expected value of the benefit from tax evasion. In order to increase the expected value of the penalty, either the probability of detecting tax evasion or the post-detection penalty for tax evasion must be increased.

Although the (Allingham and Sandmo, 1972) model of tax evasion is theoretically appealing, it has several drawbacks. Some of the assumptions of the model, such as rationality of the tax evader and complete information, may not hold in reality. For instance, individuals may not be able to accurately assess the probability of getting caught. Additionally, different individuals have different attitudes towards risk and this can directly determine whether they consider tax evasion to be worthwhile. Finally, the model fails to acknowledge the socio-political aspects of tax evasion, such as the psychological costs suffered by tax evaders who get caught.

Following these shortcomings, alternative theories of tax evasion have been explored and considered at different times. For example, people may evade taxes simply because they are too fond of their money (Plato, 380 BCE). Tax evasion could be indicative that people feel that taxes are too high compared to the benefits they receive, or that they feel that their tax money is not being spent wisely by the government (Hillman, 2003). Tax evasion may be viewed as unfair since it involves free riding of public goods (Hillman, 2003). The "just man" may pay more tax than the "unjust man" and yet still get the same or even fewer benefits from the state (Plato, 380 BCE). This may motivate the "just man" to evade taxes as well.

Since corruption is conducive to tax evasion, it is necessary to incorporate a corruption indicator in a tax evasion model. However, corruption alone does not suffice in explaining the political economy of tax evasion. This becomes obvious when we observe the methods commonly employed to evade taxes. These methods include, but are not limited to, misrepresentation of the true value of assets, concealment of ownership,

underreporting of income, failure to declare profits, hiding money from creditors, using offshore structures to conceal banking activities, filing false returns, opening and servicing undeclared accounts in tax havens, creating fictitious companies, and employing an "army of clever accountants" (Platt, 2015). These ingenious mechanisms reveal not only the creativity of tax evaders but also the importance of rule of law and governance as determinants of tax evasion.

2.2 Empirical Evidence

This paper attempts to shed light on the pitfalls of the suggestions provided by Gupta (2015) with regards to generating larger tax revenue in South Asia. According to Gupta (2015), the South Asian countries were recommended to broaden their tax bases, simplify their tax systems and strengthen the tax administration. Yet, despite implementation of most of these suggestions not much progress has resulted in escalating the tax-GDP ratio across South Asia. A plausible explanation for these trends could be the fact that merely increasing the tax base would not simulate simultaneous increment in the tax-GDP ratio if willingness of the taxpayers to file their tax returns is not ensured. For instance, according to the Household Income Expenditure Survey report of Bangladesh (HIES 2016), there had been an increase in the taxpayer base in the country over 2010 and 2016. However, still, the nation experiences poor tax-GDP ratio compared to the other LMICs. Moreover, strengthening the tax administration requires good governance as a key prerequisite, which was not given emphasis in the paper by Gupta (2015). Thus, this paper makes an attempt to put forward other determinants of tax compliance in Bangladesh and other South Asian countries that have faced similar macroeconomic constraints.

The concerning issue of poor or lack of good governance stimulating adverse impacts on the government’s revenue figures has been documented in a study by Hiwatari (2014). A linear regression model comprising of tax effort, defined as the ratio of revenue to GDP, was expressed as a function of the economic and institutional factors that determine tax revenue generation. The study used annual data in a panel framework in the context of 55 developed and developing economies over 2002 and 2012. Pooled OLS, fixed effects and random effects panel estimators were employed to determine the tax effort dynamics in those countries. In light of the regression findings, it was asserted that governance plays a crucial role in determining government's tax revenue collection since a less corrupt tax administration was found to be effective in generating more revenue compared to a highly corrupt and less capable administration.

Likewise, Mansor and Guarama (2016) also made an attempt to map the determinants of tax evasion behavior in the potential taxpayers in the Gombe state of Nigeria. The methodology of their study involved a primary survey that was conducted on 303 taxpayers belonging to both the private and public sectors in within that state. Based on the questionnaire, the authors modeled a multiple linear regression model of tax evasion with several possible determinants of tax evasion as the explanatory variables. Reliability tests, Variance Inflating Factor (VIF) approach to test multicollinearity, descriptive statistical analysis and Ordinary Least Squares (OLS) estimation techniques were employed to determine the relationships between tax evasion and its determinants.

According to the estimated results, corruption and the rate of income tax were found to stimulate tax evasion while the acceptability of the tax system and other demographic characteristics of the taxpayers' were found to inflict reduction in the tax evasion behavior.

Economic instability has also been referred to as one of the prime reasons behind low tax-GDP ratio in developing countries. In many empirical studies, domestic inflation had been referred to as a proxy variable for economic instability. The general understanding behind this proxy selection is that as economic stability decreases, the rate of inflation goes up. However, the final effect of inflation on tax revenue collection has yet to reach a unanimous decision. In a study by Caballé *et al.* (2004), the authors examined the effects of inflation on tax evasion behavior. The results from this analysis confirmed that as inflation increases in the economy, the quantum of punishment following detection of unreported taxable income practices, in real terms, declines which in turn stimulates tax evasion decisions. Thus, a negative relationship between inflation and tax revenue can be expected. In contrast, Patoli *et al.* (2012) asserted that rising rates of inflation can be effective in increasing the revenue of the local government. According to the authors, inflation and tax revenue are positively correlated. However, the rise in tax revenue is less than the rise in the rate of inflation. Their findings were in line with the findings by Chaudhry and Munir (2010) in context of Pakistan.

Establishment of rule of law and the building the government's capacity to implement the tax acts effectively has also been associated with changes in tax payment attitudes in potential taxpayers. The effective role of tax audits and penalties in reducing tax evasion has been acknowledged in the past (Slemrod *et al.* 2001). In contrast, a study by Mohdali *et al.* (2014) suggested that the effects of threats of punishment for tax non-compliance attitudes of members of the tax base of Malaysia failed to uplift the rate of tax compliance in the country. The study involved primary survey on 302 individual taxpayers in Malaysia, amongst whom about 90% of the respondents were paid salary earners while the rest were self-employed. The survey findings clearly opposed the *a priori* expectation of threats of punishment following detection of non-compliance and partial compliance being effective in inducing greater compliance was not held to be true. Rather, the results revealed that the threats of audits and penalties actually stimulated tax evasion decisions in Malaysia. The ineffectiveness of tax penalties in stimulating tax payment decisions was also put forward in the paper by Swistak (2016).

3. Empirical Model and Data Specification

The empirical model considered in this paper is an extension of the model proposed by Yalama and Gumus (2013). In contrast to that model which was in the context of data obtained from survey analysis, the authors of this paper have augmented that model via inclusion of crucial variables that can be effective in explaining the tax evasion scenario across South Asia. The regression model in general form is as follows:

$$\frac{tax}{gdp}_{it} = \beta_0 + \beta_1 COR_{it} + \beta_2 ROL_{it} + \beta_3 PR_{it} + \beta_4 INF_{it} + \beta_5 HDI_{it} + \beta_6 GDPPC_{it} + \beta_7 GDP_{it} + \beta_8 GOV_{it} + \epsilon_{it} \ldots \text{(i)}$$

where i denotes country (or cross-section) and t refers to time. In addition, $\frac{TAX}{GDP}$ is the tax-GDP ratio which was taken as a proxy for tax evasion; COR is corruption; ROL is rule of law; PR is political risk; INF is inflation and is used as a proxy for economic stability; HDI is human development index and used as a proxy to denote the status of health and education in the economy; GDPPC is per capita GDP; GDP is growth rate of GDP; and GOV refers to government's expenditure. Annual data for all the aforementioned variables were collected across 2001 to 2015 using various sources. COR, ROL and PR are considered as indicators of governance within the economies of the countries in the panel. The values of COR, ROL and PR range from -2.5 to 2.5 where a higher value refers to less corruption, better implementation of law and order and lower political instability, respectively. Further description of all the variables and their corresponding data sources are provided in table 1.

