

-RESEARCH ARTICLE-

DOES (ISLAMIC) STOCK MARKET MITIGATE SHADOW ECONOMY IN MALAYSIA?

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—Abstract—

In the present study we estimate the size of the shadow economy for Malaysia using the modified-cash-deposit-ratio (MCDR) approach. Subsequently, we relate shadow economy with its determinants such as national income, government spending, stock market development, misery index and tax burden. Our emphasis in this study is on the role of Islamic stock market in mitigating shadow economy in Malaysia. We consider Bursa Malaysia as an Islamic stock market as more than 70% of the companies listed in the Bursa Malaysia stock indices are Sharia-compliant. Our results clearly suggest that there is a role for Islamic stock market in reducing the size of shadow economy in Malaysia.

JEL classification: E26, E44, G1, M38

Keywords: Shadow economy, financial development, Islamic stock market, Malaysia

1. INTRODUCTION

Sustainable long-term economic growth as well as acceptable standard of living is indeed the desired goal of any economies. However, the long-term growth of living standards depends significantly on the rate of technological innovation and business firms' related investment expenditures (Romer, 1990; Schumpeter, 1961; Solow, 1957). Firms' does not only need to invest on research and development, expand current facilities, or build new factories; but they also need to replace old and obsolete capital goods due to wear and tear, which causes depreciation over time. Taking all these into account, the economy must generate and transfer a significant flow of saving into investment goods to maintain the nation's capital stock and preserve existing living standards, and this can only be achieved by a continuous flow of saving and investment in the economy. Thus, the greater the proportion of current output saved and invested the more rapid a nation's rate of long-term economic growth.

Studies have shown that financial sector development can indeed play the crucial role as the engine for economic growth. Schumpeter (1961) argues that financial sector leads economic growth by acting as a provider of fund for productive investments and therefore could accelerate economic growth. The seminal works by Pagano (1993), Greenwood et al. (1990), Bencivenga et al. (1991) and Levine (1991) iterates that (i) efficient financial market improvise the quality of investments and promotes economic growth; (ii) banks as liquidity provider permit risk-averse households to hold interest-bearing deposits and funds obtained are then channeled to productive investment; and (iii) stock markets help individuals' manage liquidity and productivity risk and as a result, stock markets accelerate growth. This suggests that financial sector development may naturally tend to alter the composition of savings in a way that is favorable to capital accumulation, and if the composition of savings affects real growth rates, financial

development will tend to promote growth. The more resources allocated to firms, the more rapid will be economic growth (Habibullah et al., 2006b), many more prominent studies have also shown that financial development enhance growth through its impact on capital accumulation as well as productivity (Huang et al., 2009; Rioja et al., 2004).

1.1 Does Shadow Economy Harm Financial Development?

Seminal work by Schneider et al. (2000), and Schneider et al. (2010) have shown that the average size of the shadow economy all over the world is about one-third of the world's gross domestic product (GDP). A simple comparison among the regions show that shadow economy in the high income nations, albeit the OECD is about 17.1%; and among the developing countries - Latin America and the Caribbean is about 41.1%, followed by Sub-Saharan Africa 40.2%, Europe and Central Asia 38.9%, South Asia 33.2%, East Asia and Pacific 32.3%, and Middle East and North Africa 28.0%. The inherent risk of shadow economy is the reduction of the tax base and overall tax revenue. The shortfall in tax revenue collection will incapacitate the role of government in providing quality public services to the population, weaken the government and may cripple economic growth (Eilat et al., 2002). On top of that, shadow economy is also related to criminal activities (Habibullah et al., 2006a; Naylor, 1995).

Studies have shown that shadow economy can be mitigated through the development of the financial sector (Bittencourt et al., 2014; Blackburn et al., 2012; Bose et al., 2012; Capasso et al., 2013; Gordon et al., 2009; Singh et al., 2012; Straub, 2005). The main contention in these studies is that accessibility of firms to bank financing can formalize the informality of the business enterprises, thus reduce shadow economy. Although formality imposes fiscal burden on a firm, such as taxes or costs of complying with regulatory requirements in the form of registration and licensing fee to be able to operate formally; benefits of being formal consist in the access to public goods and services, and access to external finance. Empirical findings by Bayar et al. (2016) on European Union transition economies; Berdiev et al. (2016) on a panel of 161 countries; and Habibullah et al. (2016) and Din (2016) on Malaysia, support the view that higher financial development commensurate with lower shadow economy. Both Din (2016) and Habibullah et al. (2016) further found that the relationship between shadow economy and financial development in Malaysia is nonlinear, exhibiting an inverted-U shape curve, thus supporting the works by Bose et al. (2012), Blackburn et al. (2012) and Bittencourt et al. (2014) that shadow economy increases at lower level of financial development but at higher level of financial development, shadow economy ultimately decreases.

In contrast, Berdiev et al. (2016) interestingly found a differing causation, that shadow economy can harm financial development. As a matter of fact, their study supports the earlier work by Gobbi et al. (2012) and Elgin et al. (2013). Gobbi et al. (2012) conducted a study on Italian credit market and their results suggest that when 1% of people migrate

from the official economy into the shadow economy, total bank lending reduces by 2%; and total amount of household borrowings drop by 0.4%. Further analysis on the impact of shadow economy on new bank branching decisions, produce results suggesting a 1% decrease in the size of the shadow economy would encourage bank to open up three new bank branches per province in Italy. [Elgin et al. \(2013\)](#) provide a theoretical model that relates the effects of shadow economy on the financial sector. They suggest that in the presence of large shadow economy, tax evasion is also large. Due to loss in tax revenue, the government has to impose indirect tax through the financial intermediary, and as a consequence the financial sectors are repressed. However, decreasing shadow economy will improve society's financial market activity. Their theoretical model suggests an inverted-U shape curve - those higher levels of shadow economy increase the level of financial repression in the formal financial sector, and at lower level of shadow economy, improves financial development as the losses due to financial repression are negligible in the formal financial sector. Their empirical findings on a cross-country panel data set of 152 countries support the nonlinear, inverted-U shape relationship between shadow economy and financial development.

On a global scale, shadow economy can lead to financial crisis and international financial scandals. For example, a study by [Berger et al. \(2014\)](#) found that the significant presence of the shadow economy in 11 EMU member countries increase the debt to GDP ratio, thus implying that unchecked shadow economy could contribute to the deepening of budgetary imbalances and eventually lead to an unsustainable debt position that give rise to severe economic and financial turmoil. They have estimated that a 1% reduction in the size of the shadow economy averaged over the 11 countries would decrease the debt-to-GDP ratio by about 0.35%. On the other hand, shadow economy can also inflict financial system across international borders. Illicit financial flows have always been linked to illegal activities in the shadow economy ([Buchanan, 2004](#); [Kar, 2012](#); [Kar et al., 2013](#); [Kar et al., 2014](#); [Kar et al., 2015b](#)). Illicit financial flows are a worldwide obstacle to global development. According to [Janský \(2013\)](#) illicit financial flows ranges from an individual transferring income abroad without having paid taxes, to highly complex money laundering schemes involving criminal networks to hide ownership and transfer of stolen funds. [Kar \(2012\)](#) explain further those illicit financial flows involve the cross-border transfer of money mainly earned through illegal economic activities such as corruption, transactions in contraband goods including drugs, criminal activities, human trafficking and the sex trade. They also include money that has been earned legitimately such as business profits or individual income that has been transferred to avoid tax.

[Kar et al. \(2015a\)](#) estimated that between 2004 to 2013, developing countries as a whole lost US\$7.8 trillion in illicit money. The average amount of illicit financial flows relative to GDP in the developing countries is about 4%: Sub-Saharan Africa is about 6.1%,

follow by developing Europe 5.9%, Asia 3.8%, Western Hemisphere 3.6% and MENA+AP 2.3%.

Among the top five illicit financial outflows averaging the ten-year period, China ranked first with US\$139 billion, follow by Russia US\$105, Mexico US\$53, India US\$51 and Malaysia US\$42 billion. On the other hand, [Schneider \(2013\)](#) reports that the amount of money laundering in a total of four regions – America, Asia-Pacific, Europe and the Middle East & Africa is about 2% of GDP in 2005. On tax evasion, [Network \(2011\)](#) reports that the amount of total tax evasion is in the excess of US\$3.1 trillion or about 5.1% of world's GDP. Among the ASEAN countries, Malaysia was placed fourth in the ASEAN-5, with a total of US\$11.2 billion losses from tax evasion activities; while Thailand was ranked number one (approximately US\$25.8 billion), followed by Indonesia and Philippines recording losses of almost US\$17.8 billion and US\$11.7 billion of tax evasion, respectively. Singapore lost over US\$4.1 billion, the lowest in the region.

The substantial amount of financial loss resulting from shadow economic activities can have adverse effects on economic growth of a country and the global financial market ([Bank, 2009](#)). Among the macroeconomic impact, shadow economy at the international level can: (i) weaken the government and resulting in low level of economic development, (ii) undermine investors' trust in a country's financial system, (iii) cause economic distortions in particular, allocation of resources and distribution of wealth, (iv) lessen the ability to attract foreign investment, (v) increase the volatility of international capital flows and exchange rates, and (vi) reinvestment into crime and develop unique symbiotic relationships ([IMF, 2001](#); [Quirk, 1997](#); [Rao, 2013](#)). Kars and his colleagues conclude from their studies on Russia, Mexico, Myanmar, India and the Philippines that mitigating the shadow economy can and will curtail illicit financial flows ([Kar, 2012](#); [Kar et al., 2013](#); [Kar et al., 2014](#); [Kar et al., 2015b](#)).

