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FINANCIAL CHARACTERISTICS OF TAKEOVER TARGETS IN THE GAMING INDUSTRY

by

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Bachelor of Science
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1994

A thesis submitted in partial fulfillment
of the requirements for the

Master of Science Degree
William F. Harrah College of Hotel Administration

Graduate College
University of Nevada, Las Vegas
December 1999

UNLV

Thesis Approval
The Graduate College
University of Nevada, Las Vegas

December 18, 1999

The Thesis prepared by

Seung Jai Yuh

Entitled

Financial Characteristics of Takeover Targets in the Gaming Industry

is approved in partial fulfillment of the requirements for the degree of

Master of Science

Examination Committee Chair

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ABSTRACT

Financial Characteristics of Takeover Targets in the Gaming Industry

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Forty-five takeover activities took place from 1989 to 1999. Decisions in takeovers may be affected by financial or non-financial factors. Since non-financial factors are hard to measure and quantify for analysis, this study investigates the financial characteristics of takeover target firms in the gaming industry.

Logistic regression analysis was employed because the dependent variable of this study is dichotomous. By the stepwise selection procedure, six variables were identified in this study. These include size, profitability, liquidity, leverage, capital expenditure, cash reserve

capacity, operational efficiency and returns on invested capital. The takeover likelihood in the gaming industry is found to be positively related with the size, operational efficiency and liquidity of a firm, and negatively related with the leverage, profitability and returns on invested capital of a firm.

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ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my advisor Dr. Zheng Gu for his continuous support and encouragement during the course of my research. Without his help and patient guidance, this work would not have been possible. Special thanks go to the members of my committee; Dr. Shannon Bybee was a source of support and professionalism; Dr. John Stefanelli encouraged me during the course of my graduate program; Dr. Seungmook Choi offered invaluable comments and suggestions regarding this study.

Also my sincere gratitude goes to Dr. Kyu-Youb Chung, a professor of my undergraduate college, Sejong University, Seoul Korea, for his motivation and encouragement of my advanced study.

Finally, I would like to express my profound thanks to my parents, friends and colleagues for their constant motivation and support.

CHAPTER 1

INTRODUCTION

Background of the Study

According to Merger & Acquisition Roster (from 1989 to 1998) and Bear Stearns' Gaming Industry Intelligence Report (1999, March 22-April 5), there were 45 takeovers from 1988 to 1999 in the gaming industry. The following reasons may explain the prevalence of takeover activities.

First, takeovers are investment alternatives similar to other large capital budgeting decisions. One of the most beneficial aspects of merger and acquisition activities is synergy gaining. According to Morck, Shleifer and Vishny (1988), synergy gains can come from increases in market power, offsetting the profits of one firm with tax loss carry forwards, combining the marketing networks or simply eliminating functions that are common to the two firms. Especially in the gaming industry, a takeover can have the benefit of acquiring customer databases from the target company. Such databases

can help the acquiring company to enter a new market with ease or enrich their nationwide telemarketing opportunities. Takeovers have also been used for gaining from valuation discrepancies between the target company's market value and its book value.

Second, takeovers generally occur because of changes in technology or market environment, requiring a major restructuring of corporate assets. The gaming industry has been growing rapidly in the past 10 years. However, according to Salomon Smith Barney's 1998 State of the Industry Report: Gaming (1998, April 21), the gaming industry has reached a maturation stage of its business cycle due to the lack of new markets available to propel growth and heightened competition in existing markets. These environments may force the industry to undergo restructuring of its assets. Here, takeover can be a good alternative for corporate restructuring.

Third, since the early 1980s, changes in the political and economic environments have made takeover activities much easier. These factors include the relaxation of restrictions on mergers, improvements in takeover technology, and financing technology such as the strip financing and the issuance of high-yield non-investment-

grade bonds, Junk Bonds (Jensen, 1994). Jensen (1994) explains that each of these factors has contributed to the increase in total takeover and reorganization activities. While the gaming industry has been growing rapidly during the 1980s and 1990s, the over-supply in gaming markets and a lack of new markets have hurt the profitability and growth opportunity of the gaming firms, enforcing the restructuring efforts within the industry.

Fourth, high barriers to entry in the gaming industry may lead to takeover activities for entering into the industry. Such barriers include state agencies' strong regulations, intensely competitive markets, initial high capital requirements and long development timelines. In addition, due to the limitations of good geographic locations and the strength of market competition, it is difficult to successfully develop new projects which create proper returns on their investment.

Due to these barriers for entering into the gaming industry, companies that want to enter into the gaming industry may find the acquisition of already existing properties an easier and more convenient way to enter the industry.

Also, many prior studies have found differences in the financial characteristics between takeover target companies and non-target companies. These studies include Simkowitz and Monroe (1971), Stevens (1973), Belkaoui (1978), Dietrich and Sorensen (1984), Hasbrouck (1985), Palepu (1986), and Kim and Arbel (1998).

These studies are from industries other than the gaming industry, which may have different capital and asset structures. Therefore, this study will conduct research to find the differences between the financial characteristics of takeover target companies and those of non-target companies in the gaming industry. Then, a takeover prediction model, produced from logistic regression, will be developed to assist in identifying a candidate for takeover target.

Again, the gaming industry is situated in very unique business circumstances when compared to other industries. In some gaming jurisdictions there may be some restrictions for entering into the industry. These restrictions include the limitation of the number of licenses, the requirement of the size of the facilities, tax structures, and some mandatory fees based on revenues. These factors may affect the takeover decision because a company may takeover a

gaming company without considering the financial factors of the company in a certain jurisdiction where there are no gaming licenses available. Since, these non-financial factors are hard to measure and quantify for analysis, this study investigates only the financial factors which affect the takeover decisions.

Purpose of the Study

The purpose of this study is to identify several financial characteristics which differentiate takeover target firms from non-targets, to build a statistical prediction model of takeover likelihood and to compare those financial characteristics with those found in other studies.

The Sub-problems

The First Sub-Problem

The first sub-problem is to identify several financial characteristics differentiating takeover targets from non-targets. According to prior studies, takeover target companies have financial features different from non-target companies. Therefore, finding those differences in the gaming industry is the first sub-problem of this study.

The Second Sub-Problem

The second sub-problem is to build a statistical prediction model of takeover likelihood with those characteristics. This prediction model will help identify the quality takeover targets.

The Third Sub-Problem

The third sub-problem of this study is to compare the financial characteristics of takeover target gaming companies with those of other industries. The financial characteristics of takeover targets in other industries can be found in several prior studies, including one from the lodging industry. Because the gaming industry has the characteristics of high initial investment, abundant cash flows from its operations, barriers to entry, the necessity of ongoing maintenance, etc., the different financial characteristics of the target firms are expected to be found in this study.

Restrictions

Several restrictions will affect the execution of this research. Restrictions beyond the researcher's control are found in the section, "Delimitation of the Study."

Additional restrictions beyond control of the researcher are in the section, "Limitation of the Study."

Delimitation of the Study

The first delimitation of this study is that of the definition of the gaming industry. Primarily, Standard Industry Classification (SIC) Code 7993 or 7990 identifies the gaming industry. However, many of the gaming companies' primary SIC codes are SIC 7011, which represents hotels and motels, while there are many gaming and gaming related companies not included in SIC 7993.

According to the State of Nevada Gaming Regulations, a gaming company or casino is defined as "the room or rooms wherein gaming is conducted and includes any bar, cocktail lounge or other facilities housed therein as well as the area occupied by the games (NGC Reg. 1.065)." Therefore, this study will mainly focus on gaming companies as defined in the State of Nevada Gaming Regulations. Therefore, each sample should have at least two types of SIC codes, 7011, and 7990 or 7993, in order to qualify under the definition.

Second, due to the unique nature of the gaming industry, non-financial factors should be taken into consideration in this study. Since those non-financial factors are hard to measure and quantify for analysis, this

study will limit investigation only to the financial factors. Thus, this study assumes that only financial factors affect takeover decisions.

Third, the study will use the yearly financial statement data of gaming companies. The time period of those financial statements is from 1989 to 1998.

Limitation of the Study

Secondary data are the only sources of data used in this study. Therefore, the limitation of the study is the availability of the required financial data. Because some of the acquired firms are the subsidiaries of a corporation and the financial data of the property is not published to the public, they are excluded from the sample.

Hypothesis of the Study

Variables in the logistic regression model will reveal the financial characteristics of takeover target firms in the gaming industry. Thus, the null hypothesis of this study is that the coefficients of the variables in the model are equal to zero. If the null hypothesis is rejected, the coefficients of the variables in the model will be used to identify the financial characteristics of takeover target firms in the gaming industry.

Definition of Terms

1. Dependant Variable or Predicting Variable: the dependent variable in this study is dichotomous, which is coded 0 or 1. It is assigned a value of one if at least one takeover offer occurred during the period set in this study; otherwise, it is given a value of zero.

2. Independent Variable or Explaining Variable: An independent variable is called an explanatory variable or an explaining variable. It is the variable which influences the dependant variable in the logistic regression equation and affects the likelihood of takeover in this study.

3. Merger: a merger is a combination of two corporations in which only one corporation survives and the merged corporation goes out of business. A merger is usually used to refer to a friendly movement in which both companies agree to merge.

4. Takeover: the term takeover is defined as the purchase of an entire company or a controlling

interest in a company, and is usually used to refer to an unfriendly or forced acquisition. However, the distinctions between mergers and takeovers are meaningless within the scope of this study. Therefore, the terms merger and takeover will be used interchangeably in this study.

