Governance and Sustainability on Global Business Economics

Global Conference on Business and Economics Research (GCBER) 2017
14-15August 2017, UniversitiPutra Malaysia, Malaysia

Does Economic Development Mitigate Tax Evasion? Evidence From Evasional Kuznet Curve

Yan-Ling Tan[a,b], Muzafar Shah Habibullah[*b], Badariah Haji Din[c]

[a]*Faculty of Business and Management, UNIVERSITI TEKNOLOGI MARA Cawangan Johor Kampus Segamat, Malaysia*
[b]*Faculty of Economics and Management, Universiti Putra Malaysia, Malaysia*
[c]*College of Law, Government and International Studies, Universiti Utara Malaysia, Malaysia*

Abstract

Tax evasion is a common problem persisted in all countries around the world. Recent estimates registered a loss of tax revenue amounting to US$3.1 trillion or 5.1% of world's GDP. Tax revenue losses have negative consequences to the government ability to fueled economic growth by providing enough public infrastructure and other services. In this study we have estimated the share of shadow economy to the official economy for Malaysia for the period 1983 to 2013 based on Tanzi-type currency demand approach (CDA) that captures all relevant determinants of the shadow economy. We employ the nonlinear autoregressive distributed lag (NARDL) modeling approach proposed by Shin, Yu and Greenwood-Nimmo (2014) which gives more merits over linear ARDL approach. Given the estimated size of the shadow economy, we are able to calculate the loss in tax revenue as a result of the presence of the shadow economy. We further analyze factors determining tax evasion in Malaysia. Our results suggest that tax evasion exhibit an inverted-*U* shape curve (nonlinear) with the level of economic development and positive relationship with various measures of tax burden in Malaysia during the period under study. We conclude that increasing the level of economic development able to reduce tax evasion in Malaysia.

Keywords: NARDL, Currency demand, Shadow economy, Tax evasion, Malaysia

1. INTRODUCTION

Tax evasion remains one of the most common and persistent problem for any nations. It is a growing concern to the government as the tax revenue loss has serious economic consequences (Cerqueti & Coppier, 2011). By evading taxes the government are deprived from providing adequate financing for public services, infrastructure, human capital development, best health care services and other facilities that would benefit the society (Johnson, Kaufman, McMillan, & Woodruff, 2000). Furthermore, large tax evasion signifies that the country having large shadow economy compared to the developed world (Fuest & Riedel, 2009). Franzoni (1998) asserts that the loss of tax revenue may result in slow economic growth, upsetting the proper functioning of the government as the ability to finance its basic expenses is threatened. Thus, fighting tax evasion should be an important agenda for any government.

The Tax Justice Network (2011) reported that the estimated total tax evasion is in excess of US$3.1 trillion or about 5.1% of world GDP. Europe experienced tax losses of US$1.5 trillion, followed by Asia US$666 billion, North America US$453 billion, South America US$376 billion, Africa US$79 billion while the Oceania US$46

---

[*]Corresponding author. Tel.: +6-03-89467635; Fax: +6-03-89486188
E-mail: muzafar@upm.edu.my

billion. Among the ASEAN-5 economies Malaysia ranked fourth with total tax evaded of US$11.2 billion; after Thailand US$25.8 billion, Indonesia US$17.8 billion and the Philippines US$11.7 billion. On the other hand, Singapore experience tax losses of US$4.1 billion.

The report further point out that the loss from tax evading activity occurs as a result of shadow economic activities existed in all economies as well as due to tax haven activity. Tax haven countries are those countries characterize of having low or non-existent tax rates on some types of income, lack of transparency, bank secrecy, lack of information sharing, and requiring no economic activity for an entity to obtain legal status (Gravelle, 2015). Zucman (2013) estimates that bank deposits in Switzerland constitute about one third of the global stock of household offshore wealth and it is believed that a fraction of this wealth escapes home country taxation (offshore tax evasion). Johannesen (2014) reports that most of this wealth is owned by the very richest households and that it is largely escapes taxation. In tax haven countries with strict bank secrecy rules, banks do not generally report the investment income earned by their clients to the tax authorities, and therefore escape paying taxes.

One fundamental question that is relevant to tax evasion is: why people evade tax? According to Hanousek and Palda (2015, 2004), people did not just evade taxes in order to enrich themselves but also as a means of signaling their discontent with the quality of government services they received. Their study on the transition economies found some evidence that when people believe the quality of government services to be poor, they will evade taxes in response. In fact, Feige (1994) contended earlier that a rising public dissatisfaction with the performance of government and/or a growing public distrust and resentment may potentially contribute to the size of the shadow economy, and economic activities in the shadow economy will be tax evading (Tax Justice Network, 2011).

The purpose of the present paper is to determine factors affecting tax evasion in Malaysia. According to Schneider (2012), shadow economy and tax evasion is not congruent, however, activities in the shadow economy in most cases imply the evasion of direct or indirect taxes, such that the factors affecting tax evasion will most certainly also affect the shadow economy. In this study we emphasis on the role of economic development as a vehicle to reduce tax evasion in Malaysia. Our study concludes that economic development can play an important role in mitigating tax evasion in Malaysia.

The paper is organized as follows. In the next section we review some related literature on factors affecting tax evasion. In section 3, we discuss the model and method used to estimates tax losses through estimating the size of shadow economy in Malaysia. In section 4, we discuss the empirical results. The last section contains our conclusion.