The purpose of the present paper is to estimate the size of shadow economy in Malaysia. Subsequently, we investigate whether the (Islamic) stock market can mitigate the size of shadow economy in Malaysia. To estimate the magnitude of the Malaysian shadow economy we employ the modified-cash-deposit-ratio (MCDR) procedure proposed by [Pickhardt et al. \(2011\)](#) and [Pickhardt et al. \(2015\)](#). In this study, our focus is on the role of the Islamic stock market as a vehicle to reduce shadow economy in Malaysia. In this study we can consider the Malaysian stock market as "Islamic" in the sense that more than three-quarter of the stock listed in the Bursa Malaysia are Sharia-compliant. Our study concludes that Malaysian (Islamic) stock market can play an important role in mitigating shadow economy in Malaysia.

2. CAN WE TRUST THE FINANCIAL INSTITUTIONS?

According to [Schneider \(2005\)](#), shadow economy *includes all market-based legal production of goods and services that are deliberately concealed from public authorities for the following reasons: (1) to avoid payment of income, value added or other taxes, (2) to avoid payment of social security contributions, (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.*

[Rothenberg et al. \(2016\)](#) argue that individuals and firms exit from the formal economy because the cost of formality is greater than its benefits. When making the formality decision, they evaluate the expected benefits and costs just like any other investment decision. *They weigh the benefits of formality, such as reduced risks of informal payments to government officials, increased access to banks, courts, government contracts, or skilled labor, against the costs of formality, including official tax payments, registrations costs, and costs of compliance with different business regulations, such as labor laws (Rothenberg et al., 2016).* Thus, being in the shadow, the firms enjoy tax advantages, cheaper wage rates, and other cost advantages from not complying with tax rules and other regulations, and being able to compete with the formal firm unfairly.

In view of this, it is imperative that barrier to entry such as government and banking rules and regulation need to be relaxed to accommodate and encourage individuals and firms to exit the shadow economy. The large pool of entrepreneurs is a big lost (in terms of lost in potential output and funding) to the official economy if they stay in the shadow economy. Studies have shown that entrepreneurs with access to external financing will be able to increase output and further enhance economic growth ([Raj et al., 2014](#)). The financial institutions can offer varieties of funding from simple loan (bank-based system) to tapping funds from the stock market (market-based system), and banks can be access easily as they have branches even in the rural areas. In fact, studies have shown that having access to bank finance, firms prefer to stay in the formal economy and thereby mitigate the size of the shadow economy ([Blackburn et al., 2012](#); [Bose et al., 2012](#)). [Capasso et al. \(2013\)](#) and [Beck et al. \(2014\)](#) stressed that bank outreach can play an important role on reducing the incidence of shadow economy by cutting barriers to entering the formal economy. Thus, expanding financial inclusion can potentially reduce shadow economy in an economy ([Zins et al., 2016](#)).

Nevertheless, one non-economic factor that can impair individuals or firms from using the services of the financial markets is trust ([Sapienza et al., 2012](#)). Trust underpins the existence and development of financial markets. Trust is an essential element of economic transactions and an important driver of economic development; and it is particularly crucial in financial transactions where people pay money in exchange for promises ([Bachas et al., 2021](#)). To advocate the role of trust in economic exchange,

Guiso et al. (2009), for example, illustrate that: (i) increase in importer's trust toward the exporter raises exports by 10%; (ii) a country is more willing to invest in another (either directly or via the equity market) when it trusts the other country's citizen more; (iii) countries trust each other more and thus can transfer faster and more effectively; (iv) venture capitalists are more likely to invest in start-ups of countries they trust more; and (v) trust play an important role in the recovery effort during the great depression in the US (Brescia, 2009). Nevertheless, the effective functioning of financial markets relies heavily on the expectation that high professional, legal, and ethical standards are observed and enforced. A reputation for integrity—soundness, honesty, adherence to standards and codes—is one of the most valued assets by investors, financial institutions, and jurisdictions (IMF, 2001). For example, as a result of corporate financial scandals and financial fraud, Giannetti et al. (2016) and Guiso et al. (2008) showed that the lack of trust on the financial markets can explain why individuals do not participate in the stock market. Georgarakos et al. (2011) found that the effect of trust is significant in countries with low stock market participation rates and relatively low average trust across Europe.

D'Heroncourt et al. (2012) point out that trust play a special role in the informal sector. People who trust each other may carry out transactions that would otherwise be impossible outside the formal legal system. As such trust can be a substitute to official contracts. Even in the formal legal system, when individuals are willing to sign financial contracts depends not only on the enforceability of contracts, but also on the extent to which they trust the counterpart (Guiso et al., 2004). Williams et al. (2015) argue that due to a lack of trust in the government, there is a higher likelihood of participation in the shadow economy. For example, the people of Myanmar use cash because they mistrust the government and the banking system. In fact, the deep seeded mistrust of the banking sector dates back to the 1960s; furthermore, cash is more secured and offers security in terms of anonymity (MDRI-CESD, 2014). On the other hand, the World Bank (2014) reports that 13% of the people they surveyed documented in the Global Findex survey on 70,000 adults indicate that the reason they do not have a formal account with a bank because they lack of trust in the banking system (Demirgüç-Kunt et al., 2013).