Moreover, in order to analyze whether the relationship between tax evasion and economic growth is linear or quadratic, the authors augment equation (i) with the squared terms of GDPPC and GDP. The augmented regression model is as follows:

$$\frac{tax}{gdp}_{it} = \beta_0 + \beta_1 COR_{it} + \beta_2 ROL_{it} + \beta_3 PR_{it} + \beta_4 INF_{it} + \beta_5 HDI_{it} + \beta_6 GDPPC_{it} + \beta_7 GDPPC_{it}^2 + \beta_8 GDP + \beta_9 GDP_{it}^2 + \beta_{10} GOV_{it} + \epsilon_{it} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(ii)}$$

Table 1: Description of the Data and the Corresponding Data Sources

Variable	Description/Unit	Source
Tax-GDP	It refers to government's revenue collected from taxation tools and measured as a percentage of GDP.	World Development Indicators, 2017
COR	Control of Corruption index is used as a proxy for corruption. It reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Higher values of the control of corruption index reflect better governance. Measured in the index value.	Worldwide Governance Indicators, 2017
PR	It measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Political risk index is used as a proxy for political stability in the model. Measured in the index value. Higher values of the control of corruption index reflect better governance	Worldwide Governance Indicators, 2017
ROL	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Measured in the index value. Higher values of the ROL index reflect better governance.	Worldwide Governance Indicators, 2017
INF	Inflation, as measured by the annual growth rate (in percentage terms) of the GDP implicit deflator, shows the rate of price change in the economy as a whole. The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.	World Development Indicators, 2017
HDI	The Human Development Index (HDI) is a composite statistic (composite index) of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development.	United Nations Development Program, 2016
GDPPC	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars.	World Development Indicators, 2017
GDP	Annual percentage growth rate of GDP (in percentage terms) at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.	World Development Indicators, 2017
GOV	General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security but excludes government military expenditures that are part of government capital formation.	World Development Indicators, 2017

4. Methodology

4.1 Fixed Effects Panel Estimation Techniques

Given the heterogeneity of the data set in terms of countries belonging to different income groups and levels of development, the fixed effects panel estimation techniques are considered to be appropriate, over the pooled Ordinary Least Squares (OLS) methods, in this paper. In contrast to the pooled OLS estimation that provides a common constant

across all cross sections, the fixed effects estimation technique allows for cross section-specific constants. The fixed effects estimator can also be classified as the Least-Squares Dummy Variables (LSDV) since it incorporates a dummy variable for each cross-section to include different constants (Asteriou and Hall, 2007). A simple fixed effects model can be given by:

$$Y_{it} = A_i + \partial_1 X_{1it} + \partial_2 X_{2it} + \cdots + \partial_3 X_{kit} + U_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(ii)}$$

where Y and X are dependent and independent variables, respectively. The subscripts 'i' denotes a particular cross section or country and can take any value from 1 to N (i.e. I = 1, 2, …, N). The other subscript 't' is used to denote the time period (t = 1, 2, …, T). The constant term is given by A which varies according to the value of i. This model can be rewritten in matrix form as well:

$$Y = DA + X\partial' + U \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(iii)}$$

where D is the dummy variable that allows different cross section-specific estimates for each of the constant term.

The appropriate applicability of a fixed effects estimation method over a random effects estimation method can be confirmed by the results from the Hausman (1978) test. The null hypothesis used in the test asserts that the random effects model is appropriate, which is tested against the alternative hypothesis asserting the fixed effects model to be more appropriate. Under this test, if the estimated value of the Chi-squares statistic is greater than the associated critical value then the null hypothesis can be rejected validating the acceptability of the fixed effects estimation method, vice-versa.

4.2 Panel Vector Error Correction Model Approach to Causality

A VECM model is a restricted Vector Autoregressive VAR) model structured to employ non-stationary series that are known to be cointegrated. It is restricted in the sense that the VECM has cointegrating relations built into the specification so that it restricts the long-run behavior of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the Error Correction Term (ECT) which provides the pace at which any deviation from the long-run equilibrium in the previous lag is corrected in the next lag through a series of partial short-run adjustments. This is referred to as the Error Correction Mechanism (ECM).