2.   REVIEW OF RELATED LITERATURE

In Malaysia, the Malaysian Income Tax Act 1967 and Service Tax Act 1975 make clear that any non-declared, under-reporting as well as concealment of income are considered evading taxes (see Noor, Jamaludin, Omar, & Aziz, 2013). In a study by Fatt and Ling (2008), Malaysians evade tax by not declaring their dividend income, rental income earned not in their name but in their parent's name, claim parents' maintenance expenses as salary paid to employees, and submitting tax return on time without tax payment. On the other hand, a cross-country study by Richardson (2006) posits that age, education, employment in the services sector, fairness and tax morale affect tax evasion in 45 countries investigated. Study by Crane and Nourzad (1986) reveal that inflation, marginal tax rate, probability of detection, penalty rate, proportion of wages to income and real income influence tax evading behavior in the U.S. The role of inflation in stimulating tax evasion is further supported by Caballe and Panades (2004).

In two studies on tax evasion in Switzerland, Feld and Frey (2006) and Kirchgassner (2010) contend that the probability of detection, penalty rate, marginal tax rate, tax procedures, democracy, income, age, type of employment, language, and population are important determinants of tax compliance. For the OECD countries, Kafkalas, Kalaitzidakis and Tzouvelekas (2014) found that apart from income and tax rate, government effectiveness (quality of government) and tax monitoring expenses influence tax evasion. On the other hand, studies by Cebula (1998) and Cebula and Foley (2010) indicate that income tax rate, unemployment, interest rate, audit and penalty rate affect tax compliance in the U.S.

On another strand of studies, researchers have investigated the role of financial sector as determinant of tax evasion. According to Bose, Capasso and Wurm (2012) in developed economies characterized by high level of financial development, individual or firm have easy access to the credit market. However, borrowers have to declare their income and/or assets and this can be used as collateral or to gauge their creditworthiness but in doing so they will subject to tax liability. Since the value provided by the financial intermediation is considerable

(Gordon & Li, 2009), there is less incentive to evade tax and the need to participate in the shadow economy is minimal. On the contrary, for developing economies with low level of financial development, there is limited access to the credit market due to shortage of loanable funds, asymmetric information and high cost of borrowings; borrowers have less incentive to declare income and/or assets. In such environment, tax evasion is substantial and shadow economy is also larger. Their cross-sectional and panel analyses indicate that improvement in the development of the banking sector as well as the depth and the efficiency of the banking sector contribute to smaller shadow economy. The contention that more tax compliance is associated with more access to the credit market is also supported by the finding in Gatti and Honorati (2008).

3.   METHODOLOGY

3.1   The estimating model

Currently, there are many techniques used to estimate the size of the shadow economy. The CDA is considered as one of the most well-recognized and popular methods in estimating the size of the shadow economy. The idea behind this approach assumes that shadow economic transactions are undertaken in the form of cash which leave no trace or trail. Transactions involve cash are difficult to trace as compared to those activities using other assets or registered in any financial institutions. A rise in the tax burden implies stronger incentive to engage in cash-intensive underground economic activities, and hence increase the demand for cash. In other words, the CDA provides an indirect measure of the shadow economy by estimating how much cash used for shadow transactions with assumption about the equality of velocity between the cash used in the unofficial and the official economy (Tanzi, 2002).

Since currency in circulation is a subset of the money demand, thus, the currency demand is modeled as a function of a scale variable (Alm & Embaye, 2012) (often measured by real income) to account for transactions demand, the opportunity cost of holding currency (represented by interest rate), and additional variables that might influence the behavior of currency holdings. Following Tanzi (1983) and other subsequent studies (Dell'Anno & Halicioglu, 2010; Dobre & Davidescu, 2013; Kiani, Ahmed, & Zaman, 2015), the general specification for long-run currency demand function is specified as follow:

$$LCM_t = \theta_0 + \theta_1 LTAX_t + \theta_2 LR_t + \theta_3 LY_t + e_t \qquad t = 1, \dots, T \qquad (1)$$

where L is the natural logarithms, CM is the ratio of currency in circulation to broad money supply (M2), TAX is the ratio of total tax revenue to GDP, R is the real interest paid[1], Y is real income per capita, and e is the error term. The estimated coefficient for θ_1 is positive, while the parameter estimates for interest rate (θ_2) and income per capita (θ_3) are expected to be negatively related with currency holdings.

3.2   The nonlinear autoregressive distributed lag (NARDL) model

The NARDL model is a new technique and recently proposed by Shin et al. (2014) and is an extension of the linear ARDL model (Pesaran, Shin & Smith, 2001; Pesaran & Shin, 1999). The NARDL allows for estimating asymmetric effects in the short-run as well as in the long-run among variables examined. Following Equation (1), the asymmetric long-run equation can be specified in the following form:

$$LCM_t = \theta_0 + \theta_1^+ LTAX_t^+ + \theta_2^- LTAX_t^- + \theta_3 LR_t + \theta_4 LY_t + e_t \qquad (2)$$

where $\theta = (\theta_0, \theta_1^+, \theta_2^-, \theta_3, \theta_4)$ is a cointegrating vector. In Equation (2), $LTAX_t$ can be decomposed as:

$$LTAX_t = LTAX_0 + LTAX_t^+ + LTAX_t^- \qquad (3)$$

where $LTAX_0$ is the initial value, $LTAX_t^+$ and $LTAX_t^-$ are partial sums of positive and negative changes in $LTAX_t$:

$$LTAX_t^+ = \sum_{i=1}^t \Delta LTAX_i^+ = \sum_{i=1}^t max(\Delta\, LTAX_i, 0) \qquad (4)$$
$$LTAX_t^- = \sum_{i=1}^t \Delta LTAX_i^- = \sum_{i=1}^t min(\Delta\, LTAX_i, 0) \qquad (5)$$

Following Shin et al. (2014), Equation (2) is then associated with the linear ARDL(p, q, r, s) model (Pesaran et al., 2001; Pesaran & Shin, 1999) becomes NARDL(p, q, r, s) model:

---

[1]Real interest rate = nominal interest rate paid on saving deposits - the inflation rate (growth in the GDP deflator).

$$\Delta LCM_t = \gamma_0 + \beta_0 LCM_{t-1} + \beta_1^+ LTAX_{t-1}^+ + \beta_2^- LTAX_{t-1}^- + \beta_3 LR_{t-1} + \beta_4 LY_{t-1} + \sum_{i=1}^{p} \alpha_{0i} \Delta LCM_{t-i} +$$
$$\sum_{i=0}^{q}(\alpha_{1i}^+ \Delta LTAX_{t-i}^+ + \alpha_{2i}^- \Delta LTAX_{t-i}^+) + \sum_{i=0}^{r} \alpha_{3i} \Delta LR_{t-i} + \sum_{i=0}^{s} \alpha_{4i} \Delta LY_{t-i} + \mu_t \qquad (6)$$

where $\theta_1^+ = -\frac{\beta_1^+}{\beta_0}$ and $\theta_2^- = -\frac{\beta_2^-}{\beta_0}$ represent long-run impacts of tax burden increase and tax burden decrease on the currency holdings; while $\sum_{i=0}^{q} \alpha_{1i}^+$ and $\sum_{i=0}^{q} \alpha_{2i}^-$ measure the short-run effects of an increase in tax burden and a decrease in tax burden, respectively on currency in circulation.

Conducting empirical analysis for the NARDL model involves the following steps. The first step is to estimate asymmetric error correction model (AECM) of Equation (6) using the standard Ordinary Least Square (OLS). Secondly, we identify the existence of a long-run level cointegrating relationship between levels of the variables $LCM_t, LTAX_t^+, LTAX_t^-, LR_t,$ and LY_t using a bound testing approach of Pesaran et al. (2001) and Shin et al. (2014). With the modified F-test, the null hypothesis for all the long-run coefficients is jointly equal to zero ($i.e.\ \beta_0 = \beta_1^+ = \beta_2^- = \beta_3 = \beta_4 = 0$). The long-run cointegrating relationship is identified when the computed F-statistic is compared with the bound critical value tabulated by Narayan (2005) for small sample size. The null hypothesis of no cointegration is rejected when the computed F-statistic exceeds the upper bounds of critical value that the variables are cointegrated. On the other hand, the variables are not cointegrated if the null hypothesis of no cointegration is not rejected where the estimated F-statistic falls below the lower bond of critical value. If the calculated F-statistic falls between the upper and lower bounds of critical values, the decision is inconclusive. Lastly, we examine for long-run and short-run symmetry using the standard Wald test. The null hypothesis of long-run symmetry is $\theta_1^+ = \theta_2^-$ or $-\frac{\beta_1^+}{\beta_0} = -\frac{\beta_2^-}{\beta_0}$ whereas the short-run symmetry restrictions is $\sum_{i=0}^{q} \alpha_{1i}^+ = \sum_{i=0}^{q} \alpha_{2i}^{-2}$.

The estimated long-run Equation (2) is used to calculate the estimated currency in circulation. Again, Equation (2) is estimated by setting the tax rate at minimum levels, whilst coefficients for other variables remain unchanged[3]. The difference between the two estimations show an estimate of illegal stock of currency held for the purpose of tax evasion. The illegal stock money is then multiplied by the velocity of money to yield an estimate of shadow economy. It is assumed that velocity of illegal stock money is equal to the velocity of legal money[4].

3.3   Sources of data

In this study, we used annual data spanning from the period 1983 to 2013, which consisting of 31 observations. Data for currency in circulation, broad money (M2), and total tax revenue were collected from Asian Development Bank Website (http://www.adb.org). While other data such as interest rate (on saving deposits), real GDP per capita (income), and inflation rate (growth in GDP deflator) were compiled from World Bank's World Development Indicators (WDI).

4.   RESULTS AND DISCUSSIONS

Although the NARDL cointegration test does not require that all variables examined be integrated of $I(1)$, the unit root tests are important to check whether the variables examined are not integrated of $I(2)$. This is because the critical values of the F-statistic for bound tests computed by Pesaran et al. (2001) and Narayan (2005) are based on the assumption that either the variables are $I(0)$ or $I(1)$. Therefore, the F-test will be misleading in the presence of $I(2)$ variables. The results of augmented Dickey-Fuller (ADF) and Philips-Perron (PP) unit root tests suggest that all variables are $I(1)$ series[5]. Hence, it may be worth concluding that none of the variables used are not $I(2)$ or higher level of integration in this study.

The result of the bounds test for cointegration is shown in Table 1. Using the asymptotic critical value computed by Narayan (2005) for small sample size, the result reveals that the null hypothesis of no cointegration is rejected at 5% significance level. The computed F-statistic of 6.832 is greater than the upper bound of critical value of 4.774, leading to conclude that there exists a long-run relationship between $LCM_t, LTAX_t^+, LTAX_t^-, LR_t$ and LY_t.