5. Compustat Database (North America): the Standard & Poors Company provides a Compustat database of financial information on publicly traded companies, including over 7,000 current companies and 3,500 former companies in North America. The Compustat database contains fundamental financial, statistical, and market data for U.S. and Canadian corporations, banks, business segments, geographic areas, industry composites and indexes. It also provides extensive coverage of annual and quarterly Income Statement, Balance Sheet, Cash Flow and supplemental data items. Compustat data is derived from publicly traded and closed-end funds trading on the NYSE, AMEX, NASDAQ, and Canadian Stock Exchanges.

6. Mergers and Acquisitions Roster: the periodical Mergers and Acquisitions provides Mergers and Acquisitions Roster, which reports merger and acquisition deals valued at $1 million or more. The Roster is organized by the Standard Industrial Classification Code (SIC Code).

7. Logistic Regression Analysis: logistic regression, more commonly called logit regression, is used when the dependant variable is dichotomous. The independent variable may be quantitative, categorical, or a mixture of the two. The logistic regression model generates the sigmoid curve that resembles an elongated S or inverted S laid on its side instead of straight line (Retherford & Choe, 1993). The simplest form of logistic regression analysis is bivariate logistic regression, involving a straight-line relationship between one dependant variable and one independent variable. In this study, the multivariate logit regression analysis, which has more than one independent variable, will be employed.

8. Log likelihood: the log-likelihood is the criteria for selecting parameters (Menard, 1995) and testing the null hypothesis.

9. Multicollinearity: multicollinearity occurs when one of the independent variables in regression is linearly related to one or more of the independent variables in the equation (Berry & Feldman, 1986).

10. Stepwise selection procedure: the stepwise procedure is used for selecting variables, and is based upon the contributions of variables to the regression equation (Hosmer & Lemeshow, 1989).

11. Initial log-likelihood: initial log-likelihood is a statistic, which indicates the model's efficiency, with none of the independent variables in the equation.

12. Model log-likelihood: model log-likelihood is a statistic, which indicates the model's efficiency, with the intercept and independent variables in the equation.

13. Model Chi-square (χ^2): model χ^2 is the difference between the initial log-likelihood and the model log-likelihood statistics. It tests the significance of the model.

14. Wald Statistic: the Wald statistic is obtained by comparing the estimate of the coefficient to an estimate of its standard error (Hosmer & Lemeshow, 1989), and tests the statistical significance of individual coefficients in the logistic regression equation.

Organization of the Study

This study is designed to empirically investigate the financial characteristics of takeover target firms in the gaming industry. Chapter 1 provides a background of the study, including the purpose, limitations, delimination of the study, and definition of terms. Chapter 2 reviews the

literature on the takeover prediction model. Chapter 3 discusses the data, variables, and research methodologies used in this study. Chapter 4 reports the findings of the empirical investigation and analyzes the results. Finally, Chapter 5 concludes the study, discusses the implications of the results, and provides suggestions for further research.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

Many empirical studies have attempted to differentiate the financial characteristics of takeover target firms from those of non-target firms, and to construct a statistical prediction model of takeover targets using publicly available financial information. Most of the studies questioned whether there are distinct financial characteristics between the takeover target companies and the non-target companies. Based on their findings, they have tried to build a statistical model which could estimate the likelihood of takeover.

Previous Studies of Takeover Prediction Model

This part of the literature review is organized in the following order:

1. Method of Analysis
2. Variables

3. Sampling

4. Model Building

5. Empirical Results

Method of Analysis

The predominant methodology to distinguish the financial differences and construct a statistical prediction model of takeover likelihood in prior studies in the 1970's is a discriminant analysis. These studies include those by Simkowitz and Monroe (1971), Stevens (1973), and Belkaoui (1978).

These studies employed the multiple discriminant analysis, using financial ratio data to develop a linear model that best discriminates the financial characteristics of takeover target firms from those of non-target firms. Stevens (1973) asserted that the multiple discriminant analysis is well suited to many financial problems where the dependant variable is dichotomous or binary (i.e., takeover target or non-target, bankruptcy or not bankruptcy, etc.).

However, most of the studies conducted in the 1980's and 1990's used a logistic regression analysis instead of multiple discriminant analysis. They included studies by Dietrich and Sorensen (1984), Hasbrouck (1985), Palepu

(1986), and Kim and Arbel (1998). These studies employed logistic regression analysis due to its advantages over the multiple discriminant analysis in differentiating the financial characteristics of target group from the non-target group. Eisenbeis (1977) and Dietrich and Sorensen (1984) stressed that logistic regression analysis can simplify the interpretation of the coefficients and require less restrictive assumptions on the statistical properties of the data than does multiple discriminant analysis.

Variables

All of the prior studies used publicly available financial data on the subject companies, such as balance sheet, income statement, statement of cash flow, stock market data, etc. By using this information, they established the variables which could be used for differentiation of the characteristics.

Stevens (1973) categorized the variables as five distinct groups: liquidity, profitability, leverage, activity and others. Due to multicollinearity problems, Stevens (1973) first used a factor analysis to simplify group patterns into data. The original group of ratios was factored into six distinct and orthogonal dimensions. Then, the six factors of leverage, profitability, activity,

liquidity, dividend policy and price earnings were identified for use in multiple discriminant analysis. However, he dropped two variables, including dividend payout ratio and price earnings ratio, since these two variables of target firms did not show statistical differences.

Dietrich and Sorensen (1984) regard takeover decisions as similar to any other capital asset acquisition decisions, assessing that the factors affecting current and expected future cash flows would influence the decision. That is, factors tending to increase the net present value of the cash flow of a potential target are expected to increase the attractiveness of a particular takeover candidate. They selected 10 variables that had increased the net present value of the cash flow of a target. These variables included price-earnings ratio, profit margin, debt ratio, times interest earned, dividend payout ratio, capital expenditure, asset turnover rate, current ratio, market value of the equity and trading volume in the year of acquisition.

Hasbrouck (1985) selects variables as the measure of q (market to replacement value), financial leverage, liquidity and the size of the firm. Hasbrouck (1985)

stresses the role of q as the most crucial variable. He explains that as long as the replacement value is larger than the market value, any firm wanting to enter the industry will prefer acquisition. The unused debt capacity of the target was also regarded as an attractive concern.

Based on the financial theory in which it is presumed that acquisitions are a mechanism by which managers of a firm who fail to maximize its market value are replaced, Palepu (1986) introduces the variable of managerial efficiency, excess stock return, and accounting profitability. In addition, firms showing the growth-resources imbalance, both low-growth/high-resources and high-growth/low-resources, were regarded as attractive targets. Additionally, industry environment, the size of the firm, levels of under-valuation, and price-earning ratio were also included.

Kim and Arbel (1998) first conducted the study of the takeover prediction model in the lodging industry. They used the variables developed by Palepu (1986), except for the price-earning ratio. They added financial leverage, the level of capital expenditure, the dividend payout, and stock trading volume as variables. Interestingly, they adopted the variable of capital expenditure relative to the

company's total assets. Because of the unique nature of the lodging industry, capital expenditures are important in maintaining competitive power in a highly competitive market. High capital expenditures for maintenance and improvements of the physical facilities may indicate the future growth opportunity of the firm. Thus, this variable can be the most critical aspect for selecting high quality takeover targets in the hospitality industry, including the gaming industry.

Sampling

The sampling of the firms in Hasbrouck's study (1984) was based on time, size of the firm, and industry classification. Limiting the time period from 1977 to 1981, Hasbrouck (1984) placed the experimental group in one of five groups corresponding to the years 1976-1981. Firms with market values less than $100 million were excluded from the sample. To find out the industry specific relationship, a non-industry-matched control group and an industry-matched control group were also used. Eighty-six experimental samples and 172 control samples were selected on the basis of the SIC code of the firms.

Palepu (1985) criticized the sampling method used in prior studies, arguing that the prediction accuracy of

those studies ranging from 70% to 90% were questionable due to the use of non-random, equal-share samples in the model. Thus, Palepu (1985) tried to correct the above methodological problems, suggesting the method of state-based sampling. A sample of 163 takeover target firms and a sample of 256 non-target firms were selected based on industry criteria, publicly traded firm and data availability.

On the other hand, Dietrich and Sorensen (1984) drew samples from four industries defined by the two digit Standard Industrial Classification (SIC) Code, including food and beverages (SIC 37), chemicals (SIC 28), electronics (SIC 26), and transportation (SIC 37). They found 46 takeover targets in the above industries during the period of 1969 - 1973 but dropped 16 targets due to missing data. A random sampling method was employed to select 60 takeover non-target firms. These firms were distributed equally in the same four industries.

The Two-digit Standard Industrial Classification code was also used as the basis for sampling in Kim and Arbel's (1998) study. Three sub-industry groups, including restaurants (SIC 58), hotels without gaming facilities (SIC 70), and hotels with gaming facilities (SIC 79) were

established. They identified a sample of 69 hospitality firms that were takeover targets, and a sample of 192 firms that were non-targets during the period 1980-1992. Of the 261 firms they initially identified, 100 firms were excluded from the sample for not meeting the satisfying criteria for inclusion and for missing data. Then, they selected 116 out of 161 firms, 70%, on the basis of random sampling. Among those selected firms, a sample of 38 firms was classified as an experimental group (targets), and a sample of 78 firms was classified as a control group (non-targets). The remaining 45 firms were placed into a holdout group for testing prediction accuracy.

