Analyzing the Relationship Between Systematic Risk and Financial Variables in the Casino Industry

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Abstract

The gaming industry, previous to 2007, had experienced a continued increase in revenues and stock prices, but in late 2007, the industry started to be affected by a recession. To have a better understanding of the relationship between this external economic factor (recession) and a gaming company's systematic risk (beta), this study analyzed which financial ratios are significant predictors of beta and evaluated if these financial ratios better predict beta before or during the recession. The financial ratios examined in this study include return on assets, liabilities as a percentage of assets, asset turnover, quick ratio, EBIT growth rate, and market capitalization. The results revealed that market capitalization was the only variable that had significantly positive impact on beta both before and during the recession. Asset turnover was a significant predictor only before the recession while liabilities as a percentage of assets was significant only during the recession.

Keywords: Gaming industry, financial ratios, beta, systematic risk, recession

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During the decade previous to 2007, the casino industry had seen significant growth in both revenue and stock price, but in late 2007, revenue and stock prices started to decline. This decrease happened at the same time as the recession that has affected the entire economy in the U.S. According to the National Bureau of Economic Research (2008), the current recession began in December 2007. The gaming industry does not always rise and fall with the U.S. economy, but in late 2007, both started to decline at a significant rate. Although the decline in the gaming industry occurred at the same time as the recession, there has been no specific research to determine what factors affect the financial risk in the gaming industry and hence the decline in stock prices.

Stock prices are affected by systematic and unsystematic risk. However, diversified investors are concerned only with the systematic risk and require a higher rate of return for stock that has a higher systematic risk. Financial executives in the gaming industry need to be concerned with what factors affect their firm's systematic risk and need to understand how to address and adjust these factors as necessary to satisfy their shareholders. Management and financial executives are faced with business decisions everyday that can affect the risk of their firms. By understanding how these decisions affect financial ratios and how these financial ratios affect the systematic risk of the firm, the executives will be able to manage the risk of the firm's stock price and, in turn, increase the wealth of shareholders.

The purpose of this study is to examine the determinants of casino companies' systematic risk, or Beta. The objectives are twofold. The first objective involves

investigating whether certain financial variables influence a firm's systematic risk in the gaming industry. The second objective is to analyze whether these financial variables predict a firm's systematic risk differently before and during a recession for the gaming industry.

This study can help casino operators, investors, and hospitality researchers better understand the systematic risk of casino companies. A comprehensive understanding of factors which can impact the risk of casino stocks will be essential for operators to enhance the casino companies' value. By evaluating before and during a recession separately, casino operators can see if there is a need to adjust certain financial factors differently based on general economic conditions. The findings of this study will academically contribute to the literature related to beta determinants by adding new factors from the gaming industry.

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Literature Review

Systematic risk (Beta)

The total risk of a firm's stock includes two types of risk, systematic and unsystematic. Systematic risk is the market-related risk, and unsystematic risk is the firm-specific risk. Unsystematic risk can be minimized by holding a diversified portfolio of stocks; thus, the concern to investors is the systematic risk portion. The systematic risk is often determined by the Capital Asset Pricing Model (CAPM) theory (Sharpe, 1963, 1964; Litner, 1965) which states:

$$R_i = \alpha_i + \beta_i R_m + e_i$$

where R_i is the return on the ith security, R_m is the return on the market portfolio, e_i is the error about the regression line that represents the relationship between the two, β_i is the estimated beta of the ith security and α_i is the estimated vertical intercept. The CAPM model suggests that the return on an asset is determined by adding the risk free rate to a risk premium which increases as the systematic risk of a company increases.

According to a study by Gu and Kim (1998), the systematic risk (Beta) of each firm can be estimated based on the equation or the characteristic line. The slope of the characteristic line of each firm, estimated by regressing the S&P 500 return against the firm's stock return, represents the sensitivity of the stock's return to the market return and is the estimated beta.

Financial Ratios

To determine which financial ratios are potential determinants of beta for this study, previous studies have been evaluated in this section. Logue and Merville (1972) suggest that which financial ratios predict systematic risk varies by industry. While minimal studies have been done, there are a few within multiple facets of the hospitality industry.

Kim, Ryan, and Ceschini (2007) studied financial ratios in 58 quick service and full service restaurants from 1999 to 2003. Return on investment (ROI) was found to be negatively correlated to Beta and significant in both segments at the .05 level. In quick service restaurants, debt to equity ratio also had a significantly positive relationship with Beta, but at the .10 level. Debt to equity ratio was not significant in full service restaurants. According to a study by Borde (1998), high liquidity might indicate that available resources are being unwisely invested, which can increase the investors' risk perception. Thus, Kim et al. (2007) postulates the positive relationship between quick ratio (as a liquidity indicator) and risk (beta) in their study. Although the quick ratio turned out to be insignificant in either segment, it turned out to be significantly correlated to beta at the .10 level in the overall restaurant industry (i.e., combining quick and full service restaurants). Meanwhile, receivable turnover ratio, Earnings before interest and taxes (EBIT) growth, and market capitalization turned out to be insignificant in either

segment. For the overall restaurant industry, Kim et al. (2007) found that ROI to be negatively correlated to Beta and significant at the .05 level and found debt to equity to be positively correlated to Beta and significant at the .10 level.

Lee and Jang (2007) analyzed the airline industry from 1997 to 2002 and found that debt leverage (total debt to total assets), profitability (return on assets), firm size (total assets) and EBIT growth are the financial variables that are significant predictors of Beta at the .05 level. Debt leverage and firm size turned out to be positively related to systematic risk (Beta), so as this ratios increase so does beta. Lee and Jang's study also found that profitability and growth were negatively related to Beta, which shows that the higher profitability and the higher the EBIT growth rate, the less risk of a firm. Liquidity (quick ratio) and operating (asset turnover) ratios were found to have no significant impact on systematic risk (Beta).

The only study found in the casino industry was conducted by Gu and Kim (1998) and was concerned with the period from 1992 to 1994, one of the fast growth periods of the casino industry. Gu and Kim (1998) evaluated the current ratio, leverage ratio (total liabilities to total assets), asset turnover, and profit margin of 35 casino firms and found that only asset turnover was significant and negatively correlated with Beta at the .10 level. All other variables were found to be statistically nonsignificant. The authors also found that casino firms are riskier than the market. Further, the authors suggested exploring additional liquidity, leverage, and profitability ratios to see if there is any significant relationship between other ratios and Beta. For example, it was recommended for future researchers to use quick ratio instead of current ratio since the quick ratio may better represent a casino firm's liquidity.

In terms of financial variables and recession periods, one study (Huo & Kwansa, 1994) compared the riskiness of hospitality firms and utility firms during the recessionary period of 1990 to 1991. The result of this study shows that the impact of operating and financial leverages on hotel and restaurant firms' riskiness is less than utility firms. That is, hospitality companies were less able to alter capital structure and capital budgeting decision during the recessionary period. This study also suggested further research to compare the effect of operating and financial leverages on systematic risk during recessionary and non-recessionary periods to determine whether these decisions are relevant to the hospitality business cycle. To date, no published study has attempted to explore this topic by comparing before, during and/or after a recession for the casino industry.

Testing of Hypotheses

The study includes seven hypotheses, of which the first six try and achieve the study's first objective of determining which financial variables predict a firm's systematic risk (Beta), and the final hypothesis is concerned with the second objective of potential changes in these financial indicators before and during a recession.

Table 1

Hypotheses

H1	Profitability (Return on Assets) is negatively related to systematic risk
H2	Casinos with high leverage (Liabilities as % of Assets) have high systematic risk
H3	Casinos with high efficiency (Assets Turnover Rate) will be subject to low systematic risk.
H4	Liquidity (Quick Ratio) is positively related to systematic risk.
H5	Casinos subject to fast growth (EBIT Growth Rate) have high systematic risk.
H6	Large casinos (Market Capital, US$ in billions) have low systematic risk.
H7	The relationship between financial variables and systematic risk is different before the recession (2005~2006) and during the recession period (2007~2008).

Methodology

In order to test these hypotheses simultaneously, a multiple linear regression analysis was performed with Beta as the dependent variable and the six financial variables as the independent variables in this study. Using the financial information of 19 public traded gaming companies, from 2005 to 2008, six financial ratios were analyzed (See Appendix for the list of companies). The 19 companies selected were the only gaming companies that were publicly traded, had public financial information, and owned and operated at least one physical casino for all four years. Any firm that has gone private equity, is an on-line casino, only manages casinos, or has yet to report any year's financial information was excluded.

2005 to 2008 was selected as the sample years for the following reasons. First, there are only two year ends in the current recession, 2007 and 2008. To stay consistent and use the same number of years before and during, the two years previous to the start of the recession were included. The second reason for starting with 2005 and not sooner is that gaming companies are coming into and going out of the public market every year, and the number of companies that could be included in this study would be smaller if the longer the time frame was considered.

The six financial variables selected in this study include a profitability ratio, leverage ratio, efficiency ratio, liquidity ratio, growth, and firm size.

The six financial variables selected in this study include a profitability ratio, leverage ratio, efficiency ratio, liquidity ratio, growth, and firm size. Based on the previous studies discussed in the literature review, the following specific ratios were selected to represent each financial variable : (1) return on assets (to represent profitability) , (2) liabilities as a percentage of assets (leverage), (3) asset turnover (efficiency), (4) quick ratio (liquidity), (5) earnings before interest and taxes (EBIT) growth, and (6) market capitalization (firm size). These ratios were used as independent variables in multiple regression analysis. The regression equation developed in this study takes the following form:

$$Beta = \beta_0 + \beta_1(Prof) + \beta_2(Lev) + \beta_3(Eff) + \beta_4(Liq) + \beta_5(Growth) + \beta_6(Size) + \varepsilon$$

   Prof = Return on assets
   Lev = Liabilities as a % of assets
   Eff = Asset turnover
   Liq = Quick ratio
   Growth = EBIT growth rate
   Size = Market capitalization (shares * price)

We spilt the data into sub-samples, before and during the recession, to analyze the second objective. Each sample's six ratios from years 2005 and 2006 were averaged for the before recession period, and the ratios from years 2007 and 2008 were averaged for the during the recession period. The years were averaged so that a significant change in one year did not affect the results. As a result, 19 observations in each period (before and after recession) were available to conduct multiple regression analysis twice.

According to the National Bureau of Economic Research (2008), the current recession began in December 2007 and is based on several factors including payroll employment measures, gross domestic product, and gross domestic income. Although the actual recession started in December 2007, the gaming industry saw declines in business volumes starting earlier in 2007. According to the American Gaming Association (AGA) (2009), the increase in gaming revenue in 2007 was only 1.54% which is the lowest since 1999, the earliest year the AGA provides on their website.

All financial information was secondary data from COMPUSTAT when available and for the few numbers that were not available through COMPUSTAT, the company's annual filings (10-K) with the Securities and Exchange Commission (SEC) were used. All ratios selected as variables of this study were calculated using Excel and not taken from COMPUSTAT.

The monthly stock return and monthly market return during the non-recessionary and recessionary periods were used to derive two Betas for each company. The monthly stock returns, measured as the percentage changes of stock prices, were drawn from the Wharton Research Data Services (WRDS) database. The equally weighted monthly return of the S&P 500, used as a proxy of the market portfolio return in this study, was obtained from AOL's Finance section. The market return was the percentage change of the S&P 500 index. The data encompassed from 2005 to 2008 period, which witnessed both the fast growth and recession of the casino industry.

Results

There are six assumptions required to be checked before performing a multiple regression analysis (Norušis, 2005). First of all, histograms and normal probability plots were examined for normal distribution of residuals. Secondly, the constant variance was verified by checking the plots with studentized deleted residual (Y) against standardized predicted value (X). Thirdly, partial regression plots were reviewed for linearity between the dependent variable and each independent variable. Fourthly, the independence of observations assumption was verified by checking the plots with studentized deleted residual (Y) variables and sequence (X). Finally, box plots were used to screen outliers. As a result of checking all these assumptions, none of them were violated.

Analysis of variance inflation factors (VIF) and tolerance was checked for multicollinearity. There is no formal criterion for determining the bottom line of the tolerance value or VIF. Some argue that a tolerance value less than .1 or VIF greater than 10 roughly indicates significant multicollinearity (Hair, Black, Babin, Anderson, & Tatham, 2006; Norusis, 2005). Others suggests that a conditioning index greater than 30 for a given dimension coupled with variance proportions greater than .5 for *at least two* different variables (Belsley, Kuh, & Welsch, 1980; Tabachnick & Fidell, 2007). As seen in Table 2, no multicollinearity is evident. In both models (before and during the recession), all VIF is less than 10 and all conditioning index is less than 30. Although the dimension 7 has a variance