---

[2]In this study, we exclude the asymmetric dynamic multiplier effects of a unit change in $LTAX_t^+$ and $LTAX_t^-$, respectively on LCM_t.

[3]A number of studies set the tax rate at zero. However, we assume the tax rate at minimum level which is similar to Hernandez (2009) due to the estimation of NARDL involves the partial sums of positive and negative changes in $LTAX_t$.

[4]Gadea and Serrano-Sanz (2002) and Hill and Kabir (2000) allows for different velocities of circulation in the underground economy. The velocity of money is obtained by dividing nominal GDP with total currency in this study.

[5]The full results of unit root tests are available from the authors upon request.

Panel A of Table 1 reports the estimates of the nonlinear ARDL regression of Equation (6) by applying the general-to-specific approach to arrive at the final ARDL specification. The maximum lag length order chosen is 3. Subsequently, we apply the standard Wald test for both long-run (W_{LR}) and short-run (W_{SR}) in order to examine for symmetry. For the long-run, the null hypothesis of symmetry between positive and negative components of the considered variables is rejected. As can be seen, the standard Wald test (W_{LR}) is found to be 7.210 (*p*-value =0.007). Similarly, the results suggest that rejection of the null hypothesis of the short-run symmetry impacts against the alternative of asymmetry. However, we can only reject the null hypothesis of a symmetric short-run relationship at 10% level (W_{SR}=3.066, *p*-value = 0.080). Furthermore, the estimated equation past all the diagnostic tests on no serial correlation and homoscedasticity of residuals; and the cumulative sum of recursive residual (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests also suggest stability of parameter estimates for NARDL model.

Table 1. Nonlinear ARDL estimation results and long-run relations.

Dependent variable	Independent variables:						
Panel A: Nonlinear ARDL-Unrestricted ECM model							
ΔLCM_t	Constant	LCM_{t-1}	$LTAX^+_{t-1}$	$LTAX^-_{t-1}$	LR_{t-1}	LY_{t-1}	ΔLCM_{t-1}
	6.487	-1.761***	1.034**	2.741***	-0.496	-0.928*	0.805**
	(1.940)	(5.146)	(2.514)	(3.990)	(1.688)	(2.046)	(2.904)
	ΔLCM_{t-2}	ΔLCM_{t-3}	$\Delta LTAX^+_t$	$\Delta LTAX^+_{t-1}$	$\Delta LTAX^-_t$	$\Delta LTAX^-_{t-1}$	$\Delta LTAX^-_{t-2}$
	0.422	0.209	0.917*	-0.140	0.958**	-0.834	-0.639
	(1.906)	(1.023)	(2.348)	(0.366)	(3.085)	(1.943)	(1.732)
	$\Delta LTAX^-_{t-3}$	ΔLR_t	ΔLR_{t-1}	ΔLR_{t-2}	ΔLR_{t-3}	ΔLY_t	
	-0.725*	-0.265	0.350*	0.201	0.257*	0.961**	
	(2.260)	(1.838)	(2.040)	(1.677)	(2.381)	(2.485)	
$R^2 = 0.943$	LM(1)=1.028 [0.311]		ARCH(1)=1.130 [0.288]				
	W_{LR}=7.210*** [0.007]		W_{SR}=3.066* [0.080]				
Panel B: Long-run relation							
LCM_t	Constant	$LTAX^+_t$	$LTAX^-_t$	LR_t	LY_t		
	3.6833*	0.5873**	1.5564***	-0.2817	-0.5267**		
	(2.3613)	(3.4256)	(4.6300)	(1.5534)	(2.5611)		

Notes: Asterisks ***, ** and * indicate significant at 1%, 5%, and 10% significance level, respectively. The superscript "+" and "-" denote positive and negative partial sums, respectively. W_{LR} refer to the Wald test for the long-run symmetry, $-\frac{\beta^+_1}{\beta_0} = -\frac{\beta^-_2}{\beta_0}$. W_{SR} refer to the Wald test for the short-run symmetry, $\sum_{i=0}^{q} \alpha^+_{1i} = \sum_{i=0}^{q} \alpha^-_{2i}$. LM(.) and ARCH(.) are Lagrange multiplier test for residual serial correlation and ARCH test for heteroscedasticity. Figures in round (.) brackets are *t*-statistics, and figures in square [.] brackets are *p*-values.

We further proceed to the analysis of the long-run asymmetric presented in Panel B, in Table 1. All the long-run estimated coefficients have the expected sign, which is in line with the theoretical considerations and the parameters are statistically significant except interest rate. This indicates tax rate for both positive component ($LTAX^+_t$) and negative component ($LTAX^-_t$) as well as income per capita are the key determinants of currency ratio. Tax rate is considered as the most important factor, where a higher tax rate increases the opportunity of evading taxes. Thus people who wish to engage in the underground activities by under reporting their taxes will use more currency. Turning to our interest, we notice that the asymmetric long-run relationship between the tax rate and currency ratio, with a 10% increase in the tax rate is associated with a 5.9% rise in currency ratios. In contrast, the size of the long-run parameter on $LTAX^-_t$ is relatively larger, implying that a 10% decrease of tax rate resulting in a decrease of 15.6% in currency ratios. Hence, it suggests that the negative changes of tax rates have a sizeable effect on the currency ratio as compared to the positive changes.

4.1   Determinants of tax evasion in Malaysia

The size of the shadow economy was computed based on the estimated long-run Equation (2) above. The estimates of the tax evasion are then calculated as tax revenue multiply with the ratio of shadow economy to the official GDP. In this study we specify a simple model for determinants of tax evasion as follow,

$$LTAXEVASION_t = \theta_0 + \theta_1 LRGDPPC_t + \theta_2 LRGDPPC_t^2 + \theta_3 LTAXBURDEN_t + \omega_t \qquad (7)$$

where $LTAXEVASION_t$ is measured by the ratio of tax evasion to GDP, $LTAXBURDEN_t$ is the ratio of tax revenue to GDP, and $LRGDPPC_t$ is real GDP per capita to measure the level of economic development or national income; and $LRGDPPC_t^2$ is the square of the log real GDP per capita. Data on real GDP per capita was collected from the

World Development Indicators published and accessible at the World Bank database. Data on tax burden such as total tax revenue ($LTAX_t$), direct taxation ($LDIRECTTAX_t$), indirect taxation ($LINDIRECTTAX_t$), corporate tax ($LCORPORATETAX_t$), and personal taxation ($LPERSONALTAX_t$), were compiled from various issues of the Statistical Monthly Bulletin published by Bank Negara Malaysia. With respect to the relationship between tax evasion and economic development, the expected sign for θ_1 and θ_2 is ambiguous. It is expected a *priori* that $\theta_1 > 0$ and $\theta_2 < 0$, thus we conjecture a nonlinear (or an inverted-*U* shape curve) relationship between tax evasion and economic development. This relationship implies that at lower stages of economic development tax evasion are increasing while at higher level of economic development tax evasion tends to be lower. Recent study by Hanousek and Palda (2015:7) on Czech Republic, contend that "the evasional Kuznets curve may be a curve along which evasion rises as taxes increase, summed with a curve along which evasion falls as governments become less corrupt and people stop curtail that part of their evasion which acted as a form of political protest". The inverted-*U* shape curve between tax evasion and economic development show that the marginal rate has a positive influence on evasion as tax increases people tend to evade tax; but at the same time people perceived the government effort to increase the quality of the government services and therefore, perceived quality has a negative effect. Hanousek and Palda (2015:8) point out that the people of the Czech Republic that they surveyed believe that "it is immoral to evade and that family reactions to evasion are becoming increasingly negative. If both taxes and quality were rising and working against each other in their effect on evasion, the sum of their opposite influences might have given rise to an evasional Kuznets curve".

The long-run Equation (7) was tested for cointegration. In this study we employed four estimators to test for cointegration, namely; the Engle and Granger (1987) two-step procedure (*E-G*), dynamic OLS (DOLS), fully modified OLS (FMOLS), and canonical cointegrating regression (CCR) (see Stock & Watson, 1993; Phillips & Hansen, 1990; Park, 1992). In Tables 2 to 6, we present the results of the cointegration tests as well as the estimated long-run models for Malaysia's tax evasion; with tax burden - total tax revenue ($LTAX_t$), direct taxation ($LDIRECTTAX_t$), indirect taxation ($LINDIRECTTAX_t$), corporate tax ($LCORPORATETAX_t$), and personal taxation ($LPERSONALTAX_t$), respectively[6]. For OLS we used the conventional Engle and Granger two-step procedure for testing the null hypothesis of non-cointegration or the present of unit root on the residuals. On the other hand, we also report the L_c-statistics, the test for the null hypothesis of cointegration for FMOLS, DOLS and CCR.

Table 2. Estimates of tax evasion long-run models with tax burden.

Estimators\Regressors	Intercept	$LRGDPPC_t$	$LRGDPPC_t^2$	$LTAX_t$
OLS	-235.84***	48.165***	-2.5042***	2.1221***
(robust estimates)	(4.5379)	(4.5501)	(4.6103)	(7.0163)
	E-G test: -3.220***	SER=0.149	*adjusted* R^2=0.84	
FMOLS	-212.26***	43.353***	-2.2664***	2.3742***
	(4.2831)	(4.2979)	(4.3870)	(5.0967)
	L_c=0.384 [>0.20]	SER=0.176	*adjusted* R^2=0.78	
DOLS	-212.04**	43.326***	-2.3041***	3.6097**
{lead=1, lag=1}	(3.0129)	(3.0940)	(3.3012)	(2.7591)
	L_c=0.049 [>0.20]	SER=0.152	*adjusted* R^2=0.83	
CCR	-251.47***	51.378***	-2.6799***	2.4709***
	(6.0777)	(6.0037)	(6.0580)	(5.2976)
	L_c=0.429 [>0.20]	SER=0.180	*adjusted* R^2=0.77	

Notes: Asterisks ***, ** and * denote statistically significant at 1%, 5% and 10% level, respectively. The figures in square brackets are the *p*-values. OLS regression was estimated using robust standard error procedure that corrected for autocorrelation and heteroscedasticity by using Newey-West consistent standard error (Newey and West, 1987). *E-G* test denote the DF *t*-statistic on the cointegrating regression's residuals. L_c-statistic measures Hansen (1992) parameter instability test for cointegration. The *E-G* tests with null hypothesis of no cointegration while the Hansen test the null hypothesis of cointegration. SER denotes standard error of regression.