Model Building

Stevens (1973) employed factor analysis to simplify group patterns in data because of the multicollinearity. Group separation was tested for significance by an F-statistic. The value of 2.963 allowed rejection of the null hypothesis at the 0.025 level. For the validation and the stability of the prediction model, the same ratios were calculated for two new samples of 20 firms, each drawing from the acquisition years 1967 and 1968.

Dietrich and Sorensen (1984) used a five-year average distance from the mean value for all non-targets from the

same industry over the same period. This method smoothed out some yearly variations in industry performance. For takeover target firms, their relative financial characteristics were drawn as percentage departures from the average performance measure for the industry in the last year of takeover. Then, the firms were ranked as to the relative probability of becoming a takeover target by employing the logistic probability function for a firm. Twenty-four target and 43 non-target firms were used for the estimation of the parameters of a linear function of the independent variables.

Palepu (1985) measured the independent variables as of the end of the fiscal year prior to the year of takeover for the targets, and as of the end of the fiscal year prior to 1979 for non-targets. Then, four different versions of the logistic models were estimated. Model 1 consisted of six variables corresponding to the six hypotheses. Model 2 was a re-estimation of the model 1 with three additional variables including growth, liquidity and leverage. Model 3 and 4 were re-estimations of model 1 and 2 respectively with return on equity replacing average excess return in a market performance measure. The log likelihood ratio index was used to test the model's explanatory power and the

likelihood ratio statistic was computed to test the null hypothesis.

Kim and Arbel (1998) employed logistic regression analysis. They tested several logistic regression models to identify the maximum takeover-target prediction likelihood using the stepwise procedure for the best subsets of independent variables. The likelihood ratio index was also used for the model's explanatory power, while the likelihood ratio statistic was computed to test the null hypothesis.

Empirical results

After applying factor analysis and multiple discriminant analysis, Stevens (1973) concluded that financial characteristics could explain takeover likelihood. He ranked the financial leverage, measured by long-term debt to total asset ratio, as the most discriminant characteristic of takeover target firms from those of non-target firms. The profitability of a firm, measured by EBIT to sales, was ranked second, followed by the overall measure of activity, measured by sales to asset, and liquidity. That is, the capital structure consideration is the most important factor in takeover decisions and target firms have lower levels of financial

leverage than do non-target firms. Thus, Stevens (1973) viewed the most attractive takeover target as a firm with high unused-debt capacity, high profitability and excess liquidity.

Although employing different method of analysis from Stevens (1973), Palepu (1986) also found financial leverage as the most critical factor affecting takeover decisions, indicating that a low leveraged firm with high unused debt capacity was an attractive takeover target. However, Palepu (1986) viewed low growth firms which might have inefficient management teams as quality takeover candidates. No significant differences in liquidity between the targets and non-targets were found in his study.

The size of the firm, measured by the market value of equity, was found to be the important determinant of takeover decisions in both Dietrich and Sorensen's study (1985), and Hasbrouck's study (1984). It was ranked first in Hasbrouck (1984) and second in Dietrich and Sorensen (1985).

Unlike in the other studies, the asset turnover ratio was found to be the most influential variable, with a significance level at .01 in the study by Dietrich and

Sorensen (1985). They concluded that the inability of management to generate enough cash flow was an important factor affecting the takeover likelihood.

Since the hospitality industry is characterized as being capital intensive and sensitive to the quality physical properties, capital expenditures on the maintenance of physical properties may attract the corporate raiders' concern. Kim and Arbel (1998) revealed that capital expenditures of hospitality companies, specifically in restaurant and hotel businesses, were the most significant variables in their sample. This high capital expenditures in the hospitality industry may indicate the possibility of future growth and good maintenance of the physical properties. They also found that the under-valuation of the assets in hospitality companies increased the likelihood of a merger target. Although this variable is widely recognized as an important indicator of a quality candidate in other studies, Kim and Arbel (1998) found that it is especially relevant for the hospitality industry.

CHAPTER 3

DATA AND METHODOLOGY

Introduction

This Chapter consists of four parts: (1) research objectives, (2) data collection and sample, (3) variables and (4) research method.

Research Objective

The primary research objective of this study is to identify financial characteristics of takeover target firms in the gaming industry by using logistic regression model. A logistic regression analysis produces several coefficients which explain the differences between the financial characteristics of takeover target firms and non-target firms. This will establish an economic rationale for presupposing relationships between the financial characteristics and takeover likelihood. Building a statistical prediction model of the takeover likelihood will be conducted with the financial characteristics of

target firms. Further, the financial characteristics of takeover target firms in the gaming industry will be compared with those of other industries.

These objectives will be achieved by collecting the financial data of both takeover target and non-target companies in the gaming industry, interpreting the collected data, and analyzing derived results using the research method that will be described later in this chapter. The results and findings of this study will be presented in Chapter 4.

Data Collection and Sample

In this study, the sample consists of gaming companies defined by the four digits Standard Industrial Classification (SIC) code. However, gaming related companies were classified in 9 different SIC code categories. These categories include Computer Peripheral Equipment (SIC 3577), Calculating & Accounting Equipment (SIC 3578), Miscellaneous Manufacturers (SIC 3990), Functions Related to Deposit Banking (SIC 6099), Real Property Lessors (SIC 6519), Hotels & Motels (SIC 7011), Computer & Data Processing Services (SIC 7370), Racing

including Track Operation (SIC 7948), and Coin Operated Amusement Devices (SIC 7993).

Thus, defining and limiting the range of the gaming industry should be accomplished before sampling and data collecting. Moreover, the definition and the limitation of the range should also fulfill the study's objectives.

This study will adopt the gaming regulations of the State of Nevada for the definition of gaming firms. It will also narrow down the range of the gaming industry by adopting the classification of gaming licenses of the Nevada Gaming Regulations.

First, a gaming company or casino is defined in the State of Nevada Gaming Regulations as "the room or rooms wherein gaming is conducted and includes any bar, cocktail lounge or other facilities housed therein as well as the area occupied by the games (NGC Reg. 1.065)." Therefore, each sample should have at least two types of SIC codes, 7011, and 7990 or 7993, in order to qualify under the definition.

Second, the State of Nevada Gaming Regulations classifies the licenses as gaming licenses, manufacturer's licenses and distributor's licenses (NGC Reg. 4.030). There are two kinds of gaming licenses: restricted and non-

restricted. The restricted license refers to "one which permits the operation of slot machines only in an establishment wherein the operation of machines is indicated to the primary business of the license. Fifteen machines is the maximum number of machines which may be operated under this type of license (NGC Reg. 4.030)." Non-restricted licenses refer to "any license other than a restricted license (NGC Reg. 4.030)." Manufacturer's licenses are defined as "one which authorizes the holder to manufacture, assemble or produce any device, equipment, material or machines used in gambling (NGC Reg. 4.030)." Distributor's licenses are defined as "one which authorizes the holder to sell, distribute or market any gambling device, machine or equipment (NGC Reg. 4.030)." Among those licensees, however, the restricted licensees are excluded from the sample due to the size of the gaming operations and the varied nature of the businesses in which the gaming is conducted. Gaming device manufacturer's and distributor's licensees are also excluded from the sample due to the lack of satisfying criteria for inclusion.

The list of takeover target firms was obtained from the Standard & Poor's Compustat database and were included in the Compustat research file as merged firms, from the

Mergers and Acquisitions Roster (from 1989 to 1999), and from Bear Stearns' Gaming Industry Intelligence Report (1999, March 22- April 5). The list of non-target firms was obtained from the Standard and Poor's Compustat database in active file, from 1998 Casino Business Directory (Nevadagaming, 1998) and from Bear Stearns' Global Gaming Almanac (1998).

Financial data of both target and non-target firms were obtained from the Standard & Poor's Compustat database, US Stock Exchange Commission's Edgar database, and annual reports.

Table 1 presents the result of the sample selection based on the criteria of this study. Initially, a sample of 45 gaming firms that were takeover targets during the period 1989-1998 and a sample of 78 gaming firms that were non- targets as of 1999 were identified.

Table 1

Sample Selection Results

	Initially Identified		Excluded from the Sample		Final Selection	
Target	45	36%	28	36%	17	37%
Non-target	78	64%	50	64%	28	63%
Total	123	100%	78	100%	45	100%

However, 28 out of 45 firms that were takeover targets are excluded from the sample due to the lack of sufficient data and for not meeting the criteria for inclusion. Fifty out of 78 non-target firms are excluded from the sample for the same reason. Therefore, a total of 17 takeover targets and 28 non-target gaming companies were selected in the sample (see Table 2), and used in estimating the logistic regression coefficients.

Station Casinos, which reached an acquisition agreement with Crescent Real Estate Equities' in 1998 but failed to complete the agreement, was included in the sample of takeover target firms because it had been once regarded as a quality candidate for a takeover. Crescent canceled the acquisition agreement when Station Casinos postponed a scheduled meeting and vote of its preferred shareholders (Berns, 1998).

