Technical efficiency in Saudi banks

A. George Assaf\textsuperscript{a,}*, Carlos P. Barros\textsuperscript{b}, Roman Matousek\textsuperscript{c}

\textsuperscript{a}Isenberg School of Management, University of Massachusetts, 90 Campus Center Way, 209A Flint Lab, Amherst, MA 01003, USA
\textsuperscript{b}Instituto Superior de Economia e Gestão, Technical University of Lisbon, UECE (Research Unit on Complexity and Economics), 20 Rua Miguel Lupi, Lisbon 1249-078, Portugal
\textsuperscript{c}Centre for EMEA Banking, Finance and Economics, London Metropolitan Business School, London Metropolitan University, 84 Moorgate, London EC2M 6SQ, England, United Kingdom

\textbf{Keywords:}
Saudi banks  
DEA-data envelopment analysis  
Double bootstrap  
Truncated regression

\textbf{A B S T R A C T}

This study analyses the technical efficiency of Saudi banks using a two-stage DEA-data envelopment analysis approach. In the first stage, we use a bootstrapped DEA-VRS model to identify the efficiency scores, and in the second stage, we use a bootstrapped truncated regression model to identify the covariates that explain technical efficiency. Policy implications are derived.

© 2010 Elsevier Ltd. All rights reserved.

\section{1. Introduction}

The Saudi banking sector has undergone substantial changes over the last decade. Banks have expanded their operations and have taken advantage of scale and scope economies as well as product diversification. The driving force behind these changes has been the recent gradual liberalization of financial sector, globalization of financial markets, changes in technology, product innovation and the growth of business activities by Islamic countries in the West (El-Gamal, 2006).

The Saudi banking system is quite unique compared to the traditional banking system. It is under strict regulation imposed by SAMA (Saudi Monetary Agency) and has several distinguished characteristics. Saudi banks, for instance, provide a combination of conventional banking and Islamic banking. They are also funded by low cost demand deposits\textsuperscript{1} and have difficulties to diversify credit risk due the overwhelming dependence on oil. Empirical research on bank efficiency in the Arabic peninsula is still limited as opposed to other regions such Europe and the USA. Some of the few studies include Avkiran (2009), Hisham et al. (2008), and Essayyad and Madani (2003).

The aim of the present research is to analyse the technical efficiency of Saudi banks. The banks are the institutions that channel financial institutions to provide financial services in Saudi Arabia.

\section{2. Contextual setting}

The Saudi banking system is small in comparison with OECD banking systems. The monetisation of the banking system measured in terms of private credits to GDP was just 37\% in 2008. The banking system has displayed a high degree of stability and strong resilience to external shocks till 2007. The stability of the sector has been enhanced by its strict regulatory rules imposed by the Saudi Arabia Monetary Fund.

The main distinguished characteristic of the Saudi banking sector is that it has a blend of Islamic banking and “Islamic Windows” of conventional banking. Islamic banking also known as Islamic Shariah based banking system is different from conventional banking. The concept of Islamic banking is based on its profit-and-loss sharing paradigm (PLS). Islamic banking is underpinned by five codes of belief in Islamic finance, i.e., avoidance of Riba (interest), Gharar (uncertainty), Mysur (gambling), Haram (prohibited) and sale of the items not owned or possessed. The main features of Islamic banking have been outlined by Chong and Liu (2009) and Taylor (2004).

Islamic financial products dominate the Saudi market. Islamic banks control some 62\% of total assets. It is estimated that about 40\% of deposit are non interest bearing because of Riba. The gradual deregulation process of financial services allowed foreign financial institutions to provide financial services in Saudi Arabia.

\textsuperscript{1} IMF claims that about 40\% of total assets is funded by demand deposits.

---

\textsuperscript{*} Corresponding author. Tel.: +1 4135451492.  
\textsuperscript{a} E-mail address: assaf@hrt.umass.edu (A. George Assaf).  
\textsuperscript{1} IMF claims that about 40\% of total assets is funded by demand deposits.
As a reaction to this process, domestic Saudi banks have also introduced a large scale of new products and services. The proportion of Islamic banking has increased significantly. Table 1 shows the share of Sharia-Compliant assets of banking sector.

<table>
<thead>
<tr>
<th>Year</th>
<th>On balance sheet (%)</th>
<th>Off balance sheet (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>11.2</td>
<td>1.7</td>
</tr>
<tr>
<td>2000</td>
<td>13.0</td>
<td>2.1</td>
</tr>
<tr>
<td>2001</td>
<td>15.0</td>
<td>2.3</td>
</tr>
<tr>
<td>2002</td>
<td>17.0</td>
<td>2.0</td>
</tr>
<tr>
<td>2003</td>
<td>21.0</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Other studies on Arabic banks include Turk-Arris (2008), Al-Muharani (2006) and Essayayd and Madani (2003) who investigated the concentration, efficiency, and the profitability of commercial banks operating in Saudi Arabia. They found that the banking system was highly concentrated and lacked sound competitive environment. However their results only covered the period 1989–2001, i.e., before the major structural changes have been adopted as a consequence of the membership of Saudi Arabia in the WTO.

4. Data

Our analysis includes nine banks that currently operate in the Saudi Arabia. Data were collected from annual reports over the period 1999–2007 (81 observations). To model the bank production process, we follow the intermediation approach (see Sealey and Lindley, 1977) and assume that banks purchase liabilities that are transformed into earning assets. Banks are assumed to produce four outputs that cover both on and off-balance sheet activities: (i) total customer loans, (ii) securities and (iii) interbank loans. Three inputs are used to produce bank outputs: (iv) total employees; (v) fixed assets and (vi) total deposits. The descriptive statistics are shown in Table 4.

5. Methodology

5.1. Efficiency measurement

We use the DEA method to estimate technical efficiency of Saudi banks. The motivation and early versions of the DEA method have appeared in several previous studies in the literature, so they will not be reiterated here. For a detailed review refer to Coelli, Prasada Rao, and Battese (1998). The model used in this study follows an output oriented assumption and can be derived for the ith bank by solving the following linear programming:

\[
\hat{\delta}_i = \max_{\hat{\delta}_i > 0} \left\{ \sum_{i=1}^{n} Y_i X_i \right\} \geq \sum_{i=1}^{n} \lambda X_i \geq 0 \right\}, \quad i = 1 \ldots n \text{ banks},
\]

where \( Y \) is vector of bank outputs, \( X \) is vector of bank inputs, \( \lambda \) is a \( 1 \times 1 \) vector of constants. The value of \( \hat{\delta}_i \) obtained is the technical efficiency score for the ith bank. A measure of \( \hat{\delta}_i = 1 \) indicates that the bank \( i \) is technically efficient, and inefficient if \( \hat{\delta}_i > 1 \). This linear programming problem must be solved \( n \) times, once for each bank in the sample. Note that the DEA model can also be estimated using either the constant returns to scale (CRS) or variable returns to scale (VRS) assumptions and the shape of the frontier will differ depending on the scale assumptions that underline the model. In this paper we rely on the VRS assumption, as the CRS is only correct as long as it is appropriate to assume that banks are operating at an optimal level of scale. Technological advances and regulatory changes might vary across banks in various size groups, so allowing for VRS would permit modelling the entire range of technology.

5.2. The bootstrap approach

A new debate has recently been raised in the literature regarding the statistical limitations of DEA scores. Simar and Wilson (1998, 1999, 2007) emphasise that efficiency scores generated by DEA are strongly dependent on each other in the statistical sense,
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات