



## Estimating the determinants of shadow economy in Malaysia

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### Abstract

Shadow economy and tax evasion are two inseparable phenomena. The presence of shadow economy reduces the tax base and thereby eventually reduces overall tax revenue. It also creates opportunity for distortions in resource allocation especially in the labour market where firms participating in underground activities are not subject to labour regulations. In developing countries with weak government shortage of funds will force the government to resort to inflationary financing. This study presented new estimates of the Malaysian shadow economy and explored the link between the shadow economy and financial development with the inclusion of control variables such as real income per capita, government consumption and tax burden. The size of the Malaysian shadow economy was calculated for the period 1971-2013 using the modified-cash-deposits-ratio (MCDR) approach recently proposed by Pickhardt and Sardia (2011). Also, using Ordinary Least Squares (OLS), Fully Modified OLS (FMOLS), Dynamic OLS (DOLS) and Canonical Cointegrating regression (CCR) to estimate the long-run model for the Malaysian shadow economy the contention that financial development can mitigate shadow economy was examined. The results showed that there was a non-linear long-run relationship between shadow economy and financial development, an inverted *U*-shape curve, suggesting that at lower (higher) level of financial development commensurate with higher (lower) level of the shadow economy. One policy implication from this finding was the role of the financial sector in reducing shadow economy by improving the accessibility to financing and the credit market.

**Keywords:** distortions, financial development, modified-cash-deposit-ratio, resource allocation, shadow economy, tax evasion

### Introduction

Shadow economy and tax evasion are two inseparable phenomena. The existence of the former suggests the present of the latter and *vice versa*. They are like twins, but evil twins. Both have bad economic consequences for the many economies in the world, and no economies experiences zero shadow economy. Shadow economy is a fact of life (Schneider & Enste, 2000; 2002) and a bigger shadow economy may cripple an economy (Eilat & Zinnes, 2002). Shadow economy is also related to criminal activities (Naylor, 1996; Witte, 1996; Bate, 2001; Habibullah & Eng, 2006). The presence of shadow economy reduces the tax base and thereby eventually reduces overall tax revenue. In developing countries with weak government shortage of funds will force the government to resort to inflationary financing. Furthermore, since the activity of the shadow economy is excluded from the official gross domestic product (GDP) statistics, thus, official GDP statistics will provide wrong indicators for macroeconomic policy decisions. Other than that, the existence of shadow economy creates opportunity for distortions in resource allocation especially in the labour market, whereby firms participate in underground activities are not subject to labour regulations and therefore can offer higher wages and cheaper goods and services (Eilat & Zinnes, 2002). 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.

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 et al., 2013). It is estimated that the tax noncompliance rate in Malaysia is about 20% (Lai et al., 2013). Studies suggest that Malaysians evade tax because they are not fully aware of their tax responsibilities (Choong and Lai, 2008) and thus tax evasion are done 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 (Fatt & Ling, 2088). Malaysian citizen also try to evade tax through smuggling. Masron et al. (2011) report that between 2004 and 2008, the tax value of smuggled goods to the island of Penang ranging from RM8 million to RM30 million. At the sectoral level, Lai et al. (2013) found that the construction industry is the main tax evaders followed by the manufacturing and service industries. Their study further suggests that there is no difference between large and smaller firm in terms of tax noncompliance in Malaysia.

At the national level, tax evasion is difficult to estimate. Nevertheless, the Tax Justice Network (2011) has reported that the estimated total tax evasion is in the excess of USD3.1 trillion or about 5.1% of world's GDP. Europe experienced tax losses of USD1.5 trillion, followed by Asia USD666 billion, North America USD453 billion, South America USD376 billion, Africa USD79 billion while the Oceania USD46 billion. Among the ASEAN-5 economies Malaysia ranked fourth with total tax evaded of USD11.2 billion; after Thailand USD25.8 billion, Indonesia USD17.8 billion and the Philippines USD11.7 billion. On the other hand, Singapore experience tax losses of USD4.1 billion.

In the case of Malaysia, Kasipillai et al. (2000) estimate the size of the Malaysian shadow economy for the period 1971-1994 using the standard currency demand approach; ranging from 8.1% to gross national product in 1971 to 3.73% in 1994, while the tax evasion calculated is about 1.53% in 1971 and shrunk to 0.5% in 1994. Kasipillai (1998) stresses that from his 1995 survey in Malaysia; the construction sector contributes the highest hidden income, followed by the professional sector. Mohammad (2004) reports that the services sector in 2002 formed the largest percentage of informal sector relative to the formal sector with an estimated ratio of 4.2%. Further statistics show that among the distributive trade sector, about 55% of the restaurant businesses operate underground; followed by retail trade (30%), cyber café (20%), and wholesale and motor vehicles businesses (15%). However, the 2006 statistics provided by Kamaruddin and Ali (2006) suggest that 24% of firms in the information technology industry operate underground, and this is followed by manufacturing (3.5%) and service industry (3%). On the other hand, Kassim and Jayasooria (2001) contend that the players in the informal sector are indeed very visible, particularly the petty traders and hawkers operating in the night markets. Many of these traders are micro-businesses run largely by women, selling local cakes and foods, fruits, drinks, vegetables, home appliances etc. According to Chin and Harun (2015) the night markets provide some avenue for beginners venture into business and as such a very important activity in the Malaysian context.

Apart from the time-series estimates by Kasipillai et al. (2000) of the size of the shadow economy for Malaysia, Schneider et al. (2010), Elgin and Oztunali (2012) and Alm and Embaye (2013) have also estimated the size of the shadow economy for Malaysia in a multi-country panel data framework. Using a combination of the multiple indicators multiple causes (MIMIC) procedure and the currency demand models, Schneider et al. (2010) estimate the size of the shadow economy for 162 countries including Malaysia for eight time periods that is 1999-2007. For the eight time periods, Malaysia's shadow economy averages 31% of the official GDP. Elgin and Oztunali (2012) estimate the magnitude of the shadow economy involving 161 countries by employing the two-sector dynamic general equilibrium model over the period 1955-2008; with Malaysia's shadow economy averages 47%. On the other hand, Alm and Embaye (2013) estimate the size of the shadow economy for 111 countries using the generalized method of moments for the period 1984-2006 and the estimated size for Malaysia's shadow economy averages 30% for the period.

On the other hand, Ahumada et al. (2007, 2008) point out that the estimates of the size of the shadow economy using the currency demand approach is correct if the long-run elasticity of income is unity, but,

in most cases this is not the case. However, more recently Pickhardt and Sarda (2011, 2013) propose a simple procedure to estimate the size of the shadow economy that do not subject to the Breusch and Ahumada critiques. Pickhardt and Sarda (2011, 2013) modify the original cash-deposit-ratio approach which was pioneered by Cagan (1958) and first applied by Gutmann (1977), and show that the modified-cash-deposit-ratio offer a ‘reasonable’ estimates of the shadow economy for Germany and Spain.

The purpose of the present paper is to estimate the size of the shadow economy in Malaysia; and further to determine factors affecting the Malaysian shadow economy. To estimate the magnitude of the Malaysian shadow economy we employ the modified-cash-deposit-ratio procedure proposed by Pickhardt and Sarda (2011, 2013). In this study, our focus is on the role of financial development as a vehicle to reduce shadow economy in Malaysia. Our study concludes that financial development can play an important role in mitigating shadow economy in Malaysia. The paper is organized as follows. In the next section we review some of the related literature on factors affecting shadow economy. In section 3, we discuss the model and method used to estimates the determinants of shadow economy in Malaysia. In section 4, we discuss the empirical results. The last section contains our conclusion.

## Review of related literature

### *The time series estimates of shadow economy in Malaysia*

Although it is recognized that there is no one method that is ideal to estimate the size of the shadow economy exists (Berger et al. 2014), in this study we take the initiative to estimate the size of the shadow economy in Malaysia using the procedure proposed by Pickhardt and Sarda (2011, 2013) which is free from the Breusch (2005a, 2005b, 2005c) and Ahumada et al. (2007, 2008) critiques. According to Pickhardt and Sarda (2011: 149-150), “all currency in circulation in the base year,  $C_0$ , represents the entire cash agents wish to hold in any year after the base year for the set of legal transactions they prefer to carry out in cash.” By assuming that all additional transactions in the legal economy are carried out via demand deposits (in the Malaysian context), then by definition, any cash holdings in excess of those in the base year can be fully attributed to the shadow economy. Based on these assumptions and using the Fisher’s (1911) quantity theory of money, Pickhardt and Sarda (2011, 2013) arrive at the following modified-cash-deposit-ratio, which equals the ratio of shadow economy income to official income,

$$\frac{C_t - C_0}{C_0 - D_t} = \frac{Y_{Ut}}{Y_{Lt}} \quad (1)$$

where  $C_t$  denotes currency in circulation at the end of year  $t$ ;  $C_0$  is currency in circulation at the end of base year, here 1971;  $D_t$  represents demand deposits at the end of year  $t$ ;  $Y_{Lt}$  and  $Y_{Ut}$  denote the size of the legal and shadow economy respectively. Thus,  $Y_{Ut}/Y_{Lt}$  measures the share of shadow economy to the legal economy (official GDP).

Applying Equation (1) to the Malaysian financial data yields the time series estimates of the shadow economy as per Figure 1. In Figure 1, we have also plotted the Malaysian shadow economy estimated by Kasipillai et al. (2000), Schneideret et al. (2010), Elgin and Oztunali (2012) and Alm and Embaye (2013). Our estimates of the size of the shadow economy explain reasonably well the performance of the Malaysian economy during the period 1971 to 2013; where the increase in the size of the shadow economy coincide with several episodes of economic “hardships” in Malaysia. The episode of the first oil shock of 1973/74; the second oil shock of 1978/81; commodity price collapse of 1985/86; and the Asian financial crisis of 1997/98 – all these episodes contributed to the increase in the size of the shadow economy, with the size of the shadow economy reaching at very high levels during the second oil shocks. During the Malaysia’s economic boom of the 1990s: economic growth averaging 9% per year between the year 1989/1996; privatization policy encourages private sector as engine of growth; large foreign

capital inflows and booming stock market (see Perkins & Woo, 2000) – reducing the size of the shadow economy. Compare to the estimates by Schneider et al. (2010), Elgin and Oztunali (2012), Alm and Embaye (2013), and except for Kasipillai et al. (2000), our estimates of the size of the shadow economy fairly tracked the macroeconomic performance of the Malaysian economy.

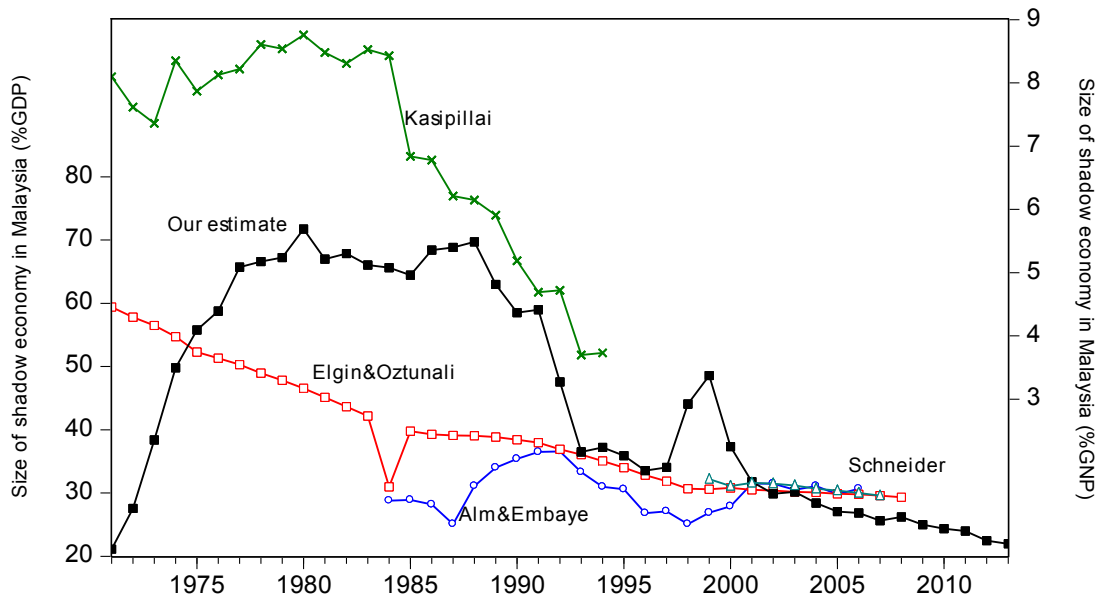


Figure 1. Estimates of the size of shadow economy in Malaysia

### Causes of shadow economy

Factors or drivers that cause people or firm participating in the shadow economy are numerous. Economists recognized that tax burden either direct or indirect taxation, social security contribution, regulation, tax morale, unemployment rate, GDP per capita (Schneider, 2005; Dell’Anno & Solomon, 2008; Bajada & Schneider, 2005); government spending or consumption (Vo & Ly, 2014; Wang et al., 2006; Buehn & Schneider, 2012); weak government and bad governance (Friedman et al., 2000; Manolas et al., 2013); lack of trust for the government (D’Hernoncourt & Meon, 2012); crime rate (Wang et al., 2006); and inflation (Bittencourt et al., 2014); are all contribute in increasing the size of the shadow economy.

On the other hand, Straub (2005) emphasize the role of the financial market in reducing the shadow economy. Straub (2005: 299) argues that “complying with costly registration procedures allows the firms to benefit from key public goods, enforcement of property rights and contracts that make the participation in the formal credit market possible.” Antunes and Calvacanti (2007) contend that the benefit from formalization is better access to outside finance; and Quintin (2008) stresses that the size of the informal sector decreases as the degree to which financing contracts can be enforced in the formal sector rises.

According to Bose et al. (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.

Blackburn et al. (2012) explain the connection between shadow market activity and credit market development using a simple model of tax evasion and financial intermediation. In imperfect financial markets (with asymmetric information) potential borrowers are required to declare their income or wealth in order to acquire a loan to finance their investment. The amount of wealth will determine the amount of collateral for securing a loan and also the type of terms and conditions of the loan contract made available to them. Thus, the less wealth been declared, less collateral to secure the required loan and the worse will be the terms and condition of the loan contract. Blackburn et al. (2012) point out that at low level of financial development, the credit arrangement is worsen. Thus, the benefit of wealth disclosure increases with the level of financial development with the implication that individual or firm participate in the shadow economy decline as the economy moves from a low to high level of financial development.

In another study, Capasso and Jappelli (2013) provide a theoretical framework in which agents allocate investment between a low-return technology which can be operated with internal funds, and a high-return technology which requires external finance. Firm can reduce the cost of funding by disclosing part or all of their assets and pledging them as collateral. The disclosure decision, however, also involves higher tax payments and reduces tax evasion. Their model predict that financial development (a reduction in the cost of credit) induces firm to disclose more assets and to invest in a high-tech project, and an improvement in the judicial efficiency reduces the cost of credit and the size of the shadow economy.

On one hand, using a standard overlapping generation framework, Bittencourt et al. (2014) posit that both a lower (higher) level of financial development and a higher (lower) level of inflation lead to a bigger (smaller) shadow economy. Furthermore, societies with a higher (lower) level of financial development will have a lower (higher) cost of monitoring. Borrowers that choose to undeclared their income to the bank will be subjected to higher costs of access to and conditions of obtaining loans. These higher costs and with lower level of financial development, will provides an incentive for borrowers to participate in tax evasion activities.

On the other hand, Beck et al. (2014) investigate the impact of credit information sharing and bank's branch penetration on tax evasion. They postulate that banking outreach that is, better information sharing and branch network expansion might affect the benefits and costs of corporate tax evasion. Higher banking sector outreach increases the opportunity costs of tax evasion by raising the likelihood and benefits of gaining access to formal finance, and more effective information sharing and more extensive branch penetration reduce information asymmetries and agency problems between lenders and borrowers and thus decrease the benefits of tax evasion. Their finding suggests that financial system that provides easier access to credit increases opportunity costs of tax evasion. Thus, in an economy with higher branch penetration and better credit information sharing, information related to corporate misconduct can be more easily observed and shared among all other potential lenders, which will make it more difficult and more expensive to receive future loans (Jappelli and Pagano, 2002). Therefore, the opportunity costs of engaging in tax evasion (or shadow economy) should be higher in countries with better financial system or high level of financial development.

### Estimating the determinants of shadow economy in Malaysia

In this study we specify the determinants of shadow economy as follows,

$$lshadow_t = \theta_0 + \theta_1 lrgdppc_t + \theta_2 lgovtcon_t + \theta_3 lfindev_t + \theta_4 lfindev_t^2 + \theta_5 lpersonstax_t + \theta_6 lsstax_t + \omega_t \quad (2)$$

where  $lshadow_t$  is the size of shadow economy (calculated using MCDR approach above);  $lgovtcon_t$  is ratio of government consumption to GDP;  $lrgdppc_t$  is real GDP per capita to measure economic

development or income;  $lfindev_t$  is financial development measured by ratio of domestic credit to private sector to GDP;  $lfindev_t^2$  is financial development square to establish whether the relationship between shadow economy and financial development is non-linear;  $lpersontax_t$  and  $lsstax_t$  are personal income tax and sales and service tax respectively, both divided by GDP. It is expected that  $\theta_2, \theta_5, \theta_6 > 0$  and  $\theta_1 < 0$ . The expected sign for  $\theta_3$  and  $\theta_4$  is ambiguous. However, we conjecture that there is a non-linear relationship between shadow economy and financial development, with a priori expected sign,  $\theta_3 > 0$  and  $\theta_4 < 0$ . This relationship implies that at lower stages of financial development shadow economy is increasing until at some point at higher level of financial development shadow economy starts to decrease, thus, exhibit an inverted U-shape curve.

Data on real GDP per capita, government consumption, domestic credit to private sector were collected from the World Development Indicators published online and accessible at the World Bank database. On the other hand, data for individual income tax, and sales and services tax were collected from various issues of the Monthly Bulletin published by the Central Bank of Malaysia. All variables are transformed into natural logarithm and denoted by  $l$ .

To estimate Equation (2) we first determine the order of integration of all variables in the equation. The unit root test results using the augmented Dickey-Fuller (Dickey and Fuller, 1981) unit root tests are presented in Table 1. Results in Table 1 clearly indicate that all variables are  $I(1)$ , that is the series achieved stationarity after first-differencing. These results clearly suggest that all variables are non-stationary in levels. Thus, estimating Equation (2) using OLS is subject to spurious regression results unless the variables are cointegrated. A cointegrating regression implies a long-run model for the shadow economy as specified in Equation (2).

