Innovative Applications of O.R.

An integrated performance evaluation of financial holding companies in Taiwan

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ABSTRACT

There has been a worldwide trend for financial institutions to become larger in scale and more diversified in scope, with Taiwan being no exception. Fourteen financial holding companies (FHCs) have each begun to function as a management umbrella in Taiwan by investing in different types of financial services such as banking, insurance, and securities. This paper focuses on this local financing issue from an integrated methodological perspective by model innovations proposed in several earlier studies. For example, the efficiency of profitability and marketability are combined to evaluate the FHCs' performance. To conduct a valid and reliable evaluation process while applying the FHC's case in Taiwan, we integrate the slacks-based measure (SBM) and slacks-based measure of super efficiency (super-SBM) models in order to directly handle the slacks and identify the best performers. A new scheme that deals with the negative output data in the SBM/super-SBM is also introduced. Inter-temporal efficiency change, which is decomposed into 'catch-up' and 'frontier-shift' effects, is analyzed by means of the SBM-based Malmquist index. A decision-making matrix is also presented to help the FHCs' managerial authorities position themselves in the industry. The above techniques show with a high degree of consistency that large-sized FHCs perform better than small-sized ones.

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1. Introduction

There has been a worldwide trend for financial institutions to become larger in scale and more diversified in terms of their scope. The emergence of the financial holding company (FHC), which has already become popular in the United States, Europe, and Japan,[1] is one of the classic ways in which financial service institutions have begun to operate across industries. In referring to the financial reform experiences of other countries, the Taiwan government successively passed legislation to enable local financial institutions to merge with or acquire other financial institutions in order to cope with the problems of over-competition in this small economy. Fourteen financial holding companies in Taiwan have begun operating since 2001. The holding company serves as a management umbrella and invests in subsidiary institutions that are engaged in different kinds of financial services such as banking, insurance, and securities. A FHC is estab-

lished as a pure financial holding company with more than two other financial subsidiaries. The 14 FHCs currently in operation are divided into the following types: (1) those with banks as the main part: Hua Nan, China Development, E.SUN, Mega, Taishin, Sinopac, Chinatrust, and First; (2) those with insurance as the main part: Cathay, Fubon, and Shin Kong; and finally (3) those with securities as the main part: Fuhwa, Waterland, and Jihsun. It is generally believed that the establishment of FHCs will promote economies of scale and help the banking sector compete more efficiently internationally.

Even though the legislation allows for expansion across industries, the FHCs in Taiwan are still 'too many in number, and too small in size' compared to those in other Asian countries. The three largest banks in both Hong Kong and Singapore have a total market share of more than 88% and 80%, respectively. However, none of the 14 FHCs in Taiwan have a market share of more than 10%. Faced with a highly saturated and competitive market, the major mission of the FHCs is to operate efficiently to secure their survival. Although the history of FHCs in Taiwan is quite short compared with that in other industrialized countries, investigating the performance of FHCs is important since this small economy is vulnerable to the existence of a handful of large and inefficient financial institutions. This paper therefore focuses on the local financing issue from an integrated methodological perspective by model innovation with managerial implications in the field of the financial service industries. It is hoped that the proposed model and techniques can be used in relation to the financial industries of other countries that face a similar environment.
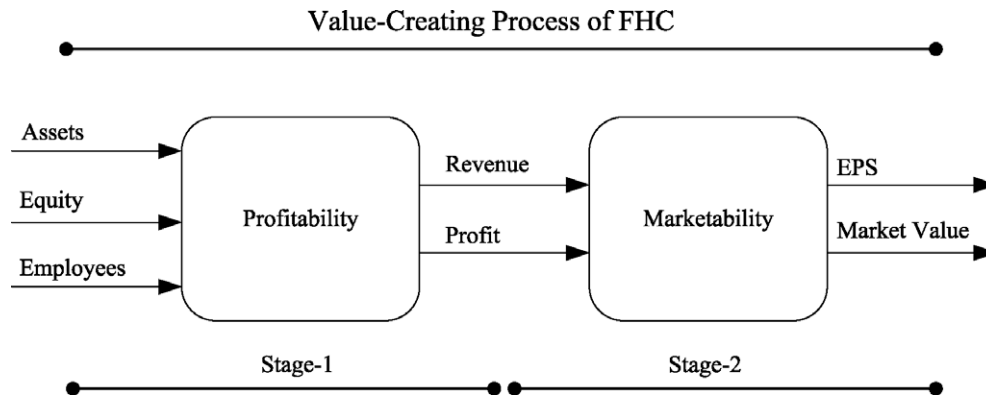

Fig. 1. Profitability and marketability efficiency models for FHCs.

Efficiency has for a long period of time been an important topic in banking research. Data envelopment analysis (DEA) is one of the techniques commonly used to measure bank efficiency. Major academic journals have published special issues on banking efficiency using the DEA technique, including the *European Journal of Operational Research* in 1997, the *Journal of Economics and Business* in 1998, and *Management Science* in 1999. Most previous studies placed emphasis on the efficiency of profitability using the production approach (Sherman and Gold, 1985; Ferrier and Lovell, 1990) or the intermediation approach (Miller and Noulas, 1996; Haslem et al., 1999). One can refer other approaches in Golany and Storbeck's (1999), Sherman and Rupert's (2006), Bergendahl and Lindblom's (2008), García-Cestona and Surroca's (2008) studies. However, while the efficiency of profitability is important for an FHC, marketability is also crucial, because the value of an FHC is ultimately assessed by the stock market. This viewpoint is representative of Taiwan's financial service industries, for once a financial institution is merged with or acquired by another as part of an FHC, its stock should be exchanged in the stock market with that of the FHC in accordance with a certain ratio. In a way that differs from previous research, we integrate the profitability as well as the efficiency of marketability to evaluate the FHCs' performance based on Seiford and Zhu's (1999) model. Seiford and Zhu (1999) initially employed the DEA technique to propose a two-stage production process that examined the efficiency of the top 55 US commercial banks. The value-creating process of an FHC consists of two stages as shown in Fig. 1. The first, involving the profitability performance model (Stage-1), measures an FHC's ability to generate revenues and profits and consists of three inputs (assets, stockholders' equity, and employees) and two outputs (revenues and profits). The marketability performance model (Stage-2) measures an FHC's attractiveness in the stock market, and consists of two inputs (revenues and profits) and two outputs (market value and earnings per share (EPS)).[2] This two-stage model is also applied in other industries in the US (Zhu, 2000; Luo, 2003).

DEA, which was first developed by Charnes et al. (1978) (CCR model), is a methodology for constructing a best practice frontier, which tightly envelops observed data on producers' inputs and outputs. Expanded DEA models were subsequently established, such as the BCC model (Banker et al., 1984), the Russell measure (Russell, 1985), and the range-adjusted measure (Aida et al., 1998). From a methodological point of view, however, these tradi-

tional DEA techniques fail to achieve our purpose in examining the FHCs in Taiwan for the following reasons:

- First, traditional DEA techniques directly assign 'input-oriented' or 'output-oriented' models that may lack objectivity in terms of reflecting the real input/output conditions for each decision-making unit (DMU). As in the two-stage production model used in this study, it is hard to assign input/output-oriented models without being subjective. In other words, non-radial measures, instead of radial measures, which deal directly with the input excesses and the output shortfalls of the DMUs, should be a main concern when seeking to achieve more realistic results.
- Secondly, a crucial issue is concerned with how to deal with negative output/input data in the slacks-based measure models. As in the case of the two-stage production model used in this study, profit is a negative output in the first stage and a negative input in the second stage. Therefore, when engaging in performance evaluations for the 14 FHCs in Taiwan, advanced techniques are needed to deal with the negative output/input data in the slacks-based measure models.
- Third, while forming an efficiency frontier to determine the efficiency score for each DMU, the results could be biased due to extreme values. For example, a small-sized DMU may have to refer to the input/output allocation experiences of some super large-sized DMUs, which cannot be achieved in reality. This technical problem should be taken care of in this study since the assets of the largest FHC are more than ten times as large as those of the smallest FHC in Taiwan. Inefficient FHCs are more likely to make progress by learning from their peers that are similar in size.
- Fourth, in most DEA models, while the number of DMUs may be small, there will be multiple DMUs exhibiting an 'efficient' status with a score of one. Engaging in DEA with a small number of DMUs compared to the number of criteria used for evaluation can lead to problems in determining which DMUs are the best performers. Therefore, when conducting a performance evaluation of 14 FHCs in Taiwan, advanced techniques are needed to identify which are the best performers.

To overcome the methodological shortfalls referred to above when evaluating the performance of FHCs in Taiwan, we adopt advanced DEA techniques, slacks-based measures (SBM) and slacks-based measures of super efficiency (super-efficiency-SBM), as proposed by Tone in 2001 and 2002, respectively. In contrast to the CCR and BCC measures, which are based on the proportional reduction in input vectors or the increase in output vectors without taking slacks into account, the SBM deals directly with input excesses and output shortfalls (slacks). The SBM reports an efficiency

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[2] Variable 'stock price' is also included as an output in Seiford and Zhu's (1999) model. Since stock price is more meaningful when multiplied by the number of shares to get the market value variable, which is already included, we therefore abandon this variable in this study.