Generally, in each table, all four long-run models for tax evasion are valid and free from the problem of spurious regression except for the results using FMOLS in Tables 3 and 5, and CCR in Table 4 in which the null hypothesis of cointegration cannot be rejected at least at the 10% level. Overwhelmingly, our results indicate that all tax burden variables consistently showing positive and are significant at least at the 5% level for all estimators. This implies that increase in tax burden will lead to an increase in tax evasion. For example, from Table 2, the elasticity of tax evasion with respect to tax burden (total tax revenue to GDP) ranges from 2.1 to 3.6; meaning that a 10% increase in tax rate will increase tax evasion by 21% to 36%.

Table 3. Estimates of tax evasion long-run models with direct tax burden.

Estimators\Regressors	Intercept	$LRGDPPC_t$	$LRGDPPC_t^2$	$LDIRECTTAX_t$

---

[6]The ADF unit root tests results suggest that all variables are I(1).

OLS	-141.98***	30.454***	-1.6503***	1.8143***
(robust estimates)	(2.9994)	(3.1305)	(3.2934)	(8.0096)
	E-G test: -2.903***	SER=0.147	*adjusted R^2=0.84*	
FMOLS	-85.395*	18.999**	-1.0792**	2.1896***
	(1.9588)	(2.1197)	(2.3512)	(6.2085)
	L_c=0.716* [0.085]	SER=0.184	*adjusted R^2=0.76*	
DOLS	-125.34*	26.502*	-1.4612**	3.4677**
{lead=1, lag=2}	(2.1287)	(2.2603)	(2.5141)	(3.2026)
	L_c=0.030 [>0.20]	SER=0.098	*adjusted R^2=0.93*	
CCR	-131.71***	28.514***	--1.5705***	2.3086***
	(3.3260)	(3.4739)	(3.7180)	(5.9423)
	L_c=0.595 [0.148]	SER=0.181	*adjusted R^2=0.77*	

Notes: As per Table 2 above.

Table 4: Estimates of tax evasion long-run models with indirect tax burden

Estimators\Regressors	Intercept	LRGDPPC$_t$	LRGDPPC$_t^2$	LINDIRECTTAX$_t$
OLS	-41.337	8.1507	-0.4014	1.2014***
(robust estimates)	(1.0900)	(1.0245)	(0.9677)	(9.8563)
	E-G test: -6.198***	SER=0.143	*adjusted R^2=0.85*	
FMOLS	-55.637*	11.088	-0.5535	1.2768***
	(1.7703)	(1.6863)	(1.6170)	(8.9434)
	L_c=0.603 [0.143]	SER=0.148	*adjusted R^2=0.84*	
DOLS	-131.89	25.138	-1.1964	1.5631**
{lead=3, lag=0}	(1.2445)	(1.1625)	(1.0881)	(3.4375)
	L_c=0.082 [>0.20]	SER=0.119	*adjusted R^2=0.89*	
CCR	-75.352**	15.477**	-0.7941**	1.1670***
	(2.5197)	(2.4151)	(2.3340)	(6.5096)
	L_c=0.880** [0.040]	SER=0.166	*adjusted R^2=0.80*	

Notes: As per Table 2 above.

Table 5: Estimates of tax evasion long-run models with corporate tax burden

Estimators\Regressors	Intercept	LRGDPPC$_t$	LRGDPPC$_t^2$	LCORPORATETAX$_t$
OLS	-41.893	10.180	-0.5984	1.0746***
(robust estimates)	(0.8093)	(0.9570)	(1.0979)	(5.1265)
	E-G test: -3.531***	SER=0.174	*adjusted R^2=0.79*	
FMOLS	6.5334	0.6827	-0.1320	1.0240***
	(0.4960)	(0.2524)	(0.9557)	(16.733)
	L_c=32.23*** [<0.01]	SER=0.234	*adjusted R^2=0.61*	
DOLS	-83.428	17.278	-0.8979	1.5000**
{lead=1, lag=0}	(0.8605)	(0.8757)	(0.8988)	(2.8151)
	L_c=0.054 [>0.20]	SER=0.136	*adjusted R^2=0.86*	
CCR	-4.9521	2.7890	-0.2328	1.3302***
	(0.0854)	(0.2327)	(0.3785)	(4.1848)
	L_c=0.608 [0.140]	SER=0.190	*adjusted R^2=0.74*	

Notes: As per Table 2 above.

Comparing the results in Table 3 and Table 4, we discover an interesting result between the impact of direct taxation and indirect taxation on tax evasion; where we found that Malaysians are generally more responsive to the increase in direct taxation as compared to indirect taxation. For example, from OLS, a 10% increase in direct taxes will increase tax evasion by 18%, while increase in tax evasion as a result from an increase in indirect taxation is only 12%. Generally, the results indicate that the response to the increase in direct taxation is 50% or more compared to the increase in indirect taxation. Further, segregating direct taxation into corporate and personal taxes and their impact on tax evasion are shown in Table 5 and Table 6, respectively. It is clear that the corporate sector is more responsive to tax rate compared to the personal sector. For example, DOLS results suggest that a 10% increase in the corporate tax rate will increase tax evasion in the corporate sector by 15%; while the same increase in tax rate will only results in a 10% increase in tax evasion by the individuals. Thus, we can conclude that firms in Malaysia are more willing to go underground and evade taxes compared to individuals.