**Table 1. Results of augmented Dickey-Fuller unit root tests**

Series	Level:		First-difference:	
	Constant	Constant & trend	Constant	Constant & trend
$lshadow_t$	-2.133 (3)	-3.169 (1)	-4.672***(1)	-4.898***(1)
$lfindev_t$	-2.775 (1)	-1.505 (0)	-4.515***(1)	-6.536***(0)
$lfindev_t^2$	-2.226 (0)	-1.337 (0)	-4.706***(1)	-6.160***(0)
$lrgdppc_t$	-1.436 (0)	-1.874 (0)	-5.755***(0)	-5.866***(0)
$lgovtcon_t$	-1.955 (0)	-2.932 (0)	-7.887***(0)	-7.793***(0)
$lpersontax_t$	-2.530(0)	-2.472 (0)	-6.303***(0)	-6.327***(0)
$lsstax_t$	-1.975 (1)	-2.226 (0)	-6.034***(0)	-6.047***(0)

Notes: Asterisks (\*\*\*) denotes statistically significant at 1% level. The calculated statistics are those computed in MacKinnon (1996). The optimal lag length in round brackets was chosen based on SC criterion throughout the analysis.

For estimating the long-run model as per Equation (2) and besides using OLS, other procedures appropriate for small sample include Dynamic OLS (DOLS), Fully Modified OLS (FMOLS), and Canonical Cointegrating Regression (CCR). Stock and Watson (1993) propose the dynamic OLS; Park (1992) introduces the canonical cointegrating regression); while Phillips and Hansen (1990) suggest the fully-modified OLS. DOLS procedure corrects for possible simultaneity bias and small sample bias amongst the regressors by regressing one of the  $I(1)$  variables on other  $I(1)$  variables, the  $I(0)$



variables, and lags and leads of the first difference of the  $I(1)$  variables. Incorporating the first difference variables and the associated lags and leads will eliminate simultaneity bias and small sample bias inherent among regressors.

On the other hand, the FMOLS procedure correct for endogeneity and serial correlation effects as well as eliminates the small sample bias. The CCR is closely related to FMOLS, but instead employs stationary transformation of the time series data to obtain least squares estimates to remove the long-run dependence between the cointegrating equation and stochastic regressors innovations. Park (1992) shows that the CCR transformations asymptotically eliminate the endogeneity caused by the long-run correlation of the cointegrating equation errors and stochastic regressors innovations, and simultaneously correct for asymptotic bias resulting from the contemporaneous correlation between the regression and stochastic regressor errors.

### Results of the shadow economy long-run models

In Table 2, we present the results of the cointegration tests as well as the estimated shadow economy long-run model for Malaysia. For OLS we employ the conventional Engle and Granger (1987) 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 both the  $L_c$ - and  $\chi^2$ -statistics, the testfor the null hypothesis of cointegration for FMOLS, DOLS and CCR.

**Table 2. Results of shadow economy long-run model estimates with financial development for Malaysia**

Estimators	Constant	$lrgdppc_t$	$lgoutcon_t$	$lfindev_t$	$lfindev_t^2$	$lpersontax_t$	$lsstax_t$
OLS	5.1740*** (3.4819)	-1.3295*** (14.484)	-0.8463*** (3.7841)	6.0254*** (8.7086)	-0.6743*** (8.0663)	0.3330** (2.3396)	-0.1996* (1.8156)
	<i>E-G</i> test: -4.648***						
FMOLS	6.0216*** (3.8828)	-1.3427*** (14.972)	-0.9418*** (4.0029)	5.7780*** (7.3808)	-0.6460*** (6.7690)	0.4442*** (3.1313)	-0.2342** (2.1685)
	$L_c=0.619$ [ $>0.20$ ] $\chi^2=0.101$ [0.749]						
DOLS {0,1}	6.4927*** (3.3596)	-1.3405*** (10.298)	-0.9649** (2.8058)	5.5546*** (6.1570)	-0.6176*** (5.4223)	0.4308* (2.0032)	-0.2406 (1.4582)
	$L_c=0.061$ [ $>0.20$ ] $\chi^2=0.106$ [0.743]						
CCR	6.0525*** (4.2770)	-1.3387*** (13.814)	-0.9518*** (3.6181)	5.7616*** (8.4600)	-0.6451*** (7.7072)	0.4651*** (2.9908)	-0.2415** (2.1496)
	$L_c=0.708$ [0.138] $\chi^2=0.045$ [0.831]						

