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Support for smallholder farmers through Islamic instruments
The case of Bangladesh and lessons for Nigeria

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Abstract
Purpose – In societies with strong presence of Islam, Islamic instruments with more scope for fairness and equity can be innovatively harnessed to play an increasing role in the development process and poverty alleviation schemes. Poor smallholder farmers dominate agricultural production in many developing countries and contribute a significant portion of global food production. This paper aims to develop a scheme to improve poor smallholder farmers’ vulnerable financial situation through the application of Zakah and Salam contract, using Bangladesh as a case study. Secondary goals are to show the effect of the scheme on food security and relevance to Nigeria.

Design/methodology/approach – The authors explore the existing traditional modes of financing available to poor smallholders, identify their challenges and propose an appropriate Islamic financing scheme.

Findings – With the Zakah-based Salam forward contract, the proposed scheme would procure food through Institutional Demand to offer interest free financing, fair price and access to new marketing channels and reduce income uncertainty for the rural smallholders. The discussions indicate that the local food security will be enhanced through incentivized farming activities and disbursement of food from the food bank to the Zakah-eligible food insecure local people.

Research limitations/implications – This proposal brings forth a potentially powerful idea that needs further empirical validation.

Originality/value – The religion-based Institutional Demand initiative to promote smallholder agricultural development and social protection is a novel one. The attempt to apply the framework to Nigeria context shows the potential of the framework to generalize for other Muslim developing countries with similar characteristics, especially the poorer agriculture-based countries.

Keywords Bangladesh, Smallholders, Nigeria, Food security, Zakah, Salam contract

Paper type Research paper

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1. Introduction
Value-based Islamic instruments to tackle development and welfare issues come with more scope for fairness and equity. In societies with strong presence of Islam, they can play an important role along with the dominant secular development models to conform to the cultural realities of indigenous people. Initiatives such as the World Bank’s World Faiths Development Dialogue show the growing interest to inject religion into development process (Mesbahuddin, 2010). Zakah and Waqf institutions, having played a significant function in the betterment of Islamic civilization over time, can be harnessed innovatively to positively contribute to the socio-economic development of Muslims. Recent studies propose the use of Zakah and Waqf for economic and financial activities, such as financing and investment into micro-enterprises for sustainable growth purposes (Anwar, 1995; Hassan, 2010; Karim and Murad, 2010; Muhammad and Naiya, 2015). Several prominent Islamic scholars argue for the mobilization of funds through Zakah, Waqf and Sadaqah as an additional source of funds to assist in poverty alleviation schemes in Organisation of Islamic Cooperation countries (Savag and Haneef, 2015). Many rural poor from the developing world rely on smallholder agriculture as an important source of income and food security (Gollin, 2014).

The study aims to outline a scheme to improve poor smallholder farmers’ vulnerable financial situation in developing Muslim-majority countries through the following two Islamic instruments, using Bangladesh as a case study:

1. establishment of a faith-based Zakah fund led by a local management committee; and
2. development of Salam contract, an Islamic forward contract, to engage the local smallholders to deliver future agricultural outputs targeted to a food bank set up for vulnerable population as Zakah.

The secondary goals are to show the effect of the scheme on food security and illustrate relevance to Nigeria.

Nehring et al. (2017) argued that Institutional Demand could be a key policy intervention to address both rural poverty and malnutrition. They defined Institutional Demand as a set of initiatives to create a long-term demand for smallholder production by procuring those to distribute among vulnerable populations through food assistance programs. This paper pushes forward the argument by presenting the above religion-based Institutional Demand initiative to promote the dual objective of agricultural development and social protection, leading to a positive impact on food security.

The existing market conditions in many areas of the developing world promote marketing channels that are not favorable to small farmers (Humphrey and Navas-Alemán, 2010; Key et al., 2000). For instance, the forward contract is a widely used marketing instrument for many agricultural products in developed countries; however, their use by smallholders in Bangladesh is rare. In that aspect, introducing forward contract through Salam is a novel contribution.

2. Food security and smallholder farmers
Ever since Thomas Malthus in the eighteenth century presented the dismal view on population growth and food production, food security has become an international issue. The food security concept in research and public policy has evolved over time due to the complexities of technical and policy issues involved (Faridi and Wadood, 2010). The 1996 World Food Summit developed a broad definition of food security which was refined in 2001: “Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary...
needs and food preferences for an active and healthy life” (FAO, 2002). Recent global food and financial crises had a serious adverse effect on poverty and hunger in low-income countries. The number of food-insecure people in the world increased to approximately one billion people in 2009 (Shapouri et al., 2009). Moreover, nearly 44 million people were added to the 1.2 billion people who were already living under the extreme poverty line of US$1.25 a day because of the 2010-11 food price shock (World Bank, 2011). Bangladesh has a high proportion of households living just above the poverty line. These households and many others are vulnerable to food insecurity, with high incidence of poverty that is estimated at 35.2 per cent in rural areas and 21.3 per cent in the urban areas (BBS, 2011). Looking at 13 developing countries, Banerjee and Duflo (2009) found that rural households’ 56-78 per cent of consumption was on food. As a larger share, estimated to be 35-65 per cent, of poor family’s limited income is spent on food, they are disproportionately affected by any food price shock (World Bank, 2009). Global food price crises of 2007-08 led to increased food insecurity and higher poverty levels in Bangladesh (Deb et al., 2009). Bangladesh had 64 million, close to half of its total population at the time, food-insecure people in 2008 (FAO, 2009). Akter and Basher (2014) concluded that the 2007-2009 food price hikes exposed the poorer and net-food-buyer households to food insecurity more than the other groups in the rural areas of Bangladesh. There is also empirical evidence that fixed wage earners in general suffer more from food insecurity as a result of increasing food prices (Faridi and Wadood, 2010). It is imperative that Bangladesh expand its social safety net programs to safeguard food security of vulnerable households. Research shows the effectiveness of safety net programs in improving food security of such households (Faridi and Wadood, 2010).

While food security is multi-faceted in nature that includes, among other things, availability, accessibility and affordability of nutritious food, production of food is still high on international agenda dealing with food security. Despite expansion of large-scale commercial agriculture, small farms contribute a significant portion of global food production (Kremen et al., 2012). Smallholders (less than 2 ha) make up approximately 85 per cent of about 525 million farms (Nagayets, 2005) and represent around 2.6 billion people worldwide (Dixon et al., 2001). They lack adequate access to important resources such as financial, material, technological, human capital, infrastructural and mainly rely on household labor (Nehring et al., 2017). Altieri (2004) estimates that 30-50 per cent of the world’s food is supplied by traditional indigenous agriculture. Government policies prioritizing domestic food self-sufficiency and other national socioeconomic conditions are contributing in increasing importance of smallholders in some countries (Nagayets, 2005). The share of the smallholders could be even more pronounced in developing regions where around 60 per cent of the population live in the rural areas, 85 per cent of whom are agricultural (Dixon et al., 2001). At the same time, decreasing mean farm size over time contributes to vulnerability of small farmers and worsening poverty situation in many parts of Africa and Asia (Nagayets, 2005).

Bangladesh, where approximately 75 per cent of its 160 million people lives in rural areas, is one of the most densely populated countries in the world. Rural villages are largely built around traditional agricultural farms. Though the country is industrializing, large-scale commercial farming is not common. Agriculture sector employs more than half of the total labor force and contributes to 20 per cent of the Gross Domestic Product (GDP) (Akter and Basher, 2014). However, agricultural sector growth rate, at low single digit, has lagged well behind that of the industrial and service sectors, and its contribution to GDP has been declining (Bonnerjee and Köhler, 2011). Bangladesh depends on domestic agricultural production for most of its basic food consumption. As food availability and food security in
Bangladesh are affected by actions of other countries in the world market, experts recommend Bangladesh to target self-sufficiency in production of important staple crops such as rice (Deb et al., 2009). As rice is the major source of calorie, rice prices play an important role in determining food security of a typical household in Bangladesh (Faridi and Wadood, 2010).

3. Islamic instruments: Zakah and Salam contract

Zakah is one of the five fundamental pillars of Islam. Allah commands Muslims, who possess nisab (a certain minimum amount of wealth), to pay Zakah. The payment is mandatory and can be collected by the official authority where such authority exists. Being the third pillar of Islam, Zakah is mentioned together with prayer 27 times in the Quran. Allah says “And establishes prayers and give Zakah and bow with those who bow (in worship and obedience)” (Translation of Quran: 2:42). Similarly, in another chapter of Quran, Allah highlights the importance of Zakah by emphasizing that compared to usury or gifts given with the intention to obtain greater benefits or gifts from the recipients, only Zakah will result in multiple benefits from Allah: “And whatever you give for interest to increase within the wealth of people will not increase with Allah. But what you give in Zakah desiring the countenance of Allah those are the multipliers” (Translation of Quran: 30:39).

Islam supports people to have a decent and prosperous life, and Zakah plays an important role in that regard. Zakah enhances goodwill, a key Islamic concept, by linking rich and poor. It provides a major tool to support the most vulnerable economic groups in society. Contemporary Muslim societies have not fully exploited the potential of the institution of Zakah. Hence, effort is made to focus not only on the charity aspect but also to diversify the uses of Zakah funds for social empowerment and development (Hassan and Khan, 2007; Oran, 2009). Available public data from half of the formal Zakah institutions in Muslim majority countries show a combined yearly Zakah fund of over $7bn (Minor, 2014). Part of that money could be allocated to productive activities.

Salam is a contract between a buyer and a supplier whereby the buyer pays cash in advance for a designated quantity and quality of a certain commodity to be delivered in the agreed future date and price. In this contract, the seller receives advanced payment on the spot and gives an undertaking to supply specified goods to buyer at a future date. It is particularly beneficial for small and marginal farmers, who constitute the majority of the agricultural workforce. Through the Salam contract, working capital is provided to these farmers during production time, which allows them to properly manage their farming expenses. According to Shariiah (Islamic law), for any sale to be valid, the commodity must be in ownership and physical possession of the seller, except in the cases of Salam and Istisna contracts, where such conditions are not included to facilitate the contract to take place. In fact, as mentioned by Kahf and Khan (1988), Salam practice was common in the agricultural sector of Madinah during the time of the Prophet (pbuh).

Bangladesh is a country with close to 90 per cent Muslim population (BANBEIS, 2017). Mesbahuddin (2010) argues that Islamic solutions to welfare have a prominent role to play in Bangladesh, where daily practices of rural villagers are shrouded in their Islamic beliefs. The powerful conventional non-governmental organizations (NGOs), such as Bangladesh Rural Advancement Committee, Grameen Bank and ASA, have success stories with secularized code of development practices such as the interest-based microfinance programs. However, some of their practices have the potential to ignite cultural clashes due to underlying tones of anti-Islamism (Mesbahuddin, 2010). On the other hand, the progress of Islamic microfinance operations in Bangladesh has been rather slow and inadequate. The most prominent one is the Rural Development Scheme of the Islamic Bank Bangladesh...
Limited, which has been actively operating poverty alleviation programs since the mid-1990s. Inadequacy of Shariah-compliant funds is found to be one of the main obstacles in the growth and efficient operation of Islamic microfinance (Ahmed, 2002).

4. The proposed scheme
According to Kahf (2013), with the exception of few countries where laws make it an obligation to make Zakah payments to the government, most other countries with significant Muslim population have numerous mosques, NGOs and individuals taking the responsibility of collecting and distributing Zakah. Some countries established special government institution to collect Zakah on a voluntary basis, such as The Islamic Foundation in Bangladesh. The inefficiency and peoples’ general preference to manage Zakah affairs individually make the effectiveness and activities of the institution very limited in the case of Bangladesh.

This study adapted the more complete and integrated framework of Hossain (2017), which demonstrates the application of Shariah-compliant Salam forward contract to impact different dimensions of food security. A competent local Zakah Management Committee (ZMC) would be at the center of the scheme presented in this paper. The decentralized nature of the scheme will create a sense of community ownership and allow efficient responsiveness at the local level. Local committee-based Zakah management models exist in some countries like Kuwait and Pakistan, where religious leaders or the committee members are expected to have better access to relevant information about the needs of the community (Kahf, 1995; Ajeel, 1995).

ZMC would determine the functional policies of the system. It would also manage the Zakah fund, set up the food bank and choose recipients of the Zakah. The paper by Hossain (2017) has more details about the collection of Zakah and distribution activities. The procurement of food aspect and its impact on smallholders are the primary focus of this paper.

The Zakah fund takes in collections from the local community, as well as a designated share from an available national Zakah fund. The fund creates a food bank, which includes some basic nutritious food items that satisfy local customs, dietary needs and local production practices. The ZMC develops a Salam contract with farmers, making advance payment for future produce that is destined for the food bank.

Expecting scarcity of the available Zakah fund and subsequent food bank, the selection process for eligible recipients of food as Zakah should take utmost care to have the greatest impact with the limited resources. Qardawi (1999) argued that the poor and needy are the most deserving groups to receive Zakah, which highlights fighting poverty as one of the primary aims of Zakah. Along with poorer households with young children, pregnant and lactating women, widows, disables, orphans and old-age people should get priority as recipients. They would be given food vouchers or ration cards that will allow them access to food banks on a periodic basis. The proposed scheme conveniently makes food available locally to the consumers who lack purchasing power, thus targeting the accessibility and affordability aspects of food security.

5. Discussion: implications for the smallholder farmers
By implementing a Zakah awareness campaign based on information, education and motivation with positive social peer pressure, the local population is encouraged to pool their Zakah contributions to the ZMC. The pooled Zakah fund will allow the ZMC to deal with local farmers through facilitating credit and Institutional Demand that would promote smallholder agricultural development and food security.
The proposed scheme operates as illustrated in Figure 1. The smallholders can organize themselves into a village level cooperative to provide an institutional platform to deal with the ZMC. Effective farmer organizations can overcome many market asymmetries that local intermediaries take advantage of at the expense of the smallholders. The village level cooperatives, such as Grameen Motsho Foundation and Milk Vita Dairy Producer projects, have success stories in many parts of Bangladesh. The key steps in the scheme are as follows:

- using the Zakah fund, ZMC provides credit in the form of Salam contract to the farmer cooperative;
- the cooperative uses some of the fund to source inputs from the factor market taking advantage of their bargaining power;
- the cooperative then engages the individual farmers by offering inputs and working capital;
- the farmers, in turn, deliver their crop produce to the cooperative in the future according to the agreement; and
- the cooperative deposits the crops to the food bank.

As in many other developing countries, rural households in Bangladesh borrow from formal lenders such as government banks and agencies, commercial banks and non-government microfinance institutions (MFIs) or from informal sources such as relatives, friends and moneylenders. One of the main sectors where they invest borrowed funds is in agriculture-related activities such as purchasing inputs, bullocks, irrigation and cultivation services. However, many poor farmers suffer from financial exclusion in the formal credit markets due to lack of collateral. In addition, there is a tendency for formal financial institutions in Bangladesh to be centralized in urban areas. Faruqee and Khalily (2011) show that informal sources charge significantly higher annual interest rates (180-240 per cent) compared to commercial banks (10-13 per cent) and MFIs (20-35 per cent). They also estimate using conservative estimates that the average annual interest rate charged by the MFIs for the loaned fund to the Bangladeshi farmers is about 28 per cent. Another estimate put the average annual interest rate charged by the informal moneylenders at 103 per cent, with a standard deviation of 59 (Mallick, 2012).

Bangladesh’s Household Income and Expenditure Survey (HIES) estimates in Table I show that MFIs are by far the top loan providers for farmers, with government institutions as the second most popular, followed by the informal lenders. The inefficient and corrupt

**Figure 1.**

The proposed scheme

**Source:** Authors’ own illustration
bureaucratic process in the government institutions makes it harder to borrow from them although the interest rates are lower. MFIs, with higher interest rates, are popular among the farmers due to their aggressive and comparatively easier lending policies. However, farmers in many cases turn to informal credit markets, such as moneylenders with excessively higher interest rates, for additional funds owing to the strict repayment schedule of MFI loans and unavailability of sufficient working capital during the production season. There is evidence of increasing interest rates charged by the moneylenders due to increased demand for their funds as the MFI coverage expands (Mallick, 2012). Many studies (Zeller et al., 2001; McKernan et al., 2005) have detailed borrowing from informal sources by rural households in Bangladesh.

It is interesting to note from the HIES analysis a general dissatisfaction about the borrowing when over two-thirds of the farmers who already borrowed money were not interested to again borrow more money from their lenders. In fact, the limited impact of commercial banks and microfinance on the borrowers’ livelihood has been documented by some studies (Mahmud, 2010; Mesbahuddin, 2010). Deb et al. (2009) highlighted the importance of steady supply of inputs, such as fertilizer, quality seed, agricultural credit, in achieving higher food grain output in Bangladesh. However, lack of appropriate funds to invest in farming leads to subsistence farming with the absence of many advanced high-yielding inputs. This contributes to lower productivity in farms (Mahmud et al., 2014). This is a serious setback for a country like Bangladesh where land is the most critical and limited productive asset for agricultural production. Zakah-based financing system can play a significant role in reducing poverty in Bangladesh (Raquib, 2011) and contribute to the expansion of Islamic microfinance by providing much-needed shariah-compliant fund. Of course, Islamic microfinance is not the only solution to improve the economic conditions of the smallholders. However, through efficiently targeting the financially vulnerable farmers, they can create favorable borrowing conditions for them by exerting pressure in the existing credit market by offering more competition.

Smallholders in many developing countries face various economic, social and infrastructural barriers over long time due to historical drawbacks originated from colonial rule, underdevelopment and inequality. Using monopolistic intermediaries, the existing marketing channels in those areas marginalize the small producers (Key et al., 2000). The dominant marketing route for many smallholders in Bangladesh is producer–middlemen–consumer route, which is a serious obstacle for them to have better access to market supply chain (Alam, 2001). Nabi (2008) also reports the actions of wholesalers and their agents (middlemen) as a barrier to market access. The inadequate rural infrastructural facilities and connectivity and uncompetitive rural markets force many smallholders to heavily rely on local intermediaries. They often exploit the situation by making syndicate to control the crops’ prices and using their superior knowledge of wider market trend in an environment of

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Table I. Sources of loans for farmers

Notes: Authors estimate the figures from Bangladesh’s HIES conducted by Bangladesh Bureau of Statistics in 2010. The total sample size was 12,240 households where 7,840 were from rural areas and 4,400 were from urban areas. The table considers the sources of loans only for the farmers out of all the respondents
asymmetric market information. The result is significantly higher gap in the prices received by smallholders and market retail prices. Barrett (2008) has shown similar evidence from eastern and southern Africa, where smallholders’ economic strain and limited transportation means to regional markets to negotiate a better price forces them to sell their produce to local intermediaries and traders.

Moreover, farmers are often involved in “distress sales” when their produce are sold to intermediaries at a time of lowest price during harvest (Bronkhorst, 2011). One of the reasons for that is the poor smallholders’ need to borrow money during production time when they cannot afford rising costs of agricultural inputs. In the absence of reliable formal credit markets, they may borrow from traders or local moneylenders. Traders often take advantage of the situation by offering contract of future sale of the harvest at unfavorable prices to the farmers. The limited market power of smallholders with respect to whom and at what price they sell their products and their inability to holdout for a better price result in difficulties in repaying high interest-bearing loans like the ones taken from informal moneylenders. They may end up selling their limited physical asset-holdings. They are likely to even migrate to urban areas in adverse conditions.

As explained above, many rural smallholders fall into vicious cycle of poverty due to unfavorable financing schemes, loss of productivity and intermediaries’ exploitation. The benefits from offering the Zakah-based Salam contract to smallholders are summarized below (source: prepared by authors):

- financial inclusion.
- interest free working capital.
- collective bargaining power in factor market.
- application of high yielding inputs.
- better access to market supply chain.
- reduction in intermediaries’ exploitation.
- fair price for crops; and
- increase in demand for local production.

This scheme promotes financial inclusion by making much-needed working capital accessible interest free during the production season, which in turn makes application of high-yielding inputs more viable. The community-based collective approach would increase the producers’ bargaining power to negotiate better input prices and fair price for their produce. The Institutional Demand from the Zakah fund creates favorable markets for smallholders and reduces harmful domination of private intermediaries in the already underdeveloped rural markets. The price stability and reliable source of income provide incentives for increased local production. The local food security situation is enhanced through incentivized farming activities and disbursement of food from the food bank to the vulnerable populations. This scheme is sustainable in the long term due to the nature of Zakah as a repetitive yearly affair. In short, Zakah-based Salam contract can be an effective strategy for stabilizing smallholders’ income to improve their precarious economic condition in Muslim-majority areas.

6. Nigerian context and lessons from Bangladesh

Nigeria is the most populated country in Africa and the seventh largest in the world [World Food Programme (WFP), 2018b]. The country that once relied on agriculture for its revenue and foreign exchange, the sector has now suffered from underinvestment, policy neglect and
Studies have identified many problems the agricultural sector in Nigeria faces, which include inappropriate financing, low farm productivity, insufficient modern farm machineries and poor communications network (Mohammed et al., 2016; Ogunbado and Ahmed, 2015). Thus, it has become a net importer of foods from abroad, and majority of its people engage in subsistence agricultural practices.

Poverty level is very high in Nigeria, where 60 per cent of the people live below the poverty line [World Food Programme (WFP), 2018b]. The figure puts majority of smallholder farmers as incapable of purchasing farm inputs for productive and efficient agricultural activities. Similarly, lack of access to working capital of finance has been identified as one of the major challenges of small- and medium-sized enterprises in Nigeria. Beck and De La Torre (2007) found that this lack of access to finance will cause the problem of poverty to persist as there will be obstacles to transform talents into productive activities to uplift socio-economic conditions. In view of this, Hussaini and Garba (2011) advocate for profit and loss sharing mode via Islamic financing institutions such as Zakah and Awqaf to be utilized properly. However, they have not provided details in that regard.

Despite the fact that the country’s mainstay is agriculture, which employs over 60 per cent of the total labor force and contributes almost 40 per cent of GDP, the country was ranked 156th out of 187 in the 2011 UNDP Human Development Index (www.foodsecurityportal.org/nigeria/resources). Though the GDP in the non-oil sector increased by 0.55 per cent in the second quarter of 2017 and the country exited recession as a result, the recent security challenges in the northeast have left many households to live on humanitarian assistance due to limited staple harvest, high food prices and poor labor opportunities in the affected areas (FEWS, 2018).

The similarities in socio-economic conditions between Nigeria and Bangladesh make the proposed scheme applicable in both countries. First, both are Muslim-majority countries. Though Nigeria is made up of approximately 55 per cent Muslims (Muhammad, 2013), most of its northern states are overwhelmingly Muslim majority. Second, in both countries, there is large rural population, with majority of them being farmers. Third, though both countries made progress on achieving some Millennium Development Goals (MDGs), there is more to be done to realize the goals set, particularly the poverty reduction goal (Bangladesh MDG progress Report, 2015 and Nigeria MDGs Survey Report, 2015).

There are varying practices of Zakah collection and distribution in Nigeria such as private, mosques and state administration of Zakah. Recently, 12 out of 36 states in Nigeria institutionalized Zakah collection and distribution with the objective of regulating the practices in those states. Recent findings (Table II) show that potential Zakah collections in Bangladesh range from 1.63 to 3.92 per cent of GDP. The corresponding figures in Nigeria range from 0.86 to 2.08 per cent of GDP. Looking at the resource shortfall (7.57 per cent in Bangladesh compared to 1.47 per cent in Nigeria) required to alleviate poverty at $1.25

<table>
<thead>
<tr>
<th>Country (Year)</th>
<th>Resource Gap as % of GDP at $1.25 per day</th>
<th>Resource Gap as % of GDP at $2.0 per day</th>
<th>Potential Zakah collection as % of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>7.57</td>
<td>33.36</td>
<td>1.63-3.92</td>
</tr>
<tr>
<td>(2010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>1.47</td>
<td>3.50</td>
<td>0.86-2.08</td>
</tr>
<tr>
<td>(2013)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

per day, mobilizing Zakah fund has high potential in eradicating poverty and improves financial vulnerability of smallholders in both countries. Though food availability, food accessibility and food utilization are the major components of food security in any country, poverty is an overall denominator of food insecurity. This underscores the role of Zakah in tackling poverty in Nigeria and Bangladesh, where poverty rates are high and, by extension, food insecurity.

A glimpse into agricultural production of some of the major crops in Bangladesh and Nigeria is presented in Tables III and IV. According to Global Hunger Index (GHI) score for 2017 (21.8) is 27 per cent lower than the 2000 score (29.9), indicating worldwide decline in the levels of hunger and undernutrition over the long term. The GHI scores for Bangladesh were 37.6 in 2000, 32.2 in 2008 and 26.5 in 2017. On the other hand, Nigeria’s scores were 41.0, 33.7 and 25.5 in 2000, 2008 and 2017, respectively. It can be discerned that the figures are quite close to each other, corroborating the similarities in poverty and other indices in both countries. Particularly, in Nigeria, the activities of insurgents in the northeastern region have displaced 1.62 million people, with another 4.7 million in need of emergency food assistance in the region [World Food Programme (WFP), 2018b)]. The country’s recurrent vulnerability in disasters such as floods and droughts reduces agricultural output, thus affecting the living standard and welfare of the people.

In terms of lessons, the deep penetration of microfinance in the Bangladesh society easily helps reach out majority of the farmers to introduce various types of intervention, such as Salam financing. Initiatives such as Rural Development Scheme of Islamic Bank Bangladesh could be an effective partner in the application of Salam. Thus, Nigeria needs to open more MFIs that are line with Islamic principles to ensure financial inclusion and acceptance among majority of the populace particularly rural farmers. For instance, Kano, a northern state in Nigeria with more than 95 per cent Muslims and one of the most important agrarian regions, has already established MFIs in all its local governments to benefit agriculture, trade, commerce, etc. (Mohammed et al., 2016). These kinds of initiatives give opportunities to introduce Salam financing to enhance agricultural output in the Kano State.

<table>
<thead>
<tr>
<th>Items</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice production (MT)</td>
<td>50,627,000</td>
<td>50,497,000</td>
<td>51,534,000</td>
<td>52,325,620</td>
</tr>
<tr>
<td>Wheat production (MT)</td>
<td>972,085</td>
<td>995,356</td>
<td>1,255,000</td>
<td>1,303,000</td>
</tr>
<tr>
<td>Maize production (MT)</td>
<td>1,018,287</td>
<td>1,297,717</td>
<td>1,548,000</td>
<td>2,124,000</td>
</tr>
<tr>
<td>Soybean production (MT)</td>
<td>65,883</td>
<td>64,143</td>
<td>58,037</td>
<td>112,024</td>
</tr>
</tbody>
</table>

Source: World Food Programme (WFP) (2018a)

<table>
<thead>
<tr>
<th>Items</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice production (MT)</td>
<td>4,612,614</td>
<td>5,432,930</td>
<td>4,823,330</td>
<td>6,734,000</td>
</tr>
<tr>
<td>Wheat production (MT)</td>
<td>165,000</td>
<td>100,000</td>
<td>80,000</td>
<td>70,000</td>
</tr>
<tr>
<td>Maize production (MT)</td>
<td>8,878,456</td>
<td>8,694,900</td>
<td>8,422,670</td>
<td>10,790,600</td>
</tr>
<tr>
<td>Soybean production (MT)</td>
<td>492,852</td>
<td>650,000</td>
<td>517,960</td>
<td>679,000</td>
</tr>
</tbody>
</table>

Source: World Food Programme (WFP) (2018b)

Table III. Agricultural production in Bangladesh

Table IV. Agricultural production in Nigeria
7. Conclusion

The Government of Bangladesh has made a commitment to fulfill the MDGs, where the eradication of poverty and hunger gets high priorities (Haneef et al., 2015). The proposed scheme has a positive influence on some of the MDGs, such as poverty alleviation, increased employment, hunger reduction and sustainability. The MDGs have now evolved into Sustainable Development Goals, but the main aims and activities are unchanged. In addition, the scheme is also consistent with the aim of governments of many developing countries to improve smallholder farming in rural areas. The importance of food security, along with poverty and inclusive development, has been acknowledged worldwide. Diverse Institutional Demand initiatives in the form of targeted food procurement schemes, such as national food reserves, public food distribution system, Food for Work, School Feeding programs, are being implemented in many developing countries.

Religion can play an increasing role in the development process as it brings a value rationality based on equity and fairness and adds stronger moral and ethical codes to institutions in countries like Bangladesh where rampant corruption exists. Besides Bangladesh, being a country with high poverty incidence, along with many obstacles in agricultural sector, needs an array of support to better the situation. This paper elaborated the procurement of food aspect of the original framework proposed by Hossain (2017). Two existing Islamic instruments, Zakah and Salam forward contract, have been used for the betterment of the smallholders using rural Bangladesh as a case study. Smallholders are a major player in the food security conundrum and need special protection and support to be able to make a substantial impact on the challenge.

With the pooled local Zakah fund, the scheme proposes procurement of food through Institutional Demand to offer fair price and access to new marketing channels and reduce income uncertainty for the smallholders. This would make farming more attractive, leading to increased food production and better food security. Zakah-based Salam contract could be an addition to traditional bank-centered modes of financing to empower the smallholders, the backbone of many developing countries’ agricultural sector, to improve their precarious financial condition. Effective distribution of food from a food bank created mostly with the procured food from the contracted farmers will help support long-term improvement of the Zakah-eligible food-insecure groups in the area.

The religion-based Institutional Demand initiative to promote smallholder agricultural development and social protection is a novel one. The attempt to apply the framework to Nigeria context does show the potential of the framework to generalize for other Muslim developing countries with similar characteristics, especially the poorer agriculture-based countries. Obviously, diversities in producers, problems and institutional capacities emphasize the responsibility of local and national governments to appropriately design and implement the framework. However, because of the absence of empirical validation, it needs further exploration to assess the applicability of the scheme. Though the evidence and rationale presented in the paper is inadequate, the proposal brings forth a potentially powerful idea that needs an expanded research agenda with more quantitative and qualitative investigation of different aspects of the scheme.

along with other agrarian states to enhance agricultural output taking into account heavy interest burden and religious sensitivity associated with conventional banking. Salam can play a vital role in agricultural financing, creating employment opportunities and sustained economic growth. It is an essential tool for farmers to acquire farm inputs and working materials such as harvesters, tractors and incubators among others, particularly in countries with vast agricultural and harvestable land.
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Data envelopment analysis and data mining to efficiency estimation and evaluation

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Beirut, Lebanon

Abstract

Purpose – This paper aims to assess the application of seven statistical and data mining techniques to second-stage data envelopment analysis (DEA) for bank performance.

Design/methodology/approach – Different statistical and data mining techniques are used to second-stage DEA for bank performance as a part of an attempt to produce a powerful model for bank performance with effective predictive ability. The projected data mining tools are classification and regression trees (CART), conditional inference trees (CIT), random forest based on CART and CIT, bagging, artificial neural networks and their statistical counterpart, logistic regression.

Findings – The results showed that random forests and bagging outperform other methods in terms of predictive power.

Originality/value – This is the first study to assess the impact of environmental factors on banking performance in Middle East and North Africa countries.

Keywords Bank performance, Data envelopment analysis, MENA countries, Data mining tools

Paper type Research paper

1. Introduction

Sustainability is one of the concepts which has been associated with bank performance; therefore, assessing and predicting bank performance have become vital for managers when examining the suitability of their managerial decisions. Additionally, studying bank performance greatly facilitates measuring the success of decisions made by a bank as compared to those of its counterpart during the same period. Furthermore, it allows one to learn how to make better financial decisions that allocate financial resources in a more efficient manner. There is substantial body of published academic research that discusses different methods of evaluating bank performance; Berger and Humphrey (1997) grouped them into two main approaches, namely, parametric and nonparametric. The most popular parametric method is known as the stochastic frontier approach (SFA), whereas the most
popular nonparametric method is data envelopment analysis (DEA). Although using these methods could help researchers determine performance level, they are not sufficient to explain inefficiency or predict performance. Therefore, several studies, like that of Fethi and Pasiouras (2010), proposed a combination of measuring and explaining bank performance using DEA or SFA in the first stage to measure performance and regression models as a second stage to explain it. Casu and Molyneux (2003); Ariff and Can (2008) and San et al. (2011) used Tobit regression in particular to explain bank performance. Other researchers used different regression models to explain bank performance; Anouze (2010); Emrouznejad and Anouze (2010) and Bou-Hamad et al. (2017) used boosted generalized linear model, and Seol et al. (2007) used decision trees, whereas Azadeh et al. (2011) used the artificial neural networks (ANNs). On the other hand, Sun and Li (2008) and Wu and Hsu (2019) used decision tree techniques to introduce a multiple criteria decision-making method to determine suitable warning mechanisms of corporate financial failure or distress. Meanwhile, Lai et al. (2011) used DEA to develop an intellectual benchmarking knowledge-based system for benchmarking, performance evaluation and process improvement.

However, no comparison of methods used in second DEA stage has been made, and most of these studies aimed only to explain the factors affecting efficiency rather than predicting future efficiency of banks. Predicting bank performance is extremely important: bad performance may lead to bankruptcy, which negatively influences the economy of a country. Thus, conceiving a powerful predictive model for bank performance would be useful in avoiding or at least limiting such consequences. Therefore, this study proposes a comprehensive performance evaluation framework based on managerial, financial and macroeconomic indicators to predict bank performance. More specifically, seven predictive techniques, namely, classification and regression trees (CART), conditional inference trees (CIT), random forest based on CART (RF-CART), random forest based on CIT (RF-CIT), bagging, ANNs and logistic regression (LR) are assessed when applied to second-stage DEA. This framework is applied to a data set of 151 banks from Middle East and North Africa (MENA) countries observed over a period of three years (2008-2010); hence, the data set contains 453 observations with 15 environmental variables (predictors). For predictive comparison among the used data mining methods, we used the overall accuracy, sensitivity, specificity and the areas under the ROC curve (AUC).

The following sections are organized as follows: Section 2 reviews the related literature and Section 3 describes DEA and data mining methods used. Section 4 describes the MENA banks data set. The experimental set up and model performance measures used in our comparison are described in Section 5. Finally, we present and discuss our results in Section 6, and we conclude in Section 7.

2. Literature review
Several authors investigated the influence of environmental conditions on bank performance. Linear regression analysis is one of the most popular statistical techniques used in performance measurement. However, in practice, researchers have used regression analysis for both prediction and explanation of a firms’ performance level (Azen and Budescu, 2003; Courville and Thompson, 2001; Johnson and LeBreton, 2004; Pedhazur, 1997). The linear regression result is not particularly well suited, as it is a common nature of the environmental variables to be correlated (Grömping, 2007).

Hence, other approaches to investigating the impact of environmental variables on performance were proposed. Ray (1988) proposed using a two-stage method; the first stage consisted of measuring bank efficiency using DEA, while in the second stage, the obtained DEA efficiency score of each bank is regressed against selected environmental variables using SFA. Later on, Ray (1991) proposed using a regression analysis in which the environmental
variables are regressed on efficiency scores rather than the SFA. The second stage method (two-stage analysis), which is the most common method used among researchers (Ariff and Can, 2008; Casu and Molyneux, 2003; San et al., 2011), is seen as a solution for the impact of variables that are not included in the initial DEA model. In addition, Fried et al. (2002) recommended using three-stage analysis; the first stage comprised computing the efficiency score using DEA model. Then the total slack of the input and output constraints, \( [x - X\lambda \geq 0 \text{ and } Y\lambda - y \geq 0] \) which is the source of inefficiency, is considered to have three effects: managerial inefficiencies, environmental influences and measurement error (statistical noise).

In the third stage, SFA is used to estimate values for these components. Estelle et al. (2010) proposed a different three-stage framework, and their results show that the one-stage model is unable to decompose the efficiency and environment effects, which point out the weak performance of the one-stage model.

Alternative powerful methods such as CART (Anouze, 2010; Emrouznejad and Anouze, 2010; Seol et al., 2007) and ANNs (Azadeh et al., 2011; Toloo et al., 2015; Hanafizadeh et al., 2014) were considered to complement the classic statistical genetic methods.

3. Data envelopment analysis and data mining methodology

The framework starts with DEA computation of the performance of each bank, and the efficiency scores obtained are grouped accordingly into efficient banks (efficiency score of 1, target = 1) and inefficient banks (efficiency score less than one, target = 0). This classified efficiency score is used as a target, while the environmental (exploratory) variables are used as inputs of data mining techniques. Figure 1 depicts our proposed framework.

In the following paragraphs, we briefly describe the DEA and the seven prediction techniques used in our study.

3.1 Data envelopment analysis

DEA is a non-parametric method developed by Charnes et al. (1978) to measure the performance of set decision-making units (DMUs) (Emrouznejad et al., 2008 and Emrouznejad and De Witte, 2010). The initial DEA models consider constant return to scale (CRS) which ignores the fact that different DMUs (banks) could be operating at different scales. To overcome this drawback, Banker et al. (1984) introduced variable returns to scale (VRS) model,
which ensures that each bank is only benchmarked against banks of similar size. To introduce DEA-VRS model, assume there are \( n \) banks \((a_j = 1, \ldots, n)\) using \( m \) inputs \((x_{ij} i = 1, \ldots, m)\) and producing \( s \) outputs \((y_{rj} j = 1, \ldots, s)\). DEA measures the technical efficiency of bank \( j_0 \) compared to \( n \) peer group of banks input and output. DEA formulation in Models (1a) assesses bank \( j_0 \) under VRS, where the efficiency of bank \( j_0 \) is the optimal value of \( \theta \). This model is described as input oriented. Similarly, an output-oriented DEA is defined in Model (1b) where the efficiency of bank \( j_0 \) is the optimal value of \( 1/\theta \) (Thanassoulis, 2001).

Model 1a. Standard input-oriented DEA-VRS

\[
\min \theta
\]

subject to

\[
\sum_{j=1}^{n} \lambda_j x_{ij} \leq \theta x_{j_0} ; \forall i
\]

\[
\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{rj_0} ; \forall r
\]

\[
\sum_{j=1}^{n} \lambda_j = 1
\]

\[
\lambda_j \geq 0 ; \forall j, \theta \text{ free}
\]

Model 1b. Standard output-oriented DEA-VRS

\[
\max \varnothing
\]

subject to

\[
\sum_{j=1}^{n} \lambda_j x_{ij} \leq x_{j_0} ; \forall i
\]

\[
\sum_{j=1}^{n} \lambda_j y_{rj} \geq \theta y_{rj_0} ; \forall r
\]

\[
\sum_{j=1}^{n} \lambda_j = 1
\]

\[
\lambda_j \geq 0 ; \forall j, \varnothing \text{ free}
\]

To reach to CRS-DEA, one can remove \( \sum_{j=1}^{n} \lambda_j = 1 \) constraint from the above models.
However, DEA alone determines only the efficiency scores of each bank and does not account for the factors related to inefficiency; neither can it predict the performance of each bank (Emrouznejad and Anouze, 2010) nor account for flexible measures variables (Amirteimoori and Emrouznejad, 2011; Amirteimoori and Yan, 2014) and the uncertain nature of the future (Amirteimoori et al., 2013).

3.2 Logistic regression
LR is a generalization of linear regression (Hosmer and Lemeshow, 2000) used for predicting a dichotomous dependent variable (efficient, inefficient) or multi-class-dependent variables. LR assumes that the response variable is linear in the coefficients of the predictor variables. In this study, LR analysis is performed with financial and economic data related to bank performance to assess the independent effect of each factor. The specific form of a logistic model is as follows:

\[
\text{probability(efficient}|x_1, \ldots, x_m) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x_1 + \ldots + \beta_k x_m)}}
\]

where \(x_1, \ldots, x_m\) are \(m\) explanatory variables. LR produces a simple probabilistic formula of classification, and this is its main advantage. However, the weakness is that LR cannot deal with the problems of non-linear and interactive effects of explanatory variables (Yeh and Lien, 2009).

3.3 Classification and regression tree
A classification and regression tree is a non-linear discrimination method that uses a set of independent variables to split a sample into progressively smaller subgroups. Tree-based methods have appeared with Morgan and Sonquist (1963). However, they gained their popularity through the major theoretical and practical contribution of Breiman et al. (1984). It was initially introduced as an alternative to parametric methods in discriminant and regression analysis and has been extended more recently to censored survival analysis (LeBlanc and Crowley, 1992; Bou-Hamad et al., 2009; Bou-Hamad et al., 2011). CART uses a recursive algorithm to split the data into classes (or nodes) based on logical if-then conditions on the explanatory variables. The splitting criteria of classification trees aim to find the best splitter explanatory variable partitioning the parent node into two more homogenous children nodes. The algorithm starts with the root node (initial data set) and so on until growing a large tree. For classification trees, the goodness of the split is measured by the impurity function defined as follows:

\[
\Delta(s, t) = i(t) - p_L i(t_L) - p_R i(t_R)
\]

where \(s\) is the candidate split of a variable \((s, t)\) the parent node, \(i(t)\) the impurity of the node \(t\), \(p_L\) and \(p_R\) the proportions of objects going to the left \((t_L)\) or right \((t_R)\) child nodes, respectively, and \(i(t_L)\) and \(i(t_R)\) their impurities. Several impurity measures have been proposed, and the most popular ones are the deviance and the Gini index. The impurity measure is defined as

\[
i(t) = -\sum_{j=1}^{C} p_j(t) \ln(p_j(t)) \quad \text{for the deviance and } \quad i(t) = 1 - \sum_{j=1}^{C} \left( p_j(t) \right)^2 \quad \text{for the Gini index,}
\]

where \(p_j(t)\) is the proportion of objects in node \((t)\) that belong to the \(j^{th}\) class of the \(C\) classes present in the data set.

The growth of the tree can be continued until no further splits are possible. However, fully grown trees tend to over-fit the data, which is why a stopping criterion is needed.
Breiman et al. (1984), proposed a pruning algorithm in which a large tree is grown then pruned back to produce a set of nested trees from which the final tree will be selected. The main advantage of classification trees is the simplicity of interpreting their results. Another advantage is that classification trees do not require implicit assumptions as in the case of parametric models. Despite their advantages, decision trees suffer from instability (Breiman et al., 1984), where a small change in the training data may have a major impact on the predictive ability of the tree.

3.4 Conditional inference trees
Unlike CART where its splitting criterion is based on impurity reduction, the CIT recently proposed by Hothorn et al. (2006b) use a splitting criterion based on multiplicity-adjusted conditional tests (Hothorn et al., 2006a). For any node, the splitting procedure consists of conducting a global permutation test of no association between any predictor variable and the response within the node. If the global hypothesis of no association is not rejected, the node is not split and is considered a terminal node. Otherwise, for each predictor, an individual null hypothesis of no association with the response will be conducted. The predictor with the lowest \( p \)-value is selected for splitting. In CIT, pruning is not required as the trees stop growing when the split is not statistically significant.

3.5 Bagging
A single tree is unstable in the sense that small perturbations in its training set may result in changes in its predictions (Breiman, 1996). Using ensemble methods such as bagging and random forests often produces better performances than using a single tree. Bagging is a bootstrap ensemble method introduced by Breiman (1996). It can be used with many classification methods and regression methods to reduce the variance associated with prediction and therefore improve the prediction process (Sutton, 2005). Hence, it consists of averaging the fitted values of the response variable of many trees built with bootstrapped samples from the original data. Basically, it trains each classifier on a randomly drawn training set; each classifier’s training set consists of same number of banks randomly drawn from the original training set, with an equal probability of drawing any given bank. These samples are drawn with replacement so that some banks may be selected multiple times, while others may not be selected at all. As a result, each classifier could return a higher test set error than a classifier using all of the data (Kim, 2006). However, when these classifiers are combined (typically by voting), the resulting ensemble produces a lower error on the test set than a single classifier. Bagging has been found to be the simplest algorithm that helps in reducing variance and improving unstable classifiers in accuracy (Breiman, 1996). It also enhances accuracy when random features are used and can help avoid overfitting. However, the disadvantage of bagging is that bagged trees are not as easily interpretable as a single tree (Zhu, 2010).

3.6 Random forests
Breiman (2001) originally introduced the random forest as an ensemble of CART trees (RF-CART). This method gives a prediction based on the majority voting (the case of classification) or averaging (the case of regression) predictions made by each tree in the ensemble using some input data (Antipov and Pokryshevskaya, 2012). In this sense, it is similar to the bagging technique, and it combines many individual decision trees to provide a final prediction. However, the key difference between them is that bagging uses an exhaustive search of all the explanatory variables to find the best split, while RF uses a randomly selected set of explanatory variables at this step. Recently, Strobl et al. (2007)
developed a random forest based on conditional inference trees (RF-CIT). The general method of both RF-CART and RF-CIT can be outlined as follows:

- Draw B bootstrap samples from the data,
- Grow a tree for each bootstrap sample. At each node, select at random k out of m covariates on which to base the decision at that node.
- Each tree is fully grown and not pruned. The splitting is stopped when a minimum node size is reached.

RF suffers from the same problem of interpretation as bagging does. However, several techniques have been developed for RF to allow for interpretation. The most useful one is the variable importance; the common and frequently used variable importance measure is the permutation-based mean decrease in accuracy (Breiman, 2001). This measure allows researchers to identify a set of important variables that can potentially affect the dependent variable.

3.7 Artificial neural networks

ANNs are one of the most commonly used data mining models for prediction. An ANN is inspired by the structure of biological neural networks where neurons are interconnected and learn from experience. Neural networks are composed of nodes (neurons) arranged in layers that are fully connected to the preceding layer via a system of weights. Numerous different neural network architectures have been studied. However, the most successful applications of neural networks have been multilayer feed forward networks. These are networks in which there is an input layer, one or more hidden layers and an output layer. The input layer is where the input features are fed and forwarded to the hidden layer, which is again forwarded to the output layer.

The output of a hidden layer node is computed in the following manner. First, a weighted sum of inputs is computed and then a transfer function is applied to this sum. More specifically, for a set of input values, \( x_1, x_2, \ldots, x_m \), the output of node \( j \) is computed by taking the weighted sum \( \theta_j + \sum_{i=1}^{m} w_{ij} x_i \), where \( \theta_j, w_{ij}, \ldots, w_{mj} \) are weights that are initially set randomly and adjusted as the network learns. The next step is to apply a transfer function \( g \) to this sum. A transfer function is a monotone function. The most popular transfer function is the logistic function \( g(s) = 1/(1 + e^{-s}) \). Finally, the output layer obtains input values from the hidden layer and the same transfer function is applied to create the output (Shmueli et al., 2010, pp. 222-229).

The common algorithm used to estimate and update the weights is the back-propagation (Rumelhart et al., 1986). However, this algorithm suffers from a low learning speed (Castillo et al., 2006). Many alternatives have been proposed to increase the learning speed. One of them is a general quasi-Newton optimization procedure, the Broyden-Fletcher-Goldfarb-Shanno algorithm that is used in this paper.

4. Data description

The proposed methodology is applied to a sample of banks operating in MENA countries over the period of 2008-2010. The period after 2011 was witness an Arabic Spring movement that impacted the performance of banking sector in these countries; therefore, these years were excluded to avoid any up-normal variation in bank performance. The total number of banks operating in MENA countries over the selected period was 535 banks, however due to data availability only 151 banks (Appendix A) are included. The sample includes data from
Lebanon (27 banks); Egypt (21); United Arab Emirates (18); Bahrain; Israel and Jordan (13 banks each); Saudi Arabia (11); Oman (7); Qatar and Tunisia, (6 banks each); Iran and Kuwait (5 banks each); Algeria (2) and Libya; Morocco; Yemen and Palestine (1 bank each). Figure 2 illustrates their share of assets.

Although our sample consists of banks from various countries with differing accounting regulations, we believe the accounting data are comparable across the whole sample, as the financial statements data optioned from Bankscope are reported in a unified global format.

4.1 Data envelopment analysis input and output variables

In general, different set of input and output variables were used in various studies. A debatable concern usually occurs when it comes to classifying a variable as either an input or an output due to varying definitions. There are three main approaches used as a base to select and classify the input and output variables: production, intermediate and value-added approach. Other researchers used a mix approaches. The first approach popular in branches efficiency studies was that bank is treated as a vendor who use labor, capital and equipment to produce various number of deposits and loans transactions. The second approach treats banks as intermediaries between savers and investors, hence variables such as labor or labor cost and deposits and assets were frequently used as inputs and variables like loans, securities and investments were frequently used as outputs.

In this study, for the purpose of measuring bank performance and comparing different data mining techniques in predicting the performance, an in-depth analysis of previously published literature was conducted to select the most popular input and output variables. A total of 204 published were reviewed and analyzed in term of used inputs, output and environmental variables. In term of DEA input and output variables, most of the reviewed literature relied on bank’s balance sheet. Figure 3 illustrates the most used input variables, whereas Figure 4 illustrates the most used DEA output variables and Table II illustrates the most used environmental variables and the used statistical test to study the impact of the environmental variables on bank performance.

Figure 3 shows the most popular DEA input variables are fixed assets, personnel expenses and number of employees, operational (interest) expense, overhead expenses, number of branches, premises and deposits. However, due to data availability and high correlation between personnel expenses and number of employees; therefore, personnel expenses with fixed assets, deposit and equity are selected as a DEA input variable.
On the other hand, Figure 4 shows the most popular DEA output variables that extracted from the reviewed literature.

Figure 4 shows that loans is the most used output variable followed by investment, other earning assets, net commission, profit and off-balance sheet items. However, due to data availability the following outputs are selected loans, net income (profit), off-balance sheet and liquid assets.

A brief statistical descriptive of DEA input and output variables are presented in Table I. On the other hand, Table III describes the 15 environmental variables considered for the second stage, as inputs to data mining algorithms.

Table I shows that DEA model consists of five inputs and four outputs. These variables vary over the study period: the minimum value of fixed assets, which is one of the inputs, is US$0.16m, whereas the maximum value is US$2,424.24m, with an average of US$143.83m and standard deviation of US$305.39m. In terms of loans, which are output variables, the minimum loan is US$1.28m, and the maximum value is US$58,487.64m, with an average of US$6,052.46m and standard deviation of US$9,702.11m. Therefore, as DEA models are sensitive to observations, it is likely to find significant levels of variation in the efficiencies as well.

Source: Developed by researchers
4.2 Determinants of bank efficiency: select data mining input variables

Although, measuring bank efficiency score can vary according to managerial decisions, the impact of environmental variables has been highlighted by previous research because of its effect on these decisions. Table II summarizes part of the previously published studies in this field along with the statistical methods used to investigate the impact of environment variables on bank performance.

Table II presents key findings of previous studies that investigated the impact of different exogenous variables on banks efficiency and the used statistical test. It is clear from this table that these studies used different environmental variables, and the majority of researchers used regression analysis. Few of them used other techniques such as classification and regression and data mining techniques. Introducing such methods to the study of bank performance was motivated by the need to avoid some of the critical problems in regression analysis by avoiding parametric assumptions, reducing dimensionality of the model and removing the redundant variables, which is in favor of the model’s performance. Moreover, selecting the most important variables with good predictive capacities will allow us to interpret the parameter estimates easily due to a plausible reduction of multicollinearity. Based on Table II and data availability, Table III illustrates the statistical description of the selected environmental variables.

5. Experimental setup

This section describes the data used for training and testing the model, the adjustable parameters for each data mining technique and the predictive performance measures used.

5.1 Data partition and parameters

Using the statistical programming language R, which is widely used among statisticians, all predictor variables are included as inputs, and the efficiency class (0 or 1) obtained from DEA is also included as output. Then the initial data set is partitioned into training and validation data sets. The training data set contains all of the bank data over the two years 2008 and 2009, while the data set of 2010 is used for testing. The adjustable parameters of each class have been set. The bagging and the two types of random forests (RF-CART and RF-CIT) are built with 50 bootstrap samples. For neural networks, one hidden layer with five neurons is used. The splitting criterion used in CART is the deviance. The minimum number of observations in a node is fixed to 10. For CIT, the significance level of the permutation tests is set to 5 per cent. The deletion or inclusion of an explanatory variable in the logistic model is based on Akaike’s information criterion.

<table>
<thead>
<tr>
<th>Description</th>
<th>Average</th>
<th>SD</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed assets</td>
<td>143.83</td>
<td>305.39</td>
<td>2,424.24</td>
<td>0.16</td>
</tr>
<tr>
<td>Deposits</td>
<td>8,628.96</td>
<td>12,543.11</td>
<td>67,599.47</td>
<td>2.11</td>
</tr>
<tr>
<td>Equity</td>
<td>1,115.05</td>
<td>1,675.85</td>
<td>8,229.41</td>
<td>4.95</td>
</tr>
<tr>
<td>Interest expense</td>
<td>285.25</td>
<td>404.57</td>
<td>2,569.13</td>
<td>0.12</td>
</tr>
<tr>
<td>Personnel expenses</td>
<td>88.06</td>
<td>174.25</td>
<td>1,252.50</td>
<td>0</td>
</tr>
<tr>
<td>Outputs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loans</td>
<td>6,052.46</td>
<td>9,702.11</td>
<td>58,487.64</td>
<td>1.28</td>
</tr>
<tr>
<td>Net income</td>
<td>140.28</td>
<td>286.27</td>
<td>1,804.59</td>
<td>0</td>
</tr>
<tr>
<td>Off-balance sheet</td>
<td>3,522.14</td>
<td>7,217.32</td>
<td>68,429.57</td>
<td>0</td>
</tr>
<tr>
<td>Liquid assets</td>
<td>2,457.64</td>
<td>3,603.58</td>
<td>26,637.08</td>
<td>2.31</td>
</tr>
</tbody>
</table>

Table I. Statistical descriptive of input and output variables (US$m)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study period</th>
<th>Method used</th>
<th>Environmental variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Fernandes, Stasinakis and Bardarova</td>
<td>2007-2014</td>
<td>Double-bootstrapped truncated regression (DBTR)</td>
<td>Capital risk, liquidity risk, banks’ profitability, GDP and inflation</td>
</tr>
<tr>
<td>2 Nguyen (2018)</td>
<td>2007-2014</td>
<td>Ordinary least squares (OLS)</td>
<td>Bank diversification (modified Herfindahl–Hirschman Index, HHI); asset diversification (ADIV), funding diversification (FDIV), and income diversification (IDIV). Bank size, Ownership and Regulation</td>
</tr>
<tr>
<td>4 Tana and Anchor (2017)</td>
<td>2003-2013</td>
<td>Bootstrapped truncated regression</td>
<td>Bank ownership groups and size</td>
</tr>
<tr>
<td>5 Singh and Thaker (2016)</td>
<td>2008-2012</td>
<td>Descriptive tests/Analysis</td>
<td>Ownership structure</td>
</tr>
<tr>
<td>6 Zha, et al (2016)</td>
<td>2008-2012</td>
<td>Wilcoxon test</td>
<td>Total assets (size of bank); Loan loss reserve to gross loan (asset quality); Equity to total assets (capitalization); Bank’s deposit over total deposit (market power); Total loan over total assets (liquidity); Non-interest expense over total assets (management quality); Gross domestic product (gross domestic product); Customer prices index (inflation); Domestic Islamic bank; Number of the bank; and Number of the year</td>
</tr>
<tr>
<td>7 Sufian and Kamarudin (2015)</td>
<td>2006-2011</td>
<td>Ordinary least squares (OLS)</td>
<td>Ownership, Size; Merger and Acquisition Size; Competition; Diversification; Capital Structure; Funding ratio; ROA; Human resources strategy</td>
</tr>
<tr>
<td>8 Shawtari, et al. (2015)</td>
<td>1996-2011</td>
<td>Ordinary least squares (OLS)</td>
<td>Size; Competition; Diversification; Capital Structure; Funding ratio; ROA; Human resources strategy</td>
</tr>
<tr>
<td>9 Yadav and Katib (2015)</td>
<td>2006-2012</td>
<td>Ordinary least squares (OLS)</td>
<td>Ownership, Size; Merger and Acquisition Size; Competition; Diversification; Capital Structure; Funding ratio; ROA; Human resources strategy</td>
</tr>
<tr>
<td>10 Wanke, et al (2015)</td>
<td>1996-2011</td>
<td>OLS regression</td>
<td>Ownership, Size; Merger and Acquisition Size; Competition; Diversification; Capital Structure; Funding ratio; ROA; Human resources strategy</td>
</tr>
<tr>
<td>11 Mesa, et al (2014)</td>
<td>2010</td>
<td>t-test</td>
<td>Ownership, Size; Merger and Acquisition Size; Competition; Diversification; Capital Structure; Funding ratio; ROA; Human resources strategy</td>
</tr>
<tr>
<td>12 Shawtari, et al. (2015)</td>
<td>1996-2011</td>
<td>Ordinary least squares (OLS)</td>
<td>Ownership, Size; Merger and Acquisition Size; Competition; Diversification; Capital Structure; Funding ratio; ROA; Human resources strategy</td>
</tr>
<tr>
<td>14 Chan, et al. (2014)</td>
<td>2001-2008</td>
<td>Tobit regression</td>
<td>Bank operating style (saving, commercial) Risk Market structure Return on asset, Total assets (log), Equity/ Total asset, and Loan loss provision/ Net interest revenue Ownership Financial freedom Risk management</td>
</tr>
<tr>
<td>15 Hou et al. (2014)</td>
<td>2007-2010</td>
<td>Truncated regression</td>
<td>Bank operating style (saving, commercial) Risk Market structure Return on asset, Total assets (log), Equity/ Total asset, and Loan loss provision/ Net interest revenue Ownership Financial freedom Risk management</td>
</tr>
<tr>
<td>16 Rosman et al. (2013)</td>
<td>2001-2009</td>
<td>Truncated regression</td>
<td>Bank operating style (saving, commercial) Risk Market structure Return on asset, Total assets (log), Equity/ Total asset, and Loan loss provision/ Net interest revenue Ownership Financial freedom Risk management</td>
</tr>
<tr>
<td>17 Akin, et al. (2013)</td>
<td>2007-2010</td>
<td>Topsis and Electre III</td>
<td>Bank operating style (saving, commercial) Risk Market structure Return on asset, Total assets (log), Equity/ Total asset, and Loan loss provision/ Net interest revenue Ownership Financial freedom Risk management</td>
</tr>
<tr>
<td>18 Chortareas, et al. (2013)</td>
<td>2001-2009</td>
<td>Truncated regression</td>
<td>Bank operating style (saving, commercial) Risk Market structure Return on asset, Total assets (log), Equity/ Total asset, and Loan loss provision/ Net interest revenue Ownership Financial freedom Risk management</td>
</tr>
<tr>
<td>19 Matthews (2013)</td>
<td>2007-2008</td>
<td>Truncated regression</td>
<td>Bank operating style (saving, commercial) Risk Market structure Return on asset, Total assets (log), Equity/ Total asset, and Loan loss provision/ Net interest revenue Ownership Financial freedom Risk management</td>
</tr>
</tbody>
</table>

Table II. Summary of environment variables and the used statistical methods (continued)
<table>
<thead>
<tr>
<th>Study</th>
<th>Study period</th>
<th>Method used</th>
<th>Environmental variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 Elyasiani and Wang (2012)</td>
<td>1997-2007</td>
<td>Regression</td>
<td>Total assets (log); Noninterest income/ Total income; Total liability/ Total assets; Net income/ Total assets; Intangible assets/ Total assets; Bank income diversification</td>
</tr>
<tr>
<td>21 Yang (2012)</td>
<td>2009</td>
<td>Tobit regression</td>
<td>ROA; Cost to income; Non-performing loan ratio; Total assets; Privatization; Private banks; Financial holding banks</td>
</tr>
<tr>
<td>22 Zhang and Matthews (2012)</td>
<td>1992-2007</td>
<td>Truncated regression</td>
<td>Ownership; Market shares; Size (total assets, log); Diversification: Noninterest income/ total assets. Cost/ income ratio; GDP growth rate</td>
</tr>
<tr>
<td>23 Assaf et al. (2011)</td>
<td>1999-2007</td>
<td>Bootstrapped truncated regression</td>
<td>Total assets (log); Net profit margin; Liquidity; Payout ratio; Ownership</td>
</tr>
<tr>
<td>24 Chronopoulos et al. (2011)</td>
<td>2001-2007</td>
<td>Regression</td>
<td>Index of income diversification; Total assets (log); Equity to total assets ratio; Total loans to total assets ratio; ROA; Domestic credit to the private sector/GDP; Herfindah index; Banking assets controlled by foreign investors; GDP per capita; GDP growth; Index of financial freedom; Inflation rate</td>
</tr>
<tr>
<td>25 Epure et al. (2011)</td>
<td>1998-2006</td>
<td>Cluster analysis</td>
<td>ATMs/ Total Assets; No. of Branches/ Total Assets/ Liabilities; Interest Margin/No. of Employees; ROA; ROE</td>
</tr>
<tr>
<td>26 Gardener et al. (2011)</td>
<td>1998-2004</td>
<td>Tobit regression</td>
<td>Size; Profit; Capital; Bank private credit; Regulation; Economic growth; Inflation; Country-level of state; Ownership</td>
</tr>
<tr>
<td>27 Luo et al. (2011)</td>
<td>1999-2008</td>
<td>Regression</td>
<td>Ownership; ROA; Time trend (t); GDP; Ratio of loan loss reserves to total loans; Equity to total asset</td>
</tr>
<tr>
<td>28 Rezvanian et al. (2011)</td>
<td>1998-2006</td>
<td>Tobit regression</td>
<td>Profitability; ROA; ROE; Capitalization: bank equity capital to total assets; Size total assets (log); Ownership; Regulatory quality: An indicator of the regulatory quality; Economic development: GDP</td>
</tr>
<tr>
<td>29 Shyu and Chiang (2012)</td>
<td>2007-2008</td>
<td>Regression</td>
<td>Economic growth rate; CPI; Branch floor area; Years of operation; Loan amount</td>
</tr>
<tr>
<td>30 Tanna et al. (2011)</td>
<td>2001-2006</td>
<td>Regression</td>
<td>Natural logarithm of number of board directors; Non-executive directors/total number of board directors; Natural logarithm of bank total assets; Equity/ total assets; Time trend</td>
</tr>
<tr>
<td>31 Burki and Niazi (2010)</td>
<td>1991-2000</td>
<td>Tobit regression</td>
<td>Real assets (log); Interest income to earning assets; Loans to deposits ratio; Foreign bank; Private bank; Nonperforming loans; Number of bank branches (log)</td>
</tr>
<tr>
<td>32 Emrouznejad and Anouze (2010)</td>
<td>1997-2003</td>
<td>C&amp;R tree</td>
<td>Country; Operational style; Size; Number of branches; P/E; Established date; Number of employees; Price book value; Beta; Capital structure; Population; Market share</td>
</tr>
<tr>
<td>33 Fiordelisi and Molyneux (2010)</td>
<td>1995-2002</td>
<td>Regression</td>
<td>Market adjusted returns for listed banks; Ratio between economic value added and the invested capital at time (t)</td>
</tr>
<tr>
<td>34 Hermes and Nhung (2010)</td>
<td>1991-2000</td>
<td>Regression</td>
<td>Financial liberalization; Density of Demand; GDP growth; Inflation rate; Capital to asset ratio; ROE; Total loans to deposits ratio</td>
</tr>
<tr>
<td>35 Staub et al. (2010)</td>
<td>2000-2007</td>
<td>Tobit regression</td>
<td>Size; Non-performing loans; Market Share; Equity over assets ratio; Ownership</td>
</tr>
</tbody>
</table>

Table II.
<table>
<thead>
<tr>
<th>Input variables</th>
<th>Average</th>
<th>Stand</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loan loss reserve/gross loans</td>
<td>6.85</td>
<td>8.49</td>
<td>67.63</td>
<td>0</td>
</tr>
<tr>
<td>Loan loss provision/net interest reserve</td>
<td>25.89</td>
<td>66.59</td>
<td>925.81</td>
<td>(150.00)</td>
</tr>
<tr>
<td>Equity/total assets</td>
<td>12.70</td>
<td>9.47</td>
<td>91.23</td>
<td>0.72</td>
</tr>
<tr>
<td>Equity/net loans</td>
<td>33.87</td>
<td>62.42</td>
<td>987.42</td>
<td>1.10</td>
</tr>
<tr>
<td>Equity/liabilities</td>
<td>18.35</td>
<td>38.54</td>
<td>502.70</td>
<td>0</td>
</tr>
<tr>
<td>Net interest margin</td>
<td>3.19</td>
<td>1.44</td>
<td>9.39</td>
<td>(1.57)</td>
</tr>
<tr>
<td>Return on average assets (ROAA)</td>
<td>1.14</td>
<td>1.72</td>
<td>5.37</td>
<td>(15.47)</td>
</tr>
<tr>
<td>Return on average equity (ROAE)</td>
<td>9.89</td>
<td>15.64</td>
<td>60.99</td>
<td>(155.44)</td>
</tr>
<tr>
<td>Cost to income ratio</td>
<td>52.71</td>
<td>45.70</td>
<td>613.43</td>
<td>0</td>
</tr>
<tr>
<td>Recurring earning power</td>
<td>2.03</td>
<td>1.49</td>
<td>6.73</td>
<td>(11.12)</td>
</tr>
<tr>
<td>Interbank ratio</td>
<td>191.77</td>
<td>223.22</td>
<td>983.42</td>
<td>0</td>
</tr>
<tr>
<td>Net loans/total assets</td>
<td>50.87</td>
<td>18.89</td>
<td>99.52</td>
<td>5.98</td>
</tr>
<tr>
<td>Net loans/deposit and short term funding</td>
<td>71.55</td>
<td>67.89</td>
<td>959.10</td>
<td>0</td>
</tr>
<tr>
<td>Liquid assets/total deposit and borrowing</td>
<td>28.41</td>
<td>24.73</td>
<td>298.92</td>
<td>0</td>
</tr>
</tbody>
</table>

**Notes:**

*Country*: organized in alphabetic order;

**Asset quality**

- Loan loss reserve/gross loans: indicates how much of the total portfolio has been provided for but not charged off. The higher the ratio the poorer will be the quality of the loan portfolio;
- Loan loss provision/net interest revenue: presents the relationship between provisions in the profit and loss account and the interest income over the same period. Ideally, this ratio should be as low as possible;

**Capital**

- Equity/total assets: measures the ability of a bank to withstand losses. A declining trend in this ratio may signal increased risk exposure and possibly capital adequacy problem;
- Equity/net loans: measures the equity cushion available to absorb losses on the loan book;
- Equity/liabilities: is another way of looking at the equity funding of the balance sheet and is another way of looking at capital adequacy;

**Operations**

- Net interest margin: is the net interest income expressed as a percentage of earning assets. The higher this ratio, the cheaper the funding or the higher the margin the bank is commanding. Higher margins and profitability are desirable as long as the asset quality is being maintained;
- Return on average assets (ROAA);
- Return on average equity (ROAE);
- Cost to income ratio: measures the overheads or costs of running the bank. It is a measure of efficiency although if the lending margins in a particular country are very high then the ratio will improve as a result. It can be distorted by high net income from associates or volatile trading income;
- Recurring earning power: measure of after tax profits adding back provisions for bad debts as a percentage of total assets. Effectively, this is a return on assets performance measurement without deducting provisions;

**Liquidity**

- Interbank ratio: is money lent to other banks divided by money borrowed from other banks. If this ratio is greater than 100, then it indicates the bank is net placer rather than a borrower of funds in the market place, and more liquid;
- Net loans/total assets: indicates what percentage of bank assets is tied up in loans. The higher this ratio the less liquid the bank will be;
- Net loans/customer and short-term funding: high figure denotes lower liquidity;
- Liquid assets/total deposit and borrowing: amount of liquid assets available to borrower and depositors;

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**Statistical description of the environmental factors**

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5.2 Performance criteria

We used some popular measures of prediction performance frequently used in the literature. These measures are overall accuracy, sensitivity, specificity and the area under the ROC curve (AUC). Accuracy is the total number of banks (either efficient or inefficient) correctly classified over the total number of banks in the sample. Sensitivity is the total number of efficient banks correctly classified divided by the total number of efficient banks in the sample. Specificity is the total number of inefficient banks correctly classified divided by the total number of inefficient banks in the sample.

The above performance measures (accuracy, sensitivity and specificity) depend on a certain cutoff value for labeling the class, which is in general set at 0.5. However, AUC is considered as a better measure of overall performance and does not depend on any specific classification cutoff (Ling et al., 2003). Thus, the higher the AUC, the better a classifier performs.

6. Results and discussion

6.1 First and second stage results

To provide an efficiency trend of MENA countries’ commercial banks, one meta-frontier (common-frontier) approach is computed for all banks in all countries. This approach provides variations in the efficiency of banks over both time and space, which would not be the case if a separate frontier for each year were computed. Output and input-oriented DEA-VRS models are computed to measure the efficiency score of each bank.

Table IV shows that the overall average efficiency score is stable around 88 per cent over the study period for all banks. This suggests that by adopting best practices, MENA commercial banks can overall increase their outputs (without reducing any sources) or reduce their inputs (without losing any of their outputs) by approximately 11 to 13 per cent (i.e. 100 – 89 per cent and 100 – 87 per cent). However, the potential increment in outputs from adopting best practices varies from bank to bank. In general, MENA commercial banks have the scope of producing 1.14 times (i.e. $\frac{1}{0.87}$) as many outputs from the same level of inputs.

Furthermore, to measure bank efficiency across countries, the efficiency score for all banks is aggregated at country level to get the annual average efficiency scores for each country’s commercial banks. Figure 5 illustrates the results.

Figure 5 shows the Algerian, Libyan and Yemen commercial banks outperform other countries banks. On the other hand, Jordanian and Lebanese commercial banks performed badly during the study period. The first stage results show the differences in inefficiency among banks in the 17 MENA countries. In this stage, the DEA results are classified into two groups, namely, efficient group (score of 1) and inefficient group (score of 0). This grouping is used as a target variable in each predictive technique. The classification or prediction performances of these techniques are presented in Table V based on the testing data set. It is seen that CIT outperforms the other techniques on sensitivity; however, it produced the lowest overall accuracy (67.55 per cent). RF-CART and bagging show the best overall performance with AUC of 0.9293 and 0.9221, respectively. Moreover, their estimated AUCs exhibit the lowest standard errors (S.E.).

<table>
<thead>
<tr>
<th>Summary of banks efficiency scores</th>
<th>VRS input-oriented</th>
<th>VRS output-oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>0.87</td>
<td>0.88</td>
</tr>
<tr>
<td>Standard division</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Number of efficient banks</td>
<td>57</td>
<td>57</td>
</tr>
</tbody>
</table>
Aside from the numerical measures, the graphs in Figure 6 highlight the comparison between the methods (classifiers) based on ROC curves. The ROC curve is useful for visualizing the overall performance of a classifier. It maps the sensitivity against 1 - specificity. The closer the curve is to the upper left corner, the higher the performance of the classifier. Figure 6 clearly shows that RF and bagging exhibit highest performance, whereas CART, CIT and ANN exhibit the poorest performance. Thus, RF and bagging could be potentially helpful tools for predicting bank performance. However, knowing what factors affect bank performance in MENA countries might be of interest to practitioners. Therefore, RF technique is used to determine the predictors’ importance in the process of predicting bank efficiency.

6.2 Sensitivity analysis
For robustness purposes, we re-estimate the second-stage analysis using linear regression model using the same variables. The justification for carrying out this additional analysis is to compare the result of the best performs data mining techniques with the traditional well-known regression technique. The result of this comparison is reported in Table VI, which overall appear to corroborate the key findings reported in Table V and Figure 7. Specifically, we continue to find that both RF and bagging techniques outperform the regression test. It is worth to note that regression test (LR) shows competitive performance with CART and RF-CIT on overall accuracy and specificity, but it outperforms them on sensitivity.

<table>
<thead>
<tr>
<th>Methods</th>
<th>Accuracy (%)</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>AUC</th>
<th>AUC (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CART</td>
<td>75.50</td>
<td>52.63</td>
<td>89.36</td>
<td>0.7466</td>
<td>0.0408</td>
</tr>
<tr>
<td>RF-CART</td>
<td>82.78</td>
<td>68.42</td>
<td>90.43</td>
<td>0.9293</td>
<td>0.0194</td>
</tr>
<tr>
<td>ANN</td>
<td>68.21</td>
<td>61.40</td>
<td>72.34</td>
<td>0.6951</td>
<td>0.0439</td>
</tr>
<tr>
<td>Bagging</td>
<td>84.11</td>
<td>73.68</td>
<td>91.49</td>
<td>0.9221</td>
<td>0.0229</td>
</tr>
<tr>
<td>CIT</td>
<td>67.55</td>
<td>80.70</td>
<td>59.57</td>
<td>0.7077</td>
<td>0.0371</td>
</tr>
<tr>
<td>RF-CIT</td>
<td>75.50</td>
<td>52.63</td>
<td>89.36</td>
<td>0.8516</td>
<td>0.0306</td>
</tr>
</tbody>
</table>

Figure 5. Bank performance cross MENA countries (VRS output-oriented model)

Table V. Performance of the six methods

Data envelopment analysis
6.3 Critical variables to predict bank performance

To identify the most critical environmental variables on bank efficiency and to investigate the interaction between efficiency score and the changes in the environmental variables, Table VII reports the results.

Table VII lists the factors from the importance of each variable based on RF and the significant variables based on linear regression. As Table VII shows, both results agreed on the most important and significant variables: country, cost to income ratio and equity/net loans seem to be the most important factors in predicting bank performance, while interbank ratio and loan loss provision/net interest revenue seem to be the least important factors. This means that the performance and steady growth of the financial sector depend on an adequate regulatory framework. It is worth to note that these results are consistent with the findings of recent studies by Wanke et al. (2016), Li et al. (2017) and Sufian (2009) who found positive relationships between bank efficiency and equity to total assets ratio, ROA, ROE, loan loss reverse to gross loan and cost-to-income ratio.

Hence, the major concern of policymakers in countries with an inefficient banking sector need to investigate the reason for this inefficiency and learn from other countries with an efficient banking sector to improve and strengthen their financial sector. They need to understand the mechanisms of a healthy financial environment and help promote the health, safety and vitality of their banking sector in the coming years. The analysis also suggests that the decline in relative technical efficiency was attributed to the following many reasons such as cost-to-income ratio, equity-to-net loans ratio, equity-to-total assets ratio, loan loss reserve-to-gross loans ratio, net loan-to-deposit and short-term funding ratio and equity-to-liabilities ratio. This suggests that strong and prompt policy actions are needed to address these variables and recapitalize bank assets and cost to be more efficient.

![Figure 6. Performance based on ROC curves](image)

**Table VI.**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Accuracy (%)</th>
<th>AUC</th>
<th>AUC (S.E.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LR</td>
<td>74.83</td>
<td>0.8186</td>
<td>0.0348</td>
</tr>
<tr>
<td>RF-CART</td>
<td>82.78</td>
<td>0.9293</td>
<td>0.0194</td>
</tr>
</tbody>
</table>
Take for example, the cost-to-income ratio is widely regarded as a yardstick when comparing productivity and efficiency of banks, a high cost-to-income ratio is equivalent to low productivity and low efficiency and vice versa (Burger and Moormann, 2008). Also, equity-to-net loans ratio is another important variable of bank efficiency that represent the percentage of the total assets that are financed by stockholders, as opposed to creditors. A low equity ratio will produce good results for stockholders as long as the company earns a rate of return on assets that is greater than the interest rate paid to creditors.

Furthermore, investors will gain more return from investing in MENA countries’ banking sector if they invest their money in those countries whose banking sector is efficient. In addition, if bank managers want to open new branches in MENA countries, they are advised to open them in countries that have a healthy financial environment for the bank to be considered efficient.

7. Conclusion

Different statistical and data mining techniques have been used in DEA second stage to measure the impact of environmental variables on a DMU performance. Each method has its advantages and disadvantages. Most previous studies of bank performance that use the DEA second-stage approach have focused on how to explain the impact of an environmental variable on bank performance instead of predicting future bank performance. This study focused on comparing seven popular statistical and data mining techniques used in second DEA stage for bank performance to better predict bank performance in MENA countries. The techniques we used comprised CART, CIT, random forest based on CART (RF-CART), random forest based on CIT (RF-CIT) and bagging, as well as ANNs and LR. RFs and bagging have gained popularity in recent

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable importance</th>
<th>Linear regression*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>1.45</td>
<td>Net loan/deposit and short term funding</td>
</tr>
<tr>
<td>Cost to income ratio</td>
<td>1.12</td>
<td>Equity/net loans</td>
</tr>
<tr>
<td>Equity/net loans</td>
<td>1.03</td>
<td>Equity/tot assets</td>
</tr>
<tr>
<td>Equity/total assets</td>
<td>0.99</td>
<td>Equity/liabilities</td>
</tr>
<tr>
<td>Loan loss reserve/gross loans</td>
<td>0.8</td>
<td>Cost to income ratio</td>
</tr>
<tr>
<td>Net loan/deposit and short term funding</td>
<td>0.81</td>
<td>Return on average equity (ROAE)</td>
</tr>
<tr>
<td>Equity/liabilities</td>
<td></td>
<td>Loan loss reserve/gross loans</td>
</tr>
<tr>
<td>Net loans/total assets</td>
<td>0.79</td>
<td>Country</td>
</tr>
<tr>
<td>Return on avg. equity (ROAE)</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>Recurring earning power</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>Net interest margin</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>Return on avg. assets (ROAA)</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>Liquid assets/total deposit and Borrowing</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>Loan loss provision/net interest revenue</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>Interbank ratio</td>
<td>0.04</td>
<td></td>
</tr>
</tbody>
</table>

Note: *Significant variables based on linear regression analysis at $\alpha \leq 0.05$
years due to their superior performance in a range of applications. However, these methods, particularly random forests based on CIT, have not been used widely to predict bank performance. We provided a comparison of performance considering several measures of prediction performance such as sensitivity, specificity, overall accuracy and the area under the ROC curve (AUC). Approximately, the seven methods showed adequate ability to model bank performance. However, the overall performance of random forests and bagging was superior. A key advantage of random forests is also the variables importance ranking. In our case, RF ranked “Country”, “Cost to income ratio” and “Equity/Net loans” as the most important factors in predicting bank performance and “Interbank ratio” and “Loan loss provision/Net interest revenue” as the least important ones. We agree that any specific data may have different fits from different data mining techniques. In the context of bank performance prediction with a target variable (Efficiency) obtained from DEA-VRs (which is our case); RFs based on CART trees were powerful tools to predict bank performance in MENA countries. Therefore, they would be of a great benefit to practitioners and researchers in MENA countries who are interested in predicting bank performance.

The result shows that both RFs and bagging techniques are the best tools to predict bank performance using DEA-VRS model. Future research should target different data set and carefully analyze the role of their environmental and regulatory specifics in efficiency levels with other DEA models such as slack-based measure and network DEA, to predict the efficiency of DMUs. However, the availability of real data is challenging; thus, a study involving simulations of different scenarios could be an interesting topic to be explored. Furthermore, as data mining tools are sensitive to used data; hence, possible venues of future studies could also try to overcome some limitations of the current study by using other environmental variables other the one used in this study to test the robustness of RFs and bagging techniques in predicting performance.

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Further reading

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The complementarity between corporate social responsibility disclosure and institutional investor in Jordan

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Abstract

Purpose – The purpose of this paper is to explore corporate social responsibility (CSR) disclosure and its relation to institutional investor (INSV) of Jordanian private listed companies (PLCs).

Design/methodology/approach – A unique sample of 159 largest companies over “a period of 8-years” listed on the ASE in terms of market capitalisation during the 2005-2012 period. Testing of hypotheses has been conducted by applying multivariate regression techniques using longitudinal data analysis of companies’ annual reports.

Findings – Results which confirmed earlier estimations indicated that there are positive and significant relationships between CSR disclosure (CSRD) and INSV. This result indicates that among the CSRD dimensions, INSVs are less concerned with companies engaging in community contribution practices and those related to the community involvement and product dimension in which the company operates.

Practical implications – Jordanian PLCs should be encouraged to be involved in CSR activities as one of their program strategies in attracting investment, as well as to improve their reputation and image in their social activities.

Originality/value – This paper conducts a comprehensive empirical evidence on the development of the relationship between the CSRD dimensions and INSV in Jordanian PLCs as an emerging market, where much existing evidence exists on this issue that may help in explaining difference in prior work.

Keywords Disclosure, Corporate social responsibility, Institutional investor, Private ownership, Jordan

1. Introduction

In the past few decades, companies around the world have been increasing their attention on social responsibility. Consider that the goal of any company is to try to achieve competitive advantage and overcome competitors through investing in social responsibility which has been increased in recent years by changes in investors’ behaviour and attitudes of investors towards society (Saleh et al., 2010; Wahba and Elsayed, 2014). As in most industries, the concept of corporate social responsibility (CSR) is more than ever on the agenda of business organisations. Globally, the past decades have witnessed rapid changes and/or growing demand from stakeholders toward companies to adopt CSR practices. In particular, CSR is not a new concept, it means like ethics, government policy and society in general of social responsibility (Lafferty, 1996), as a means of doing good deeds for society (Carroll and Shabana, 2010) and is now an aspect of growing importance part of the business environment (Dentchev, 2005). CSR were defined in 1953 by Bowen as “the obligations of business to...
pursue those policies, to make those decisions or to follow those lines of action which are desirable in terms of the objectives and values of our society” (p. 6) to provide and contribute to its internal and external stakeholders (Kok et al., 2001). Likewise, “CSR has been represented as an umbrella-term covering a diverse range of issues which have grown steadily in importance for business performance at a global level” (Masoud, 2017, p. 1).

More fundamentally, CSR disclosure (CSRD) has attracted considerable research interests since the 1980s (Ullmann, 1985; Ness and Mirza, 1991; Blaconierie and Northcut, 1997; Gray et al., 2001; Toms, 2002; Patten, 1991; Patten, 1992; Patten, 2002). In developed countries, the level of CSRD is higher than in developing countries (Kamla, 2007; Rizk et al., 2008; Uwuigbe and Egbide, 2012; De Villiers and Marques, 2016; Jamali and Karam, 2016; Bt Abdul et al., 2017). In this case, in most Arab countries, CSRD is low, such as Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates and Yemen (Kamla, 2007; Alawi and Rahman, 2011); this may be a result of recent low economic development, weak legal systems, and corporate governance being a new concept or low demand from stakeholders. According to Gray et al. (2001), social and environmental disclosure can be typically thought of as comprising information relating to a corporation’s activities, aspirations and public image with regard to environmental, employee, consumer issues, equal opportunities, energy usage, fair trade, corporate governance and the like. Social and environmental disclosure may also take place through different media such as annual report, employee councils, advertising, focus group, school education, booklets and so forth.

Indeed, the past few decades, therefore, have witnessed a noticeable change in corporate ownership structure with an increase in the risks of institutional investor (INSV) such as banks, mutual funds, insurance companies and pension funds (Sundaramurthy et al., 2005). In recent years, however, the growth of a company’s shares owned by INSV has increased considerably. In 2011, for instance, INSV owned over 70 per cent of the outstanding shares of common stock of the 1000 largest USA public corporations (Gilson and Gordon, 2013). As an illustration of their growing importance, Lynch-wood and Williamson (2014) reports that, in the year ending March 31, 2014, assets managed worldwide by INSV rose 26 per cent. At the end of the first quarter, they managed a total of USA$1.206tn worldwide for institutions, up from USA$955m a year earlier, based on a survey conducted by Pensions and Investments. In the Jordanian capital market, there are major categories of INSV, namely, mutual funds, pension funds and life insurance companies, which managed assets totalling around USA$114bn or 96.4 per cent of gross domestic product at the end of 2004 (Ghosh, 2006).