Table 6: Estimates of tax evasion long-run models with personal tax burden

Estimators\Regressors	Intercept	LRGDPPC$_t$	LRGDPPC$_t^2$	LPERSONALTAX$_t$
OLS	-138.16**	29.732**	-1.5804**	0.9724***
(robust estimates)	(2.5737)	(2.6845)	(2.7732)	(4.7004)

	E-G test: -3.471***	SER=0.175	*adjusted R^2=0.78*	
FMOLS	-147.52***	31.756***	-1.6890***	0.9335***
	(2.9278)	(3.0649)	(3.1754)	(3.6013)
	L_c=0.434 [>0.20]	SER=0.177	*adjusted R^2=0.78*	
DOLS	-84.838***	19.088***	-1.0521***	0.9977***
{lead=2, lag=2}	(4.9977)	(5.7735)	(6.5056)	(7.6682)
	L_c=0.204 [>0.20]	SER=0.054	*adjusted R^2=0.97*	
CCR	-161.51***	34.692***	-1.8428***	0.9151***
	(3.5856)	(3.7162)	(3.8180)	(3.2921)
	L_c=0.505[>0.20]	SER=0.181	*adjusted R^2=0.77*	

Notes: As per Table 2 above.

On the other hand, further interesting results emerge from this study is the non-linear relationship shown between tax evasion and economic development in Malaysia. We can observe that $\theta_1 > 0$ and $\theta_2 < 0$ in all tables are significant at least at the 10% level; except for OLS, FMOLS and DOLS in Table 4; and Table 5 for all estimators. The inverted-*U* shape curve suggests that as economic development progress in Malaysia from low to higher level, tax evasion at first increases and then after a certain optimal point tax evasion decreases. The nonlinear relationship between tax evasion and economic development in Malaysia support the contention made by Hanousek and Palda (2015). Furthermore, this phenomenon can also be explained according to the public choice argument. Studies by Hanousek and Palda (2004), D'Hernoncourt and Meon (2012), Lassen (2007), and Torgler (2005) posit that trust and tax evasion is negatively related, and trust is related to tax morale. Torgler (2005) argue that people will be more prone to pay taxes if they trust their fellow tax-payers to do the same, and if they trust the government to use tax revenues to finance public goods. As argued by Hanousek and Palda (2015) that as the nation wealth increases, people believe and perceived the increase in the quality of government services and will impact negatively on peoples' incentive to evade tax.

6.   CONCLUSION

The aim of this study is to estimates the size of the shadow economy in Malaysia over the period of 1983-2013 using the traditional currency demand approach (CDA). By estimating the size of the shadow economy will permit the estimation of tax evasion. In this study we develop a simple model for tax evasion, with economic development and tax burden as regressors. However, in this study we endeavor to test the nonlinear relationship between tax evasion and the level of economic development. Further, we also segregate measures of tax burden into – direct, indirect, corporate and personal taxations. Using a battery of estimators, namely OLS, FMOLS, DOLS and CCR, our results suggest that tax evasion increases at lower level of economic development, but as the economy develops and progress to a higher level of development, tax evasion decreases, thus, depicting an inverted-*U* shape curve. Hanousek and Palda (2015) duped this as the Evasional Kuznet Curve (EKC). On the other hand, we can conclude from this study that increase in tax burden is important determinant that lead people to evade tax in Malaysia. Furthermore, Malaysians are more responsive to the tax rate changes, in particularly to direct taxation as compared to the indirect taxation. More so, firms are more responsive than individual to evade tax in Malaysia.

ACKNOWLEDGEMENTS

REFERENCES

Alm, L., & Embaye, A. (2012). Using dynamic panel methods to estimate shadow economies around the world, 1984-2006. *Public Finance Review*, 41(5), 510-543.

Bose, N., Capasso, S., & Wurm, M.A. (2012). The impact of banking development on the size of shadow economies. *Journal of Economic Studies*, 39(6), 620-638.

Caballe, J., & Panades, J. (2004). Inflation, tax evasion and the distribution of consumption. *Journal of Macroeconomics*, 26, 567-595.

Cebula, R.J. (1998). Determinants of aggregate income-tax-evasion behavior: The case of the US. *BNL Quarterly Review*, 206, 273-290.

Cebula, R., & Foley, M. (2010). Personal income tax evasion determinants revisited: An exploratory study using newly available data. *Academy of Economics and Finance Journal*, 2, 17-24.

Cerqueti, R., & Coppier, R. (2011). Economic growth, corruption and tax evasion. *Economic Modelling*, 28, 489-500.

Crane, S.E. & Nourzad, F. (1986). Inflation and tax evasion: An empirical analysis. *The Review of Economics and Statistics*, 68(2), 217-223.

Dell'Anno, R., & Halicioglu, F. (2010). An ARDL model of unrecorded and recorded economies in Turkey. *Journal of Economic Studies*, 37(6), 627–646.

D'Hernoncourt, J., & Meon, P.G. (2012). The not so dark side of trust: Does trust increase the size of the shadow economy? *Journal of Economic Behavior & Organization*, 81, 97-121.

Dobre, I., & Davidescu, A.A. (2013). Long-run demand for money and the size of shadow economy in Romania: An application of ARDL model. *Economic Computation and Economic Cybernetics Studies and Research*, *47*(3), 91–109.

Engle, R.F., & Granger, C.W.J. (1987). Co-integration and error correction: Representation, estimation and testing. *Econometrica*, *55*, 251-276.

Fatt, C.K., & Ling, L.M. (2008). Tax practitioners perception ontax audit and tax evasion: Survey evidence in Malaysia,Proceedings of the Eighth International Business ResearchConference, Dubai, EAU, 27-28 March 2008, WorldBusiness Institute.

