Waqf Financing Expenditure and its Impact on Government Debt

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Abstract – The Malaysian debt has been under scrutiny since the 1Malaysia Development Berhad (1MDB) scandal; placing pressure on the research for sustainable debt. The purpose of this article is to forecast the impact of waqf (Islamic pious foundation) financing expenditure on federal government debt in Malaysia. It is to ascertain whether waqf can be an alternative solution to government debt reduction. To perform this, the Neoclassical Dynamic Stochastic General Equilibrium (DSGE) model is adopted. The theoretical framework is developed by considering the history, tradition, culture, and political influence of waqf primarily in Muslim majority countries. It was also inspired by the European third sector framework. The result shows that federal government debt can be reduced when waqf finances federal government expenditure. This has several implications. For one, this study revives the cohesive government-waqf role in providing pure and mixed public goods without depending solely on government expenditure. It highlights the fact that these shared role has an impact of reducing government debt. The result also inadvertently provides evidence of a significant third sector role on public finance dynamics. As a matter of fact, this study is one of very few quantitative attempts in illustrating how waqf interacts with the economy and its impact on government debt.

Keywords – Waqf, Islamic Economics, public finance

I. INTRODUCTION

In conventional economic theory, there are multiple strategies to attain government debt sustainability. The New Keynesian economics proposes that economic growth rate should supersede interest rate of debt (Marattin et al., 2011; Mabugu et al., 2013) [1, 2] while the New Classical Economics calls for an increase in tax rates or expenditure cuts (Qin et al., 2006; Sakuragawa and Hosono, 2011; Hansen and Inrohoroglu; 2016) [3, 4, 5]. Internalizing both of the schools’ recommendation, the balanced budget and multi-period strategy came about. The former involves simultaneous manipulation of variables in the government budget constraint (Cogan et al., 2012) [6] while the latter in different fiscal periods (Reith, 2014) [7]. Copious studies had verified these strategies by developing a macroeconomic model and generated a forecast of debt to gross domestic product (GDP) ratio. Their modelled economy consists of a representative from households, a representative from firms, and the conduct of monetary and fiscal policy by the government. These studies however, never considered the inclusion of the third sector in their economy leaving a wide literature gap on the possible third sector impact on economic variables. The third sector or voluntary sector includes “all such individual and social activities, which are not by intent or design, undertaken to attain any economic or material benefit for the doer or doers, but generate wide ranging economic repercussions” (Faridi, 1983, p.35) [8].

On the other hand, literature in Islamic economics has long considered this. Waqf, which is considered as a component of the third sector (Faridi, 1983; Kahf, 2014; Arshad and Haneef, 2016) [8, 9, 10], had acquired a pivotal role in the economic landscape of past Muslim economies. The literature named waqf as one of several sources of revenue in past Muslim governments; used to finance pure public goods, mixed public goods, as well as other social goods and services (Faridi, 1983; Siddiqi, 1995; Gil, 1998; Babacan, 2011; Biancone and Radwan, 2019) [8, 11, 12, 13, 14]. These items essentially make up the components of modern public expenditure. In addition, Sultan Salahuddin al Ayyubi of the Ayyubid dynasty introduced waqf as a supplementary fiscal policy in the Nile Valley with its application lasting through the Ottoman rule (Frenkel, 1999) [15]. In fact, Ambrose et al. (2018a) [16] had concluded that waqf financing modern expenditure is also doable with its model thought out by Ambrose et al. (2018b) [17]. Çizakça (1998) [18] had long envisioned that debt can be ultimately
reduced should waqf be assigned to finance certain components of government expenditure. A simulation was specifically done for Malaysia by Marzuki et al. (2012) [18] which found that waqf can help government save more thus enabling the savings to finance debt.

However, all these studies had only focused on the historic economic application of waqf or theoretically argued its uses and impact on modern economies. Few studies had actually employed macroeconomic models using real data to show waqf’s evident impact on modern economy. Hence, the purpose of this article is to examine the impact of waqf financing government public expenditure on debt using Dynamic Stochastic General Equilibrium (DSGE) model. The Malaysian federal government is the country of choice for this study.

This article is organised as follows. The second section discusses the construction of a waqf framework in light of modern economy. Based on the framework, a theoretical model is built in the third section. The theoretical model then gave rise to the model equilibrium in Section 4. The fifth and sixth sections present the calculation for parameter values and steady state values. Simulation is then done in the eighth section and a conclusion is presented in the final section.

II. CONSTRUCTING THE FRAMEWORK OF WAQF IN MODERN ECONOMY

Waqf or its plural awqaf means retaining and preserving certain asset strictly for specific philanthropy purposes (Kahf, 2014) [9]. Just like sadaqah (donation), waqf endowments are mainly driven by the altruistic behaviour of humans. In Islamic history, it had played a pivotal role in supplying pure and mixed public goods in a decentralized fashion. Pure public goods are “goods that are non-excludable (not easily denied to unauthorized consumers) as well as non-rival (capable of being enjoyed by many consumers at once)” (Kuran, 2001, p.841) [20] while mixed public goods possess the characteristics of both private and public goods. However, mixed public goods are also categorized as public goods in the Islamic context (Akthar, 1995) [21]. At its height, awqaf were endowed by the state and society for the purposes of defence, water supply, education, training, healthcare, animal care, transportation, and others (Peri, 1992; Cizakça, 1998; Gil, 1998; Kahf, 2014) [22, 18, 12, 9]. Waqf for these purposes are often termed as public waqf.

One of the earliest waqf was initiated by Prophet Muhammad peace be upon him (pbuh) in which the Prophet had converted a property left by Mukhayriq into waqf for defence (Gil, 1998; Kahf, 2014) [12, 9]. As the territories of Islam expanded, Caliph Umar al-Khattab converted many conquered villages and Egyptian lands into waqf for military benefit and the Muslim public (Gil, 1998) [12]. Later on, Caliph Al-Ma’mun from the Abbasid Caliphate, provided healthcare through similar means and ensured continuous streams of income through a waqf investment fund (Kahf, 2014) [9]. The fund had invested in business, residential buildings, and agricultural lands (Kahf, 2014) [9]. Later on, Sultan Salâh al-Dîn of the Ayyubid Dynasty formally introduced waqf as a public policy that augmented his fiscal reforms which lasted through the Ottoman era (Frenkel, 1999) [15]. These are a few examples of how waqf had interacted with state rulers or governments.