In the scholarly and academic literature, it is found that although the number of studies on CSR is high, an empirical examination on the relationship between CSR and INSV in the Jordanian context is limited. The lack of empirical studies on this issue could be one of the factors explaining why Jordanian private listed companies (PLCs) are less concerned or involved in promoting their CSR activities to various stakeholder groups (Williams and Pei, 1999). Jamali and Sidani (2011) argued that the status of CSR in the Middle East has not been fully developed as it is understood and practiced in the West. Similar to the developing countries there are numerous hurdles for the relationship between CSR and INSV such as: lack of legislation (Thompson and Zakaria, 2004; Ziaul-Hoq et al., 2010), lack of CSR education of managers (Lu and Pavel, 2009), lack of reporting framework (Thompson and Zakaria, 2004; Zulkifi and Azlan, 2006), low per capita income (Visser et al., 2010), cost of reporting (Thompson and Zakaria, 2004; Ziaul-Hoq et al., 2010), fear of powerful investors (Zulkifi and Azlan, 2006). Carroll (1991; p. 43) states that there is a natural fit between the
idea of CSR and an organisation’s stakeholders. In this regard, companies that engage in CSR activities and its disclosure can foster various stakeholder relations (McWilliams and Siegel, 2001), thus reducing the company’s business risk (Boutin-Dufresne and Savaria, 2004). For these reasons, the strategic value of CSR is becoming increasingly recognised (Porter and Kramer, 2006). Although, by using CSRD as a proxy for the measurement of CSR activities which are published in the companies’ annual reports, the study provides a new contribution to the literature by examine whether there is any relationship between CSRD and INSV for Jordanian PLCs.

This paper is organised as follows: Section 2 presents CSR and INSV within the Jordanian corporate context. Section 3 presents behavioural theoretical framework. Section 4 presents empirical literature review and hypotheses development. Section 5 presents research design. Section 6 presents empirical results and discussion. Finally, Section 7 concludes the paper and suggests directions for future research.

2. Corporate social responsibility and institutional investor within the Jordanian corporate context
The concept of CSR may be entirely new to Jordan but has historical roots. Thus, CSR was understood as a philanthropic work, a non-institutionalised phenomenon based on traditions presented by the Arab norms, and religious beliefs, strong culture of giving, Islam recommends social co-operation (Masoud and Halaseh, 2016). Therefore, CSR activities tend to focus more on programmes that have a direct impact on the company’s performance which have invested. Hence, the pressure on firms to report CSR activities has been increased (Day and Woodward, 2009). Ararat (2006) study reveals that CSR in Jordan is generally driven by increased local and international competition due to liberalisation, concerns for efficiency and productivity. However, CSRD in Jordan has received a modest amount of attention in their annual reports of companies listed on the ASE. The most disclosed items have been those related to human resources and social community involvement. Environmental disclosure needs much more attention from Jordanian companies (Abu-Baker and Nasser, 2000). This indicates that INSVs in Jordanian are dominated by several large institutions, such as the Securities Depository Centre SDC, and ASE are the regulators and not considered as large institutions to improve transparency, accountability and disclosure, and to enhance the quality of the corporate governance overall. As the size of the assets is controlled by INSV, it is a challenge for private listed companies (PLCs) to attract these investors who are interested in looking for new investment opportunities in Jordanian PLCs that have good CSR practices. To find out whether CSR practices can be used to attract INSV in Jordanian PLCs, an empirical assessment of the relationship between CSR and INSV is crucial.

3. Behavioural theoretical framework
Although a number of previous studies have defined CSRD as the CSR activities communicated to stakeholders through a company’s annual reports (Kin, 1990; Robert, 1992; Che Zuriana et al., 2003; Mohd Ghazali, 2007). Observably, CSRD is considered to represent all of CSR activities which companies disclose information in their annual reports. Initially, the idea of CSR reporting was used by large corporations (Kolk, 2008), especially from impact of industry on reporting practices (Dierkes, 1979; Robertson and Nicholson, 1996; Clarke and Gibson-Sweet, 1999; Stray and Ballantine, 2000; Campbell, 2003; Brammer and Pavelin, 2008). In the beginning of the process, corporations began to produce special “social reports” published particularly by businesses from Western Europe countries ( Fifka, 2013). During the periods 1990-2000, the focus shifted from “social reporting” to “environmental
The reason for this was the importance of environmental aspects in production and the growth of sustainable development concepts (Welford and Gouldson, 1993; Azzone and Bertelè, 1994; Welford, 1995). After year 2000, both dimensions “social and environmental” were merged in the concept of non-financial reports. Those reports had a broader remit and also included economic issues (Rikhardsson et al., 2002; Kolk, 2003; Delbard, 2008; Gebauer and Hoffmann, 2009; Morhardt, 2010). As an observation, earlier studies found that CSRD studies in Jordanian context were limited to exploring the content of CSR activities in companies’ annual reports and revealing the motivation of managers who were engaged in them. However, studies concerning the response from the INSV when companies engage in CSR are limited.

In a review of accounting, research in this study can be categorised in two different forms. Theory development considered the extent of CSRD is fragmented and rudimentary (Sadeghzadeh, 1995; Thompson and Zakaria, 2004; Maali et al., 2006) while other studies examined and documented the driving factors behind the disclosure of CSR activities (Teoh and Thong, 1984; Abdul Rashid and Ibrahim, 2002; Amran and Devi, 2007). In this context, the most widely accepted and are the ones this study will focus on, these are: stakeholder theory and legitimacy theory (Gray et al., 1995; Milne, 2002; O’Dwyer, 2003; De Villiers and Van Staden, 2006; Jamali, 2008). The theoretical framework adopted incorporates both influences, by adopting stakeholder theory focuses upon the expectations of particular interest groups, and legitimacy theory focuses upon the expectations of society in general to explain CSRD. Thus, stakeholder theory (powerful stakeholders within the social dynamics) and legitimacy theory (as a form of social dynamics) are better seen as two with overlap, and because they can provide different and useful points of view. It is possible and helpful to jointly consider them to provide more insightful explanations for CSR disclosure practices. Thus, companies are seen as a complex political system, consisting of alliances and sub-alliances of various stakeholders involved in continuous political negotiations with different objectives and preferences (Elghuweel et al., 2017).

Over the past decades, companies have come under growing pressure to actively pursue CSR efforts from a variety of stakeholders (Brammer et al., 2007). From a stakeholder theory perspective (Freeman, 1984; Freeman et al., 2007; Freeman et al., 2010; Hamidu et al., 2015; Cahaya et al., 2017), which suggests that CSR includes managing multiple stakeholder ties concurrently, but other stakeholders will benefit from company’s activities as well, “[... ] the goal of any company is or should be the flourishing of the company and all its principal stakeholders” (Werhane and Freeman, 1999, p. 8). In addition, the stakeholder theory attempts to explain how a company identifies the powerful stakeholder groups within the social dynamics who may affect, or be affected by, the company’s CSR disclosure practices, and how the company responds to their expectations, thus winning their support and ensuring the survival of the company (Perera, 2007; Gray et al., 1996; Khliif et al., 2015).

The institutional perspective of Legitimacy theory has become one of the most cited theories within the CSRD and environmental accounting area (Neu et al., 1998; Patten and Crampton, 2004; Deegan, 2014). Suchman (1995, p. 574) define the legitimacy as “[A] generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” or “is a social judgment of appropriateness, acceptance, and desirability” (Zimmerman and Zeitz, 2002, p. 418). It would suggest that legitimacy theory attempts to explain why a company makes CSR disclosure, and therefore becomes a resource that a company can create, influence or manipulate through various disclosure-related strategies for acquiring and managing legitimacy (Lindblom, 1994; Woodward et al., 2001; Deegan, 2009, 2014) and as a means of protecting an organisation’s reputation and identity.
(Hooghiemstra, 2000; Campbell, 2003; Cho and Patten, 2007; Panwar et al., 2014). These strategies vary from changing goals, outputs and methods to changing perceptions about the company’s goals, outputs and methods. Harte and Owen (1992) and Deegan and Rankin (1996) also figure out the downside of legitimacy theory is that it may encourage business managers to put out positive information (i.e. only information that will guarantee stakeholder approval). Hybels (1995, p. 243) argues that good models in legitimacy theory must examine the relevant stakeholders, and how “Each influences the flow of resources crucial to the organisations’ establishment, growth, and survival, either through direct control or by the communication of good will”. Consequently, CSRD can be considered as a signal of building legitimacy, by which companies improve their social and environmental conducts as well as their social reputation (Neu et al., 1998; Guthrie and Parker, 1989; O’Donovan, 2002).

Following this theoretical framework, it is clear that legitimacy requires a reputation that must be retained. It requires a company to convince its relevant PLCs that its activities are congruent with their values and that of perspective. Thus, these perspectives can be explored by using stakeholder theory insights. On the other hand, organisational legitimacy and organisational reputation are inextricably linked, and in this study, the distinction between the two will not be explored further. Therefore, employ this behavioural theoretical perspective in developing our hypotheses and interpreting our findings.

## 4. Empirical literature review and hypotheses development

CSR is therefore an idea with a global nature (Midor, 2012); there are some researchers that suggest that it is applied differently across different economic, social, cultural, legal and political contexts (Ertuna and Tükel, 2010; Ryan et al., 2010; Kuznetsov and Kuznetsova, 2014). Previous studies have examined the relationship between CSR and INSV offer inconclusive evidence (Teoh and Shiu, 1990; Coffey and Fryxell, 1991; Cox et al., 2004; Graves and Waddock, 1994; Mahoney and Roberts, 2007; Saleh et al., 2010; Wahba, 2008, 2010). Empirical studies that examined the relationship between CSR and INSV found the existence of a positive and neutral relationship finding. For instance, Teoh and Shiu (1990) reveal that available data on CSR in company disclosure reports have no impact on decisions of INSV. However, INSV accepts CSR information in their account, if it is tuned to specific issues, namely product development and fair business practices. Other empirical finding by Coffey and Fryxell (1991) did not find a clear pattern regarding this relationship. Graves and Waddock (1994) and Cox et al. (2004) pointed out that INSV will choose to place their investments in companies that have good social achievement and avoid investing in companies that have poor social performance. Mahoney and Roberts (2007) and Saleh et al. (2010) found that companies are able to attract and maintain their INSV while they engage in social initiatives and programmes. In a similar vein, most previous studies found that investors require CSRD as information for their investment decisions (Mahoney and Roberts, 2007; Wahba, 2010). It can be inferred from our discussions above that CSRD is as a proxy to measurement of CSR for the Jordanian PLCs, and hence, the first hypothesis to be tested is:

**H1.** There is a positive association between CSRD and INSV for the PLCs in Jordan.

In line with the mixed theoretical expectations, discussion of the theoretical and empirical analysis of the relationship between CSR and INSV in the preceding section proves that the theoretical and empirical relation between CSR and INSV exists. It can be concluded that most studies in developed markets have a positive significant relationship between CSR and INSV. Empirical studies show opposing and mixed findings in prior studies may be traced
back to the fact that this relationship is not a direct relationship. Rather, the main argument in this paper is that better (or worse) CSR, may, in turn, be the guide for INSV when they make their investment decisions. This is due to, “the emergence of social criteria may influence INSV activity, these criteria probably remain subordinate to economic criteria” (Coffey and Fryxell, 1991, p.439). For instance, numerous investors’ value social responsibility is still their main concern (Matterson, 2000). Furthermore, not only financial returns are important for ethical investors (Sparkes, 1998), but also INSV do not consider social responsibility data unless they are presented in a “financial form” (Teoh and Shiu, 1990). Specifically, this study aims to contribute to literature in examining the relationship between CSR and INSV for Jordanian PLCs from the emerging market setting. The main dependent variable is INSV is presented by number and percentage of company shares owned by investors (Johnson and Greening, 1999; Graves and Waddock, 1994; Cox et al., 2004; Mahoney and Roberts, 2007), whilst CSRD as independent variable represents CSR activities of PLCs in Jordanian and they are divided into five categories, namely, economic performance, employee relations, community involvement, product responsibility and environment. Despite inconclusive empirical evidence and following theoretical predictions, the second hypothesis of this paper is that:

$$H2. \text{ There is a positive association between CSRD dimensions and INSV for the PLCs in Jordan.}$$

5. Research design
5.1 Sample size and data collection
To conduct this empirical study, the initial sample in this study consists of 159 largest companies over “a period of 8-years” listed on the ASE in terms of market capitalisation between 2005 and 2012. Listed companies have to meet three main specifications to be included to the study’s final sample:

1. The annual reports of the listed corporations need to be available for the years from 2005 to 2012.
2. A company’s financial and market performance data have to be available for all eighth years investigated.
3. The company has to maintain continuous listing over the eleven years investigated.

The time of duration is selected for following reasons. First, this period is the recovery period from the 2007/2008 financial crisis that hit the Middle East countries particularly the Jordan capital market, and thus, during this period, companies also started to addresses the interests and demands of its stakeholder’s environmental concerns through appropriate CSR activities. Second, this period realise that the level of awareness and attitude among Jordanian managers towards CSR practises has just issued and therefore, it is the period of companies’ involvements in CSRD.

We collected two main types of secondary data relating to the companies’ annual reports for two reasons: first, the annual report is regarded as the most important source of information about a corporate reporting (Jenkins and Yakovleva, 2006). Second, in Jordan as emerging market, annual reports of listed companies are the most accessible source of information, either in hard copy or through electronic publication document. Therefore, the data obtained can be regarded as a reasonably true reflection of the contents of the reality analysed. Those reports were downloaded from corporations’ websites and the ASE website
5.2 Definition of variables and model specification

We use three main types of variables to conduct our regression analysis, namely:

1. dependent variables, which are represented by number and percentage shares held by INSV;
2. independent variables, which are represented by CSRD and dimensions of CSRD; and
3. control variables, consisting of company-specific characteristics.

First, our main dependent variable is INSV that measured by fraction of common shares (Graves and Waddock, 1994; Johnson and Greening, 1999; Cox et al., 2004) to examine the relationship between CSRD and INSV.

INSV may be categorised according to the type of organisations, such as mutual funds, pension funds, financial institutions for instance banks, investment companies and credit cooperatives, insurance companies and private companies (Chaganti and Damanpour, 1991; Koh, 2003). For the purposes of this study, using time lag which explore the relationship between CSR and INSV in the future when a company is involved in CSR activities. Second, our main independent variable is CSRD which represent CSR activities and they are divided into five categories, namely, economic performance, employee relations, community involvement, product responsibility, and environment. For ease of presentation and explanation are one-year lag for overall independent variables use such as, year 2006 data for dependent variables and year 2005 data for independent variables. Third, the economic decisions of INSV may be affected by some other intervening factors besides CSR investments of companies. Thus, to eliminate the influence of those factors, certain controls variables are included in the model. Company’s size \((LSIZE)\) refers to the logarithm of total assets, company leverage \((LEV)\), Return on Assets \((ROA)\), Sales refers to the natural log of net sales \((LSALES)\), earnings per share \((EPS)\), and systematic risk \((BETA)\).

Specifically, the measurement of CSRD techniques in the annual reports can be classified into two general groups. The first group is on the level of the quantity of disclosing such as the number of pages (Guthrie and Parker, 1989; Patten, 1992; Gray et al., 1995), number of sentences (Hackston and Milne, 1996; Wiseman, 1982) and number of words (Zeghal and Ahmed, 1990; Deegan and Gordon, 1996). Each of these techniques has their limitations, i.e. the number of pages may possibly include images that do not have information on the CSR activities (Al-Tuwaijri et al., 2004), whereas sentences and words may possibly ignore a graph or necessary information, which is presented in charts, graphs or tables. Guthrie and Parker (1990), Gray et al. (1996), Deegan and Rankin (1997), Yusoff and Lehman (2009) and other scholars studied CSR reporting practices using annual reports as the key source of information for listed companies, in hard copies and electronically. White and Hanson (2002) present a justification for extensive use of annual report by researchers “for no other medium offers the same blend of consistency, accessibility wide applicability. No other medium yields the same access to corporate communication with lay audiences” (p. 455). This study uses the CSR disclosure of the annual report, as regularly published document to comply with voluntarily requirements. The second measurement technique uses a disclosure-scoring measure that comes from content analysis. This method is also called quantitative disclosing of each issue using a “yes/no” (or 1, 0) scoring methodology (Al-Tuwaijri et al., 2004).
This was, however, widely applied content analysis method to measure the disclosure quantity and quality of CSR (Gray et al., 1995, 2001; Guthrie and Parker, 1989; Hackston and Milne, 1996; Williams and Pei, 1999; Newson and Deegan, 2002; Guthrie and Farneti, 2008; Branco and Rodrigues, 2008; Elzahar and Hussainey, 2012; Krippendorff, 2013). Downe-Wamboldt (1992) highlights that content analysis is more than a counting process, as the goal is to link the results to their context or to the environment in which they were produced: “Content analysis is a research method that provides a systematic and objective means to make valid inferences from verbal, visual, or written data to describe and quantify specific phenomena” (p. 314). One a significant criticism is that many content analysis studies do not provide sufficient information to enable others to understand how the content analysis has been conducted (Beattie and Thomson, 2007; Striukova et al., 2008). Thus, following the approach suggested by Neuendorf (2002), Milne and Adler (1999), and Krippendorff (2004) to ensure that the definitions of the content analysis categories were reliable.

Despite this, prior studies (Hughes et al., 2001; Al-Tuwaijri et al., 2004; Cormier et al., 2005) using the value of each (items) in its annual report quantitatively disclosed in that weights are assigned to different disclosing items based on the perceived importance of each item to various user groups. Thus, in this study, using the disclosing value of each item which assigned into three qualities of classifications of quantitative disclosing:

1. assign the greatest weight score of (+3) to quantitative disclosures;
2. the next highest weight score of (+2) to non-quantitative but specific information related to these indicators (qualitative specific disclosure); and
3. general qualitative disclosures receive the lowest weight score of (+1).

If company do not disclose any kind of information for a given indicator receive a score of (0) for that indicator. Consequently, CSRD as independent variable is used as proxy to measure CSR activities which are disclosed in companies’ annual reports based on Global Reporting Initiatives (GRI) Sustainability Reporting Guidelines (version 3.0) framework. Therefore, GRI framework worked as an appropriate starting point for the development of the coding structure since the GRI framework is global, has international acceptance (Farneti and Guthrie, 2009), is considered a rigorous framework for the application of triple bottom line reporting (Lamberton, 2005) and was drafted by a wide variety of experts after stakeholder consultation (Reynolds and Yuthas, 2008). Furthermore, the GRI guidelines provide a structured overview of the base content of CSR reporting. The base content is divided into six main dimensions which are economic, environment, human rights, labour practices and decent work, product responsibility and society among others (www.globalreporting.org). This approach adds directly to the transparency and reliability of the content analysis because other researchers can also use these guidelines to determine which area and item a disclosure belongs to. In this study, disclosures relating to the five dimensions covered by GRI framework that includes: economic performance with 9 items, employee relations with 9 items, community involvement with 9 items, product responsibility with 9 items, and environment with 9 items. In total, there are 79 items reported under GRI score. Accordingly, the final CSR disclosure score indexes for each category are calculated using the following formula:

$$\text{CSRD}_j = \frac{\sum_{i=1}^{n_j} X_{ij}}{n_j}$$  \hspace{1cm} (1)
where CSRD\(_j\) is independent variable which used as proxy to measure CSR activities which are disclosure for \(j\)th company annual reports. \(X_j\) It is assigned a value of 3 if company disclosed item \(i\)th is quantitative disclosed, 2 if \(i\)th item is non-quantitative but specific information disclosed, 1 if \(i\)th item is common qualitative disclosed, and 0 if \(i\)th item does not disclosed any information. \(n_j\) Total number of items estimated for \(j\)th company that must be disclosed according to GRI standard (79 items).

Given the longitudinal nature of our data, we begin our analyses by running ordinary least squares (OLS) regression because it includes selected Jordanian companies listed on ASE. Therefore, and assuming all the hypothesised associations are linear, our main OLS regression model to be estimated is specified as follows:

\[
\text{INSV}_{it} = \alpha_0 + \beta_i \sum_{i=1}^{n} \text{CSRD}_{it} + \sum_{i=1}^{n} \beta_i \text{CONTROLS}_{it} + \epsilon_{it}
\]

where INSV is the dependent variable, it refers to INSV measurements, namely, number of company shares owned by investors; CSRD is the independent variables, it refers to the five dimensions of CSRD, namely, Economic Performance Disclosure (ECONPD), Employee Relation Disclosure (EMPRD), Community Involvement Disclosure (COMID), Product Responsibility Disclosure (PRORD), Environment Disclosure (ENVD); and CONTROLS refers to the control variables, including company’s size (LSIZE) refers to the logarithm of total assets, company leverage (LEV), Return on Assets (ROA), Sales refers to the natural log of net sales (LSALES), earnings per share (EPS), and systematic risk (BETA). \(\beta\) is the coefficient of the independent variables; \(\epsilon\) represents the error term; \(i\) indicates a firm number; and \(t\) represents time.

### 6. Empirical results and discussion

#### 6.1 Descriptive statistics and univariate regression analyses

This section presents the descriptive statistics employing mean values of each CSRD items under GRI framework shown in Table I. The mean value is the most commonly used to measure central tendency. Findings reveal that economic performance is the highest disclosed dimension with a mean value of 0.793, median value of 0.598 and standard deviation of 0.485 over the 2005 to 2012 period. This indicates that PLCs in Jordanian is more concerned with economic activities that are designed to improve employee morale or the company’s private sector image as compared to other dimensions. Similarly, the employee relations are the second highest disclosed dimension with a mean value of 0.689, median value of 0.611 and standard deviation of 0.374. This implies that the PLCs in

<table>
<thead>
<tr>
<th>Items</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>(\alpha)</th>
<th>CR</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic performance</td>
<td>0.195</td>
<td>2.831</td>
<td>0.793</td>
<td>0.598</td>
<td>0.485</td>
<td>0.850</td>
<td>0.870</td>
<td>0.658</td>
</tr>
<tr>
<td>Employee relation</td>
<td>0.150</td>
<td>2.550</td>
<td>0.689</td>
<td>0.611</td>
<td>0.374</td>
<td>0.822</td>
<td>0.851</td>
<td>0.663</td>
</tr>
<tr>
<td>Community involvement</td>
<td>0.000</td>
<td>2.799</td>
<td>0.238</td>
<td>0.000</td>
<td>0.503</td>
<td>0.851</td>
<td>0.834</td>
<td>0.642</td>
</tr>
<tr>
<td>Product responsibility</td>
<td>0.000</td>
<td>6.544</td>
<td>0.337</td>
<td>0.000</td>
<td>0.601</td>
<td>0.819</td>
<td>0.812</td>
<td>0.619</td>
</tr>
<tr>
<td>Environment dimension</td>
<td>0.000</td>
<td>3.999</td>
<td>0.195</td>
<td>0.000</td>
<td>0.562</td>
<td>0.853</td>
<td>0.842</td>
<td>0.620</td>
</tr>
<tr>
<td>Overall (CSRD)</td>
<td>0.345</td>
<td>18.723</td>
<td>2.252</td>
<td></td>
<td>2.524</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: CSRD refers to the CSRD index (DIS1...DIS9), \(\alpha\) Cronbach’s alpha; CR: composite reliability, AVE: average variance extracted

Table I. Summary descriptive statistics of CSRD
Jordanian are primarily concerned with the issues of human resources in the organisation which disclose employee relations information in their annual reports. These indicate that INSV were not totally different to company involvement in social activities (Teoh and Shiu, 1990). The findings of this analysis are consistent with those of prior studies (Williams and Pei, 1999; Nik Ahmad and Abdul Rahim, 2003; Thompson and Zakaria, 2004; Haniffa and Cooke, 2005) which reported that employee relations is highest category of CSRD dimension in Malaysian. Besides, the results show that, the environment dimension is the less disclosure of CSR activities with a mean value of 0.195, median value of 0.000 and standard deviation of 0.562. This reveals that the awareness and involvement of companies in this dimension is less than others to disclose environmental information to the private companies in Jordan. This is also implies that the number of companies disclosing their environmental is limited to an annual check. Therefore, we suggest that the environmental disclosure may affect economic performance if a company has a significant level of exposure to environmental costs and reduce pollution. The findings of this analysis are also consistent with the figures reported by a number of past studies (Nazli Nik Ahmad and Sulaiman, 2004; Sumiani et al., 2007).

Further, the evidence that emerges from Table I suggests that the mean value for the overall mean of CSR disclosure in five dimensions is 2.252, indicating that the average CSRD of the sample companies is about 45 per cent. This outcome average is higher than the averages results done in developing countries. For instance, a study found by Al-Janadi et al. (2013) and Macarulla and Talalweh (2012) reported 14.61 per cent and 36.5 per cent of CSR disclosure in Saudi Arabia companies, respectively, while Abu-Baker and Nasser (2000) and Flafiel (2011) reported 31 per cent, 34.1 per cent and 36.5 per cent of CSR disclosure in Jordan, respectively, whereas Thompson and Zakaria (2004) reported 36 per cent of CSR disclosure in Malaysia and AlNaimi et al. (2012) which indicates that 32.8 per cent of CSR disclosure in Qatar. However, the results are inconsistent with those who reported lower level of overall CSR disclosure based on GRI framework compared with the result of current study such as study found by (Suwaidan et al., 2004) that reported 13 per cent and 28.1 per cent of CSR disclosure in Jordan, respectively, while Adams (2002) reported 22.9 per cent of CSR disclosure in UK and Germany. Furthermore, the average is higher 48.5 per cent of CSR disclosure found by Yin and Yuli (2012) for a sample of China companies. The findings of this analysis that are also largely consistent with those contained in the work of several other researchers (Griffin and Mahon, 1997; Hartman et al., 2007; Nelling and Webb, 2009; Menassa, 2010; Al-Naimi et al., 2011).

Although, it can be concluded that the Jordanian companies should be concerned with better practices of various CSR activities for various CSRD dimensions. If a company has more CSR practices, it is easier to attract newer foreign investors such as pension funds, hedge funds and investment advisors, thus helping companies develop their business faster and profitable international market. Consequently, PLCs in Jordan need to integrate CSR activities with the company’s business operations to achieve a set of goals. In this respect, the company’s involvement in CSR activities is an effort to build directly business relationships with stakeholders to achieve sustainable success in the long-term of providing optimal value to its stakeholders (Amran et al., 2014), which need to find experienced business support companies to become actively involved in CSR activities or practices on INSV.

In addition to the statistical analysis that we conduct before examining our main research hypotheses, we test a number of OLS assumptions, including the presence of reliability and validity among the variables. Table I presents the reliability which measured by Cronbach’s alpha (α) coefficients of the variables tested, were all above 0.80, which was
considered satisfactory (Fornell and Larcker, 1981; Hair et al., 2010). According to Sekaran (2003), alpha coefficients less than 0.60 is poor, those in the 0.70 range as acceptable, and those over 0.80 is good. The results are consistent with that of Abdul Rashid and Ibrahim (2002) and Brønn and Vidaver-Cohen’s (2008) studies on CSR, which yielded results of 0.61 and 0.98 respectively. Therefore, this shows that there is inter-item consistency reliability among the variables analysed. In addition, we checked the condition for discriminant validity among constructs, we used the average variance extracted (AVE). As suggested by Fornell and Larcker (1981) and Barclay et al. (1995) values of AVE higher than 0.5 indicate that the set of items has an appropriate convergence in measuring the concern construct, making the validity of indicators and the validity of the entire construct questionable. Based on the results of Table I, the values of AVE of all the constructs were ranged between 0.60 and 0.65. Thus, the measures used have an appropriate level of convergent validity. Additionally, the following section discusses the empirical regression analyses between CSRD and INSV in Jordanian context.

6.2 The relationship between corporate social responsibility disclosure and institutional investor

Heteroscedasticity and serial correlation were tested to ensure that OLS regression technique is statistically appropriate to be used to perform our regression analysis model. The presence of these problems means that the standard errors associated with each regression coefficient will not be correct (Gujarati, 2003). Therefore, the modified Wald test (Greene, 2008) and the Wooldridge (2002) test were performed to check for heteroscedasticity and serial correlation, respectively, and the results are reported in Table II. The results show that heteroscedasticity and serial correlation are present in all cases. Therefore, the generalised least squares (GLS) method was employed to correct for heteroscedasticity and serial correlation in all models (Hausman, 1978). The $\chi^2$-statistics for the predicted values of CSRD and INSV, as reported in Table II, were not significant. Thus, CSRD and INSV can be treated as exogenous variables. For the $F$-test (Baltagi, 1995) according to the results that are reported in Table II, are significant. Adjusted $R^2$ value is high which indicates that all independent variables have contributed to explain number shares held by INSV. Through the three models, most outcomes of independent variables of $t$-test are significant at least at ($p < 0.10$).

According to results that are reported in Table II, CSRD, as an independent variable, affects the INSV, under all three models. The results of hypothesis testing using OLS to examine the relationship between CSRD and INSV found that CSRD coefficients are positive and significantly related to INSV for all three models. The results of the current study support $H1$ in that there is a positive and significant relationship between CSRD and INSV for PLCs in Jordan. The empirical results are consistent with the view that INSV are interest with regard to the managers who engage with social and ethical issues of their company; this finding is in line with the work of several other researchers (Teoh and Shiu, 1990; Graves and Waddock, 1994; Johnson and Greening, 1999; Cox et al., 2004; Mahoney and Roberts, 2007) which reported a positive significant relationship between CSR and INSV. Thus, if Jordan PLCs want to attract INSV, the companies have to consider about declaring their CSR activities in their annual reports as an effective means of communicating with INSV and markets.

Regarding the control variables, LSIZE and LSALES, the analysis shows that the coefficient of the LSIZE variable is found to be statistically significant at ($p < 0.10$), and positively correlated INSV, which implies that larger companies are more likely to disclose higher levels of CSR information. This result is consistent with agency theory that larger
companies need to disclose more information to reduce the larger information asymmetry and agency costs (Elzahar and Hussainey, 2012; Ntim and Soobaroyen, 2013a). The coefficient of the LSALES variable is positive and statistically significant at ($p < 0.10$), indicating that bigger companies tend to generating larger sales than do smaller companies. This condition will increase the number of shares held by INSV. However, the analysis shows that company profitability ROA variable is statistically insignificant in relationship with CSRD, indicating that they are not determinants of CSR disclosure and number of companies’ outstanding shares held by INSV. Furthermore, the results show a statistically significant and negative association between LEV, EPS and BETA variables and INSV at ($p < 0.10$) for PLCs in Jordan, which the LEV variable implying that company with higher leverage ratio are less likely to disclose more social information. Thus, investors tend to avoid holding the companies’ stocks which are high risk and more debt. Thus, bigger companies are highly leveraged and assume more risk than smaller companies, which will be reflected negatively on the CSR disclosure.

### 6.3 The relationship between dimensions of corporate social responsibility disclosure and institutional investor

Table III reports the results of the OLS regression analysis of the relationship between the CSRD dimensions and INSV for the PLCs in Jordan. There are three dimensions of CSRD, namely, economic performance (ECONPD), employee relation (EMPRD) and environment (ENVD), which are ECONPD and EMPRD positive and significantly related to INSV, but

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>(1.5846)</td>
<td>(1.4730)</td>
</tr>
<tr>
<td>CSRD</td>
<td>(0.0519)</td>
<td>(0.0372)</td>
</tr>
<tr>
<td><strong>Control variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>(0.1859)</td>
<td>(0.1708)</td>
</tr>
<tr>
<td>LEV</td>
<td>(0.3163)</td>
<td>(0.2517)</td>
</tr>
<tr>
<td>LSIZE</td>
<td>(0.1120)</td>
<td>(0.2639)</td>
</tr>
<tr>
<td>LSALES</td>
<td>(0.2770)</td>
<td>(0.0051)</td>
</tr>
<tr>
<td>EPS</td>
<td>(0.0068)</td>
<td>(0.0192 booked)</td>
</tr>
<tr>
<td>BETA</td>
<td>(0.1387)</td>
<td>(0.1392)</td>
</tr>
</tbody>
</table>

**Notes:** CSRD denotes the dimensions of CSRD. ROA denotes Return on Assets. LEV denotes company leverage. LSIZE denotes company’s size. LSALES denotes company sales. EPS denotes earnings per share. BETA denotes systematic risk. The asterisks ***, **, * indicate significance at the 1, 5 and 10 per cent levels, respectively. Adj. $R^2$ denotes adjusted $R$-square. F-Stat denotes the F-statistics. DW-statistic denotes the Durbin–Watson d test for autocorrelation. Figures in parentheses are standard errors robust to heteroscedasticity using White corrected. Heteroscedasticity is the modified Wald statistic for group-wise heteroscedasticity (Greene, 2008). Wald is the Wald test ($x^2$) for model goodness-of-fit. Serial correlation is the Wooldridge test for autocorrelation in panel-data models (Wooldridge, 2002); number of observation is 1,126.
ENVD is positive and insignificant related to INVS. Whereas the other two dimensions of CSRD namely community involvement (COMID) and product responsibility (PRORD) are negative and significantly related to INVS. Disclosure of CSR activities can be used as leverage to attract INVS to actively invest for the PLCs in Jordan that have any effort to build a solid platform for practices on CSR and responsible sourcing.

In contrast, results on the economic performance, environment and employee relation dimensions that support $H2$. Results of both dimensions are significantly positive related to INSV. These results are consistent with the empirical study by Cox et al. (2004) who found that a positive and significant relations on long-term between employee, environmental dimensions and INVS, whereas Mahoney and Roberts (2007), which reported that a negative significant effect on employee, environmental dimensions relations and INVS. These issues relate to the exploitation of the CSR activities in these issues, which will be more effective if communicated directly to the stakeholders. Thus, managers have to be proactive in understanding the requirements of INSV as shareholders typically affect company operations and decisions, particularly in providing information about the company’s involvement in CSR activities. Other arguments include that the environmental dimension is

<table>
<thead>
<tr>
<th>Model</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent variable</td>
<td>Coeff.</td>
<td>$p$-values</td>
<td>Coeff.</td>
</tr>
<tr>
<td>Constant</td>
<td>(1.3672)</td>
<td>7.0684***</td>
<td>(1.3029)</td>
</tr>
<tr>
<td>ECONPD</td>
<td>(0.1211)</td>
<td>0.4510***</td>
<td>(0.2214)</td>
</tr>
<tr>
<td>EMPRD</td>
<td>(0.1652)</td>
<td>0.6802***</td>
<td>(0.1643)</td>
</tr>
<tr>
<td>COMID</td>
<td>(0.1320)</td>
<td>−0.2647**</td>
<td>(0.1018)</td>
</tr>
<tr>
<td>PRORD</td>
<td>(0.0930)</td>
<td>−0.1865**</td>
<td>(0.0809)</td>
</tr>
<tr>
<td>ENVD</td>
<td>(0.0602)</td>
<td>0.0507</td>
<td>(0.0782)</td>
</tr>
</tbody>
</table>

Control variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Coeff.</th>
<th>$p$-values</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>(0.1720)</td>
<td>−0.7045***</td>
</tr>
<tr>
<td>LEV</td>
<td>(0.2270)</td>
<td>−1.0180***</td>
</tr>
<tr>
<td>LSIZE</td>
<td>(0.1080)</td>
<td>0.3465***</td>
</tr>
<tr>
<td>LSALES</td>
<td>(0.2048)</td>
<td>0.7040***</td>
</tr>
<tr>
<td>EPS</td>
<td>(0.0019)</td>
<td>0.0044***</td>
</tr>
<tr>
<td>BETA</td>
<td>(0.1140)</td>
<td>−0.4591***</td>
</tr>
</tbody>
</table>

Adjusted $R^2$ 0.4366 0.4367 0.4311
$F$-value 42.1580*** 42.1588*** 42.0754***
DW-Stat 2.4012 2.4115 2.3909
Wald ($\chi^2$) 10.12*** 10.11*** 11.08***
Heteroscedasticity 45,880.2*** 44,651.3*** 43,970.8***
Serial correlation 91.66*** 91.12*** 90.66***

Notes: ECONPD denotes the economic performance disclosure. EMPRD denotes the employee relation disclosure. COMID denotes the community involvement disclosure. PRORD denotes the product responsibility disclosure. ENVD denotes the environment disclosure. ROA denotes Return on Assets. LEV denotes company leverage. LSIZE denotes company’s size. LSALES denotes company sales. EPS denotes earnings per share. BETA denotes systematic risk. The asterisks ***, **, * indicate significance at the 1, 5 and 10 per cent levels, respectively. Adj. $R^2$ denotes adjusted $R$-square. $F$-stat denotes the $F$-statistics. DW-statistic denotes the Durbin-Watson d test for autocorrelation. Figures in parentheses are standard errors robust to heteroscedasticity using White corrected. Heteroscedasticity is the modified Wald statistic for group-wise heteroscedasticity (Greene, 2008). Wald is the Wald test ($\chi^2$) for model goodness-of-fit. Serial correlation is the Wooldridge test for autocorrelation in panel-data models (Wooldridge, 2002); number of observation is 1,126.
also assumed to have higher expenditure. To achieve the implementation of environmental management strategy programmes, some companies have devoted their investments to capital expenditures, such as R and D and building alternative plans, or enhancing their productive processing to reduce the negative impact on the environment. However, these expenditures might find the companies’ cash flow during the financial reporting may find their businesses economically disadvantageous compared with other companies that are less socially responsible (Balabanis et al., 1998).

Our findings generally indicate that a negative relationship exists between community involvement and product dimension to INVS for the PLCs in Jordan do not support H2. A high investment in both dimensions results in additional costs from short-term INVS perspective such as unit and investment trusts in companies’ stock outstanding, as opposed to a price change. However, the results are inconsistent with those of prior studies conducted in two studies such as Mahoney and Roberts (2007) who found that there is a positive and significant relationship between product dimension and INVS, but are positive and insignificant impact of community involvement on the INVS; whereas Cox et al. (2004) found a positive significant relationship between community involvement activities and long-term INVS. This indicates that INSV in Jordan are less interested with both dimensions (community and product), perhaps because no directly benefit from their portfolio investments. INSV in Jordan may be highly profitable, especially short-term INSV who focus only on making quick profits in shorter periods of time.

6.4 Robustness analysis

We conduct a series of robustness estimations to examine the extent to which our main findings are robust or sensitive to the use of standard OLS regression which will provide inconsistent parameters due to the correlated omitted variables’ problem. The common econometric solution to endogeneity matter is the use of instrumental variables’ specification procedure. Instrumental variables approach should be associated with endogenous regressors but unrelated to the error term in the structural equation models (Habib and Azim, 2008). Larcker and Rusticus (2010) showed that OLS estimates provide better parameter estimates than two-stage least square approach if the chosen instrumental variables do not conform to the standard definition of instrumental variables. The way of addressing the potential endogeneity for our study, we follow the Ntim (2016), Ntim and Soobaroyen (2013a, 2013b), Larcker and Rusticus (2010) and Frank (2000) alternative approach. Their method involves assessing how large the endogeneity issue (unmodeled variable) has to be to change the OLS coefficient estimates and, in particular, how large it has to be to make the coefficients statistically insignificant. Hence, Instrumental Variables methods are typically used to reduce bias in the coefficient estimates, Frank (2000) and Frank et al. (2008) method is used to assess the sensitivity of a coefficient and its standard error to the inclusion of a confounding variable. They specified a minimum threshold necessary for an omitted confounding variable to invalidate the significant results of a variable of interest in an ordinary least square regression model. The findings of these analyses are presented in Models 1 to 2 of Table III with the findings contained in Model 3 repeating our previous main findings to facilitate easy comparative analysis. The impact results also help in assessing the likelihood that such an unmould variable exists. The sign of the impact score indicates how the inclusion of each control variable affects the coefficient of each endogenous independent variable. A positive impact score indicates that inclusion of the control variables makes the coefficient on the endogenous independent variable more positive or less negative.
7. Summary and conclusion

The main contribution of this study is thus the development of the relationship between CSRD dimensions and INSV for Jordan PLCs. On the whole, this study is aiming to provide some empirical evidence from Jordan as an emerging market, where much of the existing evidence on this issue that may help in explaining difference in prior work. The first objective of this study is to contribute to an important and current debate to establish the CSRD status of Jordanian PLCs. Analysis of longitudinal data, with content analysis for the period of 2005-2012 reveals that the participation and disclosure of CSR activities is gradually improving as a benchmark for sustainable development. The highest disclosure theme is economic performance followed by employee relations, and finally the environment dimension. The information of companies' involvement in CSR activities is represented by CSRD in annual reports. In term of information, the results indicate that the most Jordanian PLCs disclose their CSR activities in general statement terms where fundamentally limited information content.

The second objective of this study would be to examine whether there are any relationships between the CSRD dimensions and INSV for the PLCs in Jordan. It is investigated whether INSV consider CSR activates while making economic decisions. Empirical evidence on private held companies listed in ASE indicates a positive relationship between CSR scores and percentage of shares held by INSV. This result is consistent with the findings of Cox et al. (2004), Mahoney and Roberts (2007) and Oh et al. (2011). It can also be concluded that companies that are interested in constructing long-term relations with INSV would find it valuable to enhance that level of CSR activities.

With relations to the dimensions reported, the results indicate that among the CSRD dimensions, INSV are less concerned with companies engaging in community contribution practices and those related to the community involvement and product dimension in which the company operates. This can be attributed to a lack of attention in the assumption that the activity does not directly affect the investment portfolios of these INSV. However, INSV are not completely opposed to companies that engage in social activities (Milne and Chan, 1999). Nevertheless, INSV respond positively to the performance of the economy and employee relations within an enabling environment. This shows that INSV appreciate fair managers who help attract and retain the best workforce under appropriate economic conditions.