Table 2

List of gaming companies in sample

		Primary SIC Code	Secondary SIC Code	Assets (M)	Sales (M)
	Target				
1	Bally's Grand Inc.	7990	7011	577.1	313.8
2	Bally Park Place	7990	7011	549.8	412.0
3	Boardwalk Casino Inc.	7990	7011	41.7	63.4
4	Boomtown Inc.	7990	7011	206.0	236.0
5	Grand Casinos Inc.	7990	7011	1333.7	607.4
6	Harveys Casino Resorts	7990	7011	403.5	283.6
7	Players International Inc.	7990	7011	409.6	323.2
8	Primadonna Resorts Inc.	7990	7011	470.7	233.9
9	Rio Hotel & Casino Inc.	7990	7011	588.2	392.1
10	Showboat Inc.	7990	7011	800.5	556.8
11	Station Casinos Inc.	7990	7011	1300.2	769.6
12	Trump Castle Funding Inc.	7990	7011	541.4	284.7
13	ITT Corporation	7011	7990	9275.0	6597.0
14	Caesars World Inc.	7990	7011	1018.0	1015.8
15	Trump Plaza Funding Inc.	7990	7011	480.0	333.3
16	Trump Taj Mahal Funding Inc.	7990	7011	821.8	553.7
17	Bally Entertainment Corporation	7990	7011	1889.2	1010.2
	Non-Target				
1	American Wagering Inc.	7990	7011	14.8	9.3
2	Ameristar Casino Inc.	7990	7011	336.2	206.2
3	Aztar Corporation	7990	7011	1091.5	782.4
4	Becker Gaming Inc.	7993	7011	71.0	69.5
5	Boyd Gaming Corporation	7990	7011	1030.2	819.3
6	California Hotel & Casino	7990	7011	590.1	523.8
7	Mandalay Resort Group	7990	7011	3263.6	1255.5
8	Claridge Hotel & Casino	7990	7011	150.4	178.1
9	Colorado Casino Resorts Inc.	7990	7011	48.4	24.1
10	Colorado Gaming & Ent. Co.	7990	7011	64.9	53.7
11	Elsinor Corp.	7990	7011	49.8	53.8
12	Great Bay Casino Corp.	7990	7011	15.8	263.4

Table 2 *(continued)*

13	Harrahs Entertainment Inc.	7990	7011	2005.5	1619.2
14	Hollywood Casino Corp.	7990	7011	277.6	267.8
15	Isle of Capris Casino Inc.	7990	7011	615.7	440.8
16	Lady Luck Gaming Corp.	7990	7011	185.3	152.6
17	MGM Grand Inc.	7990	7011	1398.4	773.8
18	Mirage Resorts Inc.	7990	7011	3347.4	1389.0
19	Monarch Casino & Resort Inc.	7990	7011	67.8	59.1
20	MTR Gaming Group Inc.	7990	7011	41.0	60.1
21	President Casino Inc.	7990	7011	187.3	187.5
22	Riviera Holdings Corp.	7011	7990	347.9	153.8
23	Santa Fe Gaming Corp.	7990	7011	192.2	112.8
24	Stratosphere Corp.	7990	7011	156.0	137.5
25	Trump Hotel & Casino Resort Inc	7990	7011	2473.3	1399.4
26	WHG Resort & Casino Inc.	7990	7011	117.5	77.4
27	Gold River Hotel & Casino	7990	7011	35.0	49.3
28	Park Place Entertainment Corp.	7990	7011	7174.0	2305.0

Variables

Dependent Variable

The dependent variable in this study is a dichotomous variable which is coded 0 or 1. When there is a dichotomous dependent variable, the mean of the variable is a function of the probability, and the predicted value of the dependent variable can be interpreted as the predicted probability (Menard, 1995). In estimating the model, the dependent variable of one is assigned for takeover target firms and zero for non-target firms.

Independent Variables

The independent variables to be included in this study are eight variables based on the popularity in prior studies and the relevance of takeover likelihood in the gaming industry.

The most frequently appearing variables in prior studies are financial leverage, financial liquidity, profitability, and the size of the target firm. Empirical studies also show that these variables are the most critical factors in takeover decisions. In addition, capital expenditure and asset under-valuation was tested to be significant factors affecting takeover decisions.

In this study, fifteen ratios were selected to provide measurements on eight different aspects of a firm's financial condition. These ratios are designed to provide a quantitative measure of a firm's (1) size, (2) profitability, (3) financial liquidity, (4) financial leverage, (5) cash reserve capacity, (6) capital expenditure, (7) operational efficiency and (8) returns on invested capital.

Size of the firm

In many merger and acquisition deals, it has been observed that target firms tend to be smaller than the acquiring firms are. That may be accounted for by several size related transaction costs associated with acquiring a firm. These include the costs associated with the absorption of the target into the acquirer's organizational framework. Thus, smaller sized firms come with lower costs of acquisition, and, hence, are more attractive as takeover targets. In this study, the size of the firm is expected to have a negative relationship with the likelihood of takeover. Sales and total assets are used as the indicators for the size of the firm. Sales and total assets are transformed by natural logarithms in order to

make extremely large or small variances in the sample less influential.

Profitability

Profitability is a measure of contributions to external interest groups such as creditors and shareholders. Stockholders may be interest in the net income of the firm and the creditors may be interested in the income that covers their claim. Profitability of the firm is expected to have a positive relationship with takeover likelihood in this study. Return on assets and Earnings before Interest and Tax (EBIT) to the average of long-term debt and equity are used for representing profitability.

Financial Liquidity

Financial liquidity, along with financial leverage, is used to proxy the availability of the financial resources of a firm. Excess liquidity of a firm indicates inefficient and conservative asset allocation or excess debt capacity. A firm with High cash reserves relative to short-term debt may also be considered as a quality candidate for becoming a takeover target. Therefore, this variable is expected to have a positive relationship with takeover likelihood in this study. Current ratio and cash

ratio are calculated for the financial liquidity of takeover target firms.

Financial leverage

Many studies have shown that the financial leverage of a firm is negatively related with the takeover likelihood. Low leverage indicates that the firm has unutilized debt capacity (Dietrich & Sorensen, 1984) or may imply incompetent management where the value can be increased (Kim & Arbel, 1998). This unutilized debt capacity will increase the debt capacity of the acquiring company and also increase takeover probability. This variable is expected to have a negative relationship with takeover likelihood. Total debt ratio and long-term debt ratio are used as ratios for this variable.

Capital Expenditure

Due to the unique nature of the gaming industry, the capital expenditures spent on the maintenance of the physical property or gaming devices may imply the potential growth of the firm. Also Salomon Smith Barney's 1998 State of the Industry Report: Gaming (1998, April 21) explained that companies must allocate substantial portions of cash for the routine maintenance of physical assets. Without continued enhancements and renovations, old properties will

become noncompetitive and fail to attract tourists. When other things remain equal, the potential acquirer will prefer high growth and well maintained gaming properties. Therefore, the capital expenditures of the firm are expected to have a positive relationship with takeover likelihood in this study. The ratio of capital expenditures over total assets is examined for this variable.

Cash reserve capacity

Cash reserve capacity variable is based upon the assumption that the firms that reserve enough cash and cash equivalents for the use of future investment activities will be regarded as quality takeover candidates. Additionally, Salomon Smith Barney's 1998 State of the Industry Report: Gaming (1998, April 21) explained that solid cash flow of a gaming firm is an important concern due to the required payments, including taxes and other governmental charges, insurance, utilities, service, maintenance and any ground lease payments.

Thus, cash and cash equivalent to total asset ratio and Earnings Before Interest, Tax, Depreciation and Amortization (EBITDA) are used as proxy ratios for the variable of cash reserve capacity. Due to capital

intensive nature, for the use of investment and maintenance, of the gaming industry, this variable is expected to have a positive relationship with the likelihood of takeover.

Operational Efficiency

One of the duties of management is to maximize shareholders' wealth with the resources they have. If management, however, fails to maximize wealth, the firm may be regarded as a takeover target by other firms with strong management teams. Therefore, operational efficiency is expected to have a negative relationship with takeover likelihood in this study. Earnings Before Interest and Tax (EBIT) to total assets is used for the efficiency of the operation. Also, asset turnover is included in the variable because low asset turnover may reveal an inefficient use of assets and a failure to generate adequate profits.

Returns on Invested Capital

The gaming industry has been a fast growing and expanding industry in recent years. Many gaming companies invest large amount of money on expansion and new projects. Highly competitive market situations in the gaming industry may result in slow returns on invested capital. Returns on

invested capital may be positively related to takeover likelihood. Palepu (1986) and Kim and Arbel (1998) used returns on equity for measuring efficiency of a firm's investing activities.

Table 3

Variables and Their Representative Ratios

Variable	Ratio	Expected Sign Of This Study	Results from Prior Studies +	Results from Prior Studies -
X_1:Size	1.Log of Sales	-	1	4
	2.Log of Total Assets	-		
X_2:Profitability	1. Return on Asset	+	2	0
	2. EBIT to Avg.(LT Debt + Equity)	+		
X_3:Financial Liquidity	1.Current Ratio	+	1	3
	2.Cash Ratio	+		
X_4:Financial Leverage	1.Total Debt Ratio	-	0	5
	2.Long-term Debt Ratio	-		
X_5:Cash Reserve Capacity	1.EBITDA to Asset	+	N/A	N/A
	2.Cash & Cash Equiv. to Asset	+		
X_6:Capital Expenditure	1.Capital Expenditure to Assets	+	1	1
X_7:Operational Efficiency	1.Asset Turnover	-	1	1
	2.EBIT to Asset	-		
X_8:Returns on Invested Capital	1.Net income to Equity + LT Debt	+	N/A	N/A
	2.Net Income to Equity	+		

Note. The numbers under Results of Prior Studies stand for numbers of variables included in the model.

In this study, the ratio of net income to equity and long-term debt and net income to equity are used for this variable.

Research Method

The research method of this study is to use logistic regression analysis. The advantage of using logistic regression analysis is that the logistic analysis requires less restrictions on the assumption of the normality of the independent variables, and enables direct interpretation of the independent variable coefficient estimators (Dietrich & Sorensen, 1984, Kim & Arbel, 1998). Additionally, unlike linear regression analysis, the probability of the logistic regression analysis lies within the true interval of a probability.