Engle and Granger (1987) showed that a VECM is an appropriate method to model the long-run as well as short-run dynamics among the cointegrated variables. However, in context of a multivariate regression analysis, the VECM approach is preferred to provide only the short-run causality among the variables. Causality inferences in the multi-variate framework are made by estimating the parameters of the following VECM equations:

$$\Delta Y = \alpha + \sum_{i=1}^{m} \beta i \Delta Y_{t-i} + \sum_{j=1}^{n} \gamma_j \Delta X_{t-j} + \sum_{k=1}^{0} \delta \Delta M^s + \sum_{l=1}^{p} \zeta \Delta N + \theta Z_{t-1} + \varepsilon_t \quad \text{(iv)}$$

$$\Delta X = a + \sum_{i=1}^{m} b_i \Delta Y + \sum_{j=1}^{n} c_j \Delta X_{t-j} + \sum_{k=1}^{0} d \Delta M^s + \sum_{l=1}^{p} e \Delta N + f Z_{t-1} + \xi_t \quad \text{(v)}$$

z_{t-1} is the error-correction term which is the lagged residual series of the cointegrating vector. The error-correction term measures the deviations of the series from the long run equilibrium relation. For example, from equation (iv), the null hypothesis that X does not Granger-cause Y is rejected if the set of estimated coefficients on the lagged values of X is jointly significant. Furthermore, in those instances where X appears in the cointegrating relationship, the hypothesis is also supported if the coefficient of the lagged error-correction term is significant. Changes in an independent variable may be interpreted as representing the short run causal impact while the error-correction term provides the adjustment of Y and X toward their respective long-run equilibrium. Thus, the VECM representation allows us to differentiate between the short- and long-run dynamic relationships. The Chi-Square test statistic is used to determine the short run causalities between pairs of variables in the model.In the context of a panel of N countries, three regressors (X, Y and Z) across T time period, the VECM model can be given by:

$$\begin{bmatrix} \Delta X_{it} \\ \Delta Y_{it} \\ \Delta Z_{it} \end{bmatrix} = \begin{bmatrix} \omega_{1i} \\ \omega_{2i} \\ \omega_{3i} \end{bmatrix} + \sum_{k=1}^{q} \begin{bmatrix} \alpha_{11ik} & \alpha_{12ik} & \alpha_{13ik} \\ \alpha_{21ik} & \alpha_{22ik} & \alpha_{23ik} \\ \alpha_{31ik} & \alpha_{32ik} & \alpha_{33ik} \end{bmatrix} \begin{bmatrix} \Delta X_{it-k} \\ \Delta Y_{it-k} \\ \Delta Z_{it-k} \end{bmatrix} + \begin{bmatrix} \gamma_{1i} \\ \gamma_{2i} \\ \gamma_{3i} \end{bmatrix} ECT_{it-1} + \begin{bmatrix} \mu_{1it} \\ \mu_{2it} \\ \mu_{3it} \end{bmatrix} \quad \text{.... (vi)}$$

where Δ denotes first difference transformation of the variables.

In addition to estimating the short run causality between the variables considered in the model, the VECM approach is also used to calculate the Error Correction Term (ECT) which shows the pace at which any deviation from the equilibrium in the previous lag is adjusted in the following lag. In order for the ECT to be considered, it must be both negative and statistically significant at 10% level of significance.

4.3 Panel Granger Causality Test

The panel Granger causality test is similar to the Granger causality test in the context of individual time series introduced by Granger (1969, 1980, and 1988). It is one of the important matters that has been much studied in empirical macroeconomics and empirical finance. The presence of non-stationarity can lead to ambiguous or misleading conclusions in the Granger causality tests (Engle and Granger, 1987). Only when the variables are cointegrated, it is possible to deduce that a long run relationship exists between the non-stationary time series. When we take y and x as the variables of interest, then the Granger causality test (Granger, 1969) determines whether past values of y add to the explanation of current values of x as provided by information in past values of x itself. If previous changes in y do not help explain current changes in x, then y does not Granger cause x. In a similar way, we can examine if x Ganger causes y just be interchanging them and carrying out this process again. There could be four probable

outcomes: (a) x Granger causes y (b) y Granger causes (c) Both x and y granger causes the other and (d) neither of the variables Granger causes the other. In this paper, the causality tests among all the concerned variables are conducted. For this the following sets of equations are estimated:

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \cdots\cdots + \alpha_l x_{t-l} + \beta_1 y_{t-1} + \cdots\cdots + \beta_l y_{t-l} + u_t \quad \text{..... (vii)}$$

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \cdots\cdots + \alpha_l y_{t-l} + \beta_1 x_{t-1} + \cdots\cdots + \beta_l x_{t-l} + v_t \quad \text{..... (viii)}$$

The above set of equations are considered for all possible pairs of (x, y) series in the group. The reported F-statistics are the Wald statistics for the joint hypothesis.

