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Predicting efficiency in Malaysian Islamic banks: A two-stage TOPSIS and neural networks approach

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ABSTRACT

This paper presents an efficiency assessment of the Malaysian Islamic banks using TOPSIS. In this research, this technique is applied first in a two-stage approach to assess the relative efficiency of Malaysian Islamic banks using the most frequent indicators found in the banking literature. Besides, in the second stage, neural networks are combined with TOPSIS results as part of an attempt to produce a model for banking performance with effective predictive ability. The results reveal that variables related to cost structure have a prominent negative impact on efficiency levels, although some parsimony in equity leveraging derived from Islamic finance principles maybe helpful in achieving higher efficiency levels. Findings also indicate that the Malaysian Islamic banking market also imposes cultural and regulatory barriers to foreign banks, so that their efficiency levels are lower when compared to their national counterparts. Learning curves (trend impact) are relevant in predicting efficiency levels.

1. Introduction

One of the major research streams in banking is to measure the relative importance of banks using popular multicriteria decision making such as DEA and TOPSIS (Hemmati et al., 2013). This paper analysis the efficiency of Malaysian Islamic banks with TOPSIS. TOPSIS applications on efficiency measurement are scarce (Bilbao-Terol et al., 2014), although efficiency has been the focus of much recent research especially on banking (Matousek et al., 2014).

Despite the increasing trend of studying banking efficiency in emerging markets most of the studies have considered developed economies as their focus group (Azad et al., 2014; Kenjegalieva and Simper, 2011). Matousek et al. (2014) presented a comprehensive literature review on banking efficiency. Paradi et al. (2011) specified top ten countries focused by the researchers worldwide and all of these countries were developed economies except India, which has been receiving increasing attention.

In addition, Sufian et al. (2014) reported that only limited researches have focused on Islamic banking, particularly in developing economies such as Malaysia. In an earlier paper, Sufian et al. (2008) examined performance of Islamic banks in Middle East and North Africa (MENA) and Asian countries. Their study results exposed managerial inefficiencies in resource management among the banks. Nevertheless, a deeper analysis of Malaysian Islamic banks is missing (Sufian, 2009).

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Therefore, this paper innovates in this context first by focusing on Malaysian Islamic banks and second by adopting TOPSIS combined with neural networks in a two-stage approach. The motivations for the present research are the following. First, to evaluate the relative efficiency among Malaysian Islamic banks. Efficiency is the relative position of the units analyzed in the frontier of best practices, which is defined by the group of banks analyzed. In this research, the TOPSIS analysis is undertaken for the first time in the Malaysian Islamic banks. Second, the paper expands the existing literature also due to the use of neural networks to predict and interpret the role of major contextual variables in achieving higher levels of efficiency in Malaysian Islamic banks. Typically, contextual variables such as financial ratios related to cost structure or other business characteristics are used in fuzzy AHP techniques for determining the criteria weights. In this research, however, these contextual variables are used in neural networks in order to build an efficiency model with predictive ability. Besides, this segmentation is per se a contribution to the current research on banking in terms of policy elaboration. Third, our analysis covers the period from 2009 to 2013. Finally, our analysis is based on a representative sample of Malaysian Islamic banks.

Results presented in this research constitute a contribution to the crescent literature on Islamic banking, mainly by shedding some light on how the compliance to the Sharia's principles may affect financial performance. These results also enhance the set of conclusions provided in previous studies recently conducted, adding up to the body of knowledge. For example, Basov and Bhatti (2014) found beneficial impacts derived from the Sharia's compliance limits on the set of admissible investments. Similar results were encountered by Ben Khediri et al. (2015). These authors showed that Islamic banks are, on average, more profitable, more liquid, better capitalized, and have lower credit risk than conventional banks. On the other hand, Dewandaru et al. (2015) found that equal returns can be obtained with lower risks for Islamic indices. As regards the findings presented here, although the variables related to cost structure have a prominent negative impact on banking efficiency, evidences were found regarding a positive impact on efficiency levels due to a greater parsimony in loans and smaller risk assumed in less leveraged operations.

The purpose of this study is to propose a predictive model for Islamic banking efficiency in Malaysia based on the financial and operational criteria commonly found in the literature. In order to achieve this objective, neural networks are presented in a two-stage approach; TOPSIS analysis is then carried out because it aims to render prediction of performance more flexible and informative than traditional statistical methods. The remainder of the paper is organized as follows: Section 2 presents the contextual setting while Section 3 covers the literature review. Section 4 presents the data and the model. The empirical results are presented and discussed in terms of policy implications in Section 5. Conclusions follow in Section 6.

2. Contextual setting

Globally, growth of Islamic finance is striking (Ajmi et al., 2014). Since inauguration of the first Islamic bank in 1965, Islamic finance has been growing with roughly two digits per year. UKIFS (2013)[1] reported that the total asset of Islamic finance will touch USD 2 trillion by the end of 2014 and notably 80% of these assets belong to banking channel.

All these reports highlighted the performance of Malaysia as the third major contributor in terms of regulation, asset value, and growth. UKIFS (2013) reported an imperative opportunity for Malaysia in merger opportunities with major financial institutions of Europe and Middle East. Stating an outperformance of Malaysian banking sector during 2008–2012, IMF (2014)[2] indicates that an annual growth of almost 19% is observed in Malaysian banking assets. During the same time period, conventional mainstream banks has grown at a rate of 9.3% per year. Excluding the direct foreign investment (DFIs), the Islamic banking assets are counted over USD132 billion at 2013, which is almost 85% of total South-eastern Asian market share. Fig. 1 depicts the percentage of Islamic banking assets of Malaysia in comparison to total banking asset. An average annual increase of 14% is seen in the period of 2000–2013.

In 2000, Bank Negara Malaysia (BNM, the Central Bank of Malaysia) introduced the Financial Sector Master-plan (FSMP) which outlined a three phases plan to restructure the Malaysian financial sector in 10 years, from 2001 to 2010. Followed by major merger and acquisition among the existing banks and followed by liberalization, the financial sector has experienced successful introduction of a dual financial system (Conventional and Islamic) fully functional and operational. This dual financial system offers to all type of financial institutions opportunities to explore the market (Bhatti et al., 2015).

Within this scenario, Huang (2014) stated that Malaysian banks have grown rapidly in the last decade due to a strong regulatory action and governmental initiatives in restructuring the banking sector just after the Asian financial crisis in 1997–1998. Being more specific on foreign banks, they have been present in Malaysia for quite a long time. Nowadays, they do business under local incorporation according to the Malaysian Banking Act of 1989. In the late 90s, just after the Asian financial crisis, Japanese banks started crediting in the Malaysian market, followed more recently by Euro zone and UK based banks. IMF (2014), however, highlighted that the Malaysian financial system is now over saturated by foreign banks and financial institutions.

Table 1 presents the composition of Islamic banks in Malaysia during the period 2009–2013. In November 2011, a merger has been taken place between ECONCAP Islamic Bank Bhd and Hong Leong Islamic Bank Bhd. At the end of 2013, Malaysian

[1] UKIFS. (2013). Islamic finance Financial markets series (October 2013 ed., pp. 1–43). UK: UK Islamic Finance Secretariat.
[2] IMF. (2014). Banking system spillovers—technical note IMF Country Report, Financial Sector Stability Assessment' (February 2013) (Vol. 14, pp. 1–23). Washington, D.C: International Monetary Fund.