This study, therefore, is the possibility for INSV to design their own investment criteria. For instance, an investor can create programmes to plan for long-term benefits by developing and holding shares over a longer period of time in companies that engage in socially responsible activities. Many companies feel happy to promote their CSR activities as part of an attempt to build public and community confidence. Good CSR practices in Jordanian PLCs will lead to increased confidentiality of INSV. This is because INSV hide from the risks in their investment decision. This suggests that INSV may feel more secure and comfortable if they keep their portfolio investments in companies actively participating in CSR practices. The findings suggest that this study has shown a positive and significant relationship between the CSRD dimensions and INSV for the PLCs in Jordan. This confirms that increased active participation and promotion of CSR activities brings together the interests of stakeholders, and therefore the existence of positive indicators on investments. Compulsory disclosure of CSR activities can also be used as leverage to attract INSV to invest effectively in related companies in Jordanian PLCs that have strong platforms for socially responsible practices.

Certain limitations of the study and recommendations on how to overcome them are explored in this section. First, the study uses the content analysis method which according
to prior studies is subject to human error as the study uses judgment to explore what represents CSRD (Abdul Hamid, 2004; Thompson and Zakaria, 2004; Mathews, 1997; Hackston and Milne, 1996). The study solely focuses on the disclosure of companies’ annual reports, even though it is known that companies use other mass communication mechanisms. Hence, future research may have to consider disclosures of CSR activities exposed by other media such as companies’ stand-alone reporting, in-house magazines, newspapers, and web sites. Finally, in this study, a number of CSR items are used to obtain a complete disclosure. However, the CSR items included in the content analysis should not be considered as a complete list of items that company should provide an integrated report. It is a list of CSR items, which contain items that can be disclosed by each company – following guidelines for the GRI. Certainly, some items that may be relevant to a specific company are not recorded in the proposed disclosures. Wholeness of reporting can only be assessed by considering supporting evidence from users. Using detailed surveys and in-depth interviews, future research can:

- continue to scrutinise the demands of detailed information for a variety of stakeholders (since most studies focus only on requests for environmental information and on specific stakeholder groups); and
- the extent to which these stakeholders stated that their information needs had been met.

Our results have a number of important implications for policy-makers and academic research. For policy-makers, if it is true that morally and morally oriented investors interested in financial performance, managers will have a great opportunity to improve the attractiveness of their firms in the eyes of investors, especially INSV, by justifying their programmes and social activities in a financial form. In other words, managers should seek financial motivation for their social orientation. The academic research uses a method of content analysis that is subject to previous studies and is subject to human error. The study uses a rule to explore what is an account (Mathews, 1997; Thompson and Zakaria, 2004). Due to data limitations, we have focussed mainly on the disclosure of corporate annual reports, although it is known that companies use other mass communication mechanisms. Future research may improve their analysis by considering disclosing CSR activities that are exposed to other media such as independent corporate reports, internal magazines, newspapers and websites. Similarly, due to data limitations, our analysis is limited to Jordanian listed companies. Thus, future studies may include non-listed companies, as well as companies from different countries to extend our evidence.

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Further reading

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Corporate governance, Sharia’ah governance and performance
A cross-country comparison in MENA region
Amina Buallay
Brunel University, London, UK and Ahlia University, Manama, Bahrain

Abstract

Purpose – The performance and effectiveness of governance principles continue to be a matter of concern (Mollah and Zaman, 2015). Focusing on differences between conventional and Islamic banks, this study aims to examine the relationship between governance and bank’s operational (return on assets [ROA]), financial (return on equity [ROE]) and market performance (Tobin’s q [TQ]).

Design/methodology/approach – This study examined 127 banks within the Mena countries for the 10 years 2007 through 2016, for a total of 1270 observations. The study’s independent variable is corporate governance principles; the dependent variables are ROA, ROE and TQ. Also, the study uses bank- and country-specific control variables to help measure the relationship between governance and bank performance.

Findings – The findings deduced from the empirical results demonstrate that Sharia’ah governance significantly influenced ROA and ROE. However, corporate governance significantly influenced TQ. Furthermore, the results indicated that there were differences between Sharia’ah governance and corporate governance with regard to operational, financial and market performance.

Originality/value – The study provides insights into the differences in the relationship between Sharia’ah governance, corporate governance and the improvement of performance, which might be used by both banks to re-adopt the governance practices in enhancing the operational, financial and market performance.

Keywords Cross-country analysis, Corporate governance, MENA countries, Sharia’ah governance

Paper type Research paper

1. Introduction

The financial crisis has shed suspicion on the functioning of conventional banks, at the same time it increases the attention on Islamic banks, as many bankers have observed the stable performance of banks during the financial crisis (Hasan and Dridi, 2011). Islamic banks have a comparatively high demand in several emerging markets, such as Middle East and North Africa (MENA) countries. However, there is little evidence available on the functioning of Islamic banks.

Islamic Banks are have a unique kind of governance where the nature of corporate governance does not suit to Sharia’ah compliance. Corporate governance of banks has become significant area that needs more attention at international level. The complicated governance followed by conventional banks minimize the ability of stakeholders to supervise their performance. Moreover, the corporate governance aims to solve the conflicts between shareholders and management. However, the Sharia’ah rules deal with all stakeholders in their activities rather than only shareholders. Therefore, Islamic governance aims to solve the conflicts between all stakeholders through following Sharia’ah rules guided by religious board which is Sharia’ah Supervisory Board (SSB), (Safieddine, 2009; Quttainah et al., 2013).

This issue made Islamic banks in need of a special kind of governance systems. (Becht et al., 2011). Islamic banks tend to have a different systems distinguished characteristic from
conventional banks; Sharia’ah finance does not allow for the payment of interest (riba). At the same time, Sharia’ah finance relies on the idea of risk-sharing, on both the profit and loss. This would suggest clear differences in the nature of Islamic and conventional banks. Those differences may enable us to capture a relatively clear image of governance mechanisms in banks and their contribution in improving performance. However, theory does not make clear predictions whether the differences in governance practices in both bank’s performance lead to different performance.

This paper contributes to a small but growing literature on Sharia’ah governance. While there is much research on Islamic banking, there are few academic papers up to now on Sharia’ah governance. With this paper we aim to contribute to the emerging countries with regards to the contribution of corporate governance and Sharia’ah governance to the bank performance. Moreover, to compare the differences between both banking governance. This comparison may add another dimension to the existing literature.

For this purpose, we use a sample of 127 Islamic and conventional banks listed in MENA region over the period 2008 to 2017 to assess whether there are significant differences between conventional and Islamic banks. Focusing on a sample of countries with both types of banks allows us to control for unobserved time-variant country-specific effects, thus a clearer identification of such differences than when comparing banks from different countries.

The study is divided into the following sections: First section being introduction, further part of this study is divided into five sections. Section 2 discusses literature review and developing hypotheses. Section 3 presents the design and research methodology. Section 4 shows the descriptive statistics. Section 5 presents empirical analysis results. Section 6 presents the study’s conclusion, recommendations and the scope for further research.

2. Literature review and hypothesis development

2.1 Definition of governance

The definition of corporate governance (CG) has become more complicated (Connelly et al., 2017; Chiang and Chia, 2005). In 2001, the OECD has defined the corporate governance as: the private and public institutions, including laws, regulations and accepted business practices, which together govern the relationship, in a market economy, between corporate managers and entrepreneurs (corporate insiders) on one hand, and those who invest resources in corporations, on the other” (OECD, 2001). Later, the OECD mentioned the characteristics of the corporate governance framework as follows:

The corporate governance framework should be developed with a view to its impact on overall economic performance, market integrity and the incentives it creates for market participants and the promotion of transparent and efficient markets (OECD, 2004).

After that, many researchers attempt to define the corporate governance from their perspectives; Clarke’s (2004) has defined corporate governance as “balancing complex interests in the pursuit of value creation for the benefit of a wide constituency”. Rezaee (2009) defined corporate governance as “a process through which shareholders induce management to act in their interest, providing a degree of confidence that is necessary for capital markets to function effectively”. Akinkoye and Olasanni (2014) defined the corporate governance as guideline, practices, customs and regulations that decide how a corporation should operate.

Recently, Elghuweel et al. (2017) defined the corporate governance as committee aims to promote governance practices by clearly defining governance arrangements and ensuring that the governance framework adopted by the firm is followed and updated.
On the other hand, The Islamic Financial Services Board in Malaysia has defined the Shariah governance (SG) as

Shariah Governance System refers to the set of institutional and organizational arrangements through which an Institutions offering Islamic financial services ensures that there is effective independent oversight of Shariah compliance (Haqqi, 2014).

According to (Alman, 2012) Shariah Supervisory Board (SSB) is one of internal governance mechanisms which includes the monitoring and controlling the implementation and compliance of Islamic banks’ activities to ensure that these activities are follow the Shariah rules.

Hamdi and Zarai (2014) defined Shariah principles relating to accountability, honesty, integrity, responsibility, transparency and truthfulness directly prohibit managers from engaging in fraudulent activities.

2.2 Significance of corporate governance

Over few past decades, corporate governance code has been considered to be a significant instrument in each organization (Laoworapong et al., 2018). Corporate Governance, Board Effectiveness, and Performance of Thai Listed Firms. AU Journal of Management, 13(1), 25-40. Nowadays, many researches concentrate their attention towards the importance of corporate governance and how it affects firms’ performance, financial reporting, corporate social responsibility and other factor that affect business success (Dias et al., 2017; Buallay et al., 2017; Rodrigues et al., 2017).

Corporate governance is significant to establish the basis for the relationship between the directors, board of directors and shareholders which clarified the rights and obligations of each party to efficiently use the available resources and opportunities (Goranova et al., 2017). Moreover, Effective CG will attract a broad base of investors to finance expansion of projects as the adoption of CG increases investor trust because those rules ensure the protection of their rights (Takacs Haynes et al., 2017).

The importance of corporate governance could be reviewed at corporate level, shareholders level and economy level. From shareholder’s perspective, effective CG will ensure the rights of all stakeholders, such as voting right and decision participating rights (Buallay et al., 2017). In Addition, Good practices of cooperate governance ensure full disclosure of the financial position and economic performance (Hamdan and Al-Sartawi, 2013). On the national economy level, the stock prices of well governed firms are sold higher than firms that are not well governed (Cuomo et al., 2016). On the economy level, as long as there are well governed firms in the economy, this definitely will increase of confidence of investors (Thenmozhi and Narayanan, 2016; Bilgin et al., 2017).

Regardless of the importance and effectiveness of corporate governance, there are many views can be discussed towards the Islamic governance. Although the literatures suggested that Islamic governance plays an important role in harmonizing the Islamic rules in Islamic banks (Arjoon, 2016), the Islamic governance should put highly concern with regard to its effectiveness compared with the corporate governance.

2.3 Theories supporting corporate governance

Corporate governance has been viewed through different theories, namely: agency theory (Bosse and Phillips, 2016), stakeholder theory (Moriarty, 2016), legitimacy theory (Frynas and Stephens, 2015) and resource dependency theory (Zona et al., 2015). However, the Islamic governance is widely based on the social contract theory (Khalid et al., 2018) and stakeholder theory (Bukair and Abdul Rahman, 2015).
Based on the agency theory, the objective of corporate governance practices is to minimize the conflict of interests between the management and the shareholders to create and improve shareholders’ wealth (Farrar, 2008). Agency problem can be explained as the agents working in their best welfare of the principal which resulting in agency costs such as observing the cost to prevent losses. Deegan and Unerman (2006) clarify the agency cost as the sum of monitoring costs by the principal to limit a typical activities of the agent; bonding costs by the agent which will assure that certain activities of the agent will not harm the principal or to ensure the principal is recovered if such actions exist; and the outstanding loss which is the dollar equivalent to the decrease of welfare as a result of the separation among the agents decisions and those decisions that would increase the welfare of the principal.

On one hand, agency problem depends on the ownership variables in each country, on other hand it gives the individuals full rights to add information and the investors have to understand whether or not governance mechanisms align to their priorities (Clark, 2004). To eliminate the agency problem, the investors and management could be agreeing to the theories, as well as efficient markets are considered to be the solution for corporate information, management labor and corporate control. Thus, corporate governance focused on the separation of ownership and control which leads in principal-agent problems arising from the scattered ownership in the corporations.

Many researchers discussed the stakeholder theory in relation to the responsibility of the firms to the community. Brown and Caylor (2006) defined stakeholder as “a group of individuals who can affect or affected by the activities of the corporation, to achieve the objectives of the corporation”. The basic goal of any corporation is to resolve the conflicts of interest of the stakeholders. So, realizing the responsibility of the stakeholders among the corporation is the main aspect of clarifying this theory. This means, if the risk of investment is related to the corporation activities the stakeholders is recognized (Lara, et al., 2009). Thus, the stakeholders must be treated fairly by the firms, and directors should manage the firm for the benefit of all stakeholders, regardless of whether the stakeholder management leads to better financial performance.

Legitimacy theory could be defined as “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate with some socially constructed systems of norms, values, beliefs and definitions”. Legitimacy theory have social participation with the society and the corporations. Deegan and Unerman (2006) indicates that an organization gets permission for society operating and the society offers the authorization to get and use natural and human resources. Thus, governance must consider the rights of the public not only the rights of the shareholders.

Clark (2004) explained the resource dependency theory and stated that directors are responsible to get resources to the corporation such as information, skills and competences, community, public decision makers, suppliers, buyers, social groups and legislations to reduce the uncertainty in the corporation. Thus, corporate governance supports the process of appointing the directors to multiple boards.

The social contract theory considers the social responsibility as a contractual obligation the corporation owes to community and society (Donaldson, 1983). Donaldson and Dunfee (1999) defined social contract theory as a way for directors and managers make ethical decision-making, and they were referred to the communities and their expectation from the business to support the local community. Deegan and Unerman (2006) found a strong relationship between the society and society members through social contracts. Also, Clark (2004) states that macro and micro social contracts should be included to manage and assist businesses in the decision-making process. Thus, corporate governance considers society as a combination of members of society and society itself.
2.4 Governance models

There are various models of governance applied across the world, each model has its different characteristics. Table I compare between two different models, namely: Anglo-Saxon Model (adopted in conventional banks) and Islamic Model (adopted in Islamic banks).

<table>
<thead>
<tr>
<th>Model</th>
<th>Anglo–Saxon</th>
<th>Islamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on</td>
<td>Market-based model</td>
<td>Stakeholder model</td>
</tr>
<tr>
<td>Purpose</td>
<td>Maximization of shareholder value by increasing profitability and efficiency (Hasan, 2008)</td>
<td>Protection of the rights of all stakeholders and not only shareholders (Iqbal and Mirakhor, 2004)</td>
</tr>
<tr>
<td>Objective</td>
<td>To set up rules and guidelines so that board members and executives work to maximize shareholder wealth</td>
<td>To guarantee that all procedures and processes are compliant with Islamic Shari’ah rules</td>
</tr>
</tbody>
</table>

Table I.

Anglo–Saxon model vs Islamic model

<table>
<thead>
<tr>
<th>Model functioning</th>
<th>Shareholders/stakeholders</th>
<th>Viewed as the “risk takers”</th>
<th>Viewed as the “risk-averse”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model functioning</td>
<td>Figure 1 (Cernat, 2004)</td>
<td></td>
<td>Figure 2 (Hasan, 2008)</td>
</tr>
</tbody>
</table>

Figure 1. Anglo–Saxon model of corporate governance

Figure 2. Islamic model of corporate governance
2.5 Governance and performance

2.5.1 Governance and operational performance. Al-Ghamdi and Rhodes (2015) found that governance practices in Saudi firms has no relationship with operational performance (ROA). In contra, Ahmed and Hamdan (2015) found that corporate governance is significantly correlated with firm performance in Bahrain. While Khamis, et al. (2015) found that there is a significant relationship between governance and return of assets (ROA) in Bahraini listed companies, Fallatah and Dickins (2012) investigates the relationship between corporate governance and firm performance in Saudi-listed companies and found that corporate governance and firm’s performance (measured as return on assets) are unrelated. In Sri Lanka, Guo and Kga (2012) found that size of board is negatively associated with the operational performance. However, In Malaysia, Fooladi and Nikzad Chaleshtori (2011) found that corporate governance negatively associated with ROA. Another Study in China adopted by Sami et al. (2011) found a positive relation between corporate governance and operational performance. Mohammed (2012) explores the effect of corporate governance on Nigerian bank’s operational performance. He found that corporate governance is associated significantly with return on assets.

2.5.2 Governance and financial performance. Ahmed and Hamdan (2015) studied the impact of corporate governance on firm’s financial performance in Bahrain listed companies. The results indicate that corporate governance is significantly correlated with return on equity (ROE). Afrifa and Tauringana (2015) provided evidence of the impact of corporate governance on the SME’s financial performance. The results show that board size has a negative impact on the ROE. In contra, Najjar (2012) found that the board size has positive significant impact on insurance firm’s performance. Al-Haddad et al. (2011) found that corporate governance is significantly added a value to the Jordanian firm. However, Gupta and Sharma (2014) found that corporate governance has limited impact on South Korean and Indian firm’s financial performance.

2.5.3 Governance and market performance. Fallatah and Dickins (2012) found that corporate governance is positively related to market performance (Tobin’s q) in Saudi firms. Moreover, Siddiqi (2014) found that the value of the firm’s performance measured by Tobin’s q is significant. Furthermore Al-Ghamdi and Rhodes (2015) found that ownership structure has a significant positive relationship with Tobin’s q. However, Al-Matari, et al. (2012) found that corporate governance is not significant to market performance.

2.5.4 Governance in Islamic banks. There is limited but growing literature on Sharia’ah governance. Hassan (2011) studied the Sharia’ah governance in different countries. He found that there are significant differences across the countries, which indicated that there are weaknesses to the existing international Sharia’ah governance requires more attention and improvement. Nathan Garas (2012) studied the conflicts of interest between the Sharia’ah board and board of directors. He concludes that the conflict of interest in the Sharia’ah board is significantly affected by the executive members. Quttainah et al. (2013) found that Sharia’ah governance are important determinants of the earning management. Grassa et al. (2010) investigated the effect of the Sharia’ah governance on financial performance. They found that there is no significant relationship between financial performance and Sharia’ah governance.

However, there is no attempt made to answer “Is there a significant difference between Islamic conventional banks in the Middle East with regard to governance practices? Therefore, this study aims empirically to determine whether the governance practices affects the bank’s performance in Islamic and conventional banks. Hence, the hypothesis is developed as follows:
H1. There is significant difference between Sharia’ah governance and corporate governance with regard to performance.

H1a. There is significant difference between Sharia’ah governance and corporate governance with regard to operational performance.

H1b. There is significant difference between Sharia’ah governance and corporate governance with regard to financial performance.

H1c. There is significant difference between Sharia’ah governance and corporate governance with regard to market performance.

3. Research methodology and descriptive

3.1 Study population, sample and resources of data

The study sample consist of banks listed on the Middle East and North Africa (MENA) countries’ stock exchange during the period from 2008–2017. The sample was selected on the basis of the following main conditions; availability of all necessary data; never been merged or delisted through the study period and their shares must have been publicly traded. This selection approach resulted in a sample of 127 listed banks out of 1270 observations. (See Table II)

3.2 The study variables

The study independent variable is index of governance (corporate governance and Sharia’ah governance) which is calculated based on the average of four dummy variables, namely; ownership of largest shareholders, size of board of directors, independency of board of directors and duality of chairman and CEO (see Table V). These principles followed by many prior studies (Buallay et al., 2017; Hamdan et al., 2017; Barros et al., 2013 and Bouaziz, 2014).

The study also used Bank’s performance measured using return on assets (ROA), return on equity (ROE) and Tobin’s q (TQ) as dependent variables (Buallay, 2017).

To complete the adopted model, we include two types of control variables that are found in the literature to influence corporate governance. These variables are:

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of banks</th>
<th>No. of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahrain</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>Egypt</td>
<td>13</td>
<td>150</td>
</tr>
<tr>
<td>Jordan</td>
<td>7</td>
<td>80</td>
</tr>
<tr>
<td>Kuwait</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>Lebanon</td>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>Oman</td>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td>Qatar</td>
<td>4</td>
<td>90</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>4</td>
<td>120</td>
</tr>
<tr>
<td>Sudan</td>
<td>7</td>
<td>110</td>
</tr>
<tr>
<td>Syria</td>
<td>6</td>
<td>70</td>
</tr>
<tr>
<td>Tunisia</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>Turkey</td>
<td>12</td>
<td>140</td>
</tr>
<tr>
<td>UAE</td>
<td>2</td>
<td>140</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>79</strong></td>
<td><strong>1,270</strong></td>
</tr>
</tbody>
</table>

Table II. Sample selection
(1) Country specific variables: gross domestic product (GDP) and public governance (GOV); and
(2) Bank specific control variables: bank age (AG) and bank size (TA).

3.3 Study model

\[ \text{perf}_{ig} = \beta_0 + \beta_1 Gindex_{ig} + \beta_2 \text{PG}_{ig} + \beta_3 \text{GDP}_{ig} + \beta_4 \text{TA}_{ig} + \beta_5 \text{AG}_{ig} + \epsilon_{ig} \]

To measure the relationship between governance and bank’s performance; the study estimates the linear model as follows:

Perf is a continuous variable; represent the dependent variables which is the banks’ performance measured using three models (ROA model, ROE model and Tobin’s q model). ROA is the ratio of net income divided by total assets of Bank (i), in the period (t), in the country (g). ROE is the ratio of net income divided by shareholder’s equity of Bank (i), in the period (t), in the country (g). Tobin’s q is the ratio of current liabilities plus market value of share capital divided by total assets of Bank (i), in the period (t), in the country (g). \( \beta 0 \) is the constant and \( \beta 1-5 \) is the slope of the independent and control variables. Gindex is a continuous variable; the independent variable is a level of corporate/Sharia’ah governance principles of Bank (i), in the period (t), in the country (g). PG is a continuous variable, the country-specific control variable, is the public governance level of the country, for the bank (i), in the period (t), in the country (g). GDP is a continuous variable, the country-specific control variable, is the Ln of GDP of the country, for bank (i), in the period (t), in the country (g). TA is a continuous variable, the bank-specific control variable, the LN of total assets of Bank (i), in the period (t), in the country (g). AG is a continuous variable, the bank-specific control variable, the number of years since the Bank was established of Bank (i), in the period (t), in the country (g). \( \epsilon \) is a random error.

3.4 Model validity

General Linear Model (GLM) was used to test the relationship between governance and performance. We, therefore, run several tests to check whether data of this study could meet the conditions of the linearity assumptions.

As presented in Table III, to secure approximation of data to normal distribution, Shapiro–Wilk parametric test were used. The null-hypothesis of these tests is that the population is normally distributed. Thus, if the \( p \)-value is less than the chosen 0.05 then the null hypothesis is rejected and there is evidence that the data are not normal. As is shown Table III, we noticed that the value for all variables was more than 0.05. This ascertains that the study data are normally distributed.

However, empirical research that uses time series, like the case of this study, presupposes stability of these series. Autocorrelation might occur in the model because time series on which this study is based on non-stationary (Gujarati and Porter, 2003). To check stationarity of time series, Unit Root test, which includes the parametric Augmented Dicky–Fuller test (ADF) was used. As is presented in Table III, we can notice that the (ADF) test is statistically significant at the level of 1 per cent which meant that the data of time series (2008-2017) was stationary.

As for the strength of the Linear Model, basically depends on the hypothesis that every variable from the independent ones is by itself independent. If this condition is not realized, the Linear Model will then be inapplicable. It can never be considered good for parameters’ evaluation. To actualize this, Collinearity Diagnostics Standard used incessant Tolerance quotient for every variable of the independent ones. Variance Inflation Factor (VIF) has to be found afterwards. This test is the standard that measures the effect of independent
<table>
<thead>
<tr>
<th>Variables</th>
<th>Labels</th>
<th>Measurements</th>
<th>Normality</th>
<th>Collinearity</th>
<th>Stationarity</th>
<th>Autocorrelation</th>
<th>Heteroscedasticity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational performance</td>
<td>ROA</td>
<td>Net income divided by total assets</td>
<td>0.221</td>
<td>−3.995</td>
<td>1.661</td>
<td>0.106</td>
<td></td>
</tr>
<tr>
<td>Financial performance</td>
<td>ROE</td>
<td>Net income divided by shareholder’s equity</td>
<td>0.195</td>
<td>−3.018</td>
<td>2.154</td>
<td>0.117</td>
<td></td>
</tr>
<tr>
<td>Market performance</td>
<td>TQ</td>
<td>The (market value of equity + book value of short-term liabilities) / book value of total assets</td>
<td>0.102</td>
<td>−5.000</td>
<td>1.843</td>
<td>0.151</td>
<td></td>
</tr>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Governance index</td>
<td>Gindex</td>
<td>Governance level (Table 5)</td>
<td>0.133</td>
<td>−3.440</td>
<td>3.661***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public governance</td>
<td>PG</td>
<td>Governance effectiveness level in the country</td>
<td>0.630</td>
<td>−2.113</td>
<td>2.118***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>GDP</td>
<td>The Ln of total consumer, investment and government spending, plus the value of exports, minus the value of imports</td>
<td>0.196</td>
<td>−5.848</td>
<td>2.665***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank-specific</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank size</td>
<td>TA</td>
<td>The Ln of total assets of the bank</td>
<td>0.178</td>
<td>−2.301</td>
<td>3.278***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank age</td>
<td>AG</td>
<td>The number of years since the company was established</td>
<td>0.491</td>
<td>−4.992</td>
<td>4.090***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Significance at: *10%, **5% and ***1% levels
variables. Gujarati and Porter (2003) stated that getting a (VIF) higher than (10) indicates that there is a Multicollinearity problem for the independent variable of concern. As presented in Table III, it can be noticed that the (VIF) values for all independent variables is less than (10) which means that we do not have any collinearity problems in the study models.

To test the Autocorrelation problem in the study models, we used Durbin–Watson (D–W) test. Table III shows that the (D–W) values of the Models are within the 1.5-2.5 range. This indicates there is no autocorrelation in this model.

Finally, one of the significant assumptions of the regression models is the presence of Heteroscedasticity. Its mean should be equal to zero. If the Heteroscedasticity is present in the model, then some statistical methods will be used to overcome this problem. As is shown in Table III, we use (Breusch–Pagan test) to test the Heteroscedasticity. The $p$-value of the three models are more than (0.05) which indicates admitting the null hypothesis; these models not suffers from actual heteroscedasticity.

4. Descriptive analysis
4.1 Variables description
In this section, we used the descriptive statistics for parametric variables and frequency for non-parametric variables to describe the study variables. Thus, we first show the difference between the variables in Islamic and conventional banks (See Table IV). Then, we calculate the corporate governance index and Sharia’ah governance index (see Table V). On the country level, we adopt cross-countries analysis to show the variation across countries (see Table VI). Finally, we adopt advanced analysis to show more advances descriptive results (see Tables VII and VIII).

The descriptive analysis of dependent variables (bank’s performance) shows that the mean of ROA and ROE are greater in Islamic banks, however, the mean value of market performance is higher in conventional banks. These differences are significant in the three performance indicators as the $p$-value of the difference $t$-test is less than 5 per cent.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Label</th>
<th>Islamic banks</th>
<th>Conventional banks</th>
<th>Difference $t$-test $(p$-value)</th>
<th>SD</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Governance index*</td>
<td>Gindex</td>
<td>83.33</td>
<td>87.60</td>
<td>0.000</td>
<td>0.363</td>
<td>92.22</td>
<td>64.81</td>
</tr>
<tr>
<td><strong>Dependent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operational performance</td>
<td>ROA</td>
<td>6.11</td>
<td>4.03</td>
<td>0.030</td>
<td>5.114</td>
<td>12.66</td>
<td>-1.22</td>
</tr>
<tr>
<td>Financial performance</td>
<td>ROE</td>
<td>10.30</td>
<td>8.88</td>
<td>0.011</td>
<td>8.046</td>
<td>24.36</td>
<td>0.00</td>
</tr>
<tr>
<td>Market performance</td>
<td>TQ</td>
<td>1.65</td>
<td>2.25</td>
<td>0.048</td>
<td>1.361</td>
<td>3.22</td>
<td>0.86</td>
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<tr>
<td><strong>Control variable</strong></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Bank-specific</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Bank size</td>
<td>TA</td>
<td>16.90</td>
<td>20.66</td>
<td>0.225</td>
<td>0.110</td>
<td>40.15</td>
<td>12.01</td>
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<tr>
<td>Bank age</td>
<td>AG</td>
<td>8.60</td>
<td>25.10</td>
<td>0.008</td>
<td>0.021</td>
<td>42.00</td>
<td>7.00</td>
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<td>Country-specific</td>
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<tr>
<td>Public governance</td>
<td>PG</td>
<td>66.33</td>
<td>64.91</td>
<td>0.125</td>
<td>2.073</td>
<td>82.00</td>
<td>58.22</td>
</tr>
<tr>
<td>GDP</td>
<td>GDP</td>
<td>12.60</td>
<td>12.11</td>
<td>0.001</td>
<td>1.001</td>
<td>15.70</td>
<td>6.33</td>
</tr>
</tbody>
</table>

*Table V shows the calculation of governance index

Table IV. Variables description
The financial performance has the most significant difference between Islamic and conventional banks. Moreover, the high standard deviation of ROE indicates significant variations of equity comparing to income among banks.
The independent variables show that conventional banks are slightly better than conventional banks in governance practices adoption. However, this difference is significant as the p-value of the difference t-test is less than 5 per cent (0.000).

More details, Table V show the frequency for the governance principles in Islamic and conventional banks; the results show that 91 per cent of conventional banks and 86 per cent of Islamic banks in Mena countries their largest shareholders are not own more than 20 per cent of a bank’s outstanding shares. This means that the largest stakeholders do not have the voting power in the Mena region bank’s which not significantly influences the strategic direction as well as the business operations of the banks. Also, this indicates that Mena banks are not controlled by certain shareholders.

One of the important governance practices is having the board of directors between seven to thirteen members. As more the members involved, the harder it becomes to take decisions. As shown in Table V, the frequency percentage for the size of board members in conventional banks (93 per cent) is widely better than Islamic banks (60 per cent). Moreover, the size of board of directors in Islamic banks has the lowest principle compared with other principles. Which means that Sharia’ah governance does not adopt strictly the size of board of director’s principle.

The third principle suggests that more than 50 per cent of total directors must be appointed as independent directors. The most important element for effective board is to have a majority of board outsider’s involvement. Having a percentage of 88 per cent of observations in Islamic banks with more than 50 per cent independent shareholders abroad is positively affects the performance and could be a possible reason for eliminating the conflict of interest. However, only 67 per cent of the conventional banks in Mena region their independent boards more than 50 per cent.

Finally, the duality takes place when the chairman of the board and CEO roles are combined; the chairman of the board is responsible for managing the board. However, the CEO is responsible for day-to-day management of the firm, including the enforcement of board decisions. Therefore, banks that have duality may have a powerful individual who has the ability to make decisions that may not maximize shareholders’ wealth. (Abbadi et al., 2016). As shown in Table V Islamic and conventional banks separating the roles of chairman and the CEO, as they have very high percentage (99 per cent and 98 per cent). The Chairman holds the most critical decisions and had the power to influence the boards; therefore, the separation between CEO and chairman role could lead to conflict of interests and hence worst performance.

4.2 Cross-country analysis
While the results provided in Table IV and V suggested evidence of differences between governance in Islamic and conventional banks, there might be important cross-country

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean difference by PG</th>
<th>Difference tests</th>
<th>Mean difference by GDP</th>
<th>Difference tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High PG</td>
<td>Low PG</td>
<td>t-Statistic</td>
<td>p-value</td>
</tr>
<tr>
<td>CG index</td>
<td>2.322</td>
<td>4.848</td>
<td>2.325</td>
<td>0.016***</td>
</tr>
<tr>
<td>SG index</td>
<td>4.846</td>
<td>5.989</td>
<td>-4.641</td>
<td>0.004***</td>
</tr>
</tbody>
</table>

Notes: The t-statistic is based on parametric test (two-independent sample t-test). The difference is significant at: *10%; **5% and ***1% levels
differences which we study in this section. We used regression model to compare the Sharia’ah governance, the corporate governance index and the performance between Mena countries.

As shown in Table VI, the Sharia’ah governance is negatively affect the operational performance (ROA) of Islamic banks in Egypt, Jordan, Oman, Sudan, Tunisia and Turkey. However, in Kuwait it was found positively affect the ROA of Islamic banks. Furthermore, the corporate governance found positively associated with conventional banks in Lebanon and Tunisia.

For the financial performance, the Sharia’ah governance is positively affected the ROE of Islamic banks in Bahrain, Oman, Saudi Arabia and Tunisia. However, in Syria it was found negatively affect the ROE of Islamic banks. Furthermore, while the corporate governance is positively associated with conventional banks in Kuwait and Emirates, it’s negatively associated with conventional banks in Syria and Tunisia.

Lastly, the market performance is positively affected by the Sharia’ah governance of Islamic banks and corporate governance of conventional banks in Bahrain, Kuwait and Syria. However, in Egypt, Jordan and Tunisia the relationship between Sharia’ah governance and TQ is negative.

4.3 Advanced analysis

4.3.1 Corporate governance and bank-specifics. In this section, we divided the governance into two categories; banks with a high level of assets and banks with low level assets (see Table VII). The study used path analysis based on the total assets median to identify the variance between the means of the two samples t-statistic test was used.

The analysis using t-statistic test showed that the corporate governance (CG) tends to be higher with banks that have less asset. However, the Sharia’ah governance (SG) found to be higher with banks that have more assets. CG and SG found to be significance in the variance between the means of the two samples because the $p$-value is less than 0.05 (0.012 and 0.003).

Further, the study used path analysis based on the bank age median to identify the variance between the means of the two samples t-statistic test was used. The analysis using t-statistic test showed that the corporate and Sharia’ah governance tends to be higher with younger banks. However, only the CG found to be significance in the variance between the means of the two samples because the $p$-value is less than 0.05 (0.006).

4.3.2 Corporate governance and country-specifics. On the country specific, we divided the governance into two categories; banks located in high public governance country and banks located in low public governance country (see Table VIII). The study used path analysis based on the public governance median to identify the variance between the means of the two samples t-statistic test was used.

The analysis using t-statistic test showed that the corporate and Sharia’ah governance tend to be higher with banks located in low public governance country. Both CG and SG found to be significance in the variance between the means of the two samples because the $p$-value is less than 0.05 (0.016 and 0.004).

Further, the study used path analysis based on the GDP median to identify the variance between the means of the two samples t-statistic test was used. The analysis using t-statistic test showed that the corporate governance tends to be higher with banks that located in low GDP countries. However, the Sharia’ah governance tends to be higher with banks that located in high GDP countries. But only CG found to be significance in the variance between the means of the two samples because the $p$-value is less than 0.05 (0.005).
5. Empirical analysis

Our study can only assume a correlation between error and independent variables of the study sample. “Hausman Test” confirmed this where a null hypothesis assumes that capabilities of fixed-effect approach (FE) and random-effects approach (RE) are same, but if a null hypothesis is accepted then this indicates that random-effect approach is appropriate, and it is therefore preferable to use Random-effect approach. As shown in Table IX, Hausman “chi-squared” is statistically significant as \( p \)-value less than 5 per cent, which mean that capabilities of Fixed-effect model (FE) is best representing the relationship, confirming our assumption that \( \varepsilon_i \) and \( X_s \) are correlated.

The results reveal that ROA, ROE and Tobin’s q regression models have high statistical significance and high explanatory power as \( p \)-value of \( F \)-test is less than 5 per cent in Islamic banks (0.000, 0.001 and 0.002) and in conventional banks (0.002, 0.002 and 0.003).

5.1 Islamic banks’ results

As shown in Table IX, the results specify that the Sharia’ah governance significantly influenced the operational (ROA) and financial performance (ROE) which is significant at 5 per cent (0.000 and 0.005) However, the Sharia’ah governance influence the market performance (TQ) of Islamic banks at 10 per cent significant level.

To clarify the results, Islamic Banks are depending on trust; hence, protecting reputation, trustiness and credibility is another performance objective for Islamic banks rather than achieving pure financial outcomes. Therefore, Islamic banks are expected not to violate moral hazard and suffer from agency problem because of Sharia’ah compliance.

Because Islamic banks provide ethical/cooperative financial services to the community they are expected to have a subsequently higher degree of Sharia’ah governance. Further, we believed that Islamic banks are followed the Sharia’ah rules which is built on the trust to protect the stakeholders rather than only investors.

For the bank specific control variables; the bank size and bank age found positively affects the ROA and ROE as the \( p \)-value more than 5 per cent. However, the bank size found negatively affect the market performance (TQ) of Islamic banks.

Finally, we tested the country specific control variables; we found that gross domestic product has positive significant effect on the ROA and ROE. However, the public governance has positive significant impact on only the market performance (TQ).

5.2 Conventional banks’ results

As shown in Table IX, the results specify that the corporate governance significantly influenced the market performance (TQ) which is significant at 5 per cent (0.000). Moreover, the corporate governance has positive effects on the financial performance (ROE). However, it’s significant at 10 per cent level.

For the bank specific control variables; the bank size and bank age found positively affects the ROA and TQ as the \( p \)-value more than 5 per cent. However, the bank size found negatively affect the financial performance (ROE) of conventional banks.

Finally, we tested the country specific control variables; we found that gross domestic product has positive significant effect on the ROA and TQ. However, the public governance has positive significant impact on only the financial performance (ROE).

5.3 Hypothesis results

Based on the results found in Table IX, we summarized the results in Table X. As shown in the table, there are differences between Sharia’ah governance and corporate governance.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Independent variables</th>
<th>Control variables</th>
<th>Country-specific</th>
<th>R2</th>
<th>Adj R2</th>
<th>F-Statistic</th>
<th>p-value</th>
<th>Hausman Test (Chi2)</th>
<th>p-value (Chi2)</th>
<th>F-Statistic</th>
<th>p-value</th>
<th>Hausman Test (Chi2)</th>
<th>p-value (Chi2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Governance index</td>
<td></td>
<td>Bank-specific</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gindex</td>
<td>0.125</td>
<td>3.154*** (0.000)</td>
<td>0.001</td>
<td>0.395</td>
<td>0.004</td>
<td>0.004</td>
<td>1.680* (0.093)</td>
<td>0.123</td>
<td>1.894*</td>
<td>0.061</td>
<td>4.804*** (0.000)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bank size</td>
<td></td>
<td>TA</td>
<td>0.009</td>
<td>2.040</td>
<td>0.038</td>
<td>0.039</td>
<td>3.623*** (0.000)</td>
<td>0.003</td>
<td>-0.406</td>
<td>-19.990*** (0.000)</td>
<td>0.005</td>
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</tr>
<tr>
<td></td>
<td>Bank age</td>
<td></td>
<td>AG</td>
<td>0.001</td>
<td>2.106</td>
<td>0.003</td>
<td>0.006</td>
<td>5.108*** (0.000)</td>
<td>0.005</td>
<td>1.730*</td>
<td>0.090</td>
<td>1.680* (0.093)</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Public governance</td>
<td></td>
<td>PG</td>
<td>-0.001</td>
<td>-0.070</td>
<td>0.000</td>
<td>0.000</td>
<td>1.931* (0.054)</td>
<td>0.016</td>
<td>2.250**</td>
<td>0.028</td>
<td>2.244** (0.025)</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>GDP</td>
<td>0.235</td>
<td>2.718*** (0.011)</td>
<td>0.300</td>
<td>2.390</td>
<td>0.038</td>
<td>0.050</td>
<td>1.822* (0.065)</td>
<td>0.052</td>
<td>1.824*</td>
<td>0.063</td>
<td>2.690** (0.015)</td>
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<tr>
<td></td>
<td>R2</td>
<td>0.323</td>
<td>0.299</td>
<td>0.227</td>
<td>0.218</td>
<td>0.398</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Adj R2</td>
<td>0.331</td>
<td>0.312</td>
<td>0.246</td>
<td>0.222</td>
<td>0.201</td>
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<tr>
<td></td>
<td>p-value</td>
<td>0.000</td>
<td>0.000</td>
<td>0.001</td>
<td>0.002</td>
<td>0.002</td>
<td>0.003</td>
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<td></td>
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<tr>
<td></td>
<td>Hausman Test (Chi2)</td>
<td>18.470</td>
<td>22.169</td>
<td>34.115</td>
<td>16.007</td>
<td>22.222</td>
<td>28.135</td>
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<td></td>
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<tr>
<td></td>
<td>p-value (Chi2)</td>
<td>0.030</td>
<td>0.001</td>
<td>0.000</td>
<td>0.040</td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Notes:** Significant level at: *10%; **5% and ***1%
with regard to operational (ROA), financial (ROE) and market (TQ) performance. Therefore, \( H1a, H1b \) and \( H1c \) are accepted.

Although findings of this research clearly discussed the differences between Sharia’ah governance and corporate governance in enhancing Mena banks’ profitability, the results of this study give us a crucial signal as a wake-up call for Islamic Banks manager to start explore and examine for the reasons of imperfect relationship between the Sharia’ah governance and the market performances (TQ). Moreover, in conventional banks the corporate governance is a driving factor behind investment decisions and stock valuation (TQ). However, the more governance adoption the less profitability in term of financial and operational.

6. Conclusion, recommendations and future research
This study considers the differences in governance level among Mena Islamic and conventional banks and investigates the relationship between Sharia’ah governance, corporate governance and bank’s operational, financial and market performance. The data collected was a pooled data from Mena listed banks during the period 2008-2017.