5. Results and Discussions

Results following the regression analysis of model (i) are reported in table 2. In light of the estimations, the authors find positive impacts of corruption control and political risk reduction on tax compliance in the panel of five South Asian nations. The coefficient attached to COR is negative and statistically significant at 1% level of significance. It implies that as a tax administration, and the economy in a broader sense, gradually gets relieved from the grasp of corruption the potential taxpayers' willingness to pay taxes goes up, holding all other variables in the model unchanged. Similarly, the negative and statistically significant estimated slope coefficient of PR also implies a positive relationship between tax compliance and political stability. However, ROL is found to be statistically insignificant in explaining the variation in the tax-GDP ratio. Thus, the results corroborate to the fact that good governance is one of the prime issues pushing tax-compliance behavior in the taxpayers' base and reduce tax evasion to a large extent. These findings are pretty much in line with the conclusions of Di John (2009) in context of Sub-Saharan African countries.

Table 2: Panel Fixed Effects Estimation of Model (i)

Independent Variables	Dependent Variable: (Tax/GDP)	
	Coefficient (Probability)	Standard Error
COR	0.315 (0.000)*	3.360
ROL	0.315 (0.374)	0.352
PR	1.794 (0.000)*	0.300
INF	0.054 (0.117)	0.034
HDI	58.871 (0.000)*	6.738
GDPPC	-0.002 (0.000)*	0.000
GDP	-0.019 (0.075)***	0.059
G	0.103 (0.178)	0.075
R^2	0.817	
Adjusted R^2	0.781	

*Notes: * , ** and *** denote statistical significance at 1%, 5% and 10% levels; Automatic maximum lag and lag length selections based on Schwarz Information Criteria (SIC)*.

Apart from the governance variables, the results, as reported in table 2, also exhibit the importance of human development in attributing to greater tax payment within the economy. This is evident from the positive sign of the slope coefficient attached to HDI which is statistically significant at 1% significance level too. A possible reason behind this

is the fact that a rise in the HDI can be perceived as a rise in the level of public health care and education services. This, in turn, would encourage the taxpayers to contribute more to the government's revenue generation as the taxpayers would feel that their taxed income is used efficiently for their own welfare (Nakamura and Williamson, 2016). The results also confirm negative associations between tax-GDP ratio and GDPPC and GDP growth, respectively. Moreover, these negative relationships are slightly puzzling in light of conventional economic theory which advocates for a positive relationship since a rise in GDPPC or GDP growth rate would result in a higher level of income which, in turn, should ideally produce a greater amount of tax revenues for the government. The findings are clearly in support of the remarks made by Bretschger (2010). However, the authors find that the estimated slope coefficients attached to GDPPC and GDP are small which forms a base for the authors to introduce the squared terms of GDPPC and GDP into the model.

Table 3 presents the estimated slope coefficients of the explanatory variables revealing the possible relationship with the response variable, tax-GDP. From the table it can be seen that the coefficients of GDPPC and GDP are negative while the corresponding coefficients of $GDPPC^2$ and GDP^2 are positive, suggesting a U-shaped non-linear relationship between tax evasion and per capita GDP and GDP growth rate. The results assert that although economic growth stimulates non-tax compliance and tax evasion initially, the effects are reversed as higher growth rates are achieved. A plausible explanation for this trend can be understood from an income approach which suggests that as an economy achieves economic growth, the real income of the people is expected to rise as well which in turn would lead to greater tax revenues for the government. However, a concerning issue from the findings is that the estimated positive coefficients of $GDPPC^2$ and GDP^2 are very small which reflect that the effect of economic growth does not have a sizeable impact on the tax-GDP ratio. Thus, these findings are supported by the existing low tax-GDP ratio trends in South Asian countries.