On the other hand, past upper class societies were also motivated to endow waqf (Bonine, 1987; Kuran, 2001) [23, 20]; indicating an interaction of waqf with past communities. One of the ways undertaken by them to sustain waqf was by using profits from their own businesses for waqf support. Bonine (1987) [23] discussed at length the evolution of Yazaad Bazaar in Iran which began through awqaf endowed by viziers and local patrons. It serves as proof that waqf had been the epicentre for economic expansion. Scores of businesses were developed and then converted into waqf back then; operated to fund religious schools, mosques, water cisterns, and other purposes. It further shows that waqf had also interacted with the market. Similarly, the waqf investment fund set up by Caliph Al-Ma’mun mentioned earlier may also serve as another example. Hence, it can be seen that waqf had integrated with the community, market, and state in the past. This is reminiscent of the modern third sector championed by Europe.

Pestoff (1992) [24] had developed a specific framework of third sector to which Evers and Laville (2004) [25] as well as Defourny and Pestoff (2008) [26] claimed the best representation for Europe by far. The framework, the third sector in the welfare triangle, is depicted in Fig. 1. The outer shape namely the welfare triangle indicates two things (Evers and Laville, 2004) [25]. First, each vertex denotes the sources of welfare contribution namely state, market, and community. Second, to show that the third sector is not juxtaposed with public sector (state) and private sector (community and market) but is in fact an intermediary sector. This is only rational because the third sector complements and interrelates with the other two sectors (Defourny and Pestoff, 2008) [26]. Meanwhile, the inner circle comprises of third sector organisations (TSOs). These TSOs are “simultaneously influenced by state policies and legislation, the values and practices of private business, the culture of civil society and by needs and contributions that come from informal family and community life” (Evers and Laville, 2004, p.15) [25]. The limits of these influences are defined using three types of dotted lines outlining the behaviours of state, market and community while simultaneously forming overlapping areas.

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Assuming that waqf can be termed as a type of TSO, the overlapping area between the state and the third sector indicates the role that waqf has on implementing public policy which are public, non-profit, and formal in nature. This is similar to past Muslim rulers that had converted conquered lands, villagers, and treasury revenues into waqf. Modern government waqf organizations such as the Department of Awqaf, Zakat and Hajj in Malaysia, Kuwait Awqaf Public Foundation in Kuwait (KAPF), and Majlis Ugama Islam Singapura or the Islamic Religious Council of Singapore fit in here too. Meanwhile, the overlapping area between the market and the third sector involves third sector enterprises like cooperatives which are private, for profit, and formal in nature. This is where businesses that support waqf in the historic Yazaad Bazaar fit in. Johor Corporation in Malaysia is an excellent modern example whereby part of the company’s shares are endowed as waqf (Waqqaf An-Nur Corporation Berhad, 2015) [27]. The final overlapping area points to self-help or mutual-aid groups that often exist in community which are informal, private, and non-profit in nature. This area marks the action of past wealthy individuals whom had supplied goods through waqf for societies’ benefit. The Vehbi Koç Foundation based in Turkey is a good contemporary example (Cizakça, 1998) [18].

However, the framework can be further modified to discuss the case of waqf exclusively as a specific type of third sector instrument (TSI). The first consideration is the fact that it is imprecise for waqf to be a “pure” TSI depicted as the centre triangle in the circle of Fig. 1. This is because waqf shares responsibilities with the government in providing for pure and mixed public goods as was alluded earlier in this section. Perhaps only sadaqah may be qualified as a “pure” TSI. This makes the centre triangle of Fig. 1 extraneous in a waqf framework. The second consideration is that the community, market, and state were not mere sources of waqf contribution. The well to do (community) supply pure and mixed public goods and guaranteed continuity of these supplies using their investments and business profits (market). This initiative by the well to do reduced the need for the state to provide such goods in the past. Another role of the state is to include waqf as a public policy. Hence, the community, market, and state actually agents of an economy that was born out of waqf; just like the economy in Yazaad Bazaar. Assertion that waqf can contribute to economic development made by Biancone and Radwan (2018) [27] indeed has its basis.

Taking these considerations into account, Fig. 2 was developed. As can be seen, the three inner triangles depict the state, community, and market which expectedly form an outer triangle. This outer triangle represents the economy thus elucidating the role of state, community, and market as economic agents which are similarly defined in most modern macroeconomic models. Waqf is placed in a circle that touches the sides of this outer triangle and juxtaposes with the three agents’ triangles. These actually delineates the intermediary role of waqf and links the three agents together. Thus in essence, the waqf circle located in the middle of the outer triangle is to emphasise waqf’s role as the crux of this economy. Meanwhile, areas of the inner triangles that do not intersect with the waqf circle are the typical role of agents that do not concern waqf.

However, this economic framework became dormant after the collapse of the Ottoman Empire. Waqf was deemed unable to integrate into an economy that was rapidly industrialising (Kuran, 2001) [20]. As a result, the views of waqf became restricted and were deemed only suitable for religious purposes. Its former role as the supplier of pure and mixed publics goods together with the state were transferred completely to the latter.

Regardless, waqf possesses evolutionary characteristics that make it a practical instrument for any era (Setia, 2014) [29]. Kuran (2001) [20] claims that two scenarios have to occur in order for waqf to integrate in modern economies. One, all awqaf should be coordinated and two, formed into a waqf municipal of corporate status. The former is self-explanatory while the latter entails the creation of corporate waqf defined by Mohsin (2014) [30] as “the confinement of an amount of liquid money, shares, profit, dividends by founder(s) such as individuals, companies, corporations, organizations or institutions, and the dedication of its usufruct in perpetuity to the welfare of society” (p.16). Kuran (2001) [20] also believes that corporate waqf should acquire a legal entity and thus overseen by a board of
managers. If these two scenarios occur, then by extension, the public waqf framework represented in Fig. 2 will be applicable again in modern economy.

The first scenario is already taking root in most Islamic countries. The Federal Constitution of Malaysia appoints the State Islamic Religious Councils (SIRCs) as the sole trustees of waqf which require all awqaf to be registered with the respective SIRCs. Singapore is however much advance than Malaysia in terms of trustee flexibility and transparency. Majlis Ugama Islam Singapura (2016) [31] contains records of all registered waqf deeds in the country which can be accessed by the public. Trustees of these waqf are by no means confined to Majlis Ugam Islam Singapura or the Islamic Religious Council of Singapore. In India, where large Muslim population resides, efforts to identify and compile a list of available awqaf are taking place through the Waqf Records Computerization Project (WRCP) under the tutelage of the Ministry of Minority Affairs India [32]. Data obtained are compiled in an online database named the Waqf Management System of India (WAMSI). When all of these awqaf are registered, coordination of waqf for the same purpose will be less of a hassle. The KAPF for instance, was tasked by the Organization of Islamic Cooperation (OIC) to coordinate waqf actions among Muslim countries (KAPF, n.d.; Kuwait News Agency, 1999) [33, 34].

There are also countries that coordinate newly founded awqaf. This is primarily done by a waqf authority that took the initiative to initiate waqf funds and categorize them into various purposes. In this regard, waqf often in the form of cash are pooled from various donors and placed in these funds; a concept called crowdfunding. For instance, KAPF found five waqf funds for the purpose of holy Quran and its sciences, mosques, scientific and social development, health development, as well as guidance and crisis relief (Busharah, 2012) [35]. Also based in Kuwait, the International Islamic Charitable Organization (IICO) offers cash waqf schemes for the purpose of financing certain public goods globally (Mohsin, 2013) [36]. These schemes financed water wells, education, mosques, healthcare, training centres, farms and productive projects, orphans, seasonal projects, social projects, as well as aid relief (Mohsin, 2013) [36].

In regards to the second scenario, waqf institutions are increasingly corporatized such as Waqaf An-Nur Corporation in Malaysia and do provide certain public goods like cheap healthcare. Corporatisation of waqf has also been progressing in various facets which are management, law, transparency, and revenue making. Countries that require waqf registration such as Singapore and Malaysia ensures that awqaf are protected and able to defend itself in court. Unfortunately, to the knowledge of this researcher, corporatisation of waqf is not done within any municipality. The idea of applying waqf in municipalities alone is an alien concept. This is mostly because modern economies are dependent on government expenditures to provide said goods.

Aside from the occurrence of these two scenarios, this researcher believes that sustainable waqf is equally important to guarantee perpetual benefits. That is, waqf needs to find ways to generate revenue like that of investment fund set up by Caliph Al-Ma‘mun and profits from businesses in the case of the Yazaad Bazaar. The best example of revenue generating waqf in modern economy is KAPF. Its investment strategy requires the fulfilment of these criteria; economic, Shariah (Islamic law), diversifying geographic, diversifying investment instruments, diversifying investment sectors, and regulation (Busharah, 2012) [35]. The economic criteria necessitates the conduct of feasibility studies for every investment activity while the Shariah criteria takes into account the minimizing risk factor to safeguard the waqf capital. Diversifying geographic, investment instruments, and sectors entails investments in separate locations, a portfolio of investment, and various sectors such as real estate, services and such.

The OIC Fiqh Academy in its Resolution No.140 (15/6) also recommends diversification of assets. The full conditions for investment of waqf funds as detailed in the Resolution are (Mohsin, 2014) [30]:

1. The whole conduct of investment must be Shariah compliant.
2. In order to minimise risk, diversification as an investment strategy should be considered. Risk can also be managed by obtaining surety ships and guarantees, confirming contracts, and performing feasibility studies.
3. Avoid high risk investments. However, it is permissible to invest cash waqf through permissible contracts such as murabahah (cost plus), mudarabah (profit sharing, loss bearing), istisna (order to manufacture), and others.
4. Chosen investment must be suitable to the corpus of waqf and duly protects the waqf and beneficiary rights. Thus, mudarabah mode is allowed due to its compatibility with cash waqf despite being considered as a high risk investment.
5. Waqf investment activities should be transparent.

III. THE THEORETICAL MODEL

Although a form of waqf municipality is almost non-existent, Fig. 2 can still be applied as a framework to forecast the impact of waqf financing expenditure on debt at the federal government level. After all, Fig. 2 forms an economy which coincides with the Neoclassical DSGE model that also contains three economic agents (Mabugu et al., 2013; Reith, 2014; Hansen and Imrohoroglu; 2016) [2, 7, 5]. The theoretical model resembles that of Torres (2013) [37] with the addition of waqf and government. For simplicity, the economy in this model is assumed to be a closed economy.

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DSGE model is based on the General Equilibrium theory formally introduced by Léon Walras in 1874 and culminated in its mathematical proof by Gerard Debreu and Herbert Scarf in 1963 (Starr, 2011) [38]. The theory claims the existence of a set of prices across all markets that produce an overall economic equilibrium when demand equals supply in these markets (Debreu, 1983; Cardenete et al., 2012) [39, 40]. Furthermore, DSGE model is built on microeconomic foundations; a suitable method since it is assumed that altruistic household behaviour is the main drive for *waqf* endowments.

### A. Households

The economy consists of many households where each makes economic decisions. Since DSGE model can only analyse one economic decision, the concept of a representative household is employed where all agents have similar preferences.

