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Chapter XVII

Data Mining in Information Technology and Banking Performance

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ABSTRACT

Information technology (IT) has become the key enabler of business process expansion if an organization is to survive and continue to prosper in a rapidly changing business environment while facing competition in a global marketplace. In the banking industry, a large amount of IT budgets are spent with the expectation that the investment will result in higher productivity and improved financial performance. However, bank managers make decisions on how to spend large IT budgets without accurate performance measurement systems on the business value of IT. A survey on managing technology in the banking industry found that 55% of the 188 senior executives surveyed stated that the returns on their investments in IT were either good or excellent. However, 50% of the senior executives also stated that they did not have any formal systems in place to measure the return on investment. This illustrates a need for a proper data-mining technique that can examine the impact of IT investment on banking performance. It has been recognized that the link between IT investment and banking performance is indirect, due to the effect of mediating and moderating

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variables. This chapter presents a methodology that measures the efficiency of IT utilization and the impact of IT on banking performance when intermediate measures are present. A set of banks is used to illustrate how we (1) characterize the indirect impact of IT on banking performance, (2) identify the best practice of two principal value-added stages related to IT investment and profit generation, and (3) improve the financial performance of banking.

INTRODUCTION

In the financial services industry worldwide, the traditional face-to-face customer contacts are being replaced by electronic points of contact to reduce the time and cost of processing an application for various products and ultimately improve the financial performance. During this process, IT investment plays a critical role. Keen (1991) indicates that (1) IT costs have grown at an annualized rate of 15% in the last decade, and this is the only area of business in which investment has consistently increased faster than economic growth, and (2) annual IT investment may constitute up to one-half of a firm's annual capital expenditures. For example, a survey on managing technology in banking industry found that 55% of the 188 senior executives surveyed stated that the returns on their investments in IT were either good or excellent. However, 50% of the senior executives also stated that they did not have any formal systems in place to measure the return on investment. The increasing use of IT has resulted in a need for evaluating the impact of IT investment on firm performance. It is essential that we be able to extract valuable information from the IT investment and financial data in the banking industry.

It has been recognized that it is difficult to empirically link investment in IT with firm performance due to a number of measurement, model specification, and data availability problems. This is partly due to the fact that IT is indirectly linked with a firm's performance. In this regard, new data-mining methods are needed to evaluate the IT investment and the banking performance. Chen and Zhu (2001) developed a methodology using a two-stage model to explicitly incorporate the intermediate variables that link the IT investment with the firm performance. Their methodology (1) captures IT's impact on firm performance via intermediate variables; (2) views firm performance as a result of a series of value-added IT-related activities; and (3) identifies the best practice when intermediate measures are present.

Note that there are multiple financial and non-financial performance measures associated with banking performance. The current chapter uses data envelopment analysis (DEA) as the fundamental tool to extract performance patterns and to evaluate the banking performance. DEA has been proven successful in performance evaluation where multiple performance measures are present (Zhu, 2000). DEA does not require a priori information about the relationship among multiple performance measures, and estimates the empirical tradeoff curve (best practice) from the observations. A number of DEA softwares are available to perform the data-mining functions (see, e.g., Zhu, 2002).