Table 3: Panel Fixed Effects Estimation of Model (ii)

IndependentVariables	Dependent Variable: (Tax/GDP)	
	Coefficient (Probability)	**Standard Error**
COR	0.278 (0.049)**	0.353
ROL	1.088 (0.254)	0.9444
PR	1.916 (0.000)*	0.291
INF	0.029 (0.379)	0.032
HDI	61.418 (0.000)*	7.603
GDPPC	-0.003 (0.078)***	0.001
$GDPPC^2$	1.03E-07 (0.099)***	2.13E-07
GDP	-0.530 (0.019)**	0.163
GDP^2	0.052 (0.013)**	0.015
GOV	0.209 (0.010)**	0.079
R^2	0.846	
Adjusted R^2	0.810	

*Notes: * , ** and *** denote statistical significance at 1%, 5% and 10% levels; Automatic maximum lag and lag length selections based on Schwarz Information Criteria (SIC).*

As per the results, the elasticity of tax-GDP ratio with regard to per capita GDP is -0.003 + 2(0.000000103) GDPPC. Thus, the threshold level of per capita GDP at the turning point of the U-shaped non-linear relationship is estimated to be $\frac{0.003}{2(0.000000103)}$ = 14,563 (current US $). Similarly, the elasticity of tax-GDP ratio with regard to GDP growth rate is -0.530 + 2(0.052) GDP. Thus, the threshold level of GDP growth rate is estimated to be $\frac{0.530}{2(0.052)}$ = 5.1 %.

Then the authors performed the panel unit root and cointegration tests as pre-requisites for the causal analyses using VECM and Granger causality test. In accordance with the unit root tests, as reported in table 6 in the appendix, all the variables are stationary at their first differences which allows the authors to proceed on to the cointegration tests. The cointegration results, as reported in table 7 in the appendix, confirms the presence of cointegrating equations in the model which implies that these variables are cointegrated in the long run.

Following the unit root and cointegration analyses, the VECM approach is applied to understand the short run causal dynamics between tax-GDP ratio and its determinants. The corresponding results are given in table 4. As per the estimates, the authors find short-run unidirectional causal linkage running from tax-GDP to GOV since the associated chi-squares statistic is found to be statistically significant at 10% level of significance. This implies that as the government spends its revenue in delivering health care and educational services, in particular, the taxpayers may have an incentive to pay their taxes in order to help the government finance the public welfare projects.

Table 4: The VECM Results

Dependent Variable	Null Hypothesis	Chi-Square Statistic	Probability
D(TAX-GDP)	COR does not Granger cause TAX-GDP	1.667	0.435
D(C0R)	TAX-GDP does not Granger cause COR	4.357	0.113
D(TAX-GDP)	ROL does not Granger cause TAX-GDP	1.301	0.522
D(ROL)	TAX-GDP does not Granger cause ROL	0.322	0.851
D(TAX-GDP)	PR does not Granger cause TAX-GDP	1.287	0.525
D(PR)	TAX-GDP does not Granger cause PR	0.259	0.323
D(TAX-GDP)	INF does not Granger cause TAX-GDP	2.128	0.363
D(INF)	TAX-GDP does not Granger cause INF	0.402	0.818
D(TAX-GDP)	HDI does not Granger cause TAX-GDP	3.540	0.173
D(HDI)	TAX-GDP does not Granger cause HDI	0.235	0.889
D(TAX-GDP)	GDPPC does not Granger cause TAX-GDP	0.422	0.810
D(GDPPC)	TAX-GDP does not Granger cause GDPPC	3.302	0.192
D(TAX-GDP)	GDP does not Granger cause TAX-GDP	2.634	0.268
D(GDP)	TAX-GDP does not Granger cause GDP	3.780	0.151
D(TAX-GDP)	GOV does not Granger cause TAX-GDP	0.299	0.861
D(GOV)	TAX-GDP does not Granger cause GOV	5.201***	0.078

*Notes: The Chi-squares statistics for the explanatory variables are reported while the corresponding probabilities are given in the parentheses. The short-run causality is determined by the statistical significance of the Chi-squares statistics. *, ** and ** denote the statistical significance of the Chi-squares statistics at 1%, 5% and 10% levels of significance.*

Finally, the long run causal associations are analyzed using the Granger causality test and the corresponding test results are reported in table 5. The estimates reveal that in the long run, there is a unidirectional causality running from HDI to tax-GDP implying that HDI is effective in influencing tax evasion trends in South Asia. This is in line with the theory of human capital development which asserts that as the HDI increases the productivity of labor goes up which results in higher wage incomes leading to higher amount of taxes. On the other hand, the authors also find evidence of another unidirectional causal association bridging from tax-GDP to GDPPC. This finding is also justified from the perspective of the income approach to national income accounting that advocates in favor of increasing the public expenditure budget, which is derived partially from the government's tax revenue, in order to attain higher growth rate of GDP and per capita GDP accordingly.