Logistic regression, commonly called logit regression, is used when the dependent variable is dichotomous. Logistic estimation allows a comparison of the relative importance of the explanatory variables in determining takeover likelihood (Dietrich & Sorensen, 1984). Firms can be classified as to the relative probability of becoming a takeover target by evaluating the logistic probability function for a firm using its measured attributes and

comparing the outcomes to similar calculations for other firms.

Logistic Function for a Prediction Model

The linear regression model with a dichotomous dependent variable that is coded with 0 or 1 is called a linear probability model. The predicted value of the dependent variable can be interpreted as the predicted probability. Ideally, the predicted probability should lie between 0 and 1 because a probability can not be below 0 or above 1. However, the linear regression model has a linearity function which can make the predicted probability unrealistic outside the interval. Suppose that there is a binary linear model.

$$P(Y=1) = a+\Sigma b_i X_i$$

Then, the smallest predicted value must lie above 0 and the largest predicted value must lie below 1.

$$0 \leq a+\Sigma b_1 X_1 < a+\Sigma b_1 X_N \leq 1$$

However, if X_i becomes large positive or negative, the linear regression line would cause the predicted value of the probability to be outside the interval, increasing the error of the prediction.

Aldrich and Nelson (1984) suggest that specifying a nonlinear model, such as the logit and probit models, can solve the boundary problem. Replacing the probability that P(Y=1) with the odds of P(Y=1), P(Y=1)/1-P(Y=1), would make the predicted value below 1, and taking the natural logarithm of the odds, log[odds(Y=1)] or log[P(Y=1)/1-P(Y=1)], would make the predicted value above 0. This natural logarithm of the odds, log[P(Y=1)/1-P(Y=1)], is called the logit of Y (Retherford & Choe, 1993).

$$\text{Logit}(Y)=\text{Log}[\text{Odds}(Y=1)]=\text{Log}[P(Y=1)/1-P(Y=1)]=\alpha+\Sigma\beta_i X_i$$

The logit of Y can be transformed into an expression for P(Y=1) by exponentiation, calculating $\text{Odds}(Y=1)=e^{\text{logit}(Y)}$.

$$\text{Odds}(Y=1)=e^{\text{logit}(Y)}=e^{\log[\text{Odds}(Y=1)]}=e^{a+\Sigma biXi}$$

The Odds ratio, Odds(Y=1), can be converted back to the probability, P(Y=1), by the formula P(Y=1)=Odds(Y=1)/1+Odds(Y=1), producing:

$$P(Y=1)=\text{Odds}(Y=1)/1+\text{Odds}(Y=1)$$

$$=e^{a+\Sigma biXi}/1+e^{a+\Sigma biXi}$$

$$=e^{Y}/1+e^{Y}$$

This formula is called the logistic probability function and the predicted value should lie between 0 and 1.

Logistic regression analysis employs a logistic cumulative probability curve, which is close to a normal curve except that it is fatter at the tails of the distribution (Retherford & Choe, 1993). The logistic cumulative probability function of this study is expressed as:

$$P(Y=1) = e^{Y}/1+e^{Y}$$

$$Y = \alpha + \Sigma\beta_i X_i$$

Where Y is a linear function of the observable independent variables, X_i, and the parameters, α and β. Therefore, P(Y=1) is the probability of being a takeover target, and α and β are the parameters to be estimated.

Stepwise Procedure for Selection of an Optimal Set of Variables.

The stepwise procedure is initially used to select the optimal set of independent variables. The decisions of inclusion or elimination in stepwise procedures are based on the magnitude or statistical significance of the influence on the dependent variable. Hosmer and Lemeshow (1989) explained that the p-values calculated in logistic

stepwise selection procedures are not p-values in the traditional hypothesis testing context but indicators of relative importance among variables.

Among the stepwise procedures in logistic regression analysis, the backward elimination method is selected. Although both backward elimination and forward inclusion methods will produce the same result, Menard (1995) recommends that the backward elimination method be used to undercover relationships which could be missed by the forward inclusion method.

At each step, backward elimination uses the likelihood ratio statistic to select variables for removal from the model until the final model is determined. Beginning with all the variables and using an iteration technique, a variable, which influences the least statistical significance on the dependent variable, is eliminated at each step. The significance is assessed by the likelihood ratio Chi-square test (Hosmer & Lemeshow, 1989).

Estimating the Logistic Regression Coefficients

To estimate the parameters of the logistic model expressed in the above, a sample will be divided into two groups, a sample of an experimental group (takeover-target firms) and a sample of a control group (non-target firms).

The dependant variable is assigned a value of one for the takeover target companies and zero for the non-target companies.

Financial data and ratios to be used for estimation will be extracted from the financial information of the gaming companies. Because most of the independent variables have more than one measure, several logistic estimation models will be tested to identify the maximum takeover target prediction likelihood by using the stepwise procedure.

Multicollinearity

Multicollinearity is a problem that arises when independent variables are correlated with one another. It tends to produce logistic regression coefficients that appear to be unreasonably high (Menard, 1995).

In order to detect the multicollinearity, a tolerance value, which is obtained from a linear regression using same variables used in the logistic regression model of this study, will be used. A tolerance value of less than .10 will be regarded as high multicollinearity in this study (Berry & Feldman, 1985).

Testing the Model's Goodness of Fit

To test the overall efficiency of the model, the goodness of fit, a log-likelihood and its related statistics such as model χ^2, R_L^2, λ_p and τ_p is used. These tests examine how well the overall model works, and tests the null hypothesis that all coefficients except the intercept in the model are equal to 0.

The log-likelihood is the criterion for selecting parameters in the logistic regression model and has approximately a χ^2 distribution when it is multiplied by −2 (Hosmer & Lemeshow, 1989). Thus, the log-likelihood in this study will be presented as -2 log-likelihood or -2LL.

The model χ^2 is analogous to the multivariate F test in linear regression (Menard, 1995), and tests the null hypothesis. If the model χ^2 is significant at .05 level, the null hypothesis will be rejected, and the independent variables will be used for the prediction model.

Like R^2 statistics in linear regression analysis, R_L^2 statistics, discussed in the study of Hosmer and Lemeshow (1995), will be used for assessing the efficiency of the model. R_L^2 is a proportional reduction in χ^2, and indicates by how much the inclusion of the independent variables in the model reduces the badness of fit (Hosmer & Lemeshow,

1989). When R_L^2 is equal to 0, it implies that the financial factors of a firm do not explain the takeover likelihood.

Lambda-p (λ_p) and Tau-p (τ_p) are used as indices of predictive efficiency. The λ_p indicates a proportional reduction in the error of prediction and the τ_p represents a proportional reduction in the error of classification (Menard, 1995). For both λ_p and τ_p, a value of 1 indicates that all cases are perfectly classified in the model.

Testing Each Logistic Coefficient

A stepwise logistic regression will produce the best set of independent variables for a dependent variable. It also includes unstandardized regression coefficients (β), standard error of β, statistical significance of β and odds ratio for each independent variable. Those statistics make it possible to evaluate the contribution of each independent variable to the model.

The unstandardized regression coefficients are useful for evaluating the practical impact of one variable on another (Menard, 1995), and will be tested for statistical significance by Wald statistics. The Wald statistic is similar to t-statistics in linear regression, and

calculated as $Wald^2=(\beta/\text{Standard Error})^2$. The Wald statistic will test the significance of each individual coefficient.

A one-unit change in an independent variable can be interpreted as a change of the unstandardized regression coefficient in logit(Y), which represents an odds ratio. An odds ratio greater than 1 indicates that the odds of being a takeover target increase when the independent variable increases, and an odd ratio less than 1 indicates that the odds decrease when the independent variable increases.

Because each independent variable has a different measure, standardized regression coefficients will be calculated and used for direct comparison among each independent variable. They compare the magnitude of the correlation and the relative impact on the dependent variable of independent variables in a common unit of standard deviation.

CHAPTER 4

RESULTS AND FINDINDS

Introduction

In Chapter 3, the research methodology and the collection of data were discussed. Chapter 4 will present the results and findings of this study. In this chapter, the summary of financial characteristics between takeover target and non-target companies will be presented by comparing the average of the ratios. Then, a logistic regression model is developed and statistically tested.

By interpreting the logistic regression coefficients, the financial characteristics of takeover target companies will be compared with those of non-target companies in the gaming industry. Those financial characteristics of takeover targets in the gaming industry will also be compared with those of targets in other industries.

In addition, a takeover prediction model which is derived from the logistic regression analysis will be established and its predictive ability will be tested.

Overview of the Financial Characteristics

Before analyzing the data to develop the logistic regression model, the overall financial characteristics of takeover target firms are compared with those of non-target firms.

Table 4 presents 8 variables and their relative ratios, as discussed in Chapter 3. Those include the size of the firm, operational efficiency, financial liquidity, financial leverage, capital expenditure, cash reserve capacity, profitability and returns on invested capital.