Two household functions to be defined are the utility function and budget constraint. Household seeks to maximize total consumption, $C_t$, and leisure, $O_t$, in order to attain utility or happiness. Total consumption is the amount of goods and services consumed by the representative agent while leisure is the remaining time left after labour services ($L_t$). Due to the altruistic behaviour of the representative agent, cash *waqf* contribution essentially becomes part of his consumption. Cash has been chosen instead of other forms of *waqf* because cash can be endowed by households from almost all levels of income class. Hence, $C_t$ can be broken down into main components namely generic consumption ($C_t^g$) and cash *waqf* contribution ($V_t$):

$$C_t^g = C_t + V_t \quad (1.0)$$

Total available discretionary time is normalized to 1 so leisure is the total available discretionary time minus labour services or working time. This means that equation containing $O_t$ and $L_t$ can be written as follows:

$$O_t + L_t = 1$$

$$O_t = 1 - L_t \quad (1.1)$$

Budget constraints the utility of the household agent. The agent is the owner of productive factors namely capital, $K_t$, and labour, $L_t$. By renting these productive factors to firms, the representative agent receives $R_t$ which is the return for $K_t$; and wage, $W_t$, which is the return for the agent’s $L_t$. $V_t$ also counts as a productive factor but as per *waqf* deed, return from $V_t$ is not gained by the household agent but is used for chosen federal government public expenditure. It is worth mentioning here that the federal government is assumed to name its public expenditure precisely as opposed to broad terms that is used in the national accounts. After paying for tax, $T_t$, earnings from the household agent is spent on $C_t$ and $V_t$ while the remaining is put into savings, $S_t$. It is further assumed that due to a competitive sector, $S_t$ is directly transform into investment, $I_t$, and federal government bonds, $B_t$, without any cost thus:

$$S_t = B_t + I_t \quad (1.2)$$

The agent receives a return of $R_t^2$ from purchasing past bonds, $B_t$, and $I_t$ follows a process of capital accumulation overtime following a simple inventory accumulation equation:

$$I_t = K_{t+1} - (1 - \delta)K_t \quad (1.3)$$

Although Equation 1.3 is theoretically correct, capital is actually decided yesterday making capital a predetermined variable. This transforms Equation 1.3 into Equation 1.4:

$$I_t = K_{t-1} - (1 - \delta)K_{t-1} \quad (1.4)$$

Substituting Equation 1.4 into Equation 1.2, Equation 1.5 is obtained:

$$S_t = B_t + K_{t-1} - (1 - \delta)K_{t-1} \quad (1.5)$$

Therefore, the intertemporal maximization problem of the representative agent is given as:

$$\max E_t \sum_{t=0}^{\infty} \beta^t U[C_t, O_t, V_t] \quad (1.6)$$

such that

$$C_t + V_t + S_t = W_t L_t + R_t K_{t-1} + B_{t-1}(1 + R_t)^{-1} T_t \quad (1.7)$$

Equation 1.6 is the utility function of the representative household with $\beta \in (0, 1)$ being the intertemporal discount factor which specifies how much the agent values his/her future utility as oppose to his/her current utility. Meanwhile, Equation 1.7 is the household’s budget constraint.

To facilitate simple calculation, the utility function can be expressed in a log linear form. Further substituting Equation 1.1 into Equation 1.6 as well as Equation 1.5 into Equation 1.7:

$$\max E_t \sum_{t=0}^{\infty} \beta^t [\mu \log C_t + \gamma \log(1 - L_t) + \eta \log V_t] \quad (1.8)$$

such that

$$C_t + V_t + K_{t-1} - (1 - \delta)K_{t-1} + B_{t-1} = W_t L_t + R_t K_{t-1} + B_{t-1}(1 + R_t)^{-1} T_t \quad (1.9)$$

$\mu, \gamma, \nu$ are the preference parameter for $C_t$, $1 - L_t$, and $V_t$ respectively where $\mu + \gamma + \nu = 1$. Specifically, $\mu$ represents the proportion of consumer spending to total income, $\gamma$ represents the proportion of leisure to total income, and $\eta$ represents the proportion of cash *waqf* endowment to total income. In economic terms, $\mu$ can also be defined as the marginal propensity to consume, $\gamma$ as the marginal propensity to leisure, and $\eta$ as the marginal propensity to endow cash *waqf*. Basically, these preference parameters indicate the agent’s
preferences toward consumption – leisure – cash waqf endowment decisions.

By nature, household will want to maximize $C_t$, $V_t$, $L_t$, $K_t$, and $B_t$. This household problem can be solved using a dynamic Lagrangian calculation before deriving first order conditions (FOCs):

$$\mathcal{L} = \sum_{t=0}^{\infty} \beta^t \left[ \mu \log C_t + \gamma \log(1-L_t) + \eta \log V_t \right. $$

$$\left. - \lambda_t [C_t+V_t+K_t(1-\delta)K_{t-1}+B_t-W_tL_t-R_tK_{t-1}-B_{t-1}(1+R_t)T_t] \right]$$

$\lambda_t$ is the Lagrange multiplier of period $t$. As the capital for a given period appears in time $t-1$ and in time $t$, the restriction faced by households at time $t$ is:

$$\vdots - \beta \lambda_t [C_{t-1}+V_{t-1}+K_{t-1}(1-\delta)K_{t-2}+B_{t-1}-W_{t-1}L_{t-1}-R_{t-1}K_{t-2}-B_{t-2}(1+R_{t-1})T_{t-1}]$$

(2.0)

The first order conditions (FOCs) of the household problem are:

$$\frac{\partial \mathcal{L}}{\partial C_t} = \beta^t \frac{\mu}{C_t} \lambda_t = 0 \quad (2.1)$$

$$\frac{\partial \mathcal{L}}{\partial L_t} = \beta^t \frac{\gamma}{1-L_t} \lambda_t = 0 \quad (2.2)$$

$$\frac{\partial \mathcal{L}}{\partial V_t} = \beta^t \frac{\eta}{V_t} - \lambda_t = 0 \quad (2.3)$$

$$\frac{\partial \mathcal{L}}{\partial K_t} = -\beta^t \lambda_t + \beta^{t+1} \lambda_{t+1} [R_{t+1}+1-\delta] = 0 \quad (2.4)$$

$$\beta \frac{\lambda_t}{\lambda_{t+1}} = R_{t+1}+1-\delta \quad (2.5)$$

By equating Equations 2.1 and 2.3, Equation 2.6 is obtained:

$$V_t = \frac{\eta}{\mu} C_t \quad (2.6)$$

Equation 2.6 determines the agent’s decision between endowing cash $waqf$ or consuming. Basically, the right hand side of Equation 2.6 is the opportunity cost of endowing an additional unit of cash $waqf$. Substituting Equations 2.1 into Equation 2.2, Equation 2.7 is obtained:

$$W_t = \frac{\gamma C_t}{\mu(1-L_t)} \quad (2.7)$$

Equation 2.7 equates the marginal rate of substitution between consumption and leisure ($\frac{C_t}{V_t}$) to the opportunity cost of an additional unit of leisure ($W_t$). Another way to view $W_t$ is to substitute Equation 2.3 into Equation 2.2 instead:

$$W_t = \frac{\gamma V_t}{\eta(1-L_t)} \quad (2.8)$$

Equation 2.8 equates the marginal rate of substitution between endowing cash $waqf$ and leisure to the opportunity cost of an additional unit of leisure.