Table 5: The Granger Causality Test Results (Lag=2)

Null Hypothesis	F-Statistic	Probability
COR does not Granger cause TAX-GDP	0.552	0.579
TAX-GDP does not Granger cause COR	0.626	0.538
ROL does not Granger cause TAX-GDP	0.812	0.449
TAX-GDP does not Granger cause ROL	0.101	0.904
PR does not Granger cause TAX-GDP	0.302	0.740
TAX-GDP does not Granger cause PR	0.062	0.940
INF does not Granger cause TAX-GDP	0.220	0.803
TAX-GDP does not Granger cause INF	0.413	0.663
HDI does not Granger cause TAX-GDP	3.076***	0.053
TAX-GDP does not Granger cause HDI	0.235	0.791
GDPPC does not Granger cause TAX-GDP	0.393	0.677
TAX-GDP does not Granger cause GDPPC	2.651***	0.079
GDP does not Granger cause TAX-GDP	2.204	0.119
TAX-GDP does not Granger cause GDP	0.038	0.963
GOV does not Granger cause TAX-GDP	0.824	0.444
TAX-GDP does not Granger cause GOV	0.827	0.442

*Notes: The long-run causality between the variables is determined by the statistical significance of the estimated F-statistics. *, ** and *** denote the statistical significance of the estimated F-statistics at 1%, 5% and 10% levels of significance. The optimal lag is automatically selected by the EViews 7.1 software.*

6. Conclusions

This paper was focused on identifying the possible determinants of tax evasion across the South Asian countries in order to adopt appropriate policies to overcome the hindrances that lay ahead in the context of mobilizing domestic resources for the ultimate goal of SDG attainment. The findings from this paper can be a cornerstone in designing public policies, restructuring the taxation system, strengthening and improving the tax administration and other policy reforms required for diminishing tax evasion behavior in the five selected South Asian nations. Enhancing the tax-GDP ratio by curbing the incidence of tax evasion could ideally be favorable for the economies of the developing and LMICs, making them less reliant on foreign financial inflows (Kayaga, 2007; Pfister, 2009).

In light of the panel data estimations, the authors find evidence suggesting the key role of ensuring good governance within the economy to incentivize the taxpayers to correctly declare their taxable income and pay the legal amount of tax accordingly. The government ideally should look forward to gradually alleviate corruption from the tax administration as well as from all the sectors within the economy in order to draw better tax compliance. Moreover, political stability was also perceived as a crucial macroeconomic tool with regards to lowering the rate of tax evasion. In contrast, implementation of the taxation acts and regulations are found to be statistically insignificant in attributing to a reduction in tax evasion within the economy. Thus, the results are in contradiction to the 'economics of crime' model (Allingham and Sandmo, 1972) that assert that tax payment can be increased by merely strengthening the law and order system and increasing the probability of tax-default detection.

Furthermore, the results also advocated in favor of efficient public spending and allocations contributing to lower tax evasion in South Asia since human development, ideally through hefty public investments in the health and education sectors, were found to be stimulating rises in the tax-GDP ratio. The robustness of this finding was also confirmed by the unidirectional causal association found to be running from HDI to the tax-GDP ratio in the long run. This is pretty much in line with the findings by Barone and Mocetti(2009) in context of Italy. Finally, the findings also shed light on the non-linear relationship between tax evasion and economic growth which implies that it takes a certain amount of GDP growth rate and level of GDP in order to initiate a downward trend in tax evasion.

Data constraint was the main limitation of the paper for which the authors had to rely on the perceptions indices for the governance variables rather than concrete numeric values which would have enhanced the richness of the findings. However, due to this limitation, the perception indices are considered to be the best alternatives to reflect the state of governance within the economy. As far as the scope of further research is concerned, the authors would like to extend the empirical investigation incorporating further robust methodologies in the context of larger panels.