Comparing the size of the firms, the average of both sales and total assets of takeover target firms are greater than those of non-target firms are. With respect to operational efficiency, the target group is low in asset turnover ratio, but high in profitability ratios when compared to the non-target group. Table 4 shows that target firms are less leveraged than non-target firms, indicating that they have more unused debt capacity than non-target firms. Both profitability measures, returns on asset and EBIT to equity and long-term debt, of the target firms are higher than those of non-target firms. However, the standard deviations of both ratios are quite high when compared to the other ratios, indicating that there

Table 4

Summary of Ratios of Each Group

N=45(Target=17/Non-target=28)	Target Group		Non-target Group	
Ratios	Mean	Std.Dev.	Mean	Std.Dev.
Size($Million)				
Sales	821.4	1512.2	479.4	598.4
Assets	1219.3	2124.9	905.3	1562.9
Operational Efficiency				
Asset Turnover	.697	.160	.846	.401
EBIT to Asset	.094	.065	.071	.248
Profitability				
Return on Asset	.010	.062	-.020	.192
EBIT to Avg.(LT Debt+Equity)	.282	.501	.166	.347
Liquidity				
Current Ratio	1.268	.836	1.205	.827
Cash Ratio	.938	.753	.777	.635
Leverage				
Total Debt Ratio	.718	.150	1.251	1.802
Long-term Debt Ratio	.470	.213	.583	.376
Capital Expenditure				
Capital Expenditure to Asset	.081	.055	.084	.091
Cash Reserve Capacity				
EBITDA to Asset	.182	.192	.195	.359
Cash & Cash Equiv. to Asset	.094	.068	.119	.111
Returns on Invested Capital				
NetIncome to Equity+LT Debt	-1.893	13.277	.795	31.923
NetIncome to Equity	7.504	56.149	11.116	264.449

is large variation throughout the data. Although liquidity measures of both groups show almost the same ratio, the cash ratio of target firms is slightly higher than in the non-target group. Firms in the target group spend less

capital expenditure in proportion to their asset sizes. For cash reserve capacity, both EBITDA to asset ratio and cash & cash equivalent to asset ratio of the target group are lower than those of the non-target group. Especially, the cash & cash equivalent to asset ratio of the target group is much lower than that of the non-target group. The target group produces less returns on invested capital and reserves less cash and cash equivalent than does non-target group.

Development of the Logistic Regression Model

The SPSS program was utilized to conduct the logistic regression analysis for differentiating the financial characteristics of takeover target firms from those of non-target firms. One ratio or figure from each independent variable was entered into the logistic regression.

Since firm size, profitability, liquidity, leverage, cash reserve capacity, managerial efficiency, and return on invested capital have two ratios or figures to measure, several logistic regression models have been tested, which is the same method found in the studies of Dietrich and Sorensen (1984) and Kim and Arbel (1998). The best model

was selected based on the model's goodness of fit (χ^2), explanatory power (R_L^2) and classification accuracy.

The backward stepwise procedure was employed to select the optimal set of independent variables. Instead of using the usual .05 criterion of the statistical significance for elimination of the variable, a relaxed criterion of .20 is used. That is because the usual .05 criterion is too low and often excludes important variables from the model (Bendel & Afifi, 1977, Woffordt, Mihalic, & Menard, 1984).

In addition, the main purpose of relaxing the criterion in this study is that this study is exploratory and focus on finding good indicators, not on eliminating bad ones.

Table 5 presents the results of model selection. Among the four models presented in Table 5, Model 1 is selected because it's χ^2 is 14.6130 with a degree of freedom of 6, and is significantly statistically better than are others. R_L^2 shows that Model 1 is explained by its independent variables better than other models. The classification accuracy of Model 1 is also higher than that of the other models.

Table 5

Logistic Regression Model Selection

N=45 (Target=17/Non-target=28) Ratios	Estimated Coefficients (Significance Level) Model 1	Model 2	Model 3	Model 4
Constant	-4.1356 (.1102)	1.4616 (.1887)	-3.4324 (.0990)	1.2743 (.2490)
Size				
Log of Sales	.6454 (.0940)		.4912 (.1203)	
Log of Total Assets		X		X
Operational Efficiency				
Asset Turnover		-3.1326 (.0772)	X	
EBIT to Asset	.3547 (.0489)			X
Profitability				
Return on Asset	-.2745 (.2056)		.0989 (.1623)	
EBIT to Avg.(LT Debt+Equity)		X		1.3924 (.1830)
Liquidity				
Current Ratio		X		X
Cash Ratio	.0080 (.1898)		.0151 (.1156)	
Leverage				
Total Debt Ratio	-.0481 (.0574)		X	-.0254 (.0782)
Long-term Debt Ratio		X		
Capital Expenditure				
Capital Expenditure to Asset	X	X	X	X
Cash Reserve Capacity				
EBITDA to Asset		.0226 (.2018)		X
Cash & Cash Equiv. to Asset	X		-.1319 (.1616)	
Returns on Invested Capital				
NetIncome to Equity+Lt Debt	-.0588 (.2236)		-.0850 (.1027)	
Net Income to Equity		X		X
Model χ^2(d.f.)	14.613(6)	4.095(2)	9.584(5)	6.832(2)
Significance of Model χ^2	.0235	.1291	.0879	.0328
R_L^2	.2449	.0686	.1606	.1145
Classification Accuracy	73.33%	62.22%	62.22%	64.44%

Note. X denotes that the variables are excluded from the model

Test of the Multicollinearity

Multicollinearity is a problem that is often encountered in regression analysis. High multicollinearity causes the confidence interval to be very wide, and statistics for significance tests to be very small (Berry & Feldman, 1986). Tolerance value, which is a statistic for testing multicollinearity, is presented in Table 6. The tolerance value of .10 is used as a cut off point in this study.

The tolerance values of all 6 variables that are included in the logistic regression model are above the cut off point, indicating that multicollinearity is not a problem in this logistic regression model.

Menard (1995) recommends that unstandardized logistic regression coefficients greater than 1, or standardized logistic regression coefficients greater than 2, should be examined to detect the multicollinearity. However, both unstandardized and standardized (see Table 9) logistic regression coefficients in this study are less than 1, indicating that a multicollinearity problem is not present in this study.

Table 6

Test of Multicollinearity

Variables	Unstandardized Coefficients β	Std. Error	Tolerance
X_1: Size	.6454	.3854	.735
X_2: Profitability	-.2745	.2168	.324
X_3: Liquidity	.0080	.0061	.958
X_4: Leverage	-.0481	.0253	.226
X_7: Operational Efficiency	.3547	.1801	.227
X_8: Returns on Invested Capital	-.0588	.0484	.387

Note. X_1: Log of Sales, X_2: Return on Asset, X_3: Cash Ratio X_4: Total Debt Ratio, X_7: EBIT to Asset Ratio, X_8: Net Income to Equity + LT Debt

Checking the Model's Overall Goodness of Fit

In linear regression analysis, the goodness of fit of the model is tested by the R^2 statistic, which is calculated from the observed error (total sum of squares, SST) and the prediction error (error sum of squares, SSE).

In logistic regression analysis, the log-likelihood statistic is used to select parameters and to test the model. It has approximately a Chi-square (χ^2) distribution when multiplied by -2. The large value of the -2 log-likelihood statistic (-2LL) indicates worse prediction of the dependent variable (Menard, 1995).

The SPSS program produces the "Initial Log Likelihood Function -2 Log Likelihood," which includes only the

constant in the model and is similar to the observed error (SST) in linear regression. Then, the SPSS program produces the value of the model's -2LL, which is the value with the independent variables and the constant.

The model -2LL is analogous to the prediction error (SSE) in linear regression, and indicates how poorly the model fits with all of the independent variables (Menard, 1995).

The difference between the initial -2LL and the model -2LL is called the model χ^2. The model χ^2 indicates how the model improves over the model with constant only. When the model χ^2 is statistically significant, the null hypothesis, that all parameters in the logistic regression model are equal to 0, can be rejected.

Table 7 presents the diagnostic statistics of the logistic regression analysis. The model's χ^2 is 14.6130 with a degree of freedom of 6 and is statistically significant at $p<0.05$. Thus, the null hypothesis, that all of coefficients in the model is equal to zero, is rejected. Instead, the independent variables in the model allow making better predictions and classifications of takeover likelihood in the gaming industry.

Table 7

Test of the Goodness of Fit

Initial -2 Log Likelihood	59.6669
Model -2 Log Likelihood	45.0539
Model χ^2	14.6130
R_L^2	.2449
Lambda-p (λ_p)	.2941
Tau-p (τ_p)	.4328

Note. N=45 (Target=17, Non-target=28)

The logistic R^2 (R_L^2) is the explained variance of this model. In the Table 7, the R_L^2 of .2449 indicates that there is a moderately strong relationship between the takeover likelihood and the financial characteristics of firms.

Lambda-p (λ_p) and Tau-p (τ_p) are measures of predictive efficiency. Lambda-p is a proportional reduction in error of prediction and Tau-p is a proportional reduction in error of classification (Menard, 1995). In Table 7, Lambda-p is .2941 and Tau-p is .4328. The lambda-p of .2941 indicates that this model reduces the error of prediction of a takeover target by about 30%, and the Tau-p of .4328 indicates that this model reduces the error of

classification of a takeover target and non-target by over 43%.

Test of Each Logistic Coefficient

Of the eight original variables entered in the model, the stepwise procedure selected six variables which can be used for explaining the financial characteristics of takeover target firms in the gaming industry. The variables included in the model are the firm size, profitability, liquidity, leverage, operational efficiency, and returns on invested capital. The excluded variables are capital expenditure and cash reserve capacity.

A statistic for testing the coefficients in logistic regression analysis is the Wald statistic. Table 8 presents the Wald statistics as well as the statistical significance.

Of the six variables included in the Model 1, the variable of operational efficiency is significant at .05 level. Two variables, including the size and leverage of a firm, are significant at .10 level. However, although the variables of profitability, liquidity, and returns on invested capital are included in the model, appear to be statistically insignificant one.