Feige, E.L. (1990). Defining and estimating underground and informal economies: The new institutional economics approach. *World Development*, *18*(7), 989–1002.

Feld, L.P., & Frey, B.S. (2006). Tax evasion in Switzerland: The roles of deterrence and tax morale. Working Paper Series No.284. Institute for Empirical Research in Economics, University of Zurich, Switzerland.

Franzoni, L.A. (1998). Tax evasion and tax compliance.Working Paper Series, University of Bologna, Italy.

Fuest, C. and Riedel, N. (2009). Tax evasion, tax avoidance and tax expenditures in developing countries: A review of the literature. Report prepared for the UK Department for International Development (DFID), Oxford University Centre for Business Taxation, Oxford, U.K.

Gadea, M.D., & Serrano-Sanz, J.M. (2002). The hidden economy in Spain – A monetary estimation, 1964–1998. *Empirical Economics*, *27*(3), 499–527.

Gordon, R, & Li, W. (2009). Tax structures in developing countries: Many puzzles and a possible explanation. *Journal of Public Economics*, *93*, 855-866.

Gravelle, J.G. (2015). Tax havens: International tax avoidance and evasion. Congressional Research Service 7-5700. CRS Report Prepared for Members and Committees of Congress.

Hanousek, J., & Palda, F. (2004). Quality of government services and the civic duty to pay taxes in the Czech and Slovak Republics and other transition countries. *Kyklos*, *57*, 237-252.

Hanousek, J., & Palda, F. (2015). The evasional Kuznets curve: A possible shadow economy dynamics during the transition. *Japanese Journal of Comparative Economics*, *52*(1), 1-17.

Hansen, B.E. (1992). Tests for parameter instability in regressions with *I*(1) processes. *Journal of Business & Economic Statistics*, *10*(3), 321-335.

Hernandez, M.A. (2009). Estimating the size of the hidden economy in Peru: A currency demand approach. *Revista de Ciencias Empresariales Y Economia*, *8*, 85–104.

Hill, R., & Kabir, M. (2000). Currency demand and the growth of the underground economy in Canada, 1991-1995. *Applied Economics*, *32*(2), 183–192.

Johnson, S., Kaufman, D., McMillan, J., & Woodruff, C. (2000). Why do firm hide? Bribes and unofficial activity after communism.*Journal of Public Economics*, *76*, 495-520.

Kafkalas, S., Kalaitzidakis, P., & Tzouvelekas, V. (2014). Tax evasion and public expenditures on tax revenue services in an endogenous growth model. *European Economic Review*, *70*, 438-453.

Kiani, M., Ahmed, A., & Zaman, K. (2015). Combining qualitative and quantitative approaches for measuring underground economy of Pakistan. *Quality & Quantity*, *49*(1), 295–317.

Kirchgassner, G. (2010). Tax morale, tax evasion and the shadow economy. Discussion Paper No.2010-17. Department of Economics, University of St. Gallen, Switzerland.

Lassen, D.D. (2007). Ethnic division, trust and the size of the informal sector. *Journal of Economic Behavior and Organization*, *63*, 423-438.

Narayan, P.K. (2005). The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics*, *37*(17), 1979–1990.

Newey, W.K. and West, K.D. 1987. A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, *55*(3), 703-708.

Noor, R.M., Jamaludin, N.E., Omar, N. and Aziz, R.A. (2013).Measuring tax gap in the service industry. Proceedings of 3rd Global Accounting, Finance and Economics Conference, 5-7 May, 2013. Rydges Melbourne, Australia.

Park, J.Y. (1992). Canonical cointegrating regressions. *Econometrica*, *60*, 119-143.

Pesaran, M. H., & Shin, Y. (1999). An autoregressive distributed-lag modelling approach to cointegration analysis. In S. Strøm (Ed.), *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium* (pp. 371–413). Cambridge University Press.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326.

Phillips, P.C.B. and Hansen, B.E. (1990). Statistical inference in instrumental variables regression with *I*(1) processes. *Review of Economic Studies*, *57*, 99-125.

Richardson, G. (2006). Determinants of tax evasion: A cross-country investigation. *Journal of International Accounting, Auditing and Taxation*, *15*, 150-169.

Schneider, F. (2012).Tax evasion in Europe.*CESifo Forum*, *2*, 3-12.

Shin, Y., Yu, B., & Greenwood-Nimmo, M. (2014). Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework. In R. C. Sickles & W. C. Horrace (Eds.), *Festschrift in Honor of Peter Schmidt SE - 9* (pp. 281–314). Springer New York.

Stock, J.H., & Watson, M. (1993). A simple estimator of cointegrating vectors in higher order integrated systems. *Econometrica*, *61*, 783-820.

Tanzi, V. (1983). The underground economy in the United States: Annual estimates, 1930-80. *IMF Staff Papers, 30*(2), 283–305.

Tanzi, V. (2002). The shadow economy, its causes and its consequences. In *International Seminar on the Shadow Economy Index in Brazil*. Rio de Janeiro: Brazilian Institute for Ethics in Competition (ETCO).

The Tax Justice Network. (2011). *The cost of tax abuse: A briefing paper on the cost of tax evasion worldwide*. The Tax Justice Network, http://www. taxjustice. net.

Torgler, B. (2005). Tax morale in Latin America. *Public Choice*, *122,* 137-157.