The descriptive analysis results on one hand showed that there are slightly difference between Islamic and conventional banks in adopting the governance practices. However, this difference is significant. On the other hand, Sharia’ah governance and corporate governance with regards to performance are very different among the countries.

The regression findings showed that Sharia’ah governance significantly influenced the operational (ROA) and financial performance (ROE). However, the results specify that the corporate governance significantly influenced the market performance (TQ).

Furthermore, the results indicate that there are differences between Sharia’ah governance and corporate governance with regard to operational (ROA), financial (ROE) and market (TQ) performance.

We suggest that Islamic banks in MENA countries to focus more on the size of boards in Sharia’ah governance as this practice is low compared with other principles. One of the important governance practices is having the board of directors between seven to thirteen members; as more the members involved, the harder it becomes to take decisions.

Moreover, we suggest that conventional banks in MENA countries to focus more on the independency of boards in adopting corporate governance as this practice is not high compared with other principles. As the independent boards could be a possible reason for eliminating the conflict of interest.

Although the findings of this research clearly discussed the differences between Sharia’ah governance and corporate governance in enhancing Mena banks’ profitability, the results of this study give us a crucial signal as a wake-up call for Islamic Banks manager to start explore and examine for the reasons of imperfect relationship between the Sharia’ah governance and the market performances (TQ). Moreover, in conventional banks the corporate governance is a driving factor behind investment decisions and stock valuation

<table>
<thead>
<tr>
<th>Performance Governance</th>
<th>ROA</th>
<th>ROE</th>
<th>TQ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SG</td>
<td>CG</td>
<td>SG</td>
</tr>
<tr>
<td>Significant level</td>
<td>positive @ 1%</td>
<td>not significant</td>
<td>positive @ 1%</td>
</tr>
<tr>
<td>Hypothesis decision</td>
<td>Accept (there is difference)</td>
<td>Accept (there is difference)</td>
<td>Accept (there is difference)</td>
</tr>
</tbody>
</table>

Table X. Hypothesis results
(TQ). However, the more governance adoption the less profitability in term of financial and operational.

In Mena countries, the laws associated with Sharia’ah and corporate governance is weak. Therefore, we recommend the bank’s regulators to pay more attention to the law associated with corporate and Sharia’ah governance and they should have a clear and mandatory law associated with corporate and Sharia’ah governance to assure more transparency in and attract more investors.

Finally, we suggest that future research has to be taken to understand the differences between corporate and Sharia’ah governance with regards to other performance indicators such as; leverage, return on income and earnings per share. Moreover, taking other governance principles on consideration such as; gender diversity, compensation and audit committee.

References


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Further reading


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External and internal determinants of performances of Shariah and non-Shariah compliant firms

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Abstract

Purpose – This study aims to provide comprehensive models that investigate the combination of both external fundamentals and internal characteristics on firm performance and if there is any difference between Shariah and non-Shariah compliant firms. The objective of this paper therefore is to analyze the significant relation between external fundamentals, internal characteristics and firm performance.

Design/methodology/approach – Panel data regression analyses are applied to determine significant results. It helps to control for unobserved factors of firm heterogeneity, which may result in spurious regression.

Findings – Most internal firm characteristics are found to be significant, but the same cannot be said for external fundamentals. Firm size is found to be very significant in driving both sets of firm performances. Financial distress in term of higher level of leverage is found to be a negative driver of non-Shariah-compliant firms’ performance in terms of return on asset but not for Shariah firms consistent with Islamic finance understanding. Shariah-compliant firms with higher liquidity tend to perform much better than less liquid firms, but the same is not found for non-Shariah-compliant ones.

Research limitations/implications – This study is limited to the industrial production sector and compares both Shariah and non-Shariah compliant firms.

Practical implications – This study adds new findings to clarify the roles of external macroeconomic fundamentals and internal characteristics determinants on firm performance. Findings from this study combine relevant information on different sets of determinants on firm performance and produce empirical evidence beneficial to both sets of Shariah and non-Shariah compliant firms in the industry.

Originality/value – This paper fulfills the need for firms to understand the external and internal environment for continuous survival and performance. It is therefore important for firms to recognize the possible factors which may influence their performance and mechanisms to sustain their performance for long-term survival.

Keywords Firm performance, Capital structure, Firm size, Macroeconomic fundamentals

Paper type Research paper

Introduction

The business world requires firms to be creative in an effort to improve their performance by creative strategies, techniques and business tools to take advantage of any opportunities that come their way. Economic growth and prosperity of a country depends on the level of economic activities within its boundaries. The higher the level of business activities, the more opportunities exist for better firm’s performance eventually leading to higher level of production and income for a country. Internationalization ensures that domestic firms find a way to contribute not only to the domestic economy but also to the global economy. Firm
performance hence symbolizes the worth of the firm and firms are forced to improve continuously in order to survive and prosper, especially in the current period of uncertainty with financial and debt crises happening in various parts of the globe. Basically, firms aim to maximize wealth and return to their shareholders in the form of accumulation of assets and value. Unpredictable economic climate during crisis results in negative responses from investors and firms that are listed in the stock exchange find it difficult to sustain their value and face difficulties in securing capital and investor’s confidence. Firms not only create employment and transfer technology and skills but also serve as a platform for firm management to acquire management and entrepreneurial skills.

An economy’s vitality is kept through a continual process of firm entry, survival and exit. According to Estrin and Prevezer (2010), Močnik (2010) and Tybout (2000), the environment is generally faced with extensive institutions changes, vibrant business climate and governmental interventions, so firms in developing and transitional economies find it very challenging to survive. There may also be differences in the performances between these two sets of firms (Ho et al., 2014). It is therefore important for firms to recognize the possible factors which may influence their performance and mechanisms to sustain their performance for long-term survival. With the rapid growth in investment in Shariah-compliant instruments and firms, it would be interesting to note if there exists any difference in the determinants of performances for both Shariah and non-Shariah compliant firms. With the stringent criteria set by the Shariah compliance boards, in terms of debt and liquidity, these firms should have lower risks and if that would have a detrimental effect on performance of firms. Differences in the determinants of performances from both sets of firms would provide significant implications on investment selection and evaluation in the long run not only for investors in general but also regulatory authorities. This study therefore aims to provide a comprehensive model that investigate the combination of both external fundamentals and internal characteristics on firm performance and if there is any difference between Shariah and non-Shariah compliant firms. The objective of this paper therefore is to analyze the significant relation between external fundamentals, internal characteristics and firm performance.

Literature review
Review of the literature provides a historical overview of existing studies in the area of research on external macroeconomic fundamentals and internal firm characteristics on firms’ performance measured by return on asset (ROA) and return on equity (ROE). Some theories in support of firm performance include Keynesian, tradeoff, pecking order and arbitrage pricing theories. According to Keynes (1930), an economic theory of total spending in the economy would affect output and inflation. Keynes hypothesis supports increase in government expenditure and lower taxes to stimulate demand and pull the global economy out of depression. Changes in aggregate demand, whether anticipated or unanticipated, have vast impact on real output. In addition, macroeconomic changes including interest rate, money supply, exchange rate and trade also affect the gross domestic product and the level of economic activities in a nation; which in turn, affect firm performance.

The major difference between Shariah and non-Shariah compliant firms is that Shariah-compliant firms must comply with Islamic ideology where every firm is screened in accordance to a set of restrictions on business activities including pork and alcohol, gambling, interest-based financial contracts, tobacco and trading of gold and silver as cash on deferred basis, pornography and weapons (Ho, 2015). In addition, the financial screen restricts the level of liquidity and debt ratios of Shariah-compliant firms. It is believed that these restrictions indirectly reduce the business and financial risks of Shariah-compliant firms and therefore render them different from
Higher profitability decreases the expected costs of distress; therefore, according to the tradeoff theory, firms should prefer debt financing because of the tax benefit. Firms can generally borrow up to the point where the tax benefit from an extra dollar in debt is exactly equal to the additional cost that comes from the increased probability of financial distress. On the other hand, the pecking order theory maintains that businesses adhere to a hierarchy of financing sources and prefer internal financing when available, and debt is only preferred over equity if external financing is required. Pecking order theory starts with asymmetric information as managers know more about their firm’s prospects, risks and value than outside investors. Asymmetric information affects the choice between internal and external financing and between the issue of debt or equity. Thus, there exists a pecking order for the financing of new projects (Myers and Majluf, 1984). Ross (1976) stated that there are many sources of risks in the economy that affect sensitivity of an asset’s return and cannot be removed through diversification according to the arbitrage pricing theories. In addition to wider economic factors, other factors also play an important role in affecting returns. This theory therefore incorporates all the other variables that can affect firm performance.

A firm’s performance is measured by profitability, and it is defined in term of traditional financial ratios including ROA and ROE. These are the two proportions usually applied to describe firm profitability: the ROE and the ROA. ROA indicates how effective a firm manages its assets to generate income. It also indicates income earned on each unit of asset. Cliff and Willy (2014) investigated the effects of macroeconomic fluctuations on financial performance of listed manufacturing firms in Kenya and found evidence that foreign exchange, interest rate and inflation rate have significant effects on the performance of the firms in the construction and manufacturing sectors. Lee (2014) used panel data for the period from 1999 to 2009 and tested the effects of firm specific and macroeconomic factors on profitability of property-liability insurance industry in Taiwan. Underwriting risk, reinsurance usage, input cost and economic growth are found to be positively significant whereas interest rate and financial leverage are found to have negative significant influence on profitability. Another study between inflation and stock returns in BRICS by Tripathi and Kumar (2014) found significant negative relationship between stock index and inflation rate in Russia but positive relationship in India and China.

Umer and Alam (2013) used co-integration technique and claimed that trade openness has negative long-run relationship with industrial sector growth in Pakistan. While Asongu (2010) did not find any significant relation between trade openness and firm’s return. Similar to Maysami and Koh (2000) on Singapore, interest rate is found to be positive and highly significant in affecting returns in Pakistan according to Zulfiqar and Din (2015). Qudah and Jaradat (2013) and Obeidat et al. (2013) also found that growth of money supply has a positive significant impact on Jordanian Islamic banks’ profitability. Banks’ equity returns is found to be negatively related to changes in foreign currency value by Gounopoulos et al. (2013) while Simiu and Ngile (2015) noted that exchange rate is positively significant in affecting the profitability of listed commercial banks in the Nairobi Securities Exchange.

Literature on internal firms’ characteristics also provided mixed results. Firm size has been recognized as an essential variable in explaining organizational profitability and studies have explored the effects of firm size on profitability with mostly inconsistent and controversial results. John and Adebayo (2013) employed panel data model on Nigerian
manufacturing sector and found that firm size has a positive effect on the firm profitability, similar to Pervan and Višić (2012). Nevertheless, Niresh and Thirunavukkarasu (2014) focused on the effects of firm size on profitability of quoted manufacturing firms in Sri Lanka with inconclusive results.

Khalilq et al. (2014), Yen and Hiep (2014) and Khurshid (2013) concluded that financially distressed enterprises have a highly leveraged capital structure with low liquidity and profitability. It is also confirmed by Yusuf et al. (2014) that the negative relationship implies the inability of Malaysian firms to meet their financial obligations resulting in inferior financial performance.

Another study on the chemical sector in Pakistan from 2001 to 2009 found that liquidity has significant positive effect on ROA (Khidmat and Rehman, 2014). If liquidity rate is improved, ROA would also increase and vice versa. This is also confirmed by Rafiq (2016) where current ratio, quick ratio, and net-working capital are used as proxies for liquidity and concluded that liquidity has positive significant relation with performance. In contrast, Eljelly (2004) and Priya and Nimalathasan (2013) found negative relationship between liquidity management and profitability. Contrary to Rahimian et al. (2012), Robson and Bennett (2000) and Serrasqueiro (2009) concluded that the relation between company growth and profitability is positive and statistically significant.

Ahmad et al. (2012) confirmed the effect of debt on firms’ performance and found that only ROA has positive significant relation with short-term debt and total debt, while ROE has no significant relation with all capital structure indicators. On the other hand, Pratheepkanth (2011) analyzed the impact of capital structure on financial performance in Sri Lanka and found that the relationship is negative (Shubita and Alsawalhah, 2012). Hasan et al. (2013) found that operating efficiency ratio negatively affects returns. Management expense, leverage and liquidity appear to be important forces affecting returns in Argentina according to Doyran (2013).

Working capital management also plays a significant role in improving profitability of firms. Makori and Jagongo (2013) used time series data in Kenya and found negative relationship between profitability and number of day’s accounts receivable and cash conversion cycle, but positive relationship between profitability and number of days of inventory and number of days’ payable. In addition, Ogundipe et al. (2012) also found significant negative relationship between cash conversion cycle and market valuation of firm’s performance. From the summary of literature in this area, it can be concluded that the majority of studies are on conventional firms and there is a lack of evidence for firms’ performance determinants of Shariah-compliant firms. In addition, results are mixed with little evidence for determinants of firms’ performance especially on both types of firms in a comprehensive manner. This study thus focuses on a comprehensive model of external macroeconomic and internal firm characteristics determinants of firms’ performance.

**Data and method**

This study analyses performances of both Shariah-compliant and non-Shariah-compliant firms in the Industrial Product sector in Malaysia. There is a total of 243 such firms listed on Bursa Malaysia consisting of 194 Shariah-compliant firms and 49 non-Shariah-compliant firms. Annual data from 1999 to 2015 is collected from Bursa Malaysia and the final sample due to data availability for the entire period is 51 Shariah-compliant and 18 non-Shariah-compliant firms as shown in Table I. The application of the expression “Shariah-compliant” is to convey full compliance with Islamic jurisprudence in financial transactions. Generally, adhering to Shariah principles or staying Shariah-compliant means conceeding strictly to the permissible (halal) and
### Table I.
List of Shariah- and non-Shariah-compliant firms

<table>
<thead>
<tr>
<th>No.</th>
<th>Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Advanced packaging technology (M) BHD</td>
</tr>
<tr>
<td>2</td>
<td>Aluminium company of Malaysia Bhd</td>
</tr>
<tr>
<td>3</td>
<td>Anzo Holdings Bhd</td>
</tr>
<tr>
<td>4</td>
<td>APM Automotive Holdings Bhd</td>
</tr>
<tr>
<td>5</td>
<td>Astral Supreme Bhd</td>
</tr>
<tr>
<td>6</td>
<td>B.I.G. Industries Bhd</td>
</tr>
<tr>
<td>7</td>
<td>Boustead Heavy Industries Corporation Bhd</td>
</tr>
<tr>
<td>8</td>
<td>Box-Pak (Malaysia) Bhd</td>
</tr>
<tr>
<td>9</td>
<td>CB Industrial Product</td>
</tr>
<tr>
<td>10</td>
<td>Central Industrial Corporation Bhd</td>
</tr>
<tr>
<td>11</td>
<td>Chemical Company of Malaysia Bhd</td>
</tr>
<tr>
<td>12</td>
<td>Choo Bee Metal Industries Bhd</td>
</tr>
<tr>
<td>13</td>
<td>CME Group Bhd</td>
</tr>
<tr>
<td>14</td>
<td>CN Asia Corporation Bhd</td>
</tr>
<tr>
<td>15</td>
<td>Concrete Engineering Products Bhd</td>
</tr>
<tr>
<td>16</td>
<td>Daibochi Plastic and Packaging Industry Bhd</td>
</tr>
<tr>
<td>17</td>
<td>EP Manufacturing Bhd</td>
</tr>
<tr>
<td>18</td>
<td>Golden Pharos Bhd</td>
</tr>
<tr>
<td>19</td>
<td>HO Wah Genting Bhd</td>
</tr>
<tr>
<td>20</td>
<td>Ideal United Bintang Bhd</td>
</tr>
<tr>
<td>21</td>
<td>Kia Lim Bhd</td>
</tr>
<tr>
<td>22</td>
<td>Kian Joo Can Factory Bhd</td>
</tr>
<tr>
<td>23</td>
<td>Kim Hin Industry Bhd</td>
</tr>
<tr>
<td>24</td>
<td>KKB Engineering Bhd</td>
</tr>
<tr>
<td>25</td>
<td>Kossan Rubber Industries Bhd</td>
</tr>
<tr>
<td>26</td>
<td>Kumpulan H and L High-Tech Bhd</td>
</tr>
<tr>
<td>27</td>
<td>KYM Holdings Bhd</td>
</tr>
<tr>
<td>28</td>
<td>Lafarge Malaysia Bhd</td>
</tr>
<tr>
<td>29</td>
<td>Lysaght Galvanized</td>
</tr>
<tr>
<td>30</td>
<td>Master-Pack Group Bhd</td>
</tr>
<tr>
<td>31</td>
<td>Mercury Industries Bhd</td>
</tr>
<tr>
<td>32</td>
<td>Mieco Chipboard Bhd</td>
</tr>
<tr>
<td>33</td>
<td>Minho (M) Bhd</td>
</tr>
<tr>
<td>34</td>
<td>Muda Holdings Bhd</td>
</tr>
<tr>
<td>35</td>
<td>Nylex (M) Bhd</td>
</tr>
<tr>
<td>36</td>
<td>Pne Pcb Bhd</td>
</tr>
<tr>
<td>37</td>
<td>Press Metal Bhd</td>
</tr>
<tr>
<td>38</td>
<td>Prestar Resources Bhd</td>
</tr>
<tr>
<td>39</td>
<td>Public Packages Holdings Bhd</td>
</tr>
<tr>
<td>40</td>
<td>Ralco Corporation Bhd</td>
</tr>
<tr>
<td>41</td>
<td>Rubberex Corporation (M) Bhd</td>
</tr>
<tr>
<td>42</td>
<td>Seacera Group Bhd</td>
</tr>
<tr>
<td>43</td>
<td>Subur Tiasa Holdings Bhd</td>
</tr>
<tr>
<td>44</td>
<td>Timberwell Bhd</td>
</tr>
<tr>
<td>45</td>
<td>Tomypak Holdings Bhd</td>
</tr>
<tr>
<td>46</td>
<td>Tong Herr Resources Bhd</td>
</tr>
<tr>
<td>47</td>
<td>Watta Holding Bhd</td>
</tr>
<tr>
<td>48</td>
<td>Wong Engineering Corporation Bhd</td>
</tr>
<tr>
<td>49</td>
<td>Woodlandor Holdings Bhd</td>
</tr>
<tr>
<td>50</td>
<td>WTK Holdings Bhd</td>
</tr>
<tr>
<td>51</td>
<td>YKGI Holdings Bhd</td>
</tr>
</tbody>
</table>

(continued)
abstaining from the forbidden (haram) activities as commanded by the Islamic faith. In practice, Shariah principles infer the divine rules of forbidding interest (riba), ambiguities (gharar), gambling (maysir) and impure commodities such as intoxicants and pork (Ho, 2015). This method of aligning Shariah principles to the main and fundamental legal rulings concerning business and financial transactions is both pragmatic and sensible (Rosly, 2010). This study therefore aims to investigate the external fundamental and internal firm specific characteristics' effects on Shariah and non-Shariah compliant firms' performance.

The data series for ROA, ROE, external macroeconomic fundamentals and internal firms' characteristics are sourced from Bursa Malaysia, International Financial Statistics of the International Monetary Fund (IMF) and the Osiris database. Table II provides the details of the variables.

The changes in the variables are computed as a measure of the respective ratios or transformed factors in order to avoid spurious analysis of results. Panel data regression analyses are applied in order to determine significant results. Panel data controls for unobserved heterogeneity of firms by including firm characteristic effects, which may be random or fixed (Hsiao, 2014). The fixed effect panel model allows the intercept to differ from firm to firm by including firm characteristic constant term in the regression model. It helps to control for unobserved factors of firm heterogeneity, which may result in variables of interest to be spuriously related in the regression (Greene, 2003). This method uses generalized least square for estimation purpose. The three models investigated in the study include Model 1 on external macroeconomic fundamentals, Model 2 on internal firm characteristics and an overall Model 3 on both external and internal determinants on Shariah- and non-Shariah-compliant firm performance.

Model 1: external macroeconomic fundamentals:

\[
FP_{it} = \alpha_0 + b_1 \Delta INF_{it} + b_2 \Delta TO_{it} + b_3 \Delta IR_{it} + b_4 \Delta ER_{it} + \Delta MS_{it} + b_6 \Delta GDP_{it} + \epsilon_t
\]
Model 2: internal firm characteristics:

\[ FP_{it} = c_0 + d_1 \Delta FSz_{it} + d_2 \Delta FDis_{it} + d_3 \Delta GO_{it} + d_4 \Delta LQ_{it} + d_5 \Delta CS_{it} + d_6 \Delta WC_{it} + f_t \]

Model 3: overall model:

\[ FP_{it} = g_0 + h_1 \Delta INF_{it} + h_2 \Delta TO_{it} + h_3 \Delta IR_{it} + h_4 \Delta ER_{it} + h_5 \Delta MS_{it} + h_6 \Delta GDP_{it} + h_7 \Delta FSz_{it} + h_8 \Delta FDis_{it} + h_9 \Delta GO_{it} + h_{10} \Delta LQ_{it} + h_{11} \Delta CS_{it} + h_{12} \Delta WC_{it} + i_t \]

\( i: = \text{Firm} \)
\( t: = \text{Time period} \)

Panel unit root tests were carried out to check time series stationarity for the two sets of firms. Panel results are shown in Tables III and IV. All the time series are transformed to ensure there is no unit-root problem and that all the time series used in the tests are stationary.

Findings

The findings for external macroeconomic fundamentals and internal firm characteristics’ effects on ROA are presented in Table V. The result for Shariah-compliant firms in Model 1 is listed in column A, Model 2 is listed in column B and Model 3 is listed in column C. The result for non-Shariah-compliant firms in column D represents Model 1, column E represents Model 2, and column F represents Model 3.

Model 1: external fundamentals effects on return on asset

The effects of external factors on ROA for Shariah and non-Shariah compliant firms are presented in panel A and D. It is interesting to note that interest rate is found to be positively significant for Shariah-compliant firms where higher interest rate would result in higher ROA for this set of firms. In Malaysia, interest rate is usually applied in conventional
finance whereas profit rate is applied in Islamic finance. Whenever the central bank announced an increase in overnight policy rate, it affects both the conventional and Islamic financial system. Evidence provided tends to indicate that the Islamic financial market indirectly bases their profit rates on the current market rate. Therefore, market interest rate is significant in affecting firm performance. This finding is consistent with the study conducted by Zulfiqar and Din (2015).

Trade openness has positive significant relation with ROA for non-Shariah-compliant firms in panel D. Liberalization has resulted in little friction between country boundaries and firms can seek markets worldwide. When markets are more opened in term of trade, firms can transact businesses across a larger market enabling them to improve firm

<table>
<thead>
<tr>
<th>Panel unit root tests</th>
<th>Levin, Lin and Chu t*</th>
<th>Im, Pesaran and Shin W-stat</th>
<th>ADF –Fisher Chi-square</th>
<th>PP – Fisher Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>-10.9395***</td>
<td>-7.04712***</td>
<td>216.133***</td>
<td>258.637***</td>
</tr>
<tr>
<td>ROE</td>
<td>-12.0463***</td>
<td>-7.88893***</td>
<td>230.954***</td>
<td>243.372***</td>
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<tr>
<td>INF</td>
<td>-27.5951***</td>
<td>-18.91277***</td>
<td>486.429***</td>
<td>486.429***</td>
</tr>
<tr>
<td>TO</td>
<td>-31.11316***</td>
<td>-7.76046***</td>
<td>214.325***</td>
<td>331.288***</td>
</tr>
<tr>
<td>IR</td>
<td>-8.43027***</td>
<td>-7.26031***</td>
<td>213.089***</td>
<td>171.967***</td>
</tr>
<tr>
<td>ER</td>
<td>-16.96888***</td>
<td>-11.13069***</td>
<td>294.735***</td>
<td>285.919***</td>
</tr>
<tr>
<td>MS</td>
<td>-14.0987***</td>
<td>-10.36311***</td>
<td>275.536***</td>
<td>266.756***</td>
</tr>
<tr>
<td>FSz</td>
<td>-8.97164***</td>
<td>-3.402011***</td>
<td>204.468***</td>
<td>206.085***</td>
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<tr>
<td>FDIs</td>
<td>-6.95506***</td>
<td>-5.28947***</td>
<td>195.016***</td>
<td>200.269***</td>
</tr>
<tr>
<td>GO</td>
<td>-8.99223***</td>
<td>-5.06262***</td>
<td>193.750***</td>
<td>214.899***</td>
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<tr>
<td>LQ</td>
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<td>-19.62200***</td>
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<td>604.665***</td>
</tr>
<tr>
<td>CS</td>
<td>-4.47421***</td>
<td>-3.26089***</td>
<td>172.640***</td>
<td>184.154***</td>
</tr>
<tr>
<td>WC</td>
<td>-17.4175***</td>
<td>-12.85414***</td>
<td>345.160***</td>
<td>398.289***</td>
</tr>
</tbody>
</table>

Notes: ***Significant at 1 per cent; **significant at 5 per cent; *significant at 10 per cent

Table III. Panel unit root test results for Shariah-compliant firms

<table>
<thead>
<tr>
<th>Panel unit root tests</th>
<th>Levin, Lin and Chu t*</th>
<th>Im, Pesaran and Shin W-stat</th>
<th>ADF –Fisher Chi-square</th>
<th>PP – Fisher Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
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<td>-4.83666***</td>
<td>83.5797***</td>
<td>81.8958***</td>
</tr>
<tr>
<td>ROE</td>
<td>-5.27797***</td>
<td>-3.94757***</td>
<td>76.3562***</td>
<td>80.9950***</td>
</tr>
<tr>
<td>INF</td>
<td>-16.39398***</td>
<td>-11.23588***</td>
<td>171.681***</td>
<td>171.681***</td>
</tr>
<tr>
<td>TO</td>
<td>-1.84949**</td>
<td>-4.61040***</td>
<td>75.6440***</td>
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</tr>
<tr>
<td>IR</td>
<td>-13.66966***</td>
<td>-8.80196***</td>
<td>135.195***</td>
<td>155.048***</td>
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<td>-10.0810***</td>
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<td>-10.0810***</td>
<td>-10.0810***</td>
</tr>
<tr>
<td>MS</td>
<td>-8.37585***</td>
<td>-6.15666***</td>
<td>97.2479***</td>
<td>94.1493***</td>
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<tr>
<td>GDP</td>
<td>-14.57122***</td>
<td>-5.72636***</td>
<td>92.1612***</td>
<td>79.4666***</td>
</tr>
<tr>
<td>FSz</td>
<td>-9.51447***</td>
<td>-7.77395***</td>
<td>131.874***</td>
<td>211.111***</td>
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<td>FDIs</td>
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<td>-7.44626***</td>
<td>123.157***</td>
<td>150.241***</td>
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<td>-2.75637***</td>
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<td>78.4172***</td>
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<td>63.2991***</td>
<td>57.3566***</td>
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<td>CS</td>
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<td>118.975***</td>
<td>135.692***</td>
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<td>WC</td>
<td>-11.8223***</td>
<td>-9.00866***</td>
<td>141.858***</td>
<td>188.474***</td>
</tr>
</tbody>
</table>

Notes: ***Significant at 1 per cent; **significant at 5 per cent; *significant at 10 per cent

Table IV. Panel unit root test results for non-Shariah-compliant firms
## Table V.
Panel data analysis findings for ROA

<table>
<thead>
<tr>
<th>PANEL</th>
<th>ROA</th>
<th>Shariah-compliant firms</th>
<th></th>
<th>Non-Shariah-compliant firms</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>INF</td>
<td>-2.398426 (0.4275)</td>
<td>0.779659 (0.1405)</td>
<td>-0.809448 (0.1957)</td>
<td>-0.444061 (0.4189)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TO</td>
<td>-0.354555 (0.1560)</td>
<td>-0.918136 (0.9143)</td>
<td>27.05820 (0.0643)*</td>
<td>0.039133 (0.5780)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IR</td>
<td>14.73362 (0.0478)**</td>
<td>-0.828094 (0.3618)</td>
<td>1.14637 (0.5048)</td>
<td>-0.325416 (0.8626)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td>17.47727 (0.1455)</td>
<td>-1.629433 (0.4353)</td>
<td>4.284551 (0.7100)</td>
<td>13.71527 (0.2724)</td>
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<tr>
<td>MS</td>
<td>1.484440 (0.6792)</td>
<td>-0.805324 (0.1993)</td>
<td>-0.127353 (0.5786)</td>
<td>-0.053306 (0.7869)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-112.4360 (0.4615)</td>
<td>-24.50550 (0.3576)</td>
<td>-37.55315 (0.5174)</td>
<td>-15.13950 (0.7599)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSz</td>
<td>0.002460 (0.0009)***</td>
<td>0.007109 (0.0000)***</td>
<td>0.005485 (0.0000)***</td>
<td>1.467625 (0.0068)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FDis</td>
<td>-0.551515 (0.1254)</td>
<td>-0.158470 (0.6338)</td>
<td>-14.69116 (0.0019)***</td>
<td>-18.21227 (0.0543)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GO</td>
<td>0.728997 (0.0464)**</td>
<td>0.811322 (0.0844)*</td>
<td>0.372108 (0.0580)*</td>
<td>0.204642 (0.5723)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LQ</td>
<td>1.521810 (0.0000)***</td>
<td>2.736110 (0.0000)***</td>
<td>0.307639 (0.1615)</td>
<td>0.629251 (0.0376)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>0.002535 (0.4640)</td>
<td>0.012381 (0.0515)*</td>
<td>0.014871 (0.0330)***</td>
<td>-0.002547 (0.7274)</td>
<td></td>
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</tr>
<tr>
<td>WC</td>
<td>0.030632 (0.3199)</td>
<td>0.066821 (0.1194)</td>
<td>0.053458 (0.5636)</td>
<td>0.018641 (0.0000)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-4.863889 (0.1458)</td>
<td>1.804674 (0.0000)***</td>
<td>1.142064 (0.1811)</td>
<td>0.323257 (0.7206)</td>
<td>0.265007 (0.5904)</td>
<td>-0.600320 (0.5075)</td>
</tr>
<tr>
<td>Adjusted R Squared</td>
<td>0.006240</td>
<td>0.533846</td>
<td>0.233724</td>
<td>0.115737</td>
<td>0.462464</td>
<td>0.142894</td>
</tr>
<tr>
<td>Prob (F-Statistic)</td>
<td>0.096447*</td>
<td>0.000000***</td>
<td>0.000000***</td>
<td>0.000000***</td>
<td>0.000000***</td>
<td>0.000000***</td>
</tr>
</tbody>
</table>

**Notes:** Numbers in parentheses are *p*-values where ***significant at 1 per cent; **significant at 5 per cent; *significant at 10 per cent.
performance. The results are supported by Wong (2007) who also found positive significant effect of trade openness on the productivity of manufacturing industries. Results confirm that non-Shariah-compliant firms are more affected by external competition than Shariah-compliant firms. The F-statistics in Model 1 for Shariah-compliant firms is found to be marginally significant but the results for non-Shariah-compliant firms confirm that there is a significant relationship between external factors and ROA.

**Model 2: internal characteristics effects on return on asset**

The effects of internal firm characteristics on ROA for Shariah and non-Shariah compliant firms are presented in panel B and E. Firm size and growth opportunity have positive relation with ROA for the both sets of firms. As size of firms and growth opportunity increases, there would also be an improvement in firm performance. This result is similar with Doğan (2013) who claimed that there is direct movement between firm size and ROA. In addition, growth opportunity and higher share prices reflect the level of confidence investors have on these firms, further strengthening performance. This finding is also similar to Serrasqueiro (2009) where higher growth opportunity corresponds to higher profitability for Portuguese companies.

The findings confirm that firm financial distress has significant negative relation with firm performance especially for non-Shariah-compliant firms as specified in panel E. The results show that a higher level of leverage implies a higher probability of financial distress, deteriorating firms’ performance, similar to Tan (2012). Financial distress is not found to be significant for Shariah-compliant firms and this may be due to controlled leverage level being one of the important criteria in financial screens.

This study also found that liquidity is an influential factor in determining ROA for Shariah-compliant firms. This positive relationship indicates that more liquid assets constitutes to better performance for Shariah-compliant firms which is in line with Rafiq (2016). It is interesting to note that liquidity which is one of the financial screens has significant relation with performance when Shariah-compliant firms are not allowed to hold excessive liquid assets.

Similarly, capital structure is found to significantly affect performance in a positive manner for non-Shariah-compliant firms. Firms with long-term investment opportunity are therefore expected to achieve better performance in the long run. Ahmad *et al.* (2012) also found that capital structure is directly related to profitability of consumer and industrial sectors firms. The F-statistics for Model 2 is found to be significant and confirm that there is significant relationship between internal firm characteristics and ROA for both sets of firms. The adjusted R-squared in Model 2 indicates that this model can explain 53.38 per cent and 46.25 per cent of changes in ROA for Shariah and non-Shariah compliant firms, respectively.

**Model 3: overall model for return on asset**

The results for the overall Model 3 on ROA for Shariah and non-Shariah compliant firms are listed in panel C and F in Table V. The external macroeconomic factors are not found to be significant in Model 3. The result is expected and similar to Model 1. This confirms that external factors are not very crucial in influencing industrial sector’s firm performance. The results for internal firm characteristic factors on the other hand yield remarkably consistent estimates where the majority of these factors are found to be significant in this overall model. Firm size is consistently significant for both Shariah and non-Shariah compliant firms where the larger the firm, the better the performance. In addition, growth opportunity,
liquidity and capital structure are also consistently significant in affecting performance of Shariah-compliant firms.

For non-Shariah-compliant firms, financial distress, liquidity, and working capital are found to significantly affect performance. Positive relationship between working capital and performance means that as firms’ working capital especially sales increases, the performance of firms also improves. This positive effect is consistent with the results obtained by Chhapra and Naqvi (2010). The F-statistics in Model 3 are found to be significant and confirm that there is a significant relationship between external, internal characteristics and ROA for both sets of firms. The adjusted R-squared in Model 3 indicates that this model can explain 23.37 per cent and 14.29 per cent of changes in ROA for Shariah and non-Shariah compliant firms, respectively. Multicollinearity issue has also been investigated and there is no multicollinearity problem for the sets of data series with low VIF (results are available upon request).

The results for external macroeconomic fundamentals and internal firm characteristics effects on ROE are presented in Table VI. Relative to ROA, the results are not as significant for ROE invested rather than profit from asset investment.

**Model 1: external fundamentals effects on return on equity**
The effects of external macroeconomic factors on ROE for Shariah and non-Shariah compliant firms are presented in panel A and D. Interest rate continues to be significant in affecting performance of Shariah-compliant firms and the finding is consistent for both measures of performance. Trade openness is positively significant in driving ROE for non-Shariah-compliant firms but has marginally negative relation with ROE for Shariah-compliant firms. Umer and Alam (2013) provided similar results for Shariah-compliant firms where trade openness has negative long-run relationship with Pakistan’s industrial sector growth. However, for non-Shariah-compliant firms, the results are in line with Wong (2007) who claimed that there is direct movement between trade openness and ROE in the manufacturing industries.

Exchange rate is found to be marginally significantly related to ROE in a negative manner for Shariah-compliant firms. This is expected because a rise in price of foreign currency would reduce productivity of domestic goods in the industrial product sector. This finding is consistent with Bassey et al. (2015) where the performances of firms in Nigeria are impacted by foreign exchange movements.

**Model 2: internal characteristics effects on return on equity**
The effects of internal firm characteristics on ROE for Shariah and non-Shariah compliant firms are presented in panel B and E of Table VI. This study found that financial distress plays a vital role in determining ROE, as it is consistently significant in both performance measurement models. The negative relationship shows that the higher the inability of firms to meet their financial obligations, the lower the firms’ financial performance and the finding is similar to Yusuf et al. (2014). Firm size is however found to be positively significant for Shariah-compliant firms only. If the size of firm is large, the profitability of the firm would rise. Possible reasons for such a size-profit behavior could be due to the market power, economies of scale and market experience. This result is parallel to Pervan and Višić (2012). The findings also confirmed that capital structure is found to be positively significant for Shariah-compliant firms which are specified in panel B where firms with higher capital structure and thus investment opportunity corresponds to the higher profitability. This positive effect of capital structure on ROE is consistent with the study conducted by Ebrati et al. (2013).
<table>
<thead>
<tr>
<th>ROE</th>
<th>Panel A</th>
<th>Panel B</th>
<th>Panel C</th>
<th>Panel D</th>
<th>Panel E</th>
<th>Panel F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
<td>Model 1</td>
<td>Model 2</td>
<td>Model 3</td>
</tr>
<tr>
<td>INF</td>
<td>-0.215106 (0.7929)</td>
<td>-1.257282 (0.7929)</td>
<td>-0.230160 (0.9188)</td>
<td>1.257282 (0.0704)*</td>
<td>-0.528321 (0.8300)</td>
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</tr>
<tr>
<td>TO</td>
<td>-41.39533 (0.0480)**</td>
<td>-27.62588 (0.1444)</td>
<td>109.3746 (0.0632)***</td>
<td>109.3746 (0.0032)***</td>
<td>91.05499 (0.0176)**</td>
<td></td>
</tr>
<tr>
<td>IR</td>
<td>2.98404 (0.2796)</td>
<td>15.99694 (0.0397)**</td>
<td>-5.135888 (0.1471)</td>
<td>1.257282 (0.0704)*</td>
<td>-7.069701 (0.0742)*</td>
<td></td>
</tr>
<tr>
<td>ER</td>
<td>-8.750663 (0.0953)*</td>
<td>4.616888 (0.4135)</td>
<td>-19.55699 (0.4972)</td>
<td>4.616888 (0.4135)</td>
<td>-16.89787 (0.5974)</td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>2.455224 (0.1542)</td>
<td>1.226169 (0.4265)</td>
<td>-3.719950 (0.1841)</td>
<td>1.226169 (0.4265)</td>
<td>-0.110587 (0.8157)</td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>-89.49473 (0.2379)</td>
<td>-131.4000 (0.0282)**</td>
<td>-73.29758 (0.5549)</td>
<td>-131.4000 (0.0282)**</td>
<td>-10.58013 (0.9346)</td>
<td></td>
</tr>
<tr>
<td>FSz</td>
<td>0.004366 (0.0002)***</td>
<td>0.011586 (0.0848)*</td>
<td>0.005225 (0.3678)</td>
<td>0.011586 (0.0848)*</td>
<td>2.01026 (0.1561)</td>
<td></td>
</tr>
<tr>
<td>FDhs</td>
<td>-2.313817 (0.0399)**</td>
<td>-0.863852 (0.2541)</td>
<td>-5.442410 (0.0369)**</td>
<td>-5.442410 (0.0369)**</td>
<td>-64.32199 (0.0112)**</td>
<td></td>
</tr>
<tr>
<td>GO</td>
<td>-0.711203 (0.2920)</td>
<td>-5.504825 (0.0099)***</td>
<td>-2.07008 (0.0030)***</td>
<td>-2.07008 (0.0030)***</td>
<td>0.178154 (0.5124)</td>
<td></td>
</tr>
<tr>
<td>LQ</td>
<td>0.097687 (0.8127)</td>
<td>-1.210818 (0.0151)**</td>
<td>1.433328 (0.0587)*</td>
<td>-1.210818 (0.0151)**</td>
<td>1.72226 (0.2030)</td>
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<tr>
<td>CS</td>
<td>0.013037 (0.0210)**</td>
<td>0.054833 (0.0001)***</td>
<td>0.012936 (0.4800)</td>
<td>0.054833 (0.0001)***</td>
<td>0.037288 (0.0530)*</td>
<td></td>
</tr>
<tr>
<td>WC</td>
<td>-0.011312 (0.7933)</td>
<td>0.077202 (0.4209)</td>
<td>0.049204 (0.0000)***</td>
<td>0.077202 (0.4209)</td>
<td>0.205743 (0.4631)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-3.230853 (0.0154)**</td>
<td>0.887780 (0.0025)***</td>
<td>-2.062409 (0.1608)</td>
<td>0.887780 (0.0025)***</td>
<td>2.930234 (0.2321)</td>
<td></td>
</tr>
<tr>
<td>Adjusted</td>
<td>0.131892</td>
<td>0.506409</td>
<td>0.064028</td>
<td>0.064028</td>
<td>0.014828</td>
<td>0.014828</td>
</tr>
<tr>
<td>R Squared</td>
<td>0.131892</td>
<td>0.506409</td>
<td>0.064028</td>
<td>0.064028</td>
<td>0.014828</td>
<td>0.014828</td>
</tr>
<tr>
<td>Prob (F-Statistic)</td>
<td>0.00000***</td>
<td>0.00000***</td>
<td>0.00000***</td>
<td>0.00000***</td>
<td>0.00000***</td>
<td>0.00000***</td>
</tr>
</tbody>
</table>

Notes: Numbers in parentheses are p-values where; ***significant at 1 per cent; **significant at 5 per cent; *significant at 10 per cent.
This study also found growth opportunity being an influential factor in determining ROE for non-Shariah firms. This negative relationship indicates that firms may show growth but growth expectation has a detrimental effect on profitability. The result is similar to Jang and Park (2011) where growth opportunity has a negative effect on the current year profitability in the restaurant industry. Liquidity is also found to be positively significant for non-Shariah-compliant firms where firms holding more liquid assets benefit from superior perception in funding projects, reducing their financing costs and increasing profitability. The finding is consistent with the study conducted by Larney et al. (2013).

The positive significant effect of the working capital on profitability for non-Shariah firms shows that Malaysian industrial product sector can maximize the wealth of shareholders by shortening the cash conversion cycle and net trading cycle. This finding is parallel with the findings by Kadduni and Ramadhan (2012). The F-statistics for Model 2 are found to be significant and confirms that there is a significant relationship between firm characteristics and ROE for both sets of firms. The adjusted $R^2$-squared in Model 2 indicates that this model can explain 50.64 per cent and 14.83 per cent of changes in ROE of Shariah and non-Shariah compliant firms, respectively.