Notes: Asterisks (\*\*\*) , (\*\*) and (\*) denote statistically significant at 1%, 5% and 10% level respectively. For the long-run model, figures in round brackets (.) are *t*-statistics; figures in square brackets [.] are p-values; figures in curly brackets {.} are lead and lag for DOLS. For the cointegration tests; the *E-G* test denotes the DF *t*-statistic on the cointegrating regression's residual.  $L_c$ -statistic measures Hansen (1996) parameter instability test for cointegration; while  $\chi^2$  measures the Park's added variable test for cointegration. The *E-G* tests with null hypothesis of no cointegration while the Hansen and Park tests the null hypothesis of cointegration.

Generally, cointegration is detected for all four estimators used in the analyses. For OLS, the null hypothesis of non-cointegration can be rejected at the 1% level. On the other hand, both of the cointegration tests shown by the  $L_c$ - and  $\chi^2$ -statistics under FMOLS, DOLS and CCR suggest that the null hypothesis of cointegration cannot be rejected. In most cases, the long-run model of the shadow economy suggest that real GDP per capita, government consumption, financial development and tax burden are important determinants of the Malaysian shadow economy. The negative relationship between shadow economy and real GDP per capita,  $lrgdppc_t$ , suggest that an increase in national income will lead to a reduction in the size of the shadow economy. The positive relationship between shadow economy and direct tax as shown by personal income tax,  $lpersontax_t$ , indicate that increasing individual income tax will encourage people to participate in the shadow economy.

On the other hand, government consumption,  $lgovtcon_t$ , and indirect tax – sales and services tax,  $lsstax_t$ , show negative relationship with the shadow economy. The inverse relationships would suggest people's satisfaction with the way government revenues has been spent appropriately. Thus, indirect taxation such as sales and services tax is not a burden to the Malaysian population as long as it is spend on public infrastructure and services.

An interesting result emerge from this study is the non-linear relationship shown between shadow economy and financial development for Malaysia. As indicated by the sign of  $\theta_3$  being positive while  $\theta_4$  is negative, this would suggest an inverted *U*-shape curve – a non-linear relationship between the shadow economy and financial development in Malaysia. The inverted *U*-shape curve suggests that as financial development progress in Malaysia from lower to higher level, shadow economy at first increases and then shadow economy decreases. Our findings support the contention by Bose et al. (2012), Blackburn et al. (2012) and Bittencourt et al. (2014) that access to finance is difficult at lower level of financial development and players seek alternative financing and participate in the shadow economy; but as financial development develops and becomes more sophisticated, access to finance will be much easier, cost of financing becomes cheaper, players willing to participate in the formal economy as the opportunity cost in participating in the shadow economy increases.

## Conclusion

In the present study, we provide new estimates of the size of the shadow economy in Malaysia for the period 1971-2013. Further, we relate shadow economy with its determinants - tax burden (both direct and indirect taxation), government consumption, economic growth and financial development. Our estimated long-run models suggest that declining economic growth (economic recessions) and increase in direct taxation – individual tax rate, increases the size of the shadow economy. Our results further suggest that government spending and indirect taxation such as sales and services tax mitigate the size of the shadow economy in Malaysia. When people perceived that tax revenue has been spent appropriately and for good used, probably on public infrastructure and services, satisfied population refrain from participating in the shadow economy.

Interestingly, our study reveal that the relationship between shadow economy and financial development in Malaysia was found to exhibit an inverted *U*-shape curve: shadow economy increases at lower level of financial development but as financial development increases, shadow economy ultimately decreases. Thus, our findings support the earlier work of Bose et al. (2012), Blackburn et al. (2012) and Bittencourt et al. (2014). An important policy conclusion is that the Malaysian government should embark on programs that can reduce the size of the shadow economy, and easy access to the credit market and further reform of the financial sector should be the focus.



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