Table 8

Statistics of the Coefficients

Independent 7Variables	Logistic Regression Coefficient	S. E.	Wald Statistic	Statistical Significance
X_1: Size	.6454	.3854	2.8040	.0940
X_2: Profitability	-.2745	.2168	1.6025	.2056
X_3: Liquidity	.0080	.0061	1.7189	.1898
X_4: Leverage	-.0481	.0253	3.6105	.0574
X_7: Operational Efficiency	.3547	.1801	3.8785	.0489
X_8: Returns on Invested Capital	-.0588	.0484	1.4808	.2236
Constant	-4.1356	2.5889	2.5517	.1102

Note. N=45 (Target=17, Non-target=28)
X_1: Log of Sales, X_2: Return on Asset, X_3: Cash Ratio, X_4: Total Debt Ratio, X_7: EBIT to Asset Ratio, X_8: Net Income to Equity+LT Debt

Therefore, it can be said that the size, operational efficiency, and leverage of a firm have statistically significant effects on takeover likelihood.

Interpretation of the Individual Coefficients

One of the reasons to use logistic regression analysis is that it is easy to interpret. Like the linear regression coefficient, a logistic regression coefficient can be interpreted as the change in the dependent variable. In the logistic regression, however, the change in the dependent variable, P(Y=1), is not a linear function of the

independent variables. Suppose the logistic regression is as follows:

$$\text{Logit}(Y) = a + bX_1 + cX_2$$

An Odds(Y=1) is equal to $e^{\text{Logit}(Y)}$ or $e^{a+bX1+cX2}$.

$$\text{Odds} = P(Y=1)/1-P(Y=1) = e^{a+bX1+cX2}$$

Then, if X_1 is increased by one unit, holding X_2 constant. A new Odds, Odds*, will be:

$$\text{Odds}^* = e^{a+b(X1+1)+cX2}$$

$$= e^{a+bX1+cX2+b}$$

$$= e^{a+bX1+cX2} \times e^{b}$$

$$= \text{Odds} \times e^{b}$$

Thus, a one-unit increase in X_1, holding X_2 constant, multiplies the odds by the factor e^b. In other words, each one-unit increase in X_1 is associated with an increase of b in logit terms. The quantity e^b is called an odds ratio (Retherford & Choe, 1993). The logistic regression function of this study was defined as $P(Y=1) = e^Y/1+e^Y$, where $Y=\alpha+\Sigma\beta_i X_i$. The logit(Y) is equal to $\alpha+\Sigma\beta_i X_i$. Thus, a one unit increase in an independent variable indicates an increase in the logit of the dependent variable by β_i or $e^{\beta i}$.

Table 9 presents the logistic regression coefficients of this model. One unit increase in log of sales (X_1), holding the other variables constant, increases the odds of

being a takeover target by .6454 in logit or $e^{.6454}$. It is equivalent to a 90.7% increase of the likelihood.

In this same manner, each one unit increase in the rest of the independent variables is associated with a change in odds of $e^{-.2745}$ (-34.0%) for return on assets, $e^{.0080}$ (0.8%) for cash ratio, $e^{-.0481}$ (-4.7%) for total debt ratio, $e^{.3547}$ (42.6%) for EBIT to asset ratio, and $e^{-.0588}$ (-5.7%) for net income to equity and long-term debt ratio.

Table 9

Comparison of Unstandardized and Standardized Coefficients

Independent Variables	Logistic Regression Coefficient	Standard Error	Statistical Significance	Standardized Regression Coefficient
X_1: Size	.6454	.3854	.0940	.0860
X_2: Profitability	-.2745	.2168	.2056	-.4338
X_3: Liquidity	.0080	.0061	.1898	.0552
X_4: Leverage	-.0481	.0253	.0574	-.7035
X_7: Operational Efficiency	.3547	.1801	.0489	.7149
X_8: Returns on Invested Capital	-.0588	.0484	.2236	-.1572

Note. N=45 (Target=17, Non-target=28)
X_1: Log of Sales, X_2: Return on Asset, X_3: Cash Ratio, X_4: Total Debt Ratio, X_7: EBIT to Asset Ratio, X_8: Net income to equity and long-term debt

The odds ratios, e^{β}, of each independent variable are presented in table 10. An odds ratio greater than 1

indicates that the odds of being a takeover target increase when the independent variable increases, and vice versa.

Thus, increases in size, liquidity and operational efficiency of a firm will increase takeover likelihood, and an increase in the profitability, leverage of a firm and return on invested capital will decrease the takeover likelihood.

In Table 10, the size variable has the most influential odds ratio, 1.9068, followed by operational efficiency, 1.4258, and profitability, .7600. The liquidity variable appears to be the least influential, with the odds of 1.0080, followed by returns on invested capital, .9428, and leverage, .9531.

The odds ratio and regression coefficient indicate the same information about the direction of the likelihood. In this study, the size, liquidity and operational efficiency of a firm, with positive coefficients and odds ratios greater than 1, will affect the positive likelihood of takeover. At the same time, profitability, leverage and returns on invested capital of a firm, with negative coefficients and an odds ratio less than 1, will affect the negative likelihood.

Table 10

Odds Ratios of the Variable

Independent Variables	Logistic Regression Coefficient (β)	Odds Ratio (e^{β})
X_1: Size	.6454	1.9068
X_2: Profitability	-.2745	.7600
X_3: Liquidity	.0080	1.0080
X_4: Leverage	-.0481	.9531
X_7: Operational Efficiency	.3547	1.4258
X_8: Returns on Invested Capital	-.0588	.9428

Note. N=45 (Target=17, Non-target=28)
X_1: Log of Sales, X_2: Return on Asset, X_3: Cash Ratio, X_4: Total Debt Ratio, X_7: EBIT to Asset Ratio, X_8: Net income to equity and long-term debt

However, the strength of the influences of each independent variable on the likelihood of being a target can not be directly compared by odds ratios or unstandardized regression coefficients (Menard, 1995). This fact is because each independent variable in this study is measured in different units, and the variances of the data in each independent variable differ as well.

In order to compare the strength of each variable directly, the standardized logistic regression coefficients are calculated and presented in table 11 with their rankings.

From table 11, EBIT to total assets ratio appears to have the strongest positive effect on takeover likelihood.

In other words, in the gaming industry, a firm with the highest operational efficiency can be regarded as the best takeover candidate. The total debt ratio is ranked second, return on asset is ranked third and net income to equity and long-term debt ratio is ranked fourth. Cash ratio of a firm indicated that it affects the least influence on takeover likelihood, followed by the size of a firm.

Table 11

Relative Contribution and Ranks of Variables in the Model

Ranking	Variables	Standardized Coefficient
1	X_7: EBIT to Total Assets	.7149
2	X_4: Total Debt Ratio	-.7035
3	X_2: Return on Asset	-.4338
4	X_8: Net Income to Equity + LT Debt	-.1572
5	X_1: Log of Sales	.0860
6	X_3: Cash Ratio	.0552

Note. X_1: Size, X_2: Profitability, X_3: Liquidity, X_4: Leverage, X_7: Operational Efficiency, X_8: Returns on invested capital

Discussion of Each Variable

The log of sales (X_1) is a proxy variable of the size of a firm. The logistic regression coefficient of this variable is .6454, and statistically significant at the

0.10 level, meaning the bigger the firm's size, the higher the likelihood of its being a takeover target.

The sign of the coefficient was expected to be negative, indicating that a smaller firm may be an attractive takeover target in the gaming industry. In addition, most prior studies, except Kim and Arbel (1998), reported that the relationship of the firm's size with the takeover likelihood was negative, and it was accounted for by relative acquisition costs. Interestingly, this study and Kim and Arbel (1998) originally expected a negative sign for the size of a firm. However, both found a positive relationship between a firm's size and its takeover likelihood.

Those same results in the gaming and lodging industries may imply that acquiring firms were motivated by the effects of synergy, economies of scale, increased market shares or the acquisition of customer databases. Another reason in the gaming industry is that there exists certain barriers to entry, and most gaming jurisdictions, except Nevada and Atlantic City, have restrictions for granting gaming licenses. Thus, a firm which wants to enter those gaming markets or to expand its market share,

may find a bigger firm for the takeover target in order to satisfy its growth objectives.

Although return on asset ratio and EBIT to asset ratio represent different variables, both ratios were obtained from profitability figures, net income and EBIT, respectively. However, the direction of the coefficients is the opposite. Return on asset ratio has a negative relationship, while EBIT to asset ratio has a positive relationship. Return on asset, in this study, represents the accounting term of profitability. EBIT to asset ratio represents the operational or managerial efficiency, because the performance of the operation is not related with debt-related expenses and dividend for shareholders. The results show that the takeover target firms are high in operational efficiency but low in accounting profitability, indicating the higher the operational efficiency, the higher the likelihood, and the higher the accounting profitability, the lower the likelihood. These results can be explained by the differences in the interest expenses between the group.

Table 12 compares the interest expenses between takeover targets and non-targets. The interest expenses of the target firms are much higher than non-targets, 61.35

vs. 38.15, in millions of dollars. This fact implies that target firms may suffer from high interest expenses, even though they produce high operating profits. Another reason for this result is that the acquiring firms may have the ability to refinance the expensive debt of target firms, reducing debt-related expenses.