**Model 3: overall model for return on equity**

The results for the internal and external effects on ROE in the overall Model 3 for Shariah and non-Shariah compliant firms are in panel C and F. For the set of external macroeconomic factors for Shariah-compliant firms: inflation, interest rate, and gross domestic product are found to be significant. Meanwhile, only trade openness and interest rate are found to be significant for non-Shariah-compliant firms. Inflation rate is only found to be marginally negatively significant for Shariah-compliant firms where higher inflation results in lower rate of ROE and vice versa. This finding is consistent with the study conducted by Kanwal and Nadeem (2013). Findings also consistently confirmed that interest rate is positively significant for Shariah-compliant firms and when interest rate increases, it improves Shariah-compliant firms' performance, consistent with Zulfiquar and Din (2015). Gross domestic product is found to be significantly related to ROE in a negative manner for Shariah-compliant firms. This negative relationship indicates that an increase in GDP constitutes to a poor performance for Shariah-compliant firms and this may be due to saturation in the market. This result is in line with Tan and Floros (2012) where an increase in GDP decreases firm profitability in China.

The results for internal characteristic factors on the other hand yield remarkably consistent results where most factors are found to be significant in the overall model for Shariah-compliant firms. Capital structure is found to be positively significant in the overall models for both sets of firms where higher investment opportunity leads to higher profitability of firms. This study also confirms that firm size, growth opportunity and liquidity are significant in affecting performance of Shariah-compliant firms. Nevertheless, firm financial distress significantly affects only ROE of non-Shariah-compliant firms. The $F$-statistics in Model 3 are found to be significant and it confirms the significant relation between macroeconomic fundamentals and firm characteristics on ROE for both sets of firms.

**Conclusion**

The findings from this study indicate that certain factors are more significant in determining both Shariah and non-Shariah compliant firms’ performance. In summary, the majority of internal firm characteristic indicators are found to be significant in affecting firm performance in the models. The set of firm characteristics include firm size, financial
distress, growth opportunity, liquidity, capital structure and working capital. However, there is only marginal significant relation between external macroeconomic determinants of interest rate, trade openness and exchange rate with performance.

For the set of internal factors, firm performance is significantly affected by firm size for both sets of performance measures especially for Shariah-compliant firms. Bigger firms tend to be more stable and can withstand any macroeconomic shocks and compete both domestically and internationally to improve their performance. Additionally, growth opportunity is more significant for Shariah-compliant firms and also positively related to firm performance where higher growth opportunity constitutes to better performance as measured by ROA.

Financial distress on the other hand is negatively related to firm performance and is more significant for non-Shariah-compliant firms where they must ensure that they do not fall into financial distress by avoiding high level of leverage. Once they are in financial distress, their performance would be drastically affected. Besides, larger firms have larger amount of capital and this would reduce their problem of financial distress as supported by Yusuf et al. (2014). This finding is significant because Shariah-compliant firms tend to take less risk with less leverage relative to non-Shariah-compliant firms. This empirical evidence clearly supports the idea that there is more stringent credit risk management in Shariah-compliant firms.

It is also important that Shariah-compliant firms manage their liquidity well and hold adequate liquid assets to improve their profitability relative to non-Shariah-compliant firms. This is an interesting finding where liquidity screening is one of the criteria for Shariah compliance. Adequate liquidity helps firms minimize liquidity risk during financial crises. These firms can absorb possible unforeseen shock caused by unexpected changes in liabilities and assets side of their financial statement. However, if liquid assets are held excessively, profitability could diminish. Liquid assets usually have little capacity to generate return (Lartey et al., 2013).

Capital structure is found to have marginally significant positive relation with performance especially for Shariah-compliant firms. Firms with long term investment opportunity are therefore expected to achieve better performance in the long term and this is in line with Ahmad et al. (2012). Significant positive relation between working capital and performance of non-Shariah-compliant firms mean that as firms’ working capital improves, especially in terms of sales, the performance of these firms also improve and this is consistent with the results obtained by Chhapra and Naqvi (2010).

The set of external macroeconomic determinants are however not as significant in affecting firm performance. There is only marginally significant relation between interest rate and performance of Shariah-compliant firms, similar marginal relation exist between trade openness and performance of non-Shariah-compliant firms. Evidence provided tends to indicate that the Islamic financial market indirectly bases their profit rates on the current market rate. In addition, liberalization has resulted in little friction between country boundaries and firms can seek markets worldwide. When markets are more open in term of trade, firms can transact businesses across a larger market enabling them to improve firm performance. This is especially true for non-Shariah-compliant firms who are more open to international trade and competition. Shariah-compliant firms on the other hand, tend not to be drastically affected by trade openness and this may indicate that they are more domestically inclined.

In addition, high interest rate is associated with higher profitability when the economy is doing well. Whenever interest rate moves upwards, Shariah-compliant firms achieve higher profit level. This findings is most interesting due to the fact that Riba is prohibited and
interest rate is not expected to be significantly affecting performance of Shariah-compliant firms. However, empirical evidence suggested otherwise and this may be due to profit rate of Islamic finance which is very closely linked to interest rate but this factor is not significant for non-Shariah-compliant firms. This is also in line with the finding conducted by Zeitun and Tian (2014).

Marginally significant negative relation is found between inflation and ROE for Shariah-compliant firms. As prices increase, the demand for products decrease, thus negatively affecting profits of Shariah-compliant firms (Ayyoub et al., 2011). Exchange rate also significantly affects Shariah-compliant firms’ performance where exchange rate depreciation improves the competitiveness of the export market. This is in line with Bassey et al. (2015) where a rise in foreign exchange rate results in a rise in non-Shariah-compliant firms’ profitability. Depreciating domestic currency also helps to boost the firms export through relatively cheaper foreign price also confirmed by Simiyu and Ngile (2015).

In summary, this paper concluded that liquidity and capital structure are more significant in affecting Shariah-compliant firms relative to non-Shariah-compliant firms and it may be due to the stringent liquidity and debt screens by the Shariah compliance boards. Nevertheless, financial distress is more negatively significant for non-Shariah-compliant firms and this could be due to them having unregulated leverage ratios, taking on higher level of credit risks jeopardizing performance.

Whenever trade reforms accelerate integration in the world economy and increase competitiveness, this can provide more opportunities for firm expansion or it might pose a danger to domestic firms which are not able to compete thus reducing firm profitability. Other constraints to profitability possibly include sound macroeconomic management, trade-related infrastructure and institutions, economy wide investments in human capital and infrastructure which can enhance economic activities in the country (Umer and Alam, 2013). Shariah and non-Shariah compliant firms should take into consideration the significant results from this study to maximize their firm performances. In addition, this study adds new findings to clarify the roles of external macroeconomic fundamentals and internal characteristics determinants on firm performance. The findings from this study also combine relevant information on different sets of determinants on firm performance and produce empirical evidence beneficial to both sets of Shariah and non-Shariah compliant firms and investors in the industry.

References


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Evolving banking market structure in Oman: should CBO approve the mergers?

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Abstract

Purpose – In 2013-2014, Bank Muscat and National Bank of Oman requested a merger and Bank Sohar and Bank Dhofar lodged a similar request. This paper aims to investigate the shape of the market structure, and it tries to answer whether approving such requests is good for the industry, economy and society.

Design/methodology/approach – The study examines the market structure of Oman Banking Industry, and it also presents the shape of the market structure if there had been an approval for these mergers’ requests. The Herfindahl–Hirschman Index (HHI) and the biggest k-banks Concentration Ratio (CRk), which measure concentration changes over 17 years during the period 1998-2014, are used in this study.

Findings – The study finds that Oman’s Banking Industry is highly concentrated, which should cause concerns over these two requests of mergers or similar requests in the future. In general, the concentration ratio shows decreasing trend. The concentration ratio in the deposit market implies a concentrated market with CR2 and CR3 recording 67 and 85%, respectively, while HHI reached 2,864 points in the 1998. However, in 2014, the concentration ratio had decreased, to CR2 and CR3 recording 52 and 65% respectively, and HHI standing at 2,112 points.

Research limitations/implications – The researcher suggests future investigation and further research in setting a benchmark index as a guideline for mergers’ requests.

Practical implications – Exercising monopoly power, by fewer banks, is very harmful to the economy. Charging higher interest rates on business loans escalates the cost of production of products and services which will cause inflation; therefore, monopoly power will lead to slow growth of the economy.

Social implications – Regulators in Central Bank of Oman (CBO) or in any central bank should be very careful in granting mergers, especially among big banks, because it enables newly bigger banks to exercise monopoly power, thereby harming depositors who will be getting low deposit interest rates and harming borrowers by charging them high loan interest rate.

Originality/value – Even though, this study discussed two requests of mergers between banks in Oman; however, it has presented formal approaches to the measurement of market structure in any country. Overall, it provides the policymakers in making the final decisions on mergers between banks in the future which are not limited to these banks or to Oman’s Banking Industry.

Keywords Mergers and acquisitions, Banking market structure, Central banks, Herfindahl–Hirschman index (HHI), K-bank concentration ratio (CRk)

Paper type Research paper

1. Introduction

In June 2012, Central Bank of Oman approved the merger between HSBC Bank Middle East Limited’s Oman branches with Oman International Bank. The registered name of the bank became HSBC Bank Oman. At the end of 2013, Bank Dhofar (BD) and Bank Sohar (BS), the second and the fifth banks in size, respectively, also requested Central Bank of Oman for a merger approval. In early 2014, Bank Muscat (BM) and National Bank of Oman (NBO), the first and the third banks in size respectively, also asked the Central Bank of Oman for an
approval to merge. Central Bank of Oman (CBO) refused the approval of the two requests of mergers.

This paper is motivated by the recent wave of mergers and acquisitions in Oman’s banking industry which raises important questions concerning the trade-offs between possible gains in banks’ operating efficiency versus possible social efficiency losses from a greater exercise of market power. This consolidation has generated fears of market concentration and monopoly power in the banking industry. Policymakers are suspicious of concentration and seek to limit it because they believe it enables banks to exercise monopoly power, thereby harming depositors and borrowers.

Thus, questions arise:

1. Did the CBO made the right decision?
2. Were there any negative outcomes of such mergers?
3. What does the banking market structure look like in Oman?
4. Is Oman’s banking industry concentrated?
5. If yes, has its concentration increased or decreased over time?
6. Does such a concentration cause concern?
7. And, have the fears of concentration been realised?

This paper seeks to answer these questions by analysing the CBO’s decision as well as examining changes in the concentration within Oman’s banking industry. It also presents the shape of the market structure, if there had been an approval for the mergers. To assess the banking market structure of the banks in Oman, this study uses the most frequently applied measures of concentrations, k-bank concentration ratio (CRk) and the Herfindahl–Hirschman Index (HHI). It discusses in Section 2 the background, the scope and the size of the banking system in Oman. In Section 3, the study presents the aim of the merger. Section 4 surveys the relevant literature on measurement of market structure, while the methodology and data are discussed in Section 5. The empirical results of concentration measurement are presented in Section 6. Section 7 concludes the paper.

2. Background about banking industry in Oman

According to the Central Bank of Oman (CBO) (2014), the institutional framework of the financial sector in the Sultanate of Oman comprised the Central Bank of Oman, commercial banks, specialised banks, Islamic banks/windows, finance and leasing companies and money exchange establishments. In addition, the broad financial sector also included public and private sector pension funds, insurance firms, brokerage firms and the Muscat Securities Market.

At the end of 2014, the number of commercial banks stood at 16 of which 7 were locally incorporated and 9 were branches of foreign banks. Commercial banks in Oman operated with a network of 469 branches. Locally incorporated commercial banks also had 7 branches and 2 representative offices abroad. The locally incorporated commercial banks were Bank Muscat, National Bank of Oman, HSBC Bank Oman, Oman Arab Bank, Bank Dhofar, Bank Sohar and Al Ahli Bank. Foreign banks operating in Oman included Standard Chartered Bank, Habib Bank, Bank Melli Iran, Bank Saderat Iran, Bank of Baroda, State Bank of India, National Bank of Abu Dhabi, Bank of Beirut and Qatar National Bank. Commercial banks in total had 1,053 ATMs (of which 523 were off-site). Of the seven local banks, six were listed at
the Muscat Securities Market at the end of 2015. All commercial banks are privately owned, with the government having minority stakes in a few. Aggregate foreign ownership in locally incorporated banks was limited to a maximum equity share of 70 per cent with prudential sub-limits imposed on the shareholding pattern. At the end of 2012, 11 commercial banks had received approval to engage in specific investment banking activities on a tiered licensing system.

An important development in the institutional framework occurred in June 2012 with the merger of HSBC Bank Middle East Limited’s Oman branches with Oman International Bank into the bank now registered as HSBC Bank Oman. In addition, Bank Nizwa was licensed on 6th December 2012 as the first full-fledged Islamic bank in Oman. Bank Nizwa had its soft launch in December 2012 and commenced business in January 2013. Four local commercial banks also set up Islamic banking windows with nine branches during the first quarter of 2013. The Government and the CBO have vigorously pursued to promote Islamic banking which would diversity banking services and promote financial inclusion. Within a short span, two full-fledged Islamic banks have commenced operations. Out of the seven local banks, six of them have also established Windows for practicing Islamic banking. The Islamic banks and windows operated with 46 branches as at the end of December 2014. All these institutions have established their own Sharia Supervisory Boards to guide them in sharia-related matters (CBO, 2014).

With regard to personal loans, the CBO regulated both quantum of loan and interest rates. Given the interest inelastic demand for consumer loans mainly emanating from the young households, the CBO set a quantitative ceiling at 35 per cent of total credit for non-housing personal loans and 15 per cent for residential housing loans. These rates kept in view bank credit needs for other sectors of the economy. With regard to interest rates on personal loans, the CBO stipulated a ceiling from time to time to safeguard the borrowers from banks charging high interest rates given the excessive demand. Initially, the CBO applied an interest rate ceiling of 13 per cent per annum applicable to personal loans in 1999. Over the years, the CBO reduced the ceiling, which presently stands at 6 per cent per annum. Despite the fall in overall deposit and lending rates, commercial banks continued to operate with a relatively high interest rate spread. Table I depicts the trend of the interest rate spread.

### 3. The aim of the merger

While enormous potential exists within Oman’s banking industry for the further development, more progress could be made. When comparing banks, the total assets of Oman’s banking industry US$62,515,689,000 is considerably less than that of each of the six biggest banks in Gulf Cooperation Council (GCC)[1] countries (see Table II for illustration). Therefore, the size of Oman’s banking sector is relatively small when compared to that in

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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Weighted average deposit interest rate</td>
<td>1.646</td>
<td>1.260</td>
<td>1.296</td>
<td>1.906</td>
<td>2.633</td>
<td>2.363</td>
<td>2.496</td>
<td>2.053</td>
<td>1.554</td>
<td>1.349</td>
<td>1.274</td>
<td>1.17</td>
</tr>
</tbody>
</table>

**Table I.** Average deposits and lending interest rates in December (%)

**Source:** Compiled by the researcher from CBO Annual Reports
other GCC banking industries. Although banks of Oman, such as Bank Muscat, have been able to receive high rating in GCC markets, Oman’s banking industry has not been able to produce big and competitive financial institutions that could be a force in GCC or the Arab banking arena. For various reasons, many of them the strict environment applied by Central Bank of Oman on Oman’s banks as well as the small scale of the Oman’s economy compared to GCC’s economies with an exception of Bahrain’s. With World Trade Organisation liberalisation plans, Oman banks need to rethink their competitive strategies for the future. One of the strategies is to merge to establish bigger competitive financial institutions.

The aim of the two mergers was to create two powerful banking groups in the GCC countries. Table II presents the ten largest banks in the Gulf and the ranking Omani banks. Bank Muscat, biggest bank in Oman, comes at the rank of 25 in December 2014. Bank Dhofar, National Bank of Oman and Bank Sohar are ranked 50, 52, and 61, respectively, among 95 banks of GCC banking industry (Table II).

Table III illustrates the relative and cumulative size of Omani banks’ to GCC banks. The total size of Oman’s banking industry represent 3.37 per cent of the whole GCC banking industry. Even after the mergers, the relative size of Bank and National Bank of Oman will

<table>
<thead>
<tr>
<th>GCC rank</th>
<th>Bank’s name</th>
<th>Country</th>
<th>US$m</th>
<th>World rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Qatar National Bank</td>
<td>Qatar</td>
<td>133,614</td>
<td>170</td>
</tr>
<tr>
<td>2</td>
<td>National Commercial Bank</td>
<td>Saudi Arabia</td>
<td>115,967</td>
<td>190</td>
</tr>
<tr>
<td>3</td>
<td>National Bank of Abu Dhabi</td>
<td>UAE</td>
<td>102,409</td>
<td>216</td>
</tr>
<tr>
<td>4</td>
<td>Emirates NBD</td>
<td>UAE</td>
<td>98,848</td>
<td>225</td>
</tr>
<tr>
<td>5</td>
<td>Al Rajhi Bank</td>
<td>Saudi Arabia</td>
<td>82,056</td>
<td>265</td>
</tr>
<tr>
<td>6</td>
<td>National Bank of Kuwait</td>
<td>Kuwait</td>
<td>74,399</td>
<td>288</td>
</tr>
<tr>
<td>7</td>
<td>Kuwait Finance-House</td>
<td>Kuwait</td>
<td>58,681</td>
<td>332</td>
</tr>
<tr>
<td>8</td>
<td>Samba Financial Group</td>
<td>Saudi Arabia</td>
<td>57,973</td>
<td>339</td>
</tr>
<tr>
<td>9</td>
<td>First Gulf Bank</td>
<td>UAE</td>
<td>57,772</td>
<td>361</td>
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<tr>
<td>10</td>
<td>Riyad Bank</td>
<td>Saudi Arabia</td>
<td>57,224</td>
<td>363</td>
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<tr>
<td>25</td>
<td>Bank Muscat</td>
<td>Oman</td>
<td>25,301</td>
<td>722</td>
</tr>
<tr>
<td>50</td>
<td>Bank Dhofar</td>
<td>Oman</td>
<td>8,307</td>
<td>1505</td>
</tr>
<tr>
<td>52</td>
<td>National Bank of Oman</td>
<td>Oman</td>
<td>7,740</td>
<td>1572</td>
</tr>
<tr>
<td>59</td>
<td>HSBC Bank Oman</td>
<td>Oman</td>
<td>5,833</td>
<td>1837</td>
</tr>
<tr>
<td>61</td>
<td>Bank Sohar</td>
<td>Oman</td>
<td>5,398</td>
<td>1908</td>
</tr>
<tr>
<td>64</td>
<td>Oman Arab Bank</td>
<td>Oman</td>
<td>4,723</td>
<td>2061</td>
</tr>
<tr>
<td>65</td>
<td>AHI Bank</td>
<td>Oman</td>
<td>4,244</td>
<td>2066</td>
</tr>
<tr>
<td>86</td>
<td>Bank Nizwa</td>
<td>Oman</td>
<td>658</td>
<td>5941</td>
</tr>
<tr>
<td>91</td>
<td>Alizz Islamic Bank</td>
<td>Oman</td>
<td>311</td>
<td>8401</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rank</th>
<th>Bank name</th>
<th>Thousand US$</th>
<th>(%)</th>
<th>Cumulative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Bank Muscat</td>
<td>25,301,170</td>
<td>1.36</td>
<td>1.36</td>
</tr>
<tr>
<td>50</td>
<td>Bank Dhofar</td>
<td>8,307,152</td>
<td>0.45</td>
<td>1.81</td>
</tr>
<tr>
<td>52</td>
<td>National Bank of Oman</td>
<td>7,740,182</td>
<td>0.42</td>
<td>2.23</td>
</tr>
<tr>
<td>59</td>
<td>HSBC Bank Oman</td>
<td>5,833,290</td>
<td>0.31</td>
<td>2.54</td>
</tr>
<tr>
<td>61</td>
<td>Bank Sohar</td>
<td>5,397,659</td>
<td>0.29</td>
<td>2.83</td>
</tr>
<tr>
<td>64</td>
<td>Oman Arab Bank</td>
<td>4,723,277</td>
<td>0.25</td>
<td>3.08</td>
</tr>
<tr>
<td>65</td>
<td>AHI Bank</td>
<td>4,243,584</td>
<td>0.23</td>
<td>3.31</td>
</tr>
<tr>
<td>86</td>
<td>Bank Nizwa</td>
<td>658,273</td>
<td>0.04</td>
<td>3.35</td>
</tr>
<tr>
<td>91</td>
<td>Alizz Islamic Bank</td>
<td>311,102</td>
<td>0.02</td>
<td>3.37</td>
</tr>
</tbody>
</table>
be 1.78 per cent (1.36 per cent + 0.42 per cent), while the relative size of Bank Dhofar and Bank Sohar will be 0.74 per cent (0.45 per cent + 0.29 per cent) of the GCC banking industry.

4. Literature review on measurement of market structure
Schiller (2003) defined market structure as the number and the relative size of firms in an industry. Differences in the number and size distribution of firms are key factors distinguishing the theoretical models of perfect competition, oligopoly, monopoly and monopolistic competition. Market concentration is easily estimated, as published data on the number and size distribution of firms are generally available. In general, banking structure refers to the number, size and location of banks in a market. Molyneux et al. (1996) note that to characterise banking structure by size and concentration involves setting criteria for size, choosing a method of determining significant market areas, defining products and taking into account the influence of all competitors in these markets.

In addition, while all market structure measures, in general, are subject to their own peculiarities and limitations, they do usually tend to correlate highly with one another (Scherer and Ross, 1990; Goddard et al., 2001). The following section focuses on the desirable properties of market structure measures, although not all of the measures of concentration satisfy all of these criteria, and there is no perfect measure.

4.1 Desirable properties of measures of market structure
There are a wide range of statistical measures of concentration, which are important to analyse as they provide us with contradictory rankings of industry concentration that have implications for how to interpret the SCP relationship. Hall and Tideman (1967) identified desirable properties for measurement of concentration as follows: First, a concentration index should be a one-dimensional measure. Second, concentration in an industry should be independent of the size of that industry. Third, concentration should increase if the share of any firm is increased at the expense of a smaller firm. Fourth, if all firms are divided into K equal parts, then the concentration index should be reduced by a proportion 1/K. Fifth, if all firms are divided into N equal parts then the concentration should be a decreasing function of N. Finally, a concentration measure should be between zero and one.

4.2 Concentration indices
The importance of concentration ratios arises from their ability to capture structural features of a market. Concentration ratios are therefore often used in structural models to explain competitive performance in the banking industry in relation to market structure. It should be noted, however, that a measure of concentration does not warrant conclusions about the competitive performance in a particular market. Competitive behaviour between leading banks remains possible then even in a highly concentrated market.

According to Bikker and Haaf (2000), there are ten concentration indices, namely, the k-bank Concentration Ratio (CRk); the Herfindahl–Hirschman Index (HHI); the Hall–Tideman Index (HTI); the Rosenbluth Index (RI); the Comprehensive Industrial Concentration Index (CCI); the Hannah and Kay Index (HKI); the U Index (U); the multiplicative Hause Index (Hm); the additive Hause Index (Ha) and the Entropy measure (E). However, this study considers only two of them: the k-bank Concentration Ratio (CRk) and the Herfindahl–Hirschman Index (HHI).
5. Methodology
In a review of 73 US SCP studies from 1961 to 1991, Molyneux et al. (1996) summarised the market structure measures used in the banking literature. They concluded that most frequently used measure of market structure is the three-firm deposits concentration ratio, as it is used in 37 studies out of the 73 studies reviewed. The second most frequently used is the Herfindahl index, followed by the number of firms in the market. Al-Muharrami (2009, 2008) used both indices to measure the market structure in Saudi Arabian and Kuwaiti Banking industries, respectively. In addition Al-Muharrami et al. (2006) used the two indices along with “H-statistic” by Panzar and Rosse to measure the market structure and the competitive condition in six Arab countries. Thus, this paper considers these two indices in measuring market concentration.

5.1 The k-bank concentration ratio
Simplicity and limited data requirements make the k-bank concentration ratio one of the most frequently used measures of concentration in the empirical literature. Summing only the market shares of the k largest banks in the market (Schiller, 2003), it takes the form:

\[ CR_k = \sum_{i=1}^{k} S_i \]

The formula states that the concentration ratio is the sum of the deposits, loans or assets shares of the K largest banks. Note that this measure places total importance on the largest banks by implying that they are the only relevant firms to consider when gauging the degree of monopoly power that exists in a market. The concentration ratio, however, does not distinguish between alternative distributions or mixes of market shares even between these largest banks. The same result would be derived from markets A or B if the three largest banks in each controlled 55, 10, 10 and 25, 25, 25 per cent, respectively. Each market would have a three-bank concentration ratio of 75, yet the implications for monopoly power would be quite different in the two markets. Note also that the concentration ratio does not take into account of the number of firms in a market or the distribution of the remaining shares among small firms.

5.2 The Herfindahl–Hirschman index
According to Rhoades (1993), the HHI index was developed independently by the economists A.O. Hirschman (in 1945) and O.C. Herfindahl (in 1950). The HHI is a static measure and, therefore, gauges market concentration at a single point in time. Algebraically, it can be depicted as:

\[ HHI = \sum_{i=1}^{n} (MS_i)^2 \]

where MS is the market share of the \( i^{th} \) firm and \( n \) is number of firms in the market. The HHI stresses the importance of larger banks by assigning them a greater weight than smaller banks. It also incorporates each bank individually so that arbitrary cut-offs and insensitivity to the share distribution are avoided. Overall, the HHI is the most widely used summary measure of concentration in the theoretical literature and often serves as a benchmark for the evaluation of other concentration indices.
According to the current screening guidelines in the USA, the banking industry is regarded to be competitive market if the HHI is less than 1000, somewhat concentrated market if the HHI lies between 1000 and 1800, and very concentrated market if HHI is more than 1800. If the post-merger market HHI is lower than 1,800 points and the increase in the index from the pre-merger situation is less than 200 points, the merger is presumed to have no anticompetitive effects and is usually approved by the regulators. Should those threshold values be exceeded, the regulators will check for the existence of potential mitigating factors. If the mitigating factors are not enough to justify the merger, the regulators may require the divestiture of some branches and offices to bring the concentration ratio to or below the threshold level. If divestiture would not accomplish this goal, the merger application is denied. A more complete discussion of HHI is presented in Rhoades (1993) and Anonymous (1998).

5.3 The data
The sample included all locally incorporated banks operating in Oman during the period 1998-2012. However, a number of banks have subsequently been excluded from the final data set according to the following criteria: Banks for which full data are not available, Mortgage and Housing banks, Industrial banks, Development banks, Central bank and Foreign banks. However, Bank Nizwa was also included in this study due to the similarities between commercial banks and Islamic banks, which are depository institutions and take part in different types of investments.

The following data were obtained from financial statements of banks lodged on firm Web pages on the internet, annual central bank reports and from the Fitch-IBCA Ltd Bankscope CD Rom Databases (2013). This study covers eight banks privately held and domestically owned that are fully licensed commercial banks. The period sample covers from 1998 to 2012. There were five banks from 1998 to 2007, six banks from 2006 to 2007, seven banks from 2008 to 2011 and finally eight banks in 2012. The final sample consists of 98 bank-year observations. Table IV presents the descriptive statistics of the eight banks in Oman. According to the end of 2012 data, Bank Muscat sat as the biggest bank in terms of the total assets and as the main player. Bank Nizwa, an Islamic bank, as previously mentioned had its soft launch on December 2012. Since the two merger’s requests were in 2013 and in 2014, then the sample range, 1998-2102, shows the market structure banking characteristics prior to the two requests.

<table>
<thead>
<tr>
<th></th>
<th>Total assets US$ (000)</th>
<th>Gross loans US$ (000)</th>
<th>Total deposits US$ (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>5,575,553</td>
<td>3,853,446</td>
<td>4,251,235</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>5,952,131</td>
<td>4,357,196</td>
<td>3,989,226</td>
</tr>
<tr>
<td>Average</td>
<td>6,804,409</td>
<td>5,582,878</td>
<td>4,854,491</td>
</tr>
<tr>
<td>Bank Muscat</td>
<td>20,581,795</td>
<td>15,115,215</td>
<td>13,846,554</td>
</tr>
<tr>
<td>NBO</td>
<td>6,600,260</td>
<td>5,122,497</td>
<td>4,907,152</td>
</tr>
<tr>
<td>HSBC Oman</td>
<td>6,275,163</td>
<td>3,160,728</td>
<td>4,815,605</td>
</tr>
<tr>
<td>Bank Dhofar</td>
<td>5,575,553</td>
<td>3,546,164</td>
<td>4,251,235</td>
</tr>
<tr>
<td>Bank Sohar</td>
<td>4,648,114</td>
<td>3,039,532</td>
<td>3,478,284</td>
</tr>
<tr>
<td>Oman Arab Bank</td>
<td>3,564,109</td>
<td>2,513,134</td>
<td>2,681,665</td>
</tr>
<tr>
<td>Ahli Bank</td>
<td>2,858,778</td>
<td>2,442,133</td>
<td>1,920,416</td>
</tr>
<tr>
<td>Bank Nizwa</td>
<td>385,868</td>
<td>0</td>
<td>943</td>
</tr>
<tr>
<td>Total</td>
<td>50,489,640</td>
<td>35,939,403</td>
<td>35,901,854</td>
</tr>
</tbody>
</table>

Table IV.
Oman Banks’ total assets, gross loans and total deposits in 2012
6. Herfindahl–Hirschman index and k-bank concentration ratio concentration results
Following the steps of the two most popular measuring indices and due to the limited number of banks in Oman, this study adopted the highest two and three bank deposits and loans concentration ratio as well as the HHI for deposits only. The following empirical results show the HHI and CR$k$ trends for Oman banking over the 15 years 1998-2012.

Estimating both HHI and CR$k$ measures shows that Oman’s banking industry has become less concentrated market. Table V presents the HHI and CR$k$ trends in deposits and loans for the period 1998-2012. In general, the concentration ratio shows decreasing trend. Moreover, the concentration ratio in the deposit market implies a concentrated market with CR2 and CR3 recording 67 and 85 per cent, respectively, and HHI standing at 2,864 points in the 1998. In 2012, the concentration ratio had decreased, to CR2 and CR3 recording 53 and 66 per cent, respectively, and HHI standing at 2,173 points due to the entry of new commercial banks (Ahli Bank) in 2008 and the entry of an Islamic bank (Bank Nizwa in 2012) beside the entry of more foreign banks. As the HHI for any year between 1998 and 2012 was more than 1,800 points, then according to current screening guidelines in the USAA, Oman’s market could be described as a “very concentrated market”. The concentration ratio in the loan market shows a similar trend to that in the deposit market.

There were eight locally incorporated banks in 2012. If these eight banks have an equal share, then the share of each bank will be 100 per cent/8 banks = 12.5 per cent per bank. Therefore, the ideal HHI will be equal to $(12.5)^2 + (12.5)^2 + (12.5)^2 + (12.5)^2 + (12.5)^2 + (12.5)^2 + (12.5)^2 + (12.5)^2 = 1250$. The ideal CR2 will be 12.5 per cent + 12.5 per cent = 25 per cent and ideal CR3 will be 12.5 per cent + 12.5 per cent + 12.5 per cent = 37.5 per cent. Comparing the ideal situation of the concentration based on this example and based on the researcher’s findings, we can conclude that Oman’s banking industry is a highly concentrated market.

Bank Muscat is the biggest bank, and it is the dominant player in the Omani market and the similar trend in both deposits and loans is attributed to the increase in a share of this bank. Table VI presents the relative size and share of Bank Muscat in Oman banking industry.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total assets</th>
<th>Gross loans</th>
<th>Total customer deposits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CR2(%)</td>
<td>CR3(%)</td>
<td>CR2(%)</td>
</tr>
<tr>
<td>2012</td>
<td>54</td>
<td>66</td>
<td>56</td>
</tr>
<tr>
<td>2011</td>
<td>60</td>
<td>72</td>
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<td>2010</td>
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<td>2009</td>
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</tbody>
</table>
If Central Bank of Oman decided to approve both requests of merger between BM and NBO and between BD and BS, then shape of the size and structure of the banking industry in Oman would look as presented in Table VII, (based on the end of 2012 data). The new bank, as the result of the merger of Bank Muscat and National Bank of Oman (BM&NBO), will control more than half of the total assets, gross loans and total loans. Also, the new bank, as the result of the merger of Bank Dhofar and Bank Sohar (BD&BS), will control one-fifth one more of the total assets, gross loans and total loans. These two new banks will control almost three quarter of the market share. The approval of the mergers might lead to monopoly control of few banks which is not in the benefits of customers and society in general.

7. Conclusion
In 2013-2014, Central Bank of Oman refused two merger requests. Bank Muscat and National Bank of Oman requested a merger and Bank Sohar and Bank Dhofar lodged a similar request. This paper assesses the CBO’s decision by examining the market structure of Oman’s banking industry. It also presents the shape of the market structure if there had been an approval for the mergers. The HHI and the CRk, which measures concentration changes over 15 years, are used in this study. On the basis of the findings, this study finds that that Oman’s banking industry is highly concentrated, which caused CBO concerns over the mergers. Therefore, the CBO’s decision to deny the two mergers stands as the right resolution.

Despite concentration measures reported here, the banking industry in Oman actually experienced declines in concentration over the 1998-2012 and remains heading for less concentration. Nevertheless, the Oman banking industry is still highly concentrated and any further concentrations such as those mergers proposed between Bank Muscat with National Bank of Oman and Bank Dhofar with Bank Sohar. The CBO should remain very cautious in granting any approvals in the Oman banking sector, especially if proposed between Bank Muscat with National Bank of Oman. As the first and third biggest banks in Oman, any merger between these two banks would lead to a higher concentration in the sector as well as greater market power of fewer commercial banks.

Overall, this paper has presented formal approaches to the measurement of market structure and given evidence of the appropriateness of the CRk and the HHI in the empirical application of market concentration. As a result, it provides data helpful for Oman policymakers making the final decisions on mergers between banks in future.

Note
1. GCC countries consist of six Arab Gulf states: the Kingdom of Bahrain, the State of Kuwait, the Sultanate of Oman, the State of Qatar, the Kingdom of Saudi Arabia and the United Arab Emirates (UAE).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total assets US$ (000)</th>
<th>CR1(%)</th>
<th>Gross loans US$ (000)</th>
<th>CR1(%)</th>
<th>Total customer deposits US$ (000)</th>
<th>CR1(%)</th>
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<tr>
<td>2010</td>
<td>15,217,425</td>
<td>43</td>
<td>10,908,193</td>
<td>42</td>
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<td>2005</td>
<td>5,185,436</td>
<td>43</td>
<td>3,777,893</td>
<td>43</td>
<td>3,358,127</td>
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<td>1999</td>
<td>3,262,159</td>
<td>36</td>
<td>2,576,853</td>
<td>37</td>
<td>2,046,554</td>
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<tr>
<td>Bank name</td>
<td>Total assets US$ (000)</td>
<td>CR1(%)</td>
<td>CR2</td>
<td>CR3</td>
<td>Gross loans US$ (000)</td>
<td>CR1(%)</td>
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<tr>
<td>-----------</td>
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<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>BM&amp;NBO</td>
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<td>54</td>
<td></td>
<td></td>
<td>20,237,712</td>
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<td>HSBC</td>
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<td>12</td>
<td></td>
<td></td>
<td>3,160,728</td>
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<td></td>
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<td>2,513,134</td>
<td>7</td>
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<td>Ahli</td>
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<td></td>
<td></td>
<td>2,442,133</td>
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<td>Nizwa</td>
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<tr>
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<td>50,489,640</td>
<td>100</td>
<td>74%</td>
<td>86%</td>
<td>35,939,403</td>
<td>100</td>
</tr>
</tbody>
</table>
References

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Abstract

Purpose – This study aims to investigate the performance of fundamental weighted portfolios (using sales, cash flows, dividends, book values and a composite of all these variables), an equal weighted portfolio and a smoothed cap-weighted (CW) portfolio in Middle East and North Africa (MENA) markets. The performance of these portfolios is compared with that of a CW portfolio for the period 2005 to 2015.

Design/methodology/approach – The portfolios are formed using different concentration levels, different construction schemes and different sub-regions. The performance is assessed using a large set of risk-adjusted performance measures, including more robust measures in the context of multi-factor models, such as the Fama and French (1993) three-factor model, the Fama and French (2015) five-factor model and a seven-factor model.

Findings – The results show that the fundamental portfolios, with the exception of the sales portfolio, underperform the CW portfolio using either the traditional or more robust risk-adjusted performance measures. The underperformance of the fundamental portfolios is found to be robust using different concentration levels, different construction schemes and different sub-regions. The results also show that the equal weighted portfolio outperforms the CW portfolio using traditional risk-adjusted measures. However, after controlling for additional risk factors, this outperformance disappears.

Practical implications – The failure of fundamental indexation in the emerging markets could help the researchers and the academics to search for the best weighting method that could be used as an alternative to the CW indexation method.

Originality/value – The results of the study add evidence to the debatable propositions on the performance of fundamental portfolios in emerging markets. Furthermore, the findings may help domestic and international investors, practitioners and decision-makers to deepen their knowledge in terms of the best portfolio construction scheme in the MENA region.

Keywords MENA Region, Cap-weighted portfolios, Equal weighted portfolios, Fundamental weighted portfolios, Smoothed cap-weighted portfolios

PAPER TYPE Research paper

1. Introduction

To measure the performance of a stock market, a market index is usually used. It is defined as “an index is a group of securities chosen to represent an unbiased view of...
the risk-and-reward attributes of a market or a portion of a market” (Philips et al., 2011, p. 14).

The most used index construction method is the market capitalization, which is a method that weighs each constituent according to its price multiplied by its common outstanding shares. This method favors the companies with anticipated future success and rewards this success today. There are many major indices that are constructed based on this method, such as the DAX (Frankfurt), the S&P 500 (New York), and the MSCI UK (London). However, some studies have found that the weights based on market capitalization in the equity index construction suffer from tough criticisms. Haugen and Baker (1991) and Grinold (1992) provide empirical evidence that there is no efficient risk-return tradeoff in market cap-weighted (CW) indices. Nevertheless, the CW method is still widely used since it is a passive strategy that needs no or limited management fees, requires low trading costs and has no rebalancing costs. Moreover, this method assigns substantial weights to the largest companies, which are the most heavily traded stocks, thus reducing the expected portfolio transaction costs (Hsu, 2006; Arnott et al., 2005).

Therefore, important questions arise for academics and researchers. Is the market CW portfolio providing the optimal risk-return relation to investors? In addition, are there alternative ways to build an index? One proposed answer is fundamental weighted (FW) indices that allocate weights on the basis of accounting data. The FW indices have been suggested by Treynor (2005), Arnott et al. (2005) and Hsu (2006). Arnott et al. (2005) find that the FW indices (using book values (BV), cash flows (CF), dividends (DIV) and sales) outperform the traditional ones since these fundamental variables are not affected by the mispricing of irrational investors. They argue that the superior returns of these indices are rooted in the fact that CW indices over-weight the over-valued stocks and under-weight the under-valued stocks.

Motivated by the potential weaknesses and criticisms associated with CW indices, we investigate the risk-adjusted performance of FW portfolios based on accounting data (using sales, CF, DIV, BV and a composite of all these variables) compared to that of a CW portfolio in the MENA equity markets over the period from 2005 to 2015. Furthermore, we analyze the risk-adjusted performance of a smoothed CW (SCW) portfolio that uses smoothed share prices and may be an alternative to the FW portfolios proposed by Chen et al. (2007) and an equal weighted (EW) portfolio that minimizes the concentration risk that characterizes the CW approach.

We conduct our study in the MENA region because the stock markets in this region are generally small, relatively illiquid, and lack transparency. Thus, stock markets in this region can be classified as less efficient markets with a high proportion of small companies since they are emerging markets (Harrison and Moore, 2012). The prices of the traded shares in stock exchanges could deviate substantially from their fair value, and so CW indices could create a return drag and FW indices would be a better alternative (Hsu and Campollo, 2006). The majority of previous studies regarding FW indices have been conducted mainly in the US and European markets, and to the best of our knowledge, no study has been conducted in the MENA region. Hence, the aim of this research is to construct a CW portfolio using the traditional methodology [1], FW portfolios using Arnott et al.’s (2005) methodology, a SCW portfolio using Chen et al.’s (2007) methodology and an EW portfolio. The performance of the CW portfolio is compared with all those constructed portfolios. Therefore, the contributions of this study are threefold. First, it is the first study that analyses and compares the performance of FW portfolios to that of a CW portfolio in the MENA region. Second, it also contributes by using more robust risk-adjusted performance measures in the context of multi-factor models, namely the Fama and French (2015) five-factor model and a seven-factor model that includes momentum and illiquidity factors (Abadi and Silva, 2017). Third, this study contributes to the literature by using different weighting schemes, different concentration levels and different sub-regions to analyze the performance of the constructed portfolios. We focus on two sub-
regions: the Gulf Cooperation Council Countries (GCC) that includes all the Gulf countries that are politically stable (Bahrain, Oman, Qatar, Kuwait, Saudi Arabia and the United Arab Emirates) and Countries in Transition (CT) that includes countries that are politically unstable (Egypt, Israel, Jordan, Lebanon, Morocco, Palestine and Tunisia).

The structure of this paper is as follows. In Section 2, we cover the literature review related to the different methods to construct equity indices and portfolios. Section 3 describes the methods for portfolio construction and the risk-adjusted performance measures. In Section 4, we present the dataset. Section 5 presents and discusses the empirical results. In Section 6, we present the main conclusions.