From Equation 2.1:

$$\lambda_{t+1} = \frac{\mu}{C_{t+1}} \quad (2.9)$$

Substituting Equation 2.9 and Equation 2.1 into Equation 2.4 and Equation 2.5:

$$\frac{C_{t+1}}{C_t} = \beta (R_{t+1}+1-\delta) \quad (3.0)$$

$$\frac{C_{t+1}}{C_t} = \beta (1+R_{t+1}) \quad (3.1)$$

Equation 3.0 defines the condition of the agent’s decision about investment. Basically, the agent compares the utility of consumption with that of investment. On the other hand, Equation 3.1 indicates that the agent compares the utility of consumption with that of purchasing bonds.

B. Firms

The concept of representative agent is also employed here. The representative firm obtain production factors, $L_t$, $K_t$, and $V_t$ from households to be converted into final goods ($Y_t$). Firms then pay labor $W_tL_t$ and $R_tK_{t-1}$ to households and channelling return $V_tD_t$ to the federal government. Specifically for Malaysia, $V_tD_t$ is channeled to Yayasan Waqaf Malaysia, a federal government trust body enacted by the Department of Awqaf, Zakat and Hajj. The federal government is obliged to use $V_tD_t$ to finance for identified public expenditures only. Since the sole owners of production
factors are the households, firms do not make investment decision nor decide on the amount of hired inputs from period to period. This is to simplify the theoretical model following Torres (2013) [37]. It causes the maximization problem of the firm to become a static equation:

$$\pi = Y_t - W_t L_t - R_t K_{t-1} - V_t D_t$$ (3.2)

$Y_t$ follows a Cobb-Douglas production function and has constant returns to scale:

$$Y_t = A_t F(K_{t-1}, L_t, V_t) = A_t K_{t-1}^{\alpha} L_t^{\rho} V_t^{1-\alpha-\rho}$$ (3.3)

$A_t$ is the technology or total factor productivity. Following Galí, Vallés and López-Salido (2007) [41], $A_t$ is normalized to unity so $Y_t$ becomes:

$$Y_t = K_{t-1}^{\alpha} L_t^{\rho} V_t^{1-\alpha-\rho}$$ (3.4)

$\alpha$ is the output elasticity of $K_{t-1}$ and $\rho$ is the output elasticity of $L_t$. Thus, the firm’s maximization problem becomes:

$$\pi = K_{t-1}^{\alpha} L_t^{\rho} V_t^{1-\alpha-\rho} - W_t L_t - R_t K_{t-1} - V_t D_t$$ (3.5)

The firm will want to maximize labour, capital, and cash $waqf$ contribution. To solve the firm’s problem, FOCs are derived:

$$\frac{\partial \pi}{\partial L_t} = \rho K_{t-1}^{\alpha-1} L_t^{\rho-1} V_t^{1-\alpha-\rho} - W_t = 0$$ (3.6)

$$W_t = \rho K_{t-1}^{\alpha-1} L_t^{\rho-1} V_t^{1-\alpha-\rho}$$ (3.7)

Substituting Equations 3.3 into Equation 3.5, 3.6, and 3.7, the below equations are respectively obtained:

$$W_t = \frac{\rho^{\alpha}}{L_t}$$ (3.8)

$$R_t = \frac{\alpha V_t}{K_{t-1}}$$ (3.9)

$$D_t = \frac{(1-\alpha-\rho) Y_t}{V_t}$$ (4.0)

Equations 3.8 to 4.0 show that the rate of productive factors (wage, capital return, and cash $waqf$ return) are a constant proportion of the total output over factor quantity ratio.

C. Federal Government

The federal government budget constraint is given as:

$$B_t = B_{t-1}(1+R_t) + G_t - T_t - V_t D_t$$ (4.1)

The government borrows $B_t$ when $T_t$ and value of return from cash $waqf$, $V_t D_t$ are insufficient to finance for total federal government expenditures, $G_t$ (i.e. sum of federal government operating and development expenditure), federal government debt $B_{t-1}$, and interest on that debt ($R_t$). It must be stressed that the federal government’s responsibility as a $waqf$ manager is to spend the return of cash $waqf$ only on permissible public expenditures as stated in the $waqf$ deeds.

Let $\tilde{s}_t = T_t - G_t$ and dividing Equation 4.1 by $Y_t$:

$$b_t = b_{t-1}(1+R_t) - \tilde{s}_t - v_t D_t$$ (4.2)

whereby,

$$b_t = \frac{B_t}{Y_t}$$ (4.3)

$$v_t = \frac{V_t}{Y_t}$$ (4.4)

$$\tilde{s}_t = \frac{\tilde{s}_t}{Y_t}$$ (4.5)

The fiscal policy rule that determines the primary balance-to-GDP ratio, $\tilde{s}_t$ is specified as:

$$\tilde{s}_t = \theta_0 \tilde{s}_{t-1} + \theta_1 \tilde{s}_t + \theta_2 D_t + e_t$$ (4.6)

whereby, $\theta_0 = 1 - \theta_1 - \theta_2$ and $e_t$ is the error term. This manner of specification is almost similar to Sakuragawa and Hosono (2011) [4] and Torres (2013) [37]. Equation 4.6 simply states that the current primary balance-to-GDP ratio is determined by its steady state value ($\tilde{s}_{t-1}$), its past value, and the current rate of return from cash $waqf$, $D_t$. The insertion of $D_t$ in Equation 4.6 actually captures the excess income from cash $waqf$.