Therefore, a takeover target firm can be described as one which produces high operating income, but low net income due to high interest expenses. For example, EBIT to asset ratio, which represents the operational

Table 12

Comparison of Interest Expenses

	Interest Expenses	Interest to total Debt
Target	61.350	.0872
Non-target	38.149	.0838
Total	46.914	.0851

Note. Interest expenses are measured in millions of dollars

efficiency in this study, of Showboat Inc., prior to the takeover, was 0.06, while return on asset ratio, which represents the accounting profitability in this study, was -0.02. Showboat Inc. paid higher interest expenses, $64.3

million, than did both target and non-target group, $61.3 million and $38.1 million, respectively. Its interest to total debt ratio, 0.10, was also higher than both groups, 0.0872 for target and 0.0838 for non-target. Therefore, Showboat Inc. showed negative accounting profitability but positive operational efficiency. That fact might be caused from high and expensive interest expenses.

In addition, Station Casinos had net debt of approximately $820 million with an average cost of 9.2% at the time of merger deal with Crescent Real Estate Equities. With access to lower costs of capital, Crescent might expect to gain significant interest savings by refinancing the Station Casinos' expensive debt (Salomon Smith Barney, 1998, April 21).

Cash ratio, representing the liquidity of a firm, appears to have a positive relationship with takeover likelihood. Prior studies in Hasbrouck (1985), Palepu (1986) and Kim and Arbel (1998), reported that the liquidity of the firm was negatively related with the takeover likelihood. However, this study and Dietrich and Sorensen (1984) show that a firm with a high liquidity ratio is viewed as a quality takeover candidate.

The total debt ratio represents a firm's financial leverage. Low level of leverage can be viewed as a signal of inefficient management, or, can increase the debt capacity in the combined firm. As most prior studies found (Stevens, 1973, Dietrich & Sorensen, 1984, Hasbrouck, 1985, Palepu, 1986, Kim & Arbel, 1998), there is a negative relationship between financial leverage and takeover likelihood. The leverage variable in this study proves the existence of a negative relationship. That is, the lower the total debt ratio of a firm, the higher the takeover likelihood. The strength of this variable is ranked second in this study (see Table 11). Thus, the level of financial leverage of a firm negatively contributes the strong effect on the takeover likelihood in the gaming industry.

However, the sign of returns on invested capital indicates that there is a negative relationship between net income to equity and long-term debt ratio and takeover likelihood.

In this study, capital expenditures and cash reserve capacity of a firm were expected to have significant positive relationships with takeover likelihood. However, capital expenditures to assets and cash & cash equivalents to assets were excluded from the model.

Development of the Takeover Prediction Model

Applying the coefficients of the variables included in the model to the logistic probability function defined in Chapter 3, a takeover prediction model is developed and presented as follows:

$$P(Y=1)=e^{Y}/1+e^{Y}$$

$$Y=-4.1356+0.6454X_1-0.2745X_2+0.0080X_3-0.0481X_4+.3547X_7-0.0588X_8$$

Where X_1 = log of sales

X_2 = return on asset

X_3 = cash ratio

X_4 = total debt ratio

X_7 = EBIT to asset ratio

X_8 = Net income to equity long-term debt

The prediction value can be obtained by replacing each variable with the values for a corresponding case and entering the outcome into the logistic function. Unlike linear regression analysis, the prediction value in logistic regression analysis will lie between 0 and 1.

The purpose of developing a takeover prediction model is to find good takeover targets. This prediction model may assist the corporate raiders in identifying their takeover candidates from the beginning. Therefore,

prediction accuracy was examined, and the results are presented in Table 13.

Firms in the sample were reclassified into targets or non-targets by using the prediction model of this study. The value of 0.5 was used as a cut off probability in this classification.

Table 13

Classification Matrix of target and non-target

		Predicted		Classification
Observed	N	Target	Non-target	Accuracy
Target	17	10	7	58.82%
Non-target	28	5	23	82.14%
Overall	45	15	30	73.33%

Of the 17 takeover target firms, 10 targets were correctly classified as targets, while 7 targets were misclassified as non-targets. Of the 28 non-target firms, 23 non-targets were correctly classified as non-targets and 5 were misclassified as targets.

Type I error refer to the probability of misclassifying a target into the non-target group; Type II error is the probability of misclassifying a non-target

firm into the target group. Table 13 shows that the Type I error is 41.2% (7/17) and Type II error is 17.9% (5/28).

The classification accuracy is 58.82% for the target group, and 82.14% for the non-target group. The overall classification accuracy of this model is 73.33%

In Table 14, the classification accuracy of the prior studies range from 45.7% in Palepu (1986), to 92.5% in Dietrich and Sorensen (1984).

Table 14

Classification Accuracy of Prior Studies

	Overall Accuracy	Classification Error	
		Type I	Type II
Simkowitz & Monroe (1971)	63.2 %	30.4 %	39.1 %
Stevens (1973)	70.0 %	15.0 %	55.0 %
Dietrich & Sorenses (1984)	92.5 %	N/A	N/A
Palepu (1986)[a]	45.7%	20.0%	56.3%
Kim & Arbel (1998)[a]	75.6 %	21.4 %	25.8 %
This Study	73.3 %	41.2 %	17.9 %

Note. a. The classification accuracy of these studies were from holdout samples.

Comparing the classification accuracy of this model with that of the prior studies, table 14 shows that the

classification accuracy of this study lies above the average of the prior studies. Although this model shows low Type II error, relatively high Type I error must be investigated.

CHAPTER 5

SUMMARY AND CONCLUSIONS

Summary

There have been many merger and acquisition activities in the gaming industry. The decision for a takeover may have been affected by both financial and non-financial factors. Since non-financial factors are hard to measure and quantify for analysis, this study originated from the question of which financial characteristics affect takeover decisions in the gaming industry.

To achieve the objectives, a sample of 17 takeover target firms and a control sample of 28 non-target firms were selected. The financial information of the firms was collected. Eight different categories of variables were established. These include the size, profitability, liquidity, leverage, capital expenditure, cash reserve capacity, operational efficiency and returns on invested capital.

Since the dependent variable of this study is

dichotomous, target or non-target, logistic regression analysis was employed to differentiate the financial characteristics of the takeover target firms from those of the non-target firms. Using stepwise selection procedure, six variables from the original eight variables were included in the logistic regression model. They were the firm's size, profitability, liquidity, leverage, operational efficiency and returns on invested capital.

The model's Chi-square was 14.6130 and was statistically significant at .05 level. The logistic R^2 of .2449 indicated that the takeover likelihood was explained by 24% with the six variables in the model.

The signs of the coefficients indicate that it was possible to determine the direction of the relationship between the financial characteristics and takeover likelihood. The size, operational efficiency, and liquidity of a firm was found to have positive relationships with takeover likelihood. This result indicates that the higher these variables of a firm, the higher the takeover likelihood. Conversely, the leverage, profitability, and returns on invested capital of a firm were found to have negative relationships with its takeover

likelihood, indicating that the higher these variables of a firm, the lower the takeover likelihood.

The takeover prediction model was developed by adopting the regression coefficients to the logistic probability function. To examine the predictive power of this model, the firms in the sample were reclassified into a takeover target group. The classification accuracy was 73.33%.

Implications of the Study

Based on the findings, this study offers three important implications for the gaming industry. First, the financial characteristics of takeover target firms in the gaming industry were identified in this study. There have been many studies on this topic in industries other than the gaming industry. However, this study is the first attempt focusing on the gaming industry to find financial factors which affect takeover decisions. The findings from this study can provide necessary information concerning quality takeover candidates for companies who want to expand their businesses or for companies wanting to enter into the gaming industry. Since the gaming industry faces certain barriers to entry in some gaming jurisdictions,

takeover can be an alternative strategy for entering into the industry. The findings of this study can be used as a tool for identifying quality takeover candidates.

Second, a unique financial characteristic of takeover target firms in the gaming industry was identified. Other studies have reported that the size of a firm has a negative relationship with the takeover likelihood. However, in this study, the size of the takeover target firms was found to have a positive relationship with takeover likelihood. In other words, the acquiring firms prefer to identify larger gaming firms as their takeover targets. That fact may account for the existence of barriers to entry in some gaming jurisdictions, the synergy effect or for the economies of scale.

Third, the takeover prediction model for the gaming industry was developed and the classification accuracy was fairly high. This model can be used as a tool for identifying early warning signals by companies which might be of hostile takeover targets, as well as a tool for identifying quality candidates.

Recommendations for Future Studies

For future studies of the financial characteristics of takeover targets in the gaming industry, it is suggested to enlarge the sample size. This study used a relatively small sample size due to the small number of gaming firms of which financial information was available to the public.

Total number of sample firms included in this study was only 45, and the selection rate of the sample was only 36.6% (45/123). A large sample would allow for a division into an original sample, used to establish the prediction model, and a holdout sample, used to test the model's prediction power.

The fifteen financial ratios, which were used to establish the logistic regression model, were all based on the firms' historical or book value data. Originally, the market value data for the firms' valuation was taken into consideration. However, the unavailability of market data for many sample firms forced this study to drop market valuation variables from the model. Therefore, it is suggested that future studies collect and utilize the firms' market valuation as a potential variable in the logistic regression model.

The low R_L^2 and high classification error for a target group in this study implies that non-financial factors might have affected the takeover decision much more than did financial factors. The difficulties of quantifying forced this study to exclude the non-financial factors. Thus, it is strongly recommended that future studies investigate non-financial factors for explaining the takeover activities in the gaming industry.

The maintenance capital expenditures of a gaming firm was expected to have a significant relationship with its takeover likelihood. Since most financial data of the sample firms were obtained from the financial database system, rather than from the annual reports, the capital expenditures for maintenance could not be separated from the capital expenditures for expansion. The study conducted in the lodging industry found a positive significant relationship between the capital expenditures and takeover likelihood. Therefore, it is recommended that future studies collect the annual reports and separate the capital expenditures for maintenance and expansion.

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