At the international level, poor people who are excluded from the financial system uses the informal money banking system called *Hawala*, to transmit funds from one country to another efficiently, without having to move the money physically or electronically (Force, 2000; Schneider, 2013). The *hawala* bankers that provide and carry out financial transactions are illegal and prohibited by law. The *halawa* system is fundamentally based on trust and social (family, clan, ethnic) connections (Nakhasi, 2006; Shanmugam, 2004). Furthermore, the *halawa* system of remitting funds is much quicker and cheaper than transferring money via the wire transfer (Wheatley, 2005). In India, for example, up to 50% of the population is using the *hawala* system to transfer funds, and it is estimated that between 200-2005, the estimated amount of money flows through *hawala*

system amounting to US\$5-10 billion per year (Schneider et al., 2011). At a global scale, Page et al. (2006) estimate that about US\$58 billion of money has been transferred using the *hawala* banking system in 2004.

2.1 Trusting the Islamic Stock Market

Studies have recognized the important role of the stock market development in enhancing economic growth (Arestis et al., 1997; Beck et al., 2002; Rousseau et al., 2000). However, the recent financial scandals and crises have put the Western style stock markets in a tight spot (Naughton et al., 2000). The mistrust in the financial system and the stock markets reduce investors' participation and led investors to seek for alternative investment opportunities. One of the alternatives is the Islamic stock market. Saiti et al. (2014) points out that Islamic investing as an alternative investment venture is not only for Muslim, but for all investors including non-Muslim in various countries (Sheng, 2013).

The Islamic stock market, in which the stock indices are subject to the Sharia principles and consists of rigorous screenings for business with core activities that are involved in any non-Sharia compliant activity such as usury or interest-related activity (*riba*), gambling (*maysir*), excessive uncertainty (*gharar*), and other prohibited (*haram*) 'unethical' industries like tobacco, alcohol, pork and so on (Hussein, 2004; Ng et al., 2015; Saiti et al., 2014). As such due to the ethical foundation of Islamic stock indices that limits the interest-based leverage business activities would lower the systematic risks of the Islamic stock indices during expansion and recession. Therefore, the Islamic stock indices can provide better diversification benefits compared with their conventional counterparts (Saiti et al., 2014; Sheng, 2013). For example, Jawadi et al. (2014) found that the impact of the 2008-2009 global financial crises on Islamic stock markets is less significant than for the conventional markets. On the other hand, Canepa et al. (2014) indicate Sharia-compliant stocks have higher returns and volatility than their non-Sharia compliant counterparts. Saiti et al. (2014) also found that Islamic stock markets in the Islamic countries provide better diversification benefits compared to the Far East countries such as Korea, Hong Kong and China. Hussein (2004) concludes that Islamic index (FTSE Islamic) yields statistically significant positive abnormal returns in the bull market period compared to the FTSE All-World index.

In a review of the UK stock market presented to the British government, Professor Kay stresses the important of trust, confidence, stewardship and respect to strengthen the existence, viability and proper functioning of the financial intermediation as a conduit between savers, managers and investors (Kay, 2012). According to Professor Kay, to gain trust and respect from the public 12 key principles were recommended to the committee; and four Kay's review principles that runs parallel with the Islamic values of ethics of participants in the Islamic stock markets than those practiced in the non-Islamic ones are:

1. All participants in the equity investment chain should act according to the principles of stewardship, based on respect for those whose funds are invested or managed, and trust in those by whom the funds are invested or managed,
2. Relationships based on trust and respect are everywhere more effective than trading transactions between anonymous agents in promoting high performance of companies and securing good returns to savers taken as a whole,
3. All participants in the equity investment chain should observe fiduciary standards in their relationships with their clients and customers. Fiduciary standards require that the client's interests are put first, that conflict of interest should be avoided, and that the direct and indirect costs of services provided should be reasonable and disclosed. These standards should not require, nor even permit, the agent to depart from generally prevailing standards of decent behavior. Contractual terms should not claim to override these standards, and
4. Risk in the equity investment chain is the failure of companies to meet the reasonable expectations of their stakeholders or the failure of investments to meet the reasonable expectations of savers. Risk is not short-term volatility of return, or tracking error relative to an index benchmark, and the use of measures and models which rely on such metrics should be discouraged (Kay, 2012).