D. Market Clearing

The feasibility constraint in the economy can be stated as:

$$Y_t = C_t + V_t + I_t + G_t$$ (4.7)

whereby,

$$G_t = g_t Y_t$$ (4.8)

g_t is simply $G_t$ over $Y_t$ or the total federal government expenditure over GDP. It follows an AR(1) process:
whereby, $\ddot{g}$ is the steady state value of $g$ and $e_2$ is the error term. This form of specification follows Torres (2013) [37].

Fig. 3 shows the relationship between primary balance and debt. When primary deficit occurs ($G-T$), the value of debt increases. When primary surplus occurs ($T-G$), the value of debt decreases. Thus the incorporation of $D$ in the primary balance (Equation 4.6) causes primary deficit to reduce which will eventually lead to primary surplus and reduced debt.

Figure 3. The Relationship between Primary Balance and Debt

IV. MODEL EQUILIBRIUM

The model equilibrium is derived from the theoretical model. It involves calculating sequences of endogenous variables which are $C_t$, $I_t$, $V_t$, $K_t$, $W_t$, $R_t$, $I_t$, $R_t^e$, $D_t$, $G_t$, $Y_t$, $b_t$, $v_t$, $\dot{s}_t$, and $g_t$, such that the balance path conditions are satisfied. Since there are 15 endogenous variables, thus 15 equations are needed to calculate the equilibrium of this modelled economy. These sets of equations are:

$$I_t=K_t(1-\delta)K_{t-1}$$  \hspace{1cm} (1.4)

$$V_t=\frac{\gamma C_t}{\mu(1-\delta)}$$  \hspace{1cm} (2.7)

$$\frac{C_{t+1}}{C_t}=\beta(R_{t+1}+1-\delta)$$  \hspace{1cm} (3.0)

$$\frac{C_{t+1}}{C_t}=\beta(1+R_{t+1})$$  \hspace{1cm} (3.1)

$$Y_t=K_t^\alpha L_t^{1-\alpha}$$  \hspace{1cm} (3.3)

$$W_t=\frac{\rho Y_t}{I_t}$$  \hspace{1cm} (3.8)

$$R_t=\frac{\alpha K}{K_t}$$  \hspace{1cm} (3.9)

$$D_t=\frac{\alpha(1-\phi)Y_t}{V_t}$$  \hspace{1cm} (4.0)

$$b_t=b_{t-1}(1+R_t^e)^{-\delta_t}v_tD_t$$  \hspace{1cm} (4.2)

$$v_t=\frac{Y_t}{Y_t}$$  \hspace{1cm} (4.4)

$$\dot{s}_t=\theta_0\ddot{s}+\theta_1\dot{s}_{t-1}+\theta_2D_t+e_1$$  \hspace{1cm} (4.6)

$$Y_t=C_t+V_t+I_t+G_t$$  \hspace{1cm} (4.7)

$$G_t=g_tY_t$$  \hspace{1cm} (4.8)

$$g_t=(1-\phi)\ddot{g}+\phi g_{t-1}+e_2$$  \hspace{1cm} (4.9)

V. DETERMINING PARAMETER VALUES

Parameter values are acquired through extrapolation, ordinary least squares (OLS) estimation, and values supplied by the literature. These methods are approved by Torres (2013) [37].

The value of $\eta$ is rather difficult to obtain because almost no recent studies has been done to determine its value for Malaysia. Hence this study uses the household consumption expenditure for year 2016, the latest report published by Department of Statistics Malaysia (DOSM) (2017) [42]. Unfortunately, there is no value recorded in the report for $\eta$. However, assuming that public awareness on waqf is heightened, the component of miscellaneous goods and services may as well be replaced with cash waqf endowment. Making that item as a proxy for $\eta$, $\eta$ can thus be assigned its value of 0.077. Meanwhile, recreation services and culture is a proxy for $\gamma$ which holds the value of 0.05. As a result, $\mu=1-0.077-0.05=0.873$.

Meanwhile, Iwata, Khan, and Murao (2003) [43] estimated $\alpha$ as 0.19 and $\rho$ as 0.58 for Malaysia using non parametric technique. The value of $\delta=0.07$ is appropriate for Malaysia as claimed by Nagaraj (2005) [44]. $\beta=0.97$ is deemed appropriate and taken from Torres (2013) [37]. Using Eviews, $\theta_0$, $\theta_1$, $\theta_2$, and $\phi$ are estimated via OLS method as shown below.

http://www.ojs.unito.it/index.php/EJIF  
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Note that symbols cannot be specified as a variable in OLS estimation using Eviews, certain alphabets are illegal, and results generated by Eviews always show variables as capital letters. Hence in Table 1, S is actually \( \hat{s} \) while D RETURN is simply D. Data of Malaysian federal government expenditure (G), federal government revenue (T), and GDP (Y) from the first quarter of 1999 to the second quarter of 2018 were obtained from Bank Negara Malaysia (2000 – 2018) [45] or the Central Bank of Malaysia. Meanwhile, the proxy of D is quarterly returns of Public Ittikal (PI) Fund from the same period. PI is a Shariah compliant unit trust fund offered by Public Mutual Berhad. It consists of Shariah compliant equities and related securities from among others, Tenaga Nasional Berhad, Telekom Malaysia Berhad, Sime Darby Berhad, HH Healthcare Berhad, and Axiata Group Berhad (Public Mutual Berhad, 2016) [46]. Thus, it matches with the argument of the place of public waqf in modern economy (Fig. 2) in that collected cash waqf are connected with firms through investments. Based on Table 1, Equation 4.6 can be specified as:

\[
\hat{s}_t = -0.045361 - 0.029819 \hat{s}_{t-1} - 0.011057 D_t \quad (5.0)
\]

From Equation 5.0, the parameter values can be determined as:

\[
\begin{align*}
\theta_2 &= -0.011057, \\
\theta_1 &= -0.029819 \\
\theta_0 &= 1 - (-0.029819) - (-0.011057) = 1.040876
\end{align*}
\]