2. Literature review
CW indices are widely used and seen as the generally accepted benchmarks for investment performance measurement. CW indices consider risk and expected growth by using the market prices of stocks as proxies for their unobservable intrinsic values. If market prices have noise, CW indices’ performances may not be accurate. From this observation, the fundamental weighting scheme brings a new way of weighting, which depends on accounting variables rather than market prices. In this field, there are several studies that have been conducted to analyze the different types of indexation methods.

Chow et al. (2011) classify the alternative equity indices into heuristics-based (equal weighting, diversity weighting, risk-clusters equal weighting and fundamental weighting), and optimization based (minimum-variance portfolio, maximum diversification and risk-efficient indexation). They find that these alternative indices have higher volatility and higher returns than using the S&P 500 as a benchmark. Furthermore, they find that the fundamental index presents the highest Sharpe ratio, the highest alpha and the highest information ratio among the four heuristics-based alternative indices. The idea of fundamental indices is introduced by Arnott et al. (2005) who argue that CW indices over-weight stocks that are over-priced, and under-weight stocks that are underpriced, which cause a return drag. Arnott et al. (2005) find that FW indices outperform CW indices in the US equity market. This finding means that these fundamental indices maintain the liquidity and investment capacity benefits of traditional CW indices. Arnott and West (2006) conduct their research on large and small US stocks, sector funds and international stocks. Their findings show that the excess returns of fundamental indices are considerably larger in the smaller companies and international portfolios. Hemminki and Puttonen (2008) show that the findings of the fundamental indexation in the European market are consistent with those of Arnott et al. (2005). These findings suggest that it is possible to produce consistently higher returns and higher risk-adjusted returns by reweighting a market CW index using fundamental values. Arnott et al. (2010) analyze the fundamental indices of the debt market in the US and emerging markets. They find that the fundamental indices outperform the CW bond indices. Estrada (2008) analyses the effects of the fundamental indexation based on the dividends measure for international portfolios. He finds that the constructed index outperforms the market CW index by 1.90 per cent per year. Stotz et al. (2010) examine whether the return differences between the FW and the CW portfolios composed by the stocks of the DJ Stoxx 600 index are driven by risk. They find that risk-adjusted returns are higher for the FW indices. Fisher et al. (2015) state that the fundamental indices are relatively passive portfolios with low turnover, low tracking error and superior returns in comparison with CW indices. These superior returns of fundamental indices arise as a result of over-weighting the over-priced stocks by the CW index and under-weighting the underpriced stocks. More recently, Balatti et al. (2017) in the UK equity markets confirm that the FW portfolios outperform the CW portfolio. Conversely, Miziolek and Zaremba (2017) find that FW portfolios generate similar risk-adjusted returns to those of the CW portfolio. They
conduct their study on Poland, Russia, and Turkey since they are the three largest European emerging markets.

However, most of the previously mentioned studies have not addressed the robustness of their findings, and they analyze the performance using the capital asset pricing model (CAPM) as the benchmark. Their approaches do not consider empirical studies, which show that the CAPM is not an appropriate model for describing stock returns. Therefore, several studies have been conducted using the Fama and French (1993) three-factor and the Carhart (1997) four-factor models. Jun and Malkiel (2008) assess the performance of the FTSE RAFI US 1000 and show that this index exhibits a significant value tilt and its alpha is not statistically different from zero.

Houwer and Plantinga (2009) find that fundamental portfolios generate statistically significant positive alphas and have significant factor loadings on the size and value risk factors. In contrast, Hsu et al. (2010) find that, on average, FW indices’ alphas are negative and statistically significant. Walkshäusl and Lobe (2010) find that fundamental indices outperform the CW index in a global context, even after controlling for the value premium within the Carhart (1997) four-factor model, but the same is not observed for country-specific indices. In relation to emerging markets, Hsieh (2013) finds that fundamental indices have significant exposures to the size and value risk factors. He argues that the inherent value bias or avoidance of large caps is the source of fundamental indices’ outperformance. Chow et al. (2011) adjust all the investment strategies that they analyze for the market, size, value, and momentum factor loadings. They find that only the global fundamental indexation strategy displays a statistically significant positive alpha.

Using different levels of concentration (top 200, 100, 50 and 30 stocks), Hsieh et al. (2012) construct fundamental indices based on the large established firms in the global equity market and compared these indices to market CW indices. They find that the FW indices outperform CW indices over the overall examination period and in two sub-periods. Hsieh et al. (2012) state that FW indices are mean-variance efficient proxies for the evaluation of large firms' performance. Their findings reveal that the level of portfolio concentration hardly affects the performance of FW indices due to the fact that removing the price element from the weighting of fundamental indices mitigates the small firm anomaly. Furthermore, they also find that the CW index is affected by firm size while the fundamental indices are not, since these indices are constructed from price insensitive attributes.

Using an alternative approach, Chen et al. (2007) use a smoothed average of standard cap-weights instead of using accounting data, which is based on the assumption that market prices are unbiased but noisy approximations for fundamentals. They find that SCW portfolios outperform CW portfolios in the US market approximately by 1 per cent a year. Fongwa (2015) examines the performance of FW portfolios (sales, BV, earnings, DIV and SCW) with different concentration levels (top 50 and mid-100 stocks) against a CW reference portfolio. His results show that most FW portfolios are more mean-variance efficient than the CW portfolio. More specifically, he finds that the SCW portfolio underperforms the other FW portfolios but it outperforms the CW portfolio.

Stotz et al. (2010) argue that the fundamental metrics can also be criticized, even though irrational investors have limited impacts on these indices compared to the CW indices. The book value may produce different stock weights according to the accounting practice that companies use. The sales could be very different across industries based on the nature of their operations. Moreover, a company that uses dividends to buy back its shares or to finance its investments will have zero weight in a dividend index and thus the dividends fundamental index can also be criticized. Perold (2007) also criticizes the fundamental indexing strategy and states that FW indices are value tilt strategies. He argues that, in general, value stocks produce higher returns than any index since these higher returns exist because the value stocks are either riskier or mispriced. Asness (2006) argues that FW
portfolios may outperform in some periods and underperform in other periods since he finds that the CW indices outperform the FW indices for the period from 1999-2000.

In summary, the previous empirical studies have documented contradictory and debatable results regarding the performance of FW indices in comparison with CW indices. Moreover, most of the studies have not addressed the robustness of their findings using alternative performance measures. In particular, it is important to investigate the performance of these alternative indices using more robust risk-adjusted performance measures in the context of recently developed multi-factor models.

3. Methods
3.1 Portfolios construction methods
The methods used to construct the FW portfolios and the SCW portfolio are based on Arnott et al. (2005) and Chen et al. (2007), respectively. As fundamental metrics, we use BV, CF, DIV, sales and a composite of these fundamental metrics (COMP). We first construct portfolios using 100 per cent of the underlying stocks in our dataset. To test if the portfolio’s concentration level has an effect on portfolio performance, we rank the stocks by their market capitalization and construct portfolios using the largest 100 (50) stocks and then independently using the smallest 100 (50) stocks. We also investigate the effect of construction scheme on the portfolio performance by constructing portfolios including the largest 100 stocks and the smallest 100 stocks in two ways: first, we use the CW portfolio constituents and reweight them based on the fundamental variables and, second, we independently rank and weight stocks according to each fundamental variable.

In an EW portfolio, the weight is the same for each stock in a portfolio and is denoted by the following:

$$X_{t}^{EW} = 1/N_t$$

where $N_t$ is the number of stocks in the portfolio at time $t$.

The weight of a stock $i$ in a market CW portfolio is the market value of the firm divided by the market value of all companies in the portfolio and is denoted by:

$$X_{i,t}^{MV} = MV_{i,t}/\sum_{j=1}^{N} MV_{j,t}$$

where $MV_{i,t}$ is the market value of company $i$ at time $t$, and $N$ is the number of stocks in the portfolio.

The weight of a stock $i$ in a SCW portfolio is obtained using the median weight for the past 12 months.

The weight of each stock for each fundamental metric is defined as:

$$X_{i,t}^{FW} = F_{i,t-1}/\sum_{j=1}^{N} F_{j,t-1},$$

where $F_{i,t-1}$ is the fundamental metric (for example, sales) of company $i$ at fiscal year-end $t-1$ closest to $t$ ($t-1 < t$). Note that $F_{i,t-1}$ is the fundamental value of the total company and not valued on a per-share basis.

The weight considering the composite of fundamental metrics is calculated as:
Finally, returns on the portfolios are calculated as:

\[ R_{Index}^{t+1} = \sum_{i=1}^{N} X_{i,t} \times R_{i,t+1} \]  

(5)

where \( R_{i,t+1} \) is the stock’s return in period \( t + 1 \).

The portfolios are rebalanced annually on 31 December. The month of December has been chosen because of the simplicity to compare companies at the end of the year.

The portfolio turnover in year \( t \) is calculated as:

\[ \sum_{i=1}^{N} |\Delta W_{i,t}| \]  

(6)

where

\[ \Delta W_{i,t} = W_{i,t} - \left( W_{i,t-1} \times \left( 1 + R_{i,t} \right) / (1 + R_{p,t}) \right) \]  

(7)

\( N \) is the total number of securities in the portfolio, \( W_{i,t} \) is security \( i \)’s weight in portfolio \( p \) in year \( t \), \( W_{i,t-1} \) is security \( i \)’s weight in portfolio \( p \) at the end of the previous year, \( R_{i,t} \) is security \( i \)’s return in year \( t \) and \( R_{p,t} \) is portfolio \( p \)’s return in year \( t \).

3.2 Risk-adjusted performance measures

This section presents the risk-adjusted measures that are used to analyze the performance of the constructed portfolios. Portfolio performance is assessed using several risk-adjusted measures: traditional measures including Jensen’s alpha, the Treynor ratio, the Sharpe ratio, and the information ratio; the Sortino ratio, which is a downside risk-adjusted measure; and a set of more robust risk-adjusted performance measures based on the Fama and French (1993) three-factor model, the Fama and French (2015) five-factor model and a seven-factor model.

Jensen’s alpha (the regression intercept \( a_p \)) is estimated using the CAPM times-series regression, as expressed in the following equation:

\[ R_{p,t} - R_f = a + b (R_{M,t} - R_f) + \epsilon_t \]  

(8)

where \( R_{p,t} \) is the return on the portfolio \( p \) in month \( t \), \( R_f \) is the risk-free rate, \( b \) is portfolio \( p \)’s beta coefficient, \( R_{M,t} \) is the return of the market C.W. portfolio in month \( t \) and \( \epsilon_t \) is the regression residual in month \( t \).

The beta coefficient (\( b \)) for the portfolio \( p \) is used to compute the Treynor ratio as:

\[ (R_p - R_f) / b_p \]  

(9)

where \( R_p \) is portfolio \( p \)’s average returns during the estimation period and \( R_f \) is the average of the risk-free rate during the estimation period.

The Sharpe ratio of portfolio \( p \) is calculated as:
where $\sigma_p$ is the standard deviation of the returns on portfolio $p$ during the estimation period. The Sortino ratio is computed as:

$$\frac{(R_p - R_f)}{\sigma_{s-d,p}},$$

where $\sigma_{s-d,p}$ is the semi deviation of portfolio $p$'s returns that is computed using only the negative returns.

To test the statistical significance of the Sharpe and Sortino ratios differences, the Jobson and Korkie (1981) test with the Memmel (2003) correction is used. The $Z$ statistic approximately follows a standard normal distribution, and it is calculated as:

$$\frac{SR_1 - SR_2}{\sqrt{1/T \left[ 2(1 - \rho_{1,2}) + 1/2 \left( SR_1^2 + SR_2^2 - SR_1 SR_2 \left( 1 + \rho_{1,2}^2 \right) \right) \right]}}$$

$SR_i$ is the portfolio's Sharpe (Sortino) ratio, $T$ is the number of observations and $\rho_{1,2}$ is the correlation between portfolios 1 and 2.

The information ratio of portfolio $p$ is calculated as in Goodwin (1998):

$$E(R_{p,t} - R_{M,t})/\sigma (R_{p,t} - R_{M,t})$$

where $E(R_{p,t} - R_{M,t})$ is the average excess return of the portfolio $p$ over the market CW portfolio and $\sigma (R_{p,t} - R_{M,t})$ is the standard deviation of the excess return.

The Fama and French (1993) model, the Fama and French (2015) model and a seven-factor model are also used to analyze portfolio performance. These models are estimated from the following equations:

$$R_{p,t} - R_f = a + b(R_{M,t} - R_f) + s(SMB) + h(HML) + \varepsilon_t$$

$$R_{p,t} - R_f = a + b(R_{M,t} - R_f) + s(SMB) + h(HML) + r(RMW) + c(CMA) + \varepsilon_t$$

$$R_{p,t} - R_f = a + b(R_{M,t} - R_f) + s(SMB) + h(HML) + r(RMW) + c(CMA) + il(ILML)$$
$$+ m(WML) + \varepsilon_t$$
over loser stocks) and illiquidity (that captures the excess return of illiquid stocks over liquid stocks) factors, respectively. These factors for the MENA region are computed by the researchers.

4. Data
Monthly total return data are obtained from Thomson Reuters DataStream database for all firms listed on all exchanges of the 13 countries in the MENA region, which covers Bahrain, Egypt, Jordan, Israel, Kuwait, Lebanon, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates. The MENA region also includes other markets, but firms of these countries do not have available data in DataStream. Therefore, our final dataset includes the markets of 13 countries from December 2004 to December 2015. The period is selected to have historical data as long as possible and to have coverage of broad markets. To avoid survivorship bias, delisted stocks are included until they disappear. It is relevant to mention that since we cover companies from different countries with different currencies, all data are converted to US dollars.

From our dataset, we select those stocks that have information available at least for one of the following variables: Sales, BV, CF and DIV. These company-accounting items are obtained from the DataStream database complemented with hand-collected raw data from the companies' financial reports. The one-month US Treasury bill rate is used as the proxy for the risk-free rate and it is downloaded from Professor Kenneth French's website.

For the fundamental variables, we follow Arnott et al. (2005), except that we use three-year average for sales, CF and DIV rather than five years because the time period is not long enough. If a fundamental metric is negative, it is set equal to zero. Since we consider several fundamentals, excluding firms with negative fundamentals does not cause a significant problem for our analysis. Moreover, for those companies that do not pay DIV, we exclude this metric and use the average of the three other metrics to calculate the composite fundamental metric of such stocks.

In terms of the sectorial composition, the final dataset includes 35 per cent financial, 2 per cent utility, 2 per cent transportation, 4 per cent oil and 57 per cent industrial stocks. The weights of the different sectors for all the constructed portfolios are also explored to examine the changes in sector allocation from one portfolio to another over time. Figure 1 shows the sectorial allocation in the COMP and the CW portfolios over the sample period. For these two portfolios, the sector allocation is not substantially different. The COMP portfolio exhibits a slightly higher allocation in oil stocks and it also shows a slightly less stable allocation to the financial sector than the CW portfolio. The weight of the financial sector in the COMP portfolio shows a higher decrease in 2006 and then increases over time, especially during the period from 2007-2009.

Figure 1.
Sectorial allocation in the COMP and the CW portfolios
5. Empirical results and analysis

5.1 Analysis of portfolio performance using all stocks universe

Table I shows the risk and returns attributes for all the constructed portfolios using all the stocks in our dataset. Panel A of Table I reports the ending value of a $1 investment at the beginning of the period, mean annualized returns, annualized standard deviation, beta, turnover ratio and several risk-adjusted performance measures, namely the Sharpe ratio, Sortino ratio, Treynor ratio, information ratio and Jensen’s alpha. By comparing the results of the CW portfolio with those of the accounting based FW portfolios, we find that the highest ending value for a $1 investment and the highest average annual returns is for the CW portfolio, while the lowest values are for the BV portfolio. All the FW portfolios generate lower returns compared with the CW portfolio. The return generated by the CW portfolio is on average 5.83 (18.45 per cent -12.62 per cent) percentage points higher than that of the composite FW portfolio. The return differences between the CW portfolio and the FW portfolios are statistically significant for all portfolios with the exception of the sales portfolio. The CW portfolio presents the highest volatility, while the sales portfolio presents the lowest volatility. The betas for all the FW portfolios are slightly lower than one. In terms of the portfolio’s turnover, the CW portfolio has the highest turnover ratio, while the sales portfolio has the lowest ratio. Lower FW portfolios’ turnover is a result of using a three-year average for the accounting variables. In relation to risk-adjusted performance measures, all the FW portfolios present lower Sharpe and Sortino ratios in comparison with the CW portfolio, with the differences being statistically significant except for the sales portfolio. In addition, all the FW portfolios have lower Treynor ratios than that of the CW portfolio. The information ratios of all the FW portfolios are negative, thus indicating that the portfolios are unable to produce excess returns relative to the CW portfolio.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Ending Value of $1 (%)</th>
<th>Annual Return (%)</th>
<th>Annual Volatility (%)</th>
<th>Beta</th>
<th>Turnover Ratio (%)</th>
<th>Sharpe Ratio</th>
<th>Sortino Ratio</th>
<th>Treynor Ratio (%)</th>
<th>Inf. Ratio (%)</th>
<th>Jensen’s Alpha (%)</th>
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Note: *, **, *** stand for statistical significance at 10, 5 and 1%, respectively
alpha is also negative and statistically significant, except for the sales portfolio that has an insignificant alpha.

Furthermore, the CW portfolio is also compared to an EW portfolio and a SCW portfolio. The results show that the EW portfolio has insignificant lower annual returns, lower volatility and a lower beta than the CW portfolio. Moreover, it has a significantly higher Sharpe and Sortino ratios, higher Treynor ratio, and a positive and statistically significant alpha, although only at the 10 per cent level. On the contrary, and similarly to the FW portfolios, the SCW portfolio tends to underperform. Therefore, based on these measures, we find some evidence for the outperformance of the EW portfolio among all the constructed portfolios.

The performance of the constructed portfolios is also analyzed using more robust risk-adjusted measures based on the Fama and French (1993) three-factor model, the Fama and French (2015) five-factor model and a seven-factor model [4]. Table I, Panel B reports the alphas of these models for all the constructed portfolios. The coefficients of the different risk factors of the seven-factor model are also reported.

The alphas are negative and statistically significant for all the constructed portfolios, with the exception of the EW portfolio. The EW portfolio's alpha becomes negative but insignificant after controlling for additional risk factors, which means that its outperformance based on the traditional risk-adjusted measures and Sortino ratio disappears. Analyzing the coefficients of the risk factors, we observe that, in general, the market betas are slightly higher than one for most portfolios. The coefficient of the size factor (coefficient $s$) is positive and statistically significant for all portfolios except the BV and the SCW portfolios. The EW portfolio has the highest exposure to the size premium and the BV portfolio has the lowest exposure. The loadings on the value factor (coefficient $h$) are statistically significant only for the BV portfolio.

This finding indicates that this portfolio has a higher exposure to value stocks returns. The coefficient of the investment factor (coefficient $c$) is negative and statistically significant at the 5 per cent level just for the BV portfolio. This suggests that this portfolio is more exposed to aggressive stocks. The loadings on the profitability factor (coefficient $r$) are negative and significant for the DIV and the SCW portfolios, which mean that these portfolios are more exposed to stocks with low profitability. The coefficient of the illiquidity factor (coefficient $il$) is negative and statistically significant at the 10 per cent level just for the sales portfolio. Finally, the loadings on the momentum factor (coefficient $m$) are positive and statistically significant for the sales, COMP and EW portfolios at the 10 per cent level and at the 5 per cent level for the SCW portfolio. Overall, it can be noted that when additional risk factors are considered, abnormal returns are more negative than when the CAPM is used for all portfolios. Overall, the results of the multi-factor models confirm the superiority of the traditional CW portfolio. This finding is consistent with Walkshäusl and Lobe (2010) who find that the abnormal returns of the fundamental portfolios are driven by the risk factors loadings.

5.2 Analysis of portfolio performance using different concentration levels
To examine if the level of concentration has any effect on the performance of the different portfolios, we use the top 100 stocks based on the market capitalization to construct all the portfolios[5].

Table II reports the risk and return attributes for the constructed portfolios using the top 100 stocks. The results show that although the FW portfolios tend to have higher annual returns than using all stocks universe, they also exhibit higher volatility. In terms of the traditional risk-adjusted performance, the results are similar to those reported in Table I. The sales portfolio shows some evidence as the foremost among the FW portfolios and the
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<th>Sharpe ratio</th>
<th>Sortino ratio</th>
<th>Treynor ratio (%)</th>
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<th>Jensen's alpha (%)</th>
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</table>

Note: *, **; *** stand for statistical significance at 10, 5 and 1% respectively.
EW portfolio is found to outperform the CW portfolio. The seven-factor model alphas show that the sales and the EW portfolios perform similarly to the CW portfolio[6].

5.3 Analysis of portfolio performance using different weighting schemes
To analyze the effect of the construction schemes on the portfolios’ performance, the FW portfolios are constructed separately and independently from the reference CW portfolio. In other words, we do not just reweight the same constituents of the CW portfolio, whilst we independently choose the highest 100 stocks based on each fundamental metric. The composition of these portfolios shows that financial stocks dominate these portfolios.

Table III presents the risk and return attributes of the constructed portfolios for the biggest 100 (Panel A) and the smallest 100 stocks (Panel B).

Table III Panel A shows that using a different construction scheme for big stocks portfolios does not affect the previous findings. All the FW portfolios with the exception of the sales portfolio underperform the CW portfolio, and the EW portfolio is the superior portfolio using the traditional risk-adjusted measures and the Sortino ratio. However, by using more robust risk-adjusted measures, the findings show that all portfolios, except the EW portfolio, generate statistically significant negative alphas. The EW portfolio’s alpha becomes insignificant, which indicates that the EW outperformance is due to its loadings on the additional risk factors.

Table III Panel B shows the effect of the construction scheme on the smallest 100 stocks portfolios. All the portfolios, except for the SCW portfolio, have annual returns that are not statistically different from those of the CW portfolio. These portfolios have higher volatility and higher betas than the CW portfolio. The EW, sales and CF portfolios seem to perform similarly to the CW portfolio. However, when more robust risk-adjusted measures are used, only the sales and the EW portfolios perform similarly to the CW portfolio.

5.4 Analysis of portfolio performance for sub-regions
To analyze the robustness of our results, we divide the dataset into two sub-regions, the GCC and the CT.

Table IV reports the risk and return attributes for these two sub-regions portfolios using all stocks in each sub-region[7]. Similar to the MENA region results, the FW portfolios in the two sub-regions underperform the CW and the EW portfolios. In terms of the best FW portfolio, the sales portfolio is the best in the GCC and the CF and BV portfolios are the best in the CT. Moreover, by using the more robust risk-adjusted measures, all the FW portfolios in the GCC, except the sales portfolio, generate significantly negative alphas. The sales portfolio generates negative but insignificant alphas, while the EW portfolio generates a significantly positive alpha at the 10 per cent significance level. In the CT, the multi-factor models’ alphas are negative and statistically significant for all the FW portfolios, while they are not statistically significant for the EW and the SCW portfolios. In general, the CT portfolios not only present higher annual returns than those of GCC, but they also present lower volatility. However, although the CT portfolios exhibit Sharpe and Sortino ratios that are statistically higher than those of the GCC, the multi-factor models’ alphas are not statistically different. This evidence suggests that the portfolios in the CT outperform those in the GCC using the Sharpe and the Sortino ratios, but this outperformance disappears using the more robust risk-adjusted measures. These results are due to the market characteristics of the CT that includes Israel, a country that has one of the largest and the most stable financial markets in the MENA region during the crisis periods. In addition, the GCC portfolios include more financial and oil stocks that are sharply affected by the global financial crisis. Nevertheless, the results confirm the underperformance of the FW in the two sub-regions.
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<th>Inf. ratio (%)</th>
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<td>14.36</td>
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<td>-0.15***</td>
<td>-0.12***</td>
<td>-0.12***</td>
</tr>
</tbody>
</table>

**Note:** *, **, ***stand for statistical significance at 10, 5 and 1% respectively

Table III: Risk and return characteristics of the constructed portfolios based on the biggest 100 and the smallest 100 stocks using different constituents of those in the CW portfolio.
Table IV.
Risk and return characteristics of the
constructed portfolios in the two sub-regions.

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Ending value of $1</th>
<th>Annual return (%)</th>
<th>Annual volatility (%)</th>
<th>Turnover ratio (%)</th>
<th>Sharpe ratio</th>
<th>Sortino ratio (%)</th>
<th>Treynor ratio (%)</th>
<th>Jensen's alpha (%)</th>
<th>Three-factor alpha</th>
<th>Five-factor alpha</th>
<th>Seven-factor alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: GCC sub-region</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>3.61</td>
<td>12.38***</td>
<td>22.75</td>
<td>1.02</td>
<td>10.99</td>
<td>0.22***</td>
<td>0.22***</td>
<td>15.31</td>
<td>-0.33</td>
<td>-0.35***</td>
<td>-0.22</td>
</tr>
<tr>
<td>CF</td>
<td>3.63</td>
<td>12.44***</td>
<td>22.16</td>
<td>0.99</td>
<td>15.46</td>
<td>0.22*</td>
<td>0.23***</td>
<td>15.82</td>
<td>-0.45</td>
<td>-0.32***</td>
<td>-0.31***</td>
</tr>
<tr>
<td>BV</td>
<td>2.96</td>
<td>10.38***</td>
<td>21.56</td>
<td>0.96</td>
<td>16.25</td>
<td>0.22***</td>
<td>0.22***</td>
<td>13.88</td>
<td>-0.59</td>
<td>-0.43***</td>
<td>-0.35***</td>
</tr>
<tr>
<td>DIV</td>
<td>3.18</td>
<td>11.09***</td>
<td>21.48</td>
<td>0.96</td>
<td>18.97</td>
<td>0.21***</td>
<td>0.21***</td>
<td>14.55</td>
<td>-0.58</td>
<td>-0.38***</td>
<td>-0.45***</td>
</tr>
<tr>
<td>COMP</td>
<td>3.33</td>
<td>11.57***</td>
<td>21.82</td>
<td>0.98</td>
<td>12.29</td>
<td>0.22***</td>
<td>0.22***</td>
<td>14.91</td>
<td>-0.63</td>
<td>-0.37***</td>
<td>-0.30***</td>
</tr>
<tr>
<td>CW</td>
<td>5.52</td>
<td>16.81</td>
<td>22.02</td>
<td>0.66</td>
<td>20.66</td>
<td>0.28</td>
<td>0.28</td>
<td>20.78</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EW</td>
<td>4.35</td>
<td>14.31</td>
<td>15.68</td>
<td>0.66</td>
<td>9.70</td>
<td>0.37***</td>
<td>0.37***</td>
<td>23.06</td>
<td>-0.07</td>
<td>0.21</td>
<td>0.12</td>
</tr>
<tr>
<td>SCW</td>
<td>5.29</td>
<td>16.36</td>
<td>22.75</td>
<td>1.03</td>
<td>20.45</td>
<td>0.27</td>
<td>0.27</td>
<td>20.36</td>
<td>-0.18</td>
<td>-0.07</td>
<td>-0.05*</td>
</tr>
<tr>
<td><strong>Panel B: CT sub-region</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Sales</td>
<td>4.87</td>
<td>15.48</td>
<td>20.36</td>
<td>1.18</td>
<td>11.85</td>
<td>0.30***</td>
<td>0.31***</td>
<td>15.57</td>
<td>-0.25</td>
<td>-0.58***</td>
<td>-0.65***</td>
</tr>
<tr>
<td>CF</td>
<td>4.66</td>
<td>15.02***</td>
<td>17.51</td>
<td>1.08</td>
<td>17.45</td>
<td>0.34***</td>
<td>0.34***</td>
<td>14.87</td>
<td>-0.48</td>
<td>-0.48***</td>
<td>-0.43***</td>
</tr>
<tr>
<td>BV</td>
<td>4.22</td>
<td>13.98***</td>
<td>16.03</td>
<td>0.99</td>
<td>17.27</td>
<td>0.34***</td>
<td>0.35***</td>
<td>14.51</td>
<td>-0.52</td>
<td>-0.43***</td>
<td>-0.31***</td>
</tr>
<tr>
<td>DIV</td>
<td>4.53</td>
<td>14.72***</td>
<td>19.13</td>
<td>1.15</td>
<td>22.98</td>
<td>0.31***</td>
<td>0.31***</td>
<td>13.36</td>
<td>-0.32</td>
<td>-0.60***</td>
<td>-0.47***</td>
</tr>
<tr>
<td>COMP</td>
<td>4.56</td>
<td>14.80***</td>
<td>17.93</td>
<td>1.10</td>
<td>12.81</td>
<td>0.33***</td>
<td>0.33***</td>
<td>14.52</td>
<td>-0.44</td>
<td>-0.52***</td>
<td>-0.47***</td>
</tr>
<tr>
<td>CW</td>
<td>7.47</td>
<td>20.06</td>
<td>15.79</td>
<td>0.50</td>
<td>21.71</td>
<td>0.47</td>
<td>0.48</td>
<td>20.28</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EW</td>
<td>8.61</td>
<td>21.62</td>
<td>19.59</td>
<td>0.92</td>
<td>9.50</td>
<td>0.40</td>
<td>0.41</td>
<td>24.47</td>
<td>-0.09</td>
<td>0.23</td>
<td>0.15</td>
</tr>
<tr>
<td>SCW</td>
<td>6.52</td>
<td>18.58</td>
<td>16.18</td>
<td>1.00</td>
<td>21.89</td>
<td>0.42***</td>
<td>0.43***</td>
<td>18.67</td>
<td>-0.13</td>
<td>-0.11</td>
<td>-0.07</td>
</tr>
</tbody>
</table>

Notes: *, **, ***stand for statistical significance at 10, 5 and 1% respectively.
6. Conclusions
This study examines the performance of FW portfolios that weights stocks based on accounting data, a SCW portfolio that may be an alternative to FW portfolios and an EW portfolio that minimize the concentration risk that characterizes the CW approach. The findings document the underperformance of the FW portfolios in comparison with the CW portfolio in the MENA region. All the FW portfolios, except the sales portfolio, generate returns and risk-adjusted ratios that are significantly lower than the CW portfolio. The sales portfolio is the only fundamental portfolio that has mean excess returns, Sharpe and Sortino ratios that are insignificantly different from those of the CW portfolio. This result may be due to the fact that the sales portfolio is the one including the lowest percentage of stocks from the financial sector. However, by using more robust risk-adjusted measures based on multi-factor models, all the FW portfolios generate statistically significant negative alphas. Therefore, the FW portfolios underperform the CW portfolio. Our study also documents that the SCW portfolio underperforms the CW portfolio, whilst the EW portfolio outperforms the CW portfolio using the traditional risk-adjusted measures. After controlling for additional risk factors, the EW portfolio outperformance disappears.

All the previous results are robust to different construction concentration levels, different construction schemes and different sub-regions. Our findings are consistent with those of Walkshäusl and Lobe (2010) who find that FW portfolios underperform in emerging markets.

Moreover, our results provide some evidence that the portfolios have exposure to the size, value, investment, profitability, momentum and illiquidity risk factors. This result confirms the prevailing view in the literature (Walkshäusl and Lobe, 2010; Stotz et al., 2010; Hsieh, 2013) that shows that in most cases the outperformance of fundamental portfolios is driven by the risk factors loadings.

Although the expectations were that FW portfolios would outperform in emerging markets, since these markets are less efficient and the prices in these markets are noisier, they are not confirmed in the MENA region. Thus, our findings suggest that the fundamental variables do not have more information about the fair values of the stocks than the stocks’ prices. From another perspective, the underperformance of the FW portfolios in this region could also be due to the overweight position in the financial sector, which represents 35 per cent of our dataset and whose stock prices dropped sharply during the global financial crisis. Furthermore, the MENA region had been affected by the Arab Spring uprisings in 2011 and by the Oil shock in 2014, which also affect financial sector prices. In conclusion, our results show that the BV, CF, DIV, COMP and SCW portfolios are not appropriate investment alternatives to the standard CW portfolio in the MENA region, while the EW and the sales portfolios could be good alternatives. Specifically, this region has a unique characteristic such as unstable political and economic situation, which makes our results differ from those in some of the previous literature.

Overall, our results add evidence to the debatable propositions on the performance of the FW portfolios in emerging markets. Furthermore, the findings may help domestic and international investors, practitioners and decision-makers to deepen their knowledge in terms of the best portfolio construction scheme in the MENA region. For further research, it would be of interest to investigate the effect of the Arab Spring on the performance of FW portfolios. Moreover, an interesting avenue for further research would be to study the investor sentiment that may influence portfolio management and its evaluation in this region.
Notes

1. There is a MSCI CW index for this region, but the constituents of this index are not freely available, and so a similar portfolio is constructed in this research based on the dataset of stocks collected for all the markets in this region. Another reason for constructing a CW portfolio, as opposed to just using the MSCI index, is to allow for a more reasonable, equitable and practical comparison.

2. The average of arithmetic monthly returns is annualized by \((1 + R)^{12} - 1.0\). We annualize the monthly standard deviation by multiplying it by \(\sqrt{12}\).

3. We considered transaction costs to be equal to zero for all portfolios.

4. The risk factors are available for the MENA region only for the period from 2007-2015.

5. We also constructed portfolios based on the top 50 stocks. The results are almost the same, with FW portfolios underperforming the CW portfolio.

6. We also used the smallest 100 stocks to construct the CW portfolio. We find similar results to those of the biggest 100 stocks with the FW portfolios underperforming the CW portfolio.

7. Portfolios constructed using the biggest 100 and the biggest 50 stocks in each of the sub region were also analysed and the results were similar to those reported in Table IV.

References


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Cross section of stock returns on Shari’ah-compliant stocks: evidence from Pakistan

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Abstract

Purpose – This paper aims to study the cross section of expected returns on Shari’ah-compliant stocks in Pakistan by using single- and multi-factor asset pricing models.

Design/methodology/approach – To estimate cross section of expected returns of Shari’ah-compliant stocks, the study uses capital asset pricing model (CAPM), Fama-French three-factor model and Fama-French five-factor model. Data for the period 2001-2015 on 217 companies are used. For the market portfolio, PSX-100 and Dow Jones Islamic Index for Pakistan are used.

Findings – The study could not find empirical support for CAPM using Lintner (1965), Black et al. (1972) and Fama and Macbeth (1973) approach. Nonetheless, the relation between beta and returns is positive in up-market and negative in down-market. The results of Fama-French three-factor and five-factor models suggest that size premium is positive and significant for explaining the cross section of stock returns of small size stocks, whereas value premium is positive and significant for explaining the cross section of returns of high value stocks.

Practical implications – The results suggest that fund managers can use Shari’ah-compliant stocks for portfolio diversification and for offering specialized investments given the positive market excess returns and the existence of size and value premium on Shari’ah-compliant stocks.

Originality/value – This is the first study on Fama-French (2015) five-factor model for Islamic capital markets in Pakistan.

Keywords CAPM, Islamic capital markets, Asset pricing, Factor models, Shari’ah-compliant stocks

Paper type Research paper

JEL classification – G11, G12, G17
1. Introduction
Equity investments provide relatively higher gross returns as compared to fixed income investments on average over a long period of time (Mehra and Prescott, 1985; Kocherlakota, 1996). One of the key activities in portfolio management is security selection and portfolio revision in response to changes in the information set. Asset pricing models are used as tools to guide investment decisions in security selection for direct investors and professional portfolio managers. Most asset pricing models relate expected returns to risks which investors have to bear. The factor based asset pricing models differ mainly in the risk factors they allow to enter into the model (Krause, 2001).

This paper aims to explore the effectiveness of single factor and multi-factor asset pricing models in explaining the cross section of returns on Shari‘ah-compliant stocks as Muslim investors can only invest in Shari‘ah-compliant stocks if they pursue Shari‘ah-compliant returns on stock market investments. The results will have important implications for investigating the risk adjusted performance of Shari‘ah-compliant stocks. If the asset pricing models do a good job in explaining cross section of returns, then, they can be used for security analysis and investment evaluation. The identification of factor premiums can also be used by the Islamic mutual funds to offer specialized style investing products.

2. Research background
2.1 Research issues
An efficient performance of pricing mechanism in capital markets is a catalyst for channeling savings into investment (Javid, 2008). Capital asset pricing model (CAPM) was the pioneer asset pricing model to appear on the scene in the 1960s (Sharpe, 1964). CAPM stipulates that only systematic risk, as measured by beta, is rewarded and that the relationship between expected return and beta is linear. Lintner (1965) performs the first empirical test of the CAPM using a two-stage regression. He rejects CAPM based on his tests; however, his two-stage regression procedure was performed on individual stocks rather than portfolios. This enabled beta estimation errors to cloud his results. Conversely, Black et al. (1972) find evidence to support CAPM based on their test of portfolios. Fama and MacBeth (1973) establish that while the riskless rate and beta explained the structure of security returns, beta squared and unsystematic variances did not. These results and those published in numerous papers afterwards lent support to the validity of CAPM.

Nevertheless, in the subsequent literature, Basu (1977) and Fama and French (1992) reveal that firms with lower P/E ratios outperform firms with higher P/E ratios. Fama and French (1992) establish that the P/E ratio combined with firm size predict security returns significantly better than CAPM.

Numerous studies provide challenging evidence against CAPM (Fama and French, 1996; Gibbons, 1982; Lehmann, 1992; Friend and Blume, 1970; Fama and French, 2004). Studies which try to reconcile and answer the challenging evidence raise the issue of imperfect observable market proxies (Roll, 1977; Jagannathan and Wang, 1993). This view, that the data are too noisy to invalidate CAPM, is supported by Amihud et al. (1992) and Black (1993). In fact, Amihud et al. (1992) find that when a more efficient statistical method is used, the estimated relation between average return and beta is positive and significant. Black (1993) suggests that the size effect noted by Banz (1981) could simply be a sample period effect.

As an alternate to CAPM, arbitrage pricing theory (APT) was developed with fewer restrictive assumptions than CAPM (Ross, 1976). APT posits that expected security returns are related in a linear fashion to multiple common risk factors. Unfortunately, the arbitrary
choice of factors in APT without theoretical support offers flexibility, but it gives little theoretical underpinning.

Another approach to identifying the risk exposures in a multifactor model relies on the characteristics of the securities themselves. Fama and French (1992) three-factor model includes market risk factor, size factor and value factor. In the multi-factor models that were developed subsequently, Carhart’s four-factor model extends the Fama-French three-factor model by including a momentum factor (Carhart, 1997). In more recent research in this vein of multi-factor models, empirical q-factor model (Hou et al., 2014) argues that an empirical model consisting of the market factor, a size factor, an investment factor, and a profitability factor largely summarizes the cross section of average stock returns. Alongside this model, Fama-French five-factor model explains cross section of average returns by capturing the market risk, size, value, profitability, and investment premium (Fama and French, 2015).

Given the multitude of asset pricing models that appear in literature and used in practice, it becomes imperative to be knowledgeable about their use and efficacy in asset pricing of Shari’ah-compliant stocks. Shaharuddin et al. (2016) observe that the existing literature has insufficient works focusing on asset pricing, especially relating to Islamic equity style investing. They argue that researchers and investors can gain by understanding the performance of Islamic stocks once classified according to different styles and characteristics. Some researchers have analyzed the characteristic features of Islamic stocks and have identified diversification benefits in down-market situations (Abbes, 2012; Saiti et al., 2014) and lower volatility (Sensoy et al., 2015) despite being not decoupled from conventional indices (Yilmaz et al., 2015). Furthermore, Chen and Lim (2016) find that Shari’ah-compliant stocks required a smaller number of stocks in a portfolio to reduce the specific amount of risk in Malaysia.

This current study is important as asset pricing for Muslim investors is crucial as they face additional challenges in terms of restricted choice of investment opportunity set, dividend purification costs and potentially lesser liquidity due to prohibition of interest based financial derivatives and margin financing. Therefore, selecting the right security and timely revising portfolio becomes even more critical for Muslim investors. To meet this need, the relative performance of different asset pricing models is investigated for explaining the cross section of expected returns of Shari’ah-compliant stocks. The study helps in identifying factor premiums which should be taken care of in security analysis and investment evaluation of Shari’ah-compliant stocks.

3. Choice of asset pricing models in security analysis of Shari’ah-compliant stocks

One issue that arises in using asset pricing models developed in mainstream financial economics literature is that can these asset pricing models be used in the security analysis of Islamic equity investments. Mannan (1982) proposed the use of accounting price of capital which will neither add to the cost of production nor form part of the profits; but, instead will be used to appraise projects and investments. In this context, the role of asset pricing models is to offer an ex-ante means of analyzing investment options available to the investors. Hazny and Yusof (2012) discuss the assumptions of Markowitz’s mean variance analysis and CAPM from the Shari’ah perspective and conclude that some of these assumptions are simplistic for the purpose of facilitating analysis. Rosly (2005) and Hazny and Yusof (2012) argue that the Islamic principle of Al Ghunn bil Ghurm means that returns are justified by taking risks. Furthermore, Al-Kharaj bil Dhaman bases the entitlement to profits on corresponding liability for bearing losses. These maxims are broadly consistent with the positive ex-ante relationship between risk and return in investment literature. In addition to
that, divisible investments are possible in real Islamic financial assets through sukuk, Islamic mutual funds and Shari‘ah-compliant common stocks. Thus, the assumption of marketability and divisibility of investment assumptions are also tenable.

Furthermore, the risk-free rate can be replaced with sukuk profit rate or to the benchmark with which sukuk profits are linked. Iqbal (2002) argues that the assumption of short selling might be solved by assuming complete markets. In subsequent developments in Islamic capital markets, Bai Salam, Bai Arboun and Ready Buy Deferred Sale products have facilitated Islamic investors and Islamic capital markets to reach equilibrium price level through liquid transaction possibilities in over-priced and under-priced stocks.