The above principles are no means uncommon to the Islamic community, in particular to the strong ethical underpinning of the Islamic stock market principles (Sheng, 2013). Ng et al. (2015) reiterate that the litmus test for a successful stock market or any form of multilateral exchange is whether such market functions in a trustworthy and ethical manner. Brescia (2009) also stressed that trustworthiness is an essential element in the economics of trust. He advocates that learning from the financial crisis that what matters more to economic growth and sustainability is not whether A trusts, but rather whether B is trustworthy in a particular context. Thus, a trustworthy and ethical stock market would increase investors' participation. In fact, Naceur et al. (2017) posit that developing a Sharia-compliant financial market (equity and sukuk), where both the instruments and trading process be in line with the Sharia requirement for transactions could help alleviate the finance constraints on SMEs. In Saudi Arabia, for example, 90% of SMEs indicate a strong preference for Sharia-compliant products. On the other hand, SMEs in Morocco (54%) and Jordan (45%) also reported a strong interest in Sharia-compliant banking services (IFC, 2014). Other studies have indicated that Islamic finance allows Muslim individuals and firms with religious concern to have access to finance or move from the informal to the formal financial system (Abedifar et al., 2016; Bank, 2014; Rabaa et al., 2016).

2.2 Islamic Stock Market in Malaysia

The episode of Islamic stock market that complies with the Islamic principles of Sharia in Malaysia begins with the launching of the Kuala Lumpur Syariah Index (KLSI) by the Kuala Lumpur Stock Exchange (now Bursa Malaysia) in 1999. The establishment of the Sharia Advisory Council (SAC) facilitates the development and innovation of Islamic financial products in Malaysia. The SAC adopts a two-tier quantitative approach, which applies the business activity benchmarks and the financial ratio benchmarks, in determining the Sharia status of the listed securities (SC, 2016). The two business activity benchmarks are the five-percent benchmark and the 20-percent benchmarks. The five-per cent benchmark is applicable to the businesses activities such as conventional banking, conventional insurance, gambling, liquor and liquor-related activities, pork and pork-related activities, non-halal food and beverages, Sharia non-compliant entertainment, tobacco and tobacco-related activities, interest income from conventional accounts and instruments (including interest income awarded arising from a court judgment or arbitrator), dividends from Sharia non-compliant investments, and other activities deemed non-compliant according to Sharia. For 20-per cent benchmark is applicable to the following businesses activities include share trading, stockbroking business, rental received from Sharia non-compliant activities, and other activities deemed non-compliant according to Sharia. On the other hand, for the financial ratio benchmarks, the SAC take into account (i) cash only includes cash placed in conventional accounts and instruments, whereas cash placed in Islamic accounts and instruments is excluded from the calculation; and (ii) debt only includes interest-bearing debt whereas Islamic financing or sukuk is excluded from the calculation. Each ratio, calculated over the total assets, which is intended to measure riba and riba-based elements within a company's statements of financial position, must be less than 33 per cent (SC, 2016).

Further development in the Islamic stock market; with cooperation between Bursa Malaysia and the international FTSE Group, saw the launched of the FTSE-Bursa Malaysia EMAS Shariah index (FBM EMAS Shariah), FTSE-Bursa Malaysia Hijrah Shariah index (FBM Hijrah Shariah), and the latest FTSE-Bursa Malaysia Small Cap Shariah index (FBM Small Cap Shariah). For more than 10 years, Malaysia's Islamic finance has grown steadily to become the second largest in the global Islamic finance industry and one of the most developed Islamic banking markets in the world (EY, 2015; Krasicka, 2012). Since 1999, the percentage number of companies that comply with Sharia-compliant to the total number of listed companies in Bursa Malaysia was 72% in 2000, 89% in 2007 and 74% in 2015. This implies that about three-quarter of the securities traded in the Malaysian stock market are Sharia-compliant.

3. SHADOW ECONOMY AND (ISLAMIC) STOCK MARKET IN MALAYSIA

Factors or drivers that cause people or firm participating in the shadow economy are numerous. Some of the common factors evaluated in the literature include tax burden either direct or indirect taxation, social security contribution, regulation, tax morale, unemployment rate, GDP per capita (Bajada et al., 2005; Dell'Anno et al., 2008; Schneider, 2005); government spending or consumption (Buehn et al., 2012; Vo et al., 2014; Wang et al., 2006); weak government and bad governance (Friedman et al., 2000; Manolas et al., 2013); lack of trust for the government (D'Hernoncourt et al., 2012); crime rate (Wang et al., 2006); financial development (Blackburn et al., 2012; Bose et al., 2012); and inflation (Bittencourt et al., 2014).

In this study we modeled shadow economy as follows,

$$\ln se_t = \theta_0 + \theta_1 \ln r g d p p c_t + \theta_2 \ln g o v c o n s p_t + \theta_3 \ln s t o c k m k t_t + \theta_4 \ln s t o c k m k t_t^2 + \theta_5 \ln m i s e r y_t + \theta_6 \ln t a x b u r d e n_t + \varepsilon_t \quad (1)$$

where \ln denotes variables in logarithm; $\ln se_t$ is the size of shadow economy (calculated using modified-cash-deposit-ratio (MCDR) approach discussed below); $\ln r g d p p c_t$ is real GDP per capita to measure economic development or national income or wealth; $\ln g o v c o n s p_t$ is the ratio of government consumption to GDP; $\ln s t o c k m k t_t$ is the stock market – Bursa Malaysia measured by the ratio of stock market capitalization to GDP ($\ln m k t c a p_t$), and stock traded-turnover ratio of domestic shares ($\ln s t o c k t u r n_t$). According to Demirgüç-Kunt et al. (1996) and Beck et al. (2002); (Beck et al., 2004) the use of market capitalization is to measure the size of stock markets relative to the economy; while stock turnover ratio would measure liquidity. Demirgüç-Kunt et al. (1996) advocate that liquidity is an important attribute of stock market development because a liquid stock market improves resource allocation (capital) that will enhance long-term economic growth. Variable $\ln s t o c k m k t_t^2$ is stock market squared to establish whether the relationship between shadow economy and stock market development is non-linear; $\ln m i s e r y_t$ is the misery index calculated as inflation rate plus unemployment rate, and $\ln t a x b u r d e n_{jt}$ is measured using personal income taxation to GDP ratio. The error term, ε_t is expected to well behave with mean zero and constant variance.

It is expected that the parameters, $\theta_1, \theta_2 < 0$ and $\theta_5, \theta_6 > 0$. Studies have indicated that tax burden being the most important factor driving people into the underground economy. On the other hand, both or either increase in the inflation rate as well as increase in the unemployment rate push people into the shadow economy, seeking for alternative cheaper goods and services and earned their lost in income. On the contrary, an increase in wealth of the nation or higher level of economic development will shift

individuals and firms from the shadow economy to the formal economy, seeking better opportunity from a promising economic growth. Government spending on quality public infrastructure and services would refrain the population from entering the shadow economy and increases their tax morale (Torgler, 2005). The expected sign for θ_3 and θ_4 is however, ambiguous. We conjecture that there is a non-linear relationship between shadow economy and the stock market, with a *priori* expected sign, $\theta_3 > 0$ and $\theta_4 < 0$. This relationship implies that at lower stage of stock market development, shadow economy is increasing until at some turning point, at higher level of stock market development, shadow economy starts to decrease, thus, exhibit an inverted-U shape curve.

3.1 Sources of Data

Data on gross domestic product (GDP), real GDP per capita, government consumption to GDP ratio, stock market capitalization to GDP ratio, stocks traded-turnover ratio of domestic shares, inflation and unemployment rates were collected from the World Development Indicators published online and accessible at the World Bank database (see <http://data.worldbank.org/indicator>). On the other hand, data on personal income taxation was collected from various issues of the Monthly Statistical Bulletin published by the Central Bank of Malaysia (Malaysia, 2016). All variables are transformed into natural logarithm and denoted by ln .

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 et al. (2011) and Pickhardt et al. (2015) which is free from the Breusch (2005c), Breusch (2005b), Breusch (2005a) and Ahumada et al. (2007), Ahumada et al. (2008) critiques. According to Pickhardt et al. (2011), “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 (1911)’s quantity theory of money, Pickhardt et al. (2011), Pickhardt et al. (2015) arrive at the following modified-cash-deposit-ratio, which equals the ratio of shadow economy GDP to official GDP,

$$\frac{C_t - C_0}{C_0 + D_t} = \frac{Y_{Ut}}{Y_{Lt}} \quad (2)$$

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).

4. THE LONG-RUN MODEL FOR SHADOW ECONOMY IN MALAYSIA

To estimate Equation (1) we first determine the order of integration of all variables in the equation. Elliott et al. (1992) proposed an efficient test, modifying the Dickey-Fuller test statistic using a generalized least squares (GLS) rationale. They demonstrate that this modified test has the best overall performance in terms of small-sample size and power, conclusively dominating the standard Dickey-Fuller test (Dickey et al., 1981). In particular, Elliott et al. (1992) find that their "DF-GLS test has substantially improved power when an unknown mean or trend is present." The unit root test results using the DF-GLS procedure are presented in Table 1 with Panel A for series in levels and Panel B presenting the series in first differences.

Results in Table 1 clearly indicate that all variables are $I(1)$, that is the series becomes stationary after first differencing. These results clearly suggest that all variables are non-stationary in levels. Thus, estimating Equation (1) 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 (1). It also implies that there are long-run relationships between shadow economy and all the factors specified in Equation (1).

To estimate the long-run model as per Equation (1) we apply the ordinary least square estimator but with robust procedure due to Newey-West (Newey et al., 2017) heteroskedasticity and autocorrelation consistent (HAC) estimates of the standard error. An important property of the robust standard errors approach is that the form of the heteroskedasticity and/or autocorrelation does not need to be specified (Croux et al., 2003). In Table 1, Panel C and Panel D present the results of the cointegration tests from the OLS estimations. For the cointegration test, we employ the conventional Engle et al. (1987) two-steps procedure for testing the null hypothesis of non-cointegration or the present of unit root in the residuals. Upon finding cointegration, we next estimate the long-run models for Malaysian shadow economy by using the dynamic OLS (DOLS), fully-modified OLS (FMOLS) and canonical cointegrating regression (CCR) proposed by Pagano (1993), Romer (1990), and Rabaa et al. (2016) respectively. These estimators are appropriate for small sample and can eliminate simultaneity or endogeneity biases.

In Table 1, Panel C presents the result for stock market capitalization ($lnmktcap_t$); while Panel D shows the results for stock turnover ratio ($lnstockturn_t$). In both panels we observe that the null hypothesis of no cointegration between shadow economy and its determinants can be rejected at the 1% level. This implies that there are long-run relationships between shadow economy and the level of economic development, government expenditure, stock market development, misery index and tax burden.

Table 1: Results of Unit Root Tests and Long-Run Model for Shadow Economy in Malaysia

Deterministic	Inse _t	lnrgdppc _t	lngovconsp _t	lnstockmkt _t	lnstockmkt _t ²	lnmisery _t	Intaxburden _t
Panel A: Level:							
				lnstockcap _t	lnstockcap _t ²		
constant	-1.60 [3]	0.76 [1]	-1.60 [1]	-2.08 [0]	-2.16 [0]	-1.39 [2]	-1.44 [0]
const + trend	-1.77 [3]	-1.74 [0]	-2.72 [0]	-2.72 [0]	-2.75 [0]	-2.79 [2]	-2.21 [0]
				lnstockturn _t	lnstockturn _t ²		
constant				-1.64 [2]	-1.58 [2]		
const + trend				-2.51 [2]	-2.48 [2]		
Panel B: First-difference:							
				Δlnstockcap _t	Δlnstockcap _t ²		
constant	-3.87** [0]	-5.71** [0]	-7.90** [0]	-7.65** [0]	-7.65** [0]	-8.27** [0]	-6.01** [0]
const + trend	-5.37** [0]	-6.00** [0]	-7.95** [0]	-7.92** [0]	-7.85** [0]	-7.78** [1]	-6.32** [0]
				Δlnstockturn _t	Δlnstockturn _t ²		
constant				-7.56** [0]	-7.86** [0]		
const + trend				-9.32** [0]	-9.42** [0]		
Estimators	constant	lnrgdppc_t	lngovconsp_t	lnstockmkt_t	lnstockmkt_t²	lnmisery_t	Intaxburden_t
Panel C: Stock market capitalization proxy for stock market:							
OLS	13.775***	-1.2244***	-0.4350***	1.1755**	-0.1278**	0.0800*	0.0456
(robust)	(8.6928)	(15.772)	(3.2740)	(2.1809)	(2.3005)	(1.9223)	(0.3477)
	Adjusted R ² =0.9631		Ljung – Box Q(2): 0.258		Ljung – Box Q(4): 0.516		SER: 0.0778
	E – G test: -4.42***						
FMOLS	12.815***	-1.1755***	-0.3984***	1.2984**	-0.1390**	0.0821	0.1214
	(8.2472)	(16.867)	(3.0153)	(2.3316)	(2.4696)	(1.1289)	(1.1846)
	Adjusted R ² =0.9655		Ljung – Box Q(2): 0.057*		Ljung – Box Q(4): 0.201		SER: 0.0828
DOLS	10.870***	-1.0522***	-0.9562***	2.0453**	-0.2387**	0.3605**	0.5316***
{0,1}	(4.7734)	(11.578)	(5.3393)	(2.5815)	(3.0255)	(2.7063)	(3.6701)
	Adjusted R ² =0.9896		Ljung – Box Q(2): 0.459		Ljung – Box Q(4): 0.093*		SER: 0.0631
CCR	11.643***	-1.1865***	-0.3146*	1.7153**	-0.1797**	0.0956	0.1169
	(5.0730)	(12.508)	(1.8878)	(2.2047)	(2.3446)	(0.8252)	(0.8467)
	Adjusted R ² =0.9642		Ljung – Box Q(2): 0.198		Ljung – Box Q(4): 0.485		SER: 0.0844
Panel D: Stock trade-turnover ratio to domestic shares proxy for stock market:							
OLS	16.335***	-1.2842***	-0.3800**	0.3465	-0.0469	0.0631	0.0171
(robust)	(14.524)	(16.991)	(2.2806)	(1.4346)	(1.0914)	(1.3350)	(0.1159)
	Adjusted R ² =0.9622		Ljung – Box Q(2): 0.536		Ljung – Box Q(4): 0.644		SER: 0.0787
	E – G test: -4.79***						

Table 1. Continued

FMOLS	15.696*** (16.163)	-1.2510*** (17.190)	-0.2676* (1.9924)	0.3763 (1.5614)	-0.0515 (1.1873)	0.0437 (0.5839)	0.0461 (0.6711)
	<i>Ajusted R</i> ² =0.9619		<i>Ljung – Box Q</i> (2): 0.358		<i>Ljung – Box Q</i> (4): 0.312		<i>SER</i> : 0.0781
DOLS {0,1}	11.809*** (14.254)	-1.0828*** (16.067)	-0.4384*** (4.5022)	1.1985*** (4.4915)	-0.1766** (3.3414)	0.5826*** (6.7461)	0.5420*** (8.9315)
	<i>Ajusted R</i> ² =0.9941		<i>Ljung – Box Q</i> (2): 0.109		<i>Ljung – Box Q</i> (4): 0.209		<i>SER</i> : 0.0295
CCR	15.656*** (12.653)	-1.2581*** (13.899)	-0.2352 (1.5034)	0.4377 (1.2287)	-0.0617 (0.9075)	0.0091 (0.0805)	0.0562 (0.3910)
	<i>Ajusted R</i> ² =0.9590		<i>Ljung – Box Q</i> (2): 0.426		<i>Ljung – Box Q</i> (4): 0.315		<i>SER</i> : 0.0810

Notes: All variables are in logarithm and denotes by *ln*. Variables *se*, *rgdppc*, *govconsp*, *stockcap*, *stockturn*, *misery* and *taxburden* denote respectively, shadow economy to GDP ratio, real GDP per capita, government consumption to GDP ratio, stock market capitalization to GDP ratio, stock trade-turnover ratio to domestic shares, misery index (inflation + unemployment rates), and personal income tax to GDP ratio. The optimal lag length for the unit root test are shown in square brackets, [.] was chosen based on Schwarz criterion (SC) throughout the analysis. Asterisks ***, ** and * denote statistically significant at 1%, 5% and 10% level respectively. SER denotes standard error of regression. For the cointegration tests (with null hypothesis of non-cointegration), the *E-G* test denotes the *DF t*-statistics on the cointegrating regression's residual, and the calculated statistics are those computed in MacKinnon (1996). For the long-run models (OLS, FMOLS, DOLS & CCR), figures in round brackets (.) are *t*-statistics. *Ljung-Box Q*-statistics are test for non-serial correlation in the residuals for the second and fourth order, and the figures are *p*-values.

In Panel C, all four estimators show that national income, government expenditure, stock market developments are significant at least at the 10% level and with correct signs. The misery index is significant and with correct sign in both OLS and DOLS estimated equations, and tax burden is only significant and show correct sign in the DOLS model. Among the four estimators, DOLS gives the highest goodness of fit and the lowest standard error of regression. Thus, using results from DOLS as our point of reference, we observe that as the Malaysian economy progress and develop the size of the shadow economy decreases. As an economy develops and progresses, wealth increases and therefore gives more and better opportunity for people to generate their income in the formal economy. On the other hand, the decrease in the size of the shadow economy as a result in the increase in government expenditure implies that people perceived the government effort to increase the quality of the government services and spending government tax revenue appropriately for the benefits of the people.

On the other hand, if misery index measures the “hardship” of the population because of economic recession with increase in prices and unemployment; the positive relationship with shadow economy suggest that the “hardship” pushes the people to participate in the shadow economy. Firms in the shadow economy could provide employment opportunity and generate some income to finance their daily life. Firms in the shadow economy could also provide cheaper goods and services as their costs of production are generally lower than the formal firms. Similarly, tax burden adversely affects shadow economy. An increase in personal taxation will drive people into shadow economy. A 10% increase in the personal tax rate will increase the size of the shadow economy by 5.3%.

Our main interest that emerges from this study is the non-linear relationship shown between shadow economy and stock market development for Malaysia. As shown in Panel C and Panel D, the DOLS estimations for both $lnmktcap_t$ and $lnstockturn_t$, show the sign of θ_3 being positive while θ_4 is negative, thus exhibiting an inverted-U shape curve – a non-linear relationship between the shadow economy and stock market development in Malaysia. The inverted-U shape curve suggests that as stock market development progress in Malaysia from lower to higher level, shadow economy at first increases and after certain optimal point, thereafter 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 sector 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.

5. CONCLUSION

In this study, we estimated the size of the shadow economy in Malaysia for the period 1971-2013 by using the modified-cash-deposit-ratio approach. Further analysis related shadow economy with its determinants – national income, government consumption, stock market development, tax burden and “hardships” measured by the misery index. Our estimated long-run models suggest that declining income (say, economic recessions) and increase in individual income tax rate, increases the size of the shadow economy. Our results further suggest that government spending 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. Further, miserable life experience by the people will also lead them into the shadow economy.

Interestingly, our study reveals that shadow economy and the (Islamic) stock market in Malaysia exhibit an inverted-U shape curve: shadow economy increases at lower level of stock market development but as stock market 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 stock market sector by providing more Islamic Sharia compliant financial products should be the focus. Since Malaysia practice dual banking system by having both conventional banks and Islamic banks; Islamic banks and Islamic capital markets can play a pivotal in the effort to enhance financial inclusion to the “unbanked” population especially among the rural and “hardcore” religious community that refused the conventional banks that practice usury. Islamic finance can also play an important role in providing finances to the small and medium enterprises that could not access the conventional banks for credit.

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