Based on Table 2, Equation 4.9 can be specified as:

\[
g_t = 0.253924 + 0.012044 g_{t-1} \quad (5.1)
\]

Hence, from Equation 5.1, the parameter value can be determined as:

\[
\varphi = 0.012044
\]

Table 3 lists the parameter values.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Definition</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \mu )</td>
<td>Preference parameter of consumption</td>
<td>0.873</td>
</tr>
<tr>
<td>( \gamma )</td>
<td>Preference parameter of leisure</td>
<td>0.05</td>
</tr>
<tr>
<td>( \eta )</td>
<td>Preference parameter of waqf contribution</td>
<td>0.077</td>
</tr>
<tr>
<td>( \rho )</td>
<td>Output elasticity of labour</td>
<td>0.58</td>
</tr>
<tr>
<td>( \alpha )</td>
<td>Output elasticity of capital</td>
<td>0.19</td>
</tr>
<tr>
<td>( \delta )</td>
<td>Depreciation rate of capital</td>
<td>0.07</td>
</tr>
<tr>
<td>( \beta )</td>
<td>Intertemporal discount factor</td>
<td>0.97</td>
</tr>
<tr>
<td>( \theta_0 )</td>
<td>Parameter of fiscal policy rule</td>
<td>1.040876</td>
</tr>
<tr>
<td>( \theta_1 )</td>
<td>Parameter of fiscal policy rule</td>
<td>-0.029819</td>
</tr>
<tr>
<td>( \theta_2 )</td>
<td>Parameter of fiscal policy rule</td>
<td>-0.011057</td>
</tr>
<tr>
<td>( \varphi )</td>
<td>Parameter of expenditure per GDP</td>
<td>0.012044</td>
</tr>
</tbody>
</table>


VI. STEADY STATE ANALYSIS

The steady state values refer to the values of endogenous variables that remain constant throughout time. Steady state occurs when the modelled economy has stationarised and is in equilibrium condition. This particular study decides to find the steady state values by using the method adopted in Torres (2013) [37] which are solving simultaneously most of the equations in the model equilibrium while subjecting the remaining equations to OLS estimation. The former requires eliminating the equations’ time subscript and solving simultaneously most of the equations in the model equilibrium. Thus the equations are converted into:

\[
\bar{I} = \delta \bar{K} \quad (5.2)
\]

\[
\bar{V} = \frac{2 \bar{C}}{\mu (1-L)} \quad (5.3)
\]

\[
\bar{W} = \frac{\bar{C}}{\mu (1-L)} \quad (5.4)
\]

\[
1 = \beta (R+1-\delta) \quad (5.5)
\]

\[
1 = \beta (1+Rr) \quad (5.6)
\]

\[
\bar{Y} = \bar{K}^\alpha \bar{I}^{1-\alpha} \bar{P}^{1-\alpha} \quad (5.7)
\]

\[
\bar{W} = \frac{\bar{C}}{\bar{K}} \quad (5.8)
\]

\[
\bar{R} = \frac{\alpha \bar{Y}}{\bar{K}} \quad (5.9)
\]

\[
\bar{G} = \frac{(1-\alpha)\bar{I}}{\bar{Y}} \quad (5.10)
\]

\[
\bar{b} = \frac{\bar{I} + \bar{G}}{\bar{R}} \quad (5.11)
\]

\[
\bar{v} = \frac{\bar{V}}{\bar{Y}} \quad (5.12)
\]

\[
\bar{Y} = \bar{C} + \bar{V} + \bar{I} + \bar{G} \quad (6.3)
\]

\[
\bar{G} = \bar{g} \bar{Y} \quad (6.4)
\]

Note that the “–” sign on the variables denote steady state variables.

Substituting \( \delta = 0.07 \) into Equation 5.2 and \( \beta = 0.97 \) into Equation 5.5 as well as Equation 5.6, below are respectively obtained:

\[
\bar{I} = 0.07 \bar{K} \quad (6.5)
\]

\[
\bar{R} = 0.1009 \quad (6.6)
\]

Substituting \( \eta = 0.077 \) and \( \mu = 0.873 \) into Equation 5.3:

\[
\bar{V} = 0.08820 \bar{C} \quad (6.7)
\]

From Equation 5.1, the steady state value of \( \bar{g} \) can be derived:

\[
(1-\phi) \bar{g} = 0.253924 \quad (6.8)
\]

\[
(1-0.012044) \bar{g} = 0.253924 \quad (6.9)
\]

\[
\bar{g} = 0.2571 \quad (6.10)
\]

Hence Equation 6.4 becomes:

\[
\bar{G} = 0.2571 \bar{Y} \quad (6.11)
\]

Substituting \( \gamma = 0.05 \) and \( \mu = 0.873 \) into Equation 5.4:

\[
\bar{W} = \frac{0.05 \bar{C}}{0.873(1-L)} \quad (7.0)
\]
Substituting Equation 7.0 into Equation 7.1 and rearranging:

\[
\hat{W}(1-L) = 0.03216\hat{Y}
\]  
(7.2)

Substituting \( \rho = 0.58 \) into Equation 5.8, Equation 7.3 is obtained:

\[
\hat{W} = \frac{0.58\hat{Y}}{L}
\]  
(7.3)

Substituting Equation 7.3 in Equation 7.2, \( L = 0.9475 \) is obtained. Substituting \( \alpha = 0.19 \) and \( \rho = 0.58 \) into Equation 5.7:

\[
\hat{Y} = K^{0.19}\hat{L}^{0.58}\hat{V}^{0.23}
\]  
(7.4)