In conventional finance, the interest rate on sovereign debt serves as a proxy for risk-free rate (Askari et al., 2011). Hanif (2011) suggests that inflation rate can be included in place of the risk-free rate in Islamic security analysis. Nonetheless, Ayub (2007) cites the Fiqh Academy of the OIC which has ruled out indexation of a lent amount of money to the cost of living indicators. Ashker (1987) suggests using Zakat rate in place of risk-free rate. As per this proposal, investors would demand at least 2.5 per cent return to keep intact their net value of the investment after payment of Zakat. A question arises that can the investment companies or the government offer such a particular return on investment. As per Islamic injunctions, Zakat is obligatory on Muslims who own assets and resources equal to at least the minimum value of Nisab. Risk-free rate implies return on safe investments; whereas, Zakat is a religious obligation to pay a part of wealth and produce provided that the aggregate sum of wealth in ownership exceeds the value of Nisab.

In searching for a better alternative for the risk-free rate in Islamic capital markets, the return offered by the government on its sovereign sukuk could be a suitable choice. In fact, sukuk are even safer than Treasury bills for investors as investors have recourse to the real assets underlying the sukuk. The rate of return on sukuk solves the problem of the alternative of risk-free rate in security analysis for Islamic investors (Schoon, 2011).

On the other hand, Hakim et al. (2016) argue that Zero-beta CAPM does not require a security paying a fixed return. Thus, Zero-beta CAPM could also be applicable for Islamic capital markets. The multi-factor models which use internal factors of the company to explain ex-post returns are empirical models based on facts. By delinking interest as a fixed return on investments, Islamic risk sharing philosophy in financial investments is more aligned with the approach of focusing on the internal factors of the company for financial decision making. Factors which represent the financial standing of the company in terms of capitalization, book value to market equity, profitability and investment style focus on the nature and quality of companies in which investments are contemplated.

Therefore, it can be seen that some of the mainstream asset pricing models can be used for security analysis in Islamic equity investments from the Shari‘ah perspective. Consequently, the choice of particular asset pricing models in practical use must depend on their ability to better explain returns on Shari‘ah-compliant stocks.

Some attempts have been made to integrate CAPM and Islamic Profit and Loss Sharing (PLS) Mode by Selim (2008) who concludes that rather than a trade-off between return and risk, there will be a trade-off between risk and investment share, i.e. investment share will be inversely proportional to the risk. Another modification to CAPM was suggested by Hanif (2011) to include inflation rate as against the interest rate on T-bills to make the asset pricing model usable for Islamic investments. In recent literature, Derbali et al. (2017) incorporate Zakat, purification of return and exclusion of short sales in CAPM.
4. Brief review of empirical studies in asset pricing

This section lists selected empirical studies which apply and test the various asset pricing models in practice for security valuation in developed and emerging markets. Kaniel et al. (2012) examine the high-volume return premium, as defined by Gervais et al. (2001), across 41 countries to investigate its existence and determinants. The results indicate that the high-volume return premium is a strikingly pervasive global phenomenon as it has a significant presence in almost all developed markets and in a number of emerging markets as well.

Fama and French (2012) examine stock returns in North America, Europe, Japan and the Asia Pacific to detect the presence of size, value and momentum premiums. Results highlight that there are value premiums in average stock returns that, except for Japan, decrease with size. Basiewicz and Auret (2010) test the feasibility of the Fama and French (1992) three-factor model on the Johannesburg Stock Exchange and find supportive evidence for size and value premium.

Czapkiewicz and Wójtowicz (2014) test four-factor asset pricing model on the Warsaw Stock Exchange (WSE) and show that momentum is a significant factor on the WSE and the four-factor model describes the returns variation much better than the three-factor model. Eraslan (2013) tests the validity of the Fama-French three-factor asset pricing model on the Istanbul stock exchange and conclude that the model has modest explanatory power to explain variations in excess portfolio returns. Minović and Živković (2014) use augmented CAPM by including the factor of liquidity and size on the Croatian stock market. Results indicate that liquidity augmented model performs better in explaining stock returns than the standard CAPM.

Next, studies that apply the various asset pricing models on the stocks listed in Pakistan are discussed. Iqbal and Brooks (2007) investigate the applicability of CAPM in explaining the cross section of stock returns on the Karachi Stock Exchange (KSE) during 1992-2006. The results reveal that the risk-return relationship appears to be non-linear.

In another research, Javid and Ahmed (2008) test standard CAPM and conditional CAPM on 49 stocks listed on KSE during 1993-2005. The empirical findings do not support the standard CAPM model. Nevertheless, the empirical results of the conditional CAPM are more supportive where lagged macroeconomic variables are used for conditioning information. Sadaf and Andleeb (2014) use inflation rate as against the T-bills rate in applying CAPM for listed stocks in Pakistan. The results show that the returns would approximately be the same no matter whether T-bills rate or inflation rate is used as a risk-free rate.

Mirza and Saima (2008) evaluate the ability of the Fama-French three-factor model to explain cross section of stock returns in KSE and find supportive evidence. Using more recent data, Rehman and Razzaq (2015) examine the impact of size and price to earnings ratio on equity returns by using the Fama-French three-factor model. Their results demonstrate that market premium exists in Pakistani equity market, but the size premium does not explain the returns of big portfolios. In another research, Iqbal et al. (2010) investigate that whether allowing the asset pricing model parameters to vary improves the performance of CAPM and the Fama-French three-factor model. The results indicate that the unconditional Fama-French three-factor model augmented with a cubic market factor performs the best among the competing models. Dissecting the results across different market conditions, Javid and Ahmad (2011) investigate the dynamics of beta by the asymmetric response of beta to bullish and bearish market environment. The results show that the betas increase (decrease) when the market is bullish (bearish).

Hence, the above review suggests that asset pricing models have had mixed performance in Pakistan. However, most recent models like the Fama-French five-factor model are yet to
be applied. Furthermore, empirical studies do not differentiate between Shari’ah-compliant and Shari’ah-non-compliant stocks. Islamic mutual funds now own one-third market share in the asset management industry in Pakistan. Thus, it is pertinent to analyze the choice of asset pricing models to use for security analysis and investment evaluation of Shari’ah-compliant stocks.

5. Research methodology
5.1 Data collection
Shari’ah-compliant stocks are selected through the screening methodology adopted in KSE Al-Meezan Index (KMI). Data for the period 2001-2015 on 217 companies are used. For each year, the total number of halal stocks used in the analysis are reported in Table I.

For the market portfolio, Pakistan Stock Exchange 100 index (PSX-100) and Dow Jones Islamic Index for Pakistan are used. PSX-100 index has a representation of Modarba sector, mutual funds and real estate investment trusts along with representation from each of the other economic sectors. On the other hand, Dow Jones Islamic Index for Pakistan focuses particularly on Shari’ah-compliant equities in Pakistan. For risk-free rate, the interbank benchmark rate with which sukuk profits are linked is used, i.e. Karachi Interbank Offered Rate (KIBOR).

5.2 Empirical approach
To estimate cross section of expected returns of Shari’ah-compliant stocks, this study uses CAPM, Fama-French three-factor model and Fama-French five-factor model. Brief details of the estimation procedures to use these models in asset pricing are given below.

5.2.1 Capital asset pricing model. The standard algebraic form of CAPM is as follows:

\[ E(R_i) = R_f + (R_m - R_f) b_i \] (1)

Here, \( E(R_i) \) is expected return on capital asset “i”, \( R_f \) is risk-free rate of return, \( R_m \) is return on market portfolio and \( b_i \) is index of systematic risk.

To estimate CAPM byLintner (1965) approach, first, the time series regression is run for each individual stock to estimate the stock’s beta using the monthly dividend adjusted price data. In the second step, the cross sectional regression is run using the beta and fitted values of first step regression. First pass regression is estimated as follows for each individual stock \( i \):

\[ R_{it} - R_{ft} = \beta_{0i} + \beta_{1i} (R_{mt} - R_{ft}) + \mu_{it} \] (2)

In the next step, the second pass regression is estimated in three versions as expressed in equations (3)-(5).
\[ \bar{R}_i - \bar{R}_f = \alpha_0 + \alpha_1 \hat{\beta}_i + \varepsilon_i \]  \hfill (3)

\[ \bar{R}_i - \bar{R}_f = \alpha_0 + \alpha_1 \hat{\beta}_i + \alpha_2 \hat{\beta}_i^2 + \varepsilon_i \]  \hfill (4)

\[ \bar{R}_i - \bar{R}_f = \alpha_0 + \alpha_1 \hat{\beta}_i + \alpha_2 \hat{\beta}_i^2 + \alpha_3 \hat{\sigma}^2(\varepsilon_i) + \varepsilon_i \]  \hfill (5)

Where, \( \bar{R}_i - \bar{R}_f \) represents the average excess return on each security.

\( \hat{\beta}_i \) represents the beta of the individual securities as estimated in the first pass regression.

\( \hat{\sigma}^2(\varepsilon_i) \) represents the residual variance from the first pass regression for each security \( i \).

If CAPM is correct, then \( \alpha_0 \) term must be zero and statistically insignificant in equation (3). If linear CAPM is correct, then \( \alpha_2 \) term must be zero and statistically insignificant in equation (4). If CAPM is correct and the only relevant risk in asset pricing is the systematic risk, then \( \alpha_3 \) term must be zero and statistically insignificant in equation (5).

Using the Black et al. (1972) portfolio approach of testing CAPM, this stepwise procedure is followed:

1. Estimate a beta for each stock using 60 monthly returns observations during the period, 2001-2005.
2. Form ten portfolios based on beta rankings. The first portfolio has top 10 per cent stocks with the highest betas. The last portfolio comprises bottom 10 per cent stocks with the smallest betas.
3. Compute each of the portfolio’s returns for each month of 2006.
4. Repeat Steps 1-3 for subsequent years by moving a year ahead one at a time.

The security market line is examined by forming 20 portfolios. From this four-step procedure, a series of 120 monthly beta-sorted portfolio returns are obtained from 2006 to 2015. Finally, the security market line is estimated by regressing the average of all monthly returns for each of the ten portfolios against their portfolio betas.

Using the Fama and Macbeth (1973) portfolio approach of testing CAPM, this stepwise procedure is followed:

1. Estimate a beta for each stock using 48 monthly returns observations during the period, 2001-2004.
2. Form 20 portfolios based on the beta rankings. The first portfolio has top 5 per cent stocks with the highest betas. The last portfolio comprises bottom 5 per cent stocks with the smallest betas.
3. Estimate beta of each of the portfolios by regressing monthly portfolio returns against the market index during the period, 2005-2008.
4. For each of the months during 2009, estimate the expected portfolio returns by regressing actual portfolio returns against portfolio betas.
5. Repeat Steps 1-4 for subsequent years by moving a year ahead one at a time.

From this five-step procedure, a series of 84 monthly beta-sorted portfolio returns are obtained from 2009 to 2015. Using this data, equations (3)-(5) are estimated to obtain 84 estimates of each of the parameter coefficients in these equations. For each equation, the
mean value is computed for each of the coefficients. A test is performed to see whether the means are significantly different from zero or not.

Following Pettengill et al. (1995), the conditional relation between beta and returns is also examined. To do this, equations (6)-(8) are estimated:

\[
\bar{R}_i - \bar{R}_f = \alpha_0 + \alpha_1 \delta \hat{\beta}_i + \alpha_2 (1 - \delta) \hat{\beta}_i + \varepsilon_i
\]  

(6)

\[
\bar{R}_i - \bar{R}_f = \alpha_0 + \alpha_1 \delta \hat{\beta}_i + \alpha_2 (1 - \delta) \hat{\beta}_i + \alpha_3 \hat{\beta}_i^2 + \varepsilon_i
\]  

(7)

\[
\bar{R}_i - \bar{R}_f = \alpha_0 + \alpha_1 \delta \hat{\beta}_i + \alpha_2 (1 - \delta) \hat{\beta}_i + \alpha_3 \hat{\beta}_i^2 + \alpha_4 \sigma^2(e_i) + \varepsilon_i
\]  

(8)

In equations (6)-(8), \( \delta = 1 \) if the return on market exceeds the risk-free rate and \( \delta = 0 \) if the return on market is lower than the risk-free rate. Following Pettengill et al. (1995), the study tests \( \alpha_1 > 0 \) and \( \alpha_2 < 0 \).

5.2.2 Fama-French three factor model. The estimable econometric equation for Fama-French three-factor model is as follows:

\[
R_{it} - R_f = \beta_0 + \beta_M (R_{mt} - R_f) + \beta_{SMB} SMB_t + \beta_{HML} HML_t + u_{it}
\]  

(9)

Here, \( R_{it} - R_f \) and \( R_{mt} - R_f \) represent the excess return on portfolio \( i \) and market portfolio. \( \beta_M, \beta_{SMB} \) and \( \beta_{HML} \) represent the market, size and value premiums, respectively.

To construct the SMB and HML factors, stocks are categorized into two categories in size dimension and three categories in book-to-market equity dimension. Size can be big (B) or small (S). Book-to-market equity could be low (L), medium (M) or high (H). By sorting stocks on book-to-market equity, stocks are classified into three categories at the 30th and 70th percentiles. Hence, six portfolios are obtained: S/L, S/M, S/H, B/L, B/M, and B/H, where S and B indicate small or big and L, M and H indicate growth (low book-to-market equity), neutral (medium book-to-market equity) and value (high book-to-market equity) portfolios.

SMB is the equal-weighted average of the returns on the three small stock portfolios minus the average of the returns on the three big stock portfolios:

\[
SMB = 1/3(S/L + S/M + S/H) - 1/3(B/L + B/M + B/H)
\]  

(10)

HML is the equal-weighted average of the returns on the two high B/M portfolios minus the average of the returns for the two low B/M portfolios:

\[
HML = 1/2(S/H + B/H) - 1/2(S/L + B/L)
\]  

(11)

Fama-French regression is estimated for six portfolios constructed by \( 2 \times 3 \) sorting as is done in earlier studies on emerging markets like Pakistan with a relatively small number of listed stocks (Ali et al., 2018; Mirza, 2008; Mirza and Saima, 2008). In each of these six separate regressions, the independent variables are same while the dependent variable is the return on a specific portfolio in excess of risk-free rate over a given period.

5.2.3 Fama-French Five-Factor model. Fama and French (2015) introduce a five-factor asset pricing model with two new factors: profitability and investment. They define profitability as operating profit minus interest expense divided by book equity. They measure investment as the change in total assets divided by total assets. Total assets can
change due to the change in debt and/or equity. Instead of using growth in total assets as the indicator for aggressive and conservative investment strategies, the debt to equity ratio is used instead. Companies with higher debt to equity ratio are regarded as aggressive investment companies, whereas companies with lower debt to equity ratio are considered as conservative investment companies. The econometric model used for estimation is as follows:

\[
R_{it} - R_{ft} = \beta_0 + \beta_M (R_{mt} - R_{ft}) + \beta_{SMB} SMB_t + \beta_{HML} HML_t \\
+ \beta_{RMW} RMW_t + \beta_{CMA} CMA_t + \epsilon_{it}
\]

(12)

Using the portfolio formation convention followed by Fama and French (2015), five factors are constructed \((2 \times 3)\) by using the six value-weighted portfolios formed on size and book-to-market, the six value-weighted portfolios formed on size and operating profitability and the six value-weighted portfolios formed on size and investment. SMB (Small Minus Big) is the average return on the nine small stock portfolios minus the average return on the nine big stock portfolios:

\[
SMB_{B/M} = \frac{(SH + SM + SL)}{3} - \frac{(BH + BM + BL)}{3}
\]

(13)

\[
SMB_{OP} = \frac{(SR + SM + SW)}{3} - \frac{(BR + BM + BW)}{3}
\]

(14)

\[
SMB_{INV} = \frac{(SC + SM + SA)}{3} - \frac{(BC + BM + BA)}{3}
\]

(15)

\[
SMB = \frac{(SMB_{B/M} + SMB_{OP} + SMB_{INV})}{3}
\]

(16)

HML (High Minus Low) is the average return on the two value portfolios minus the average return on the two growth portfolios:

\[
HML = \frac{(SH + BH)}{2} - \frac{(SL + BL)}{2}
\]

(17)

RMW (Robust Minus Weak) is the average return on the two robust operating profitability portfolios minus the average return on the two weak operating profitability portfolios:

\[
RMW = \frac{(SR + BR)}{2} - \frac{(SW + BW)}{2}
\]

(18)

CMA (Conservative Minus Aggressive) is the average return on the two conservative investment portfolios minus the average return on the two aggressive investment portfolios:

\[
CMA = \frac{(SC + BC)}{2} - \frac{(SA + BA)}{2}
\]

(19)
For estimating these asset pricing models, generalized method of moments (GMM) regression is used with two sets of instruments. The first set uses lagged market return and lagged asset return as used in Javid and Ahmed (2008). The second set uses three instruments, namely short-term interest rate (used in Fama and Schwert, 1977), default spread (used in Fama and French, 1989) and the term spread (used in Fama and French, 1989).

6. Discussion and analysis of results
This section presents the results and findings. Table II provides average monthly returns on the two value weighted indices, i.e. Dow Jones Islamic Index for Pakistan and MSCI Index for Pakistan. It is found that the average monthly returns for Dow Jones Islamic Index for Pakistan had been positive during 2001-2015. In sub-periods as well, the same trend is noted. The volatility of returns on Dow Jones Islamic Index for Pakistan is lower in absolute terms as compared to the unrestricted market index. Relatively, Islamic index provides the best returns during the period in which a major crisis occurred in the market, i.e. 2006-10.

The average monthly returns on Shari‘ah-compliant stocks sorted on the basis of size, value, profitability and investment are presented in Table III. On the whole, the size premium exists when SMB is sorted by value (1.1 per cent), profitability (2.33 per cent) and investment (1.79 per cent).

Next, the results of the asset pricing model regressions are presented. First, the results of testing linear, non-linear and non-linear with residual variance CAPM using the Lintner (1965) approach are discussed. The results which appear in Table IV reveal that all forms of standard CAPM lack supportive evidence. The beta coefficient is marginally positive in linear CAPM in OLS and negative in GMM, but it is insignificant in both estimation methods. When non-linearity term is added in the model, the beta becomes significant, but negative in OLS and positive in GMM. Furthermore, the non-linear coefficient turns out to be positive and statistically significant. When non-linearity and residual variance are added together in the model, the beta becomes significant, but negative in both OLS and GMM.

CAPM posits a positive relation between beta and returns. However, the results find contrary evidence which suggests that Islamic stocks can be used in market downturns to cushion the overall portfolio returns. Like other recent studies, there is a lack of supporting evidence for standard CAPM, which provides motivation to also test other multi-factor models to capture the cross section of returns.

Then, CAPM is tested by Black et al. (1972) portfolio approach. In Figure 1(a) and (b), the estimated relationship between average monthly portfolio returns and their respective beta is not positive. Thus, support for CAPM through Black et al. (1972) portfolio approach is also not discovered.

Finally, CAPM is tested by Fama and Macbeth (1973) portfolio approach. In Black et al. (1972) approach, betas and average returns are computed in the same periods. The difference in Fama and Macbeth (1973) approach is that betas in one period are used to

<table>
<thead>
<tr>
<th>Period</th>
<th>DJIM – pak returns (%)</th>
<th>Standard deviation (DJIM) (%)</th>
<th>MSCI market index returns (%)</th>
<th>SD (MSCI) (%)</th>
<th>Risk-free return (Rf) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-15</td>
<td>0.41</td>
<td>4.45</td>
<td>1.44</td>
<td>8.80</td>
<td>0.69</td>
</tr>
<tr>
<td>2001-05</td>
<td>0.31</td>
<td>4.05</td>
<td>2.64</td>
<td>9.39</td>
<td>0.44</td>
</tr>
<tr>
<td>2006-10</td>
<td>0.49</td>
<td>5.38</td>
<td>1.10</td>
<td>10.48</td>
<td>0.90</td>
</tr>
<tr>
<td>2011-15</td>
<td>0.42</td>
<td>3.82</td>
<td>0.80</td>
<td>6.08</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Table II. Average monthly returns on Shari‘ah-compliant stocks (2001-15)
predict returns in a subsequent period. Table V shows the results. Panel A presents results of linear CAPM, Panel B shows results of non-linear CAPM and, finally, Panel C shows the results of non-linear CAPM with residual variance as an additional variable.

In each panel, the results are presented for the overall period, up-market period \((R_m > R_f)\) and down-market period \((R_m < R_f)\). Results show that the mean of constant value is far greater than the mean monthly average risk-free return (0.82 per cent). On the other hand, the average beta coefficient for 84 months is negative for the overall period. Thus, the results are not supportive of standard CAPM using the overall market period.

Nonetheless, when up-market and down-market periods are segregated, it is found that the average of the estimated beta coefficient is positive in up-market \((\alpha_1 > 0)\) and negative in down-market \((\alpha_2 < 0)\). Except for average of the estimated residual variance, all the other mean values are statistically significant at 5 per cent level of significance. The results are consistent with non-linear relationship found between returns and beta by Iqbal and Brooks (2007) and the conditional relationship in different states of markets identified by Javid and Ahmed (2011) for the emerging market of Pakistan. Thus, rather than having a single beta benchmark for asset allocation, the up-market and down-market beta can be used in asset allocation for effective market timing and portfolio revision.

Then, the results from the Fama-French three-factor (1992) model are presented. Table VI provides estimated coefficients with \(p\)-values from Fama-French three-factor (1992) model with Dow Jones Islamic Index for Pakistan as the benchmark market portfolio. The stocks are sorted by size (big and small) and value (low, medium and high). The market risk premium fails to capture the cross section of stock returns. The results reveal that the size

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Returns (%)</th>
<th>SD (%)</th>
<th>95% Confidence Interval (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small size-high value</td>
<td>4.27</td>
<td>15.46</td>
<td>2.88</td>
</tr>
<tr>
<td>Small size-medium value</td>
<td>3.91</td>
<td>7.49</td>
<td>1.84</td>
</tr>
<tr>
<td>Small size-low value</td>
<td>2.70</td>
<td>6.30</td>
<td>0.41</td>
</tr>
<tr>
<td>Big size-high value</td>
<td>4.19</td>
<td>25.60</td>
<td>0.08</td>
</tr>
<tr>
<td>Big size-medium value</td>
<td>1.31</td>
<td>9.29</td>
<td>1.06</td>
</tr>
<tr>
<td>Big size-low value</td>
<td>2.10</td>
<td>7.65</td>
<td>3.52</td>
</tr>
<tr>
<td>Small size-robust profits</td>
<td>6.77</td>
<td>22.60</td>
<td>2.54</td>
</tr>
<tr>
<td>Small size-medium profits</td>
<td>3.80</td>
<td>9.00</td>
<td>0.75</td>
</tr>
<tr>
<td>Small size-weak profits</td>
<td>2.28</td>
<td>10.69</td>
<td>1.61</td>
</tr>
<tr>
<td>Big size-robust profits</td>
<td>2.77</td>
<td>8.31</td>
<td>0.16</td>
</tr>
<tr>
<td>Big size-medium profits</td>
<td>1.38</td>
<td>8.56</td>
<td>-0.71</td>
</tr>
<tr>
<td>Big size-weak profits</td>
<td>1.71</td>
<td>17.81</td>
<td>0.65</td>
</tr>
<tr>
<td>Risk-free rate</td>
<td>0.69</td>
<td>0.26</td>
<td>1.19</td>
</tr>
<tr>
<td>Small size-conservative</td>
<td>2.38</td>
<td>8.45</td>
<td>3.24</td>
</tr>
<tr>
<td>Small size-medium investment</td>
<td>4.70</td>
<td>10.42</td>
<td>2.39</td>
</tr>
<tr>
<td>Small size-aggressive</td>
<td>4.79</td>
<td>16.39</td>
<td>0.37</td>
</tr>
<tr>
<td>Big size-conservative</td>
<td>2.20</td>
<td>12.96</td>
<td>0.71</td>
</tr>
<tr>
<td>Big size-medium investment</td>
<td>1.87</td>
<td>8.91</td>
<td>0.47</td>
</tr>
<tr>
<td>Big size-aggressive</td>
<td>2.01</td>
<td>10.70</td>
<td>-0.17</td>
</tr>
<tr>
<td>SMB-value sorted</td>
<td>1.99</td>
<td>8.56</td>
<td>-0.82</td>
</tr>
<tr>
<td>HML</td>
<td>1.83</td>
<td>17.41</td>
<td>0.98</td>
</tr>
<tr>
<td>SMB-profitability sorted</td>
<td>2.33</td>
<td>8.82</td>
<td>0.68</td>
</tr>
<tr>
<td>SMB-investment sorted</td>
<td>1.79</td>
<td>7.55</td>
<td>0.38</td>
</tr>
<tr>
<td>RMW</td>
<td>2.78</td>
<td>15.99</td>
<td>-2.58</td>
</tr>
<tr>
<td>CMA</td>
<td>-1.11</td>
<td>10.37</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Table III. Average monthly returns on Shari’ah-compliant stocks (sorted)
<table>
<thead>
<tr>
<th>Variables</th>
<th>Linear OLS</th>
<th>Linear GMM</th>
<th>Non-linear OLS</th>
<th>Non-linear GMM</th>
<th>Non-linear with R.V OLS</th>
<th>Non-linear with R.V GMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R_i$</td>
<td>(1)</td>
<td>(1)</td>
<td>(2)</td>
<td>(2)</td>
<td>(3)</td>
<td>(3)</td>
</tr>
<tr>
<td>Beta</td>
<td>0.00600 (0.687)</td>
<td>-0.00860 (-0.533)</td>
<td>0.0354*** (28.51)</td>
<td>0.00014*** (8.444)</td>
<td>-0.00857*** (-6.045)</td>
<td>-0.00911*** (-6.045)</td>
</tr>
<tr>
<td>Beta-square</td>
<td>0.06530*** (4.159)</td>
<td>0.05134*** (21.57)</td>
<td>0.0823*** (10.25)</td>
<td>0.00497*** (7.888)</td>
<td>0.0857*** (7.888)</td>
<td>0.0857*** (7.888)</td>
</tr>
<tr>
<td>Residual variance</td>
<td>0.000838** (2.028)</td>
<td>0.0204*** (15.31)</td>
<td>0.0857*** (16.06)</td>
<td>0.000296*** (26.16)</td>
<td>0.0653*** (15.31)</td>
<td>0.0653*** (15.31)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.0503*** (3.450)</td>
<td>0.0543*** (4.159)</td>
<td>0.0823*** (13.27)</td>
<td>0.00497*** (7.888)</td>
<td>0.0695*** (7.888)</td>
<td>0.0695*** (7.888)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.003</td>
<td>0.081</td>
<td>0.827</td>
<td>0.827</td>
<td>0.943</td>
<td>0.943</td>
</tr>
</tbody>
</table>

Notes: t-statistics in parentheses; ***p < 0.01; **p < 0.05; *p < 0.1

Table IV. CAPM testing – Lintner approach
and value premium is positive and significant for explaining the cross section of returns for small size and high value stocks respectively. However, the intercepts are generally positive and statistically significant which suggests that the model does not completely capture the cross section of returns efficiently.

**Table V.** Testing CAPM by Fama and Macbeth (1973) approach

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Panel A: Linear CAPM</th>
<th>Panel B: Non-Linear CAPM</th>
<th>Panel C: Non-Linear CAPM + residual variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\alpha_0$</td>
<td>0.054* 0.057* 0.047*</td>
<td>0.036* 0.037* 0.033*</td>
<td>0.032* 0.034* 0.028*</td>
</tr>
<tr>
<td>$\alpha_1$</td>
<td>-0.019* 0.007* -0.065*</td>
<td>-0.009* 0.018* -0.058*</td>
<td>-0.011* 0.016* -0.058*</td>
</tr>
<tr>
<td>$\alpha_2$</td>
<td>0.012* 0.014* 0.009*</td>
<td>0.010* 0.012* -0.003</td>
<td>0.008* 0.008* -0.002</td>
</tr>
<tr>
<td>$\alpha_3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha_4$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** * $p < 0.05$, ** $p < 0.01$; $R_m > R_f$ represents when the market has positive excess returns and $R_m < R_f$ represents when the market has negative excess returns. The estimated values of parameters $\alpha_0, \alpha_1, \alpha_2, \alpha_3$ and $\alpha_4$ are as they appear in equations (8)-(10).

**Table VI.** Fama-French three-factor model results with DJI Pakistan as market portfolio

<table>
<thead>
<tr>
<th>Stocks sorting</th>
<th>Panel A: results for first instrument</th>
<th>Panel B: Results for second instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Low Medium High</td>
<td>Low Medium High</td>
</tr>
<tr>
<td>Book to market equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>0.0229242** 0.0334279** 0.0054278</td>
<td>0.0193218** 0.0290274** 0.005241</td>
</tr>
<tr>
<td>Big</td>
<td>0.0176189** 0.0063663 0.0337835**</td>
<td>0.0138771** 0.0066007 0.028755**</td>
</tr>
<tr>
<td>Slope (Beta)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>0.7835269 1.402138 0.1678758</td>
<td>0.426224 0.5198277 0.8150153</td>
</tr>
<tr>
<td>Big</td>
<td>0.9704254 0.6892551 1.084023</td>
<td>0.7907355 1.137442 0.3082494</td>
</tr>
<tr>
<td>Slope (Size)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>-0.0556493 0.0848443 0.8720339**</td>
<td>-0.0504394 0.0680962 0.8639511**</td>
</tr>
<tr>
<td>Big</td>
<td>-0.2560557* -0.3355754* -1.252626**</td>
<td>-0.2359889* -0.4031732* -1.216858**</td>
</tr>
<tr>
<td>Slope (Value)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>-0.0170809 0.1293693 0.8719319**</td>
<td>-0.0126558 0.1227863** 0.859496**</td>
</tr>
<tr>
<td>Big</td>
<td>-0.0604491 0.0913341** 1.018732**</td>
<td>-0.0522547 0.0594794 1.035717**</td>
</tr>
</tbody>
</table>

**Notes:** ** $p < 0.05$, * $p < 0.1$
Panel A in Tables VI and VII provides results of Fama-French three-factor (1992) model using lagged market excess return and lagged risk-free return as instruments. In Panel B of Tables VI and VII, the results from Fama-French three-factor (1992) model are presented using default premium, term premium and risk-free rate as instruments. Default premium is computed as the difference between one-year T-bill rate and one-year KIBOR. Term premium is computed as the difference in one-year treasury bond and six-months T-bill. It is found that the coefficients are almost similar to the second set of instruments.

Table VII provides estimated coefficients with p-values from the Fama-French three-factor (1992) model with PSX-100 as the benchmark market portfolio. The results are similar to Table VI with the difference that the market risk premium is positive and significant with PSX-100 as the market portfolio, especially for small size value stocks and big size growth stocks. Statistically significant market risk premium when the broader market index is used suggest that against the unrestricted market portfolio, there is a systemic risk that cannot be diversified away when stock selection only picks halal stocks among the stocks in the unrestricted market portfolio.

However, the intercepts are positive and statistically significant in half of the regressions which leans weight to the earlier concern that Fama-French three factor model also does not completely capture the cross section of returns efficiently. Finally, the results from the Fama-French five-factor model (2015) are discussed with two added premiums, i.e. profitability and investment. The results appear in Tables VIII and IX.

The market risk premium is insignificant with Dow Jones Islamic Index Pakistan as the market portfolio. Nonetheless, when PSX-100 is used as the market portfolio, the market risk premium becomes significant. It is found that for small size stocks, the size premium is positive and significant in most cases. The value premium is generally positive for all stocks. However, the two additional premiums in the five-factor model are not generally significant.

Table VIII provides results of Fama-French five-factor (1992) model using lagged market excess return and lagged risk-free return as instruments. In Table IX, the results of the Fama-French five-factor (1992) model are presented using second instrument list. The

<table>
<thead>
<tr>
<th>Stocks sorting</th>
<th>Panel A: Results for first instrument</th>
<th>Panel B: Results for second instrument</th>
</tr>
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<tbody>
<tr>
<td>Size</td>
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<td>Medium</td>
</tr>
<tr>
<td>Book to market equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
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<td></td>
</tr>
<tr>
<td>Small</td>
<td>0.0123383</td>
<td>0.0206316**</td>
</tr>
<tr>
<td>Big</td>
<td>0.0013276</td>
<td>-0.0057924</td>
</tr>
<tr>
<td>Slope (Beta)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>0.6564661*</td>
<td>0.5351891</td>
</tr>
<tr>
<td>Big</td>
<td>1.305477**</td>
<td>1.278267**</td>
</tr>
<tr>
<td>Slope (Size)</td>
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<td></td>
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<tr>
<td>Small</td>
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<td>0.1576324</td>
</tr>
<tr>
<td>Big</td>
<td>-0.2764621*</td>
<td>-0.4546919*</td>
</tr>
<tr>
<td>Slope (Value)</td>
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<td></td>
</tr>
<tr>
<td>Small</td>
<td>-0.0699229*</td>
<td>0.1056399</td>
</tr>
<tr>
<td>Big</td>
<td>-0.222203*</td>
<td>-0.0550048</td>
</tr>
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Notes: ** p < 0.05, * p < 0.1
### Table VIII.
Fama-French five-factor (2015) model results – first instrument list

**Panel A: Fama-French five-factor model results with DJI Pakistan as market portfolio**

<table>
<thead>
<tr>
<th>Size – Value</th>
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<th>Constant</th>
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<th>HML</th>
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<th>Wald</th>
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<tbody>
<tr>
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<td>0.0365**</td>
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<td>0.1853</td>
<td>0.0692</td>
<td>0.2198</td>
<td>−0.1691</td>
<td>25.29**</td>
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<tr>
<td>Small-Low</td>
<td>0.0215**</td>
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<td>−0.0594</td>
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<td>0.0487</td>
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<td>Big-High</td>
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<tr>
<td>Big-Medium</td>
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<td>−0.0146</td>
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<th>Size – Profitability</th>
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<th>CMA</th>
<th>Wald</th>
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<tbody>
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<td>0.8996</td>
<td>0.8717</td>
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<tr>
<td>Small-Medium</td>
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<td>1.1133</td>
<td>0.1899</td>
<td>0.1937</td>
<td>0.0293</td>
<td>0.1692</td>
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<tr>
<td>Small-Weak</td>
<td>0.0190**</td>
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<td>0.2877**</td>
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<td>−0.5756**</td>
<td>−0.3235**</td>
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</tr>
<tr>
<td>Big-Robust</td>
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<td>−0.7085</td>
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<td>0.1317</td>
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<td>1.2839</td>
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<td>0.1351</td>
<td>−0.0115</td>
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<td>−0.064</td>
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**Panel B: Fama-French five-factor model results with PSX-100 as market portfolio**

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<th>Wald</th>
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<td>0.1532</td>
<td>0.0396</td>
<td>−0.2192**</td>
<td>−0.2953**</td>
<td>36.76**</td>
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<tr>
<td>Small-Low</td>
<td>0.0130**</td>
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<td>−0.0845</td>
<td>−0.0472</td>
<td>0.0383</td>
<td>−0.0667</td>
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<tr>
<td>Big-High</td>
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<td>0.2509</td>
<td>0.1958</td>
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<tr>
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<tr>
<td>Big-Low</td>
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<td>0.7942**</td>
<td>0.7783</td>
<td>0.8518</td>
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<td>0.9772**</td>
<td>0.1799</td>
<td>0.1101</td>
<td>0.0041</td>
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<td>0.2537</td>
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<td>−0.3851**</td>
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<tr>
<td>Big-Robust</td>
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<td>0.0141**</td>
<td>−0.7369</td>
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<td>−0.0122</td>
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<tr>
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<th>Wald</th>
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<tr>
<td>Small-Conservative</td>
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<td>0.7184**</td>
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<td>0.2169</td>
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<tr>
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<td>0.2265**</td>
<td>0.1215</td>
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<tr>
<td>Small-Aggressive</td>
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<td>0.9941**</td>
<td>0.7807**</td>
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<td>0.0272</td>
<td>−0.8865**</td>
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<tr>
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<td>1.0491**</td>
<td>−0.2448*</td>
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**Notes:** **p < 0.05; * p < 0.1**
Table IX.

Fama-French five-factor (2015) model results – second instrument list

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<tr>
<th>Stocks sorting</th>
<th>Constant</th>
<th>Market</th>
<th>SML</th>
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<td><strong>Panel A: Fama-French five-factor model results with DJI Pakistan as market portfolio</strong></td>
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<tr>
<td><strong>Size – Value</strong></td>
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<td></td>
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<tr>
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<td>0.7971**</td>
<td>0.7906**</td>
<td>0.0220</td>
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<tr>
<td>Small-Medium</td>
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<td>0.0735**</td>
<td>−0.1996**</td>
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<td><strong>Panel B: Fama-French five-factor model results with PSX-100 as market portfolio</strong></td>
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<td><strong>Size – Value</strong></td>
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<td>0.7490**</td>
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<td>0.3891</td>
<td>0.1456</td>
<td>0.0501</td>
<td>−0.2099**</td>
<td>−0.2699**</td>
<td>37.99**</td>
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<tr>
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<td>0.0138**</td>
<td>0.3836</td>
<td>−0.0922</td>
<td>−0.0310</td>
<td>0.0386</td>
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<tr>
<td>Big-High</td>
<td>0.0290**</td>
<td>0.1787</td>
<td>−1.3292**</td>
<td>1.2066**</td>
<td>0.2256*</td>
<td>0.1465</td>
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<tr>
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<td>0.6382**</td>
<td>−0.9295**</td>
<td>0.0306</td>
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<td>−0.8055**</td>
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<td>−0.0535</td>
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<td>−0.1086</td>
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<td><strong>Size – Profitability</strong></td>
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<tr>
<td>Small-Robust</td>
<td>−0.0085</td>
<td>0.9876**</td>
<td>0.8113**</td>
<td>0.7523**</td>
<td>0.8315**</td>
<td>−0.3243*</td>
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<tr>
<td>Small-Medium</td>
<td>0.0168**</td>
<td>0.3317</td>
<td>0.1983</td>
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<td>0.1019</td>
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<tr>
<td>Small-Weak</td>
<td>0.0109*</td>
<td>0.4881*</td>
<td>0.2568**</td>
<td>0.2510**</td>
<td>−0.5709**</td>
<td>−0.4035**</td>
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<td>0.0021</td>
<td>0.4417*</td>
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<td>0.2388**</td>
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<td>−0.1184</td>
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<td>Big-Weak</td>
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<td>1.1948**</td>
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<td><strong>Size – Investment</strong></td>
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<td>Small-Conservative</td>
<td>0.0054</td>
<td>0.5831*</td>
<td>0.0403</td>
<td>0.2277**</td>
<td>−0.0851</td>
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<td>0.2380**</td>
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<tr>
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<td>0.8141**</td>
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<td>−0.1721**</td>
<td>−0.0295**</td>
<td>108.67**</td>
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</tbody>
</table>

Notes: ** p < 0.05; * p < 0.1
coefficients are almost similar to the second set of instruments. Thus, the Fama-French three-factor model appears to explain the cross section of stock returns relatively better as compared to CAPM. It is also found that the two additional premiums in the five-factor model do not affect the size and value premium. However, the two additional premiums are generally not significant in explaining the cross section of stock returns.

It shows that leverage based investment differences (aggressive or conservative) do not play a significant role in Islamic stocks as these stocks use minimal leverage and that too backed up by real assets. On the other hand, historical profitability differences might be insignificant due to the fact that investors might already incorporate the expected level of profitability in the analysis. Thus, highly profitable companies are not under-valued at the time of publishing of historical profitability numbers and hence offer no further premium to the investors.

Finally, the adjusted $R^2$ and the Gibbons et al. (1989) statistic show that Fama-French five-factor model is relatively better of the two models in terms of higher adjusted $R^2$ and lower value of the Gibbons, Ross and Shanken (GRS) statistic. The GRS statistic is identical across both market proxies and both instrument list up to two decimal places (Table X).

### 7. Conclusion

This paper investigated the cross section of expected returns on Shari’ah-compliant stocks. The tests of CAPM using individual stocks and portfolio approach showed that there is a lack of supportive evidence for standard CAPM, both in the linear and non-

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Adjusted $R^2$</th>
<th>GRS Statistic</th>
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<tbody>
<tr>
<td><strong>Panel A: Fama-French Three-Factor Model</strong></td>
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<tr>
<td>S-H</td>
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<td>S-M</td>
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<td>B-H</td>
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<tr>
<td>B-L</td>
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<td>20.01</td>
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<td>S-W</td>
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<td>S-A</td>
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**Table X.** Adjusted $R^2$ and GRS statistic
linear form. Nonetheless, when up-market and down-market period are segregated, the average of the estimated beta coefficient is found to be positive in up-market and negative in down-market. In addition to that, the results indicate that size and value premium exist in the emerging market of Pakistan on Shari’ah-compliant stocks. In future research, liquidity based asset pricing models and Consumption CAPM can also be used as well on halal stocks.

Overall, it can be concluded that faith compliance in Shari’ah-compliant stocks does not make the Islamic investor worse off. Both Islamic and conventional mutual fund investors can use well-performing Shari’ah-compliant stocks in their portfolios. The evidence from multifactor asset pricing models suggests that investment evaluation of active managers should take into account size and value premium on Shari’ah-compliant stocks. Furthermore, given the existence of size and value premium, specialized investment management products can be offered which take benefit of size and value premium. In light of these findings, specialized index funds investing in small size and value stocks can provide comparatively higher returns on average. Finally, the government shall support Islamic investments by providing tax neutrality. It shall allow the benefit of tax deduction of halal investment profits and enable investors to avail tax credits earned on halal investments as is the case for conventional portfolio investments.

References


Further reading

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