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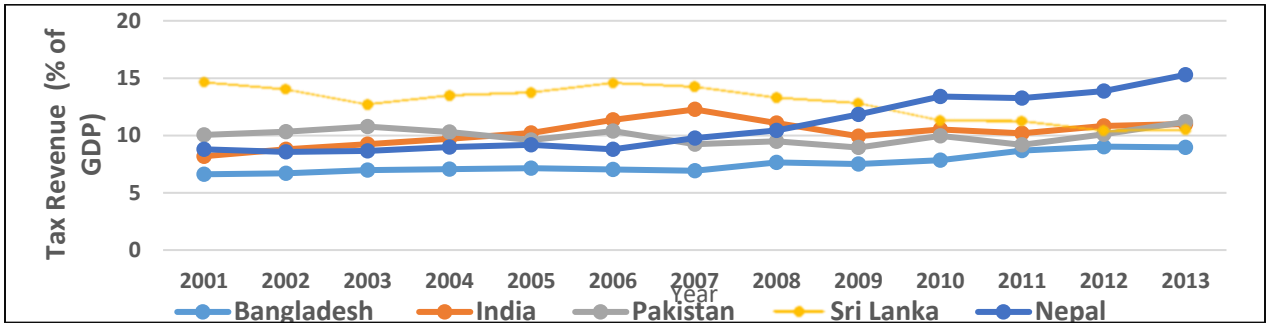
Appendix

Figure 1: Tax Revenue (as % of GDP) Trends Across 2001 and 2013



Source: World Development Indicators (2017)

Table 6: Panel Unit Root Test Results for All Fourteen Countries (Lag=6)

Panel unit root tests at 1st difference, I(1)								
Variable	Levin, Lin & Chu	Im, Pesaran & Shin	Breitung	Maddala and Wu		Hadri		Decision on Stationarity
	t-stat	W-stat.	t-stat.	ADF--Fisher Chi-Square Stat.	PP-Fisher Chi-Square Stat.	Hadri Z-stat	Heter. Cons. Z-Stat.	
Tax-GDP	-6.131*	-2.836*	-2.727*	24.877*	32.948*	3.690*	8.233*	Stationary
	(0.000)	(0.002)	(0.003)	(0.006)	(0.000)	(0.000)	(0.000)	
COR	-8.213*	-7.482*	-5.670*	57.028*	67.475*	2.689*	8.750*	Stationary
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.000)	
ROL	-9.064*	-6.168*	-2.337*	46.600*	63.566*	3.429*	13.649*	Stationary
	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	
PR	-5.564*	-3.875*	0.129	30.886*	28.893*	4.089*	7.300*	Stationary
	(0.000)	(0.000)	(0.551)	(0.001)	(0.001)	(0.000)	(0.000)	
INF	-8.031*	-4.842*	-6.649*	37.988*	81.979*	17.302*	17.402*	Stationary
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	
HDI	-6.313*	-3.816*	-1.643***	31.383*	35.110*	2.120**	1.997**	Stationary
	(0.000)	(0.000)	(0.050)	(0.001)	(0.000)	(0.017)	(0.023)	
GDPPC	-4.694*	-1.825**	-2.704*	18.508**	33.617*	4.130*	11.533*	Stationary
	(0.000)	(0.034)	(0.003)	(0.047)	(0.000)	(0.000)	(0.000)	
GDPPC^2	-4.352*	-1.778**	-2.107**	18.667**	25.837*	3.554*	11.233*	Stationary
	(0.000)	(0.038)	(0.018)	(0.045)	(0.004)	(0.000)	(0.000)	
GDP	-6.401*	-5.184*	-3.067*	40.094*	77.993*	6.785*	13.363*	Stationary
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	
GDP^2	-4.708*	-4.080*	-3.129*	33.884*	74.256*	8.620*	10.307*	Stationary
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	
GOV	-5.800*	-3.666*	-4.538*	31.021*	64.608*	2.225**	9.050*	Stationary
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.013)	(0.000)	

*Notes: Considering trend and intercepts. The probability values are given in the parenthesis. *, **&*** denote statistical significance at 1%, 5% and 10% levels; Automatic maximum lag and lag length selections based on Schwarz Information Criteria (SIC).*

Table 7: Kao Panel Cointegration Test for Model (I)

Test	t-Statistic	Probability
Panel ADF-statistic	-4.174*	0.000

*Notes: Trend assumption: No deterministic trend. Automatic lag length selection based on SIC. Probability values are provided in parenthesis. * , ** and ** denote statistical significance at 1%, 5% and 10%, respectively.*