Assigning \( \hat{L} = 0.9475 \), Equation 6.6, Equation 6.8, and Equation 7.0 into Equation 7.4, \( \hat{Y} = 0.4125 \) is obtained. Assigning \( \hat{Y} = 0.4125 \) and \( \hat{L} = 0.9475 \) into Equation 7.3, \( \hat{W} = 0.2525 \) is obtained. Inserting \( \hat{Y} = 0.4125 \) into Equation 7.0, \( \hat{C} = 0.2317 \) is obtained. Inserting \( \hat{C} = 0.2317 \) into Equation 6.8, \( \hat{V} = 0.02044 \) is obtained. Substituting \( \hat{V} = 0.02044 \) and \( \hat{Y} = 0.4125 \) in Equation 6.0, \( \hat{D} = 4.6416 \) is obtained. Substituting \( \hat{V} = 0.04955 \), \( \hat{D} = 4.6416 \) and \( \hat{R}^r = 0.03093 \) in Equation 6.1:

\[
\hat{b} = \frac{\hat{s} + 0.04955(4.6416)}{0.03093}
\]  
(7.5)

Value of \( \hat{s} \) can be derived from Table 1:

\[
1.040876\hat{s} = -0.045361
\]

\[
\hat{s} = -0.04358
\]

Hence, using \( \hat{s} = -0.04358 \), \( \hat{b} = 6.02688 \) is generated. Assigning \( \hat{Y} = 0.4125 \) to Equation 6.6, \( \hat{R} = 0.7767 \) is generated. Assigning \( \hat{R} = 0.7767 \) into Equation 6.5, \( \hat{I} = 0.05437 \) is generated. Finally, assigning \( \hat{Y} = 0.4125 \) to Equation 6.9, \( \hat{G} = 0.1061 \) is generated. Table 4 lists the steady state values of the modelled economy.

<table>
<thead>
<tr>
<th>TABLE IV. Steady State Values</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Steady State</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>0.9475</td>
</tr>
<tr>
<td>Y</td>
<td>0.4125</td>
</tr>
<tr>
<td>W</td>
<td>0.2525</td>
</tr>
</tbody>
</table>

VII. SIMULATION RESULT

The first step in simulation is to induce shock to the model equilibrium. Shock is perturbation introduced to the system in order to observe the deviations of the variables in comparison to their steady state values and the trend of variables before the variables return to the steady state (Torres, 2013) [37]. For the purpose of this study, shock in \( \hat{s} \) is introduced to indicate an increase in waqf return by specifying 1% shock to \( e_1 \). As a consequence of this shock, impulse response function (IRF) of variables that are affected by the shock will be generated. The generated IRF of \( \hat{b} \) will determine the impact of waqf financing public expenditure on debt. 1% is a sufficient amount of shock to produce IRFs. The software used for simulation are Dynare and Matlab.

Fig. 4 depicts the IRFs of \( \hat{b}, \hat{s} \) and \( \hat{R}^r \) upon 1 percent increase on the standard deviation of Equation 4.6. The y-axis of the graphs represents each variables’ unit of deviation from its steady state value while x-axis represent the period of time. Hence at its basic, the IRF show the trend of variables upon shock before the variables return to the steady state (Torres, 2013) [37].
As can be seen in Fig. 4, increase in 1% of $e_1$ translates into an increase of 1% in $\delta$. This indicates a reduction in primary deficit which resonates with the claim made by Çizakça (1998) [18] and Marzuki et al. (2012) [19]. $R'$ also increases upon impact but at a lesser rate namely 0.2%. On the other hand, an increase of 1% in $\delta$ has an opposite impact on $b$. The rate of increase in $b$ is lowest which is 0.025% before heading back to its steady state. This goes to show that the incorporation of $D$ in the fiscal policy rule (Equation 4.6) impacts $\delta$ the most followed by $R'$ and lastly $b$. Several deductions can be derived.

Firstly, the increase in $\delta$ after impact extends the finding of Ambrose et al. (2018a) [16] that is $waqf$ financing expenditure is not only doable but also practical. Secondly, the increase in $R'$ after impact suggests that government will induce households to save more within an economic framework that recognises altruism (cash $waqf$ contribution). This can be explained by referring to the equations in the theoretical model. As indicated in Equation 1.2, savings will further increase investment. In turn, capital may increase (Equation 1.3), firms will be more productive (Equation 3.3), profits will increase and more return can be generated to finance expenditure (Equation 3.2 and Equation 4.6). Thirdly, $b$ has the least impact because employing $D$ to reduce debt might not be enough aside from government borrowing and collecting $T$. Albeit having the least impact, this result still answers the main purpose of the study namely $b$ is reduced when $waqf$ finances expenditure.

There are two possible ways that debt is reduced. First, as $waqf$ is now financing public goods, idle tax can be channelled to finance government debt. Second, the government would not need to borrow a large sum in the future as internal financing from $waqf$ has been acquired. Thus intuitively in the long term, it is highly likely that government are able to reduce tax rates significantly. Therefore, it can be stated that $waqf$ financing public expenditure has an impact of decreasing federal government debt. This result also concurs with the findings of Çizakça (1998) [18] and Marzuki et al. (2012) [19].

Note that other variables namely $C$, $L$, $V$, $K$, $W$, $R$, $I$, $R'$, $D$, $G$, $Y$, $v$, and $g$ are not affected by the change in $\delta$ hence no IRFs are generated. Intuitively, it indicates two things. One, $V$ is not affected because the amount of $V$ is not modelled as an AR(1) process. To model $V$ as an AR(1) process is impossible because most State Islamic Religious Councils in Malaysia were unwilling to release the values of $waqf$ fund in quarterly frequencies, some did not provide them despite persistent enquiries, while others cannot disclose the values. It is standard practice to use data in quarterly frequencies when simulating DGSE model. Second, the 1% increase did not affect the other aforementioned variables because of a simple fact whereby $waqf$ return is not distortionary in nature.

VIII. SUMMARY AND CONCLUSIONS

This paper had shown that $waqf$ financing public expenditure has an impact of reducing government debt by considering the altruistic behaviour of households. Such result was also obtained by considering the intermediary role of $waqf$. It showed that $waqf$ can aid in government debt reduction and provided evidence of a significant third sector role on public finance dynamics. Thus, this paper provides a fresh contribution on the field of modern public finance. Further research can be done by considering an open economy and/or model the cash $waqf$ data according to an AR process. Considering that cash $waqf$ alone (aside from borrowing and tax collection) has smaller impact on government debt, further research can also be done by modelling other government policy and/or financial instrument together with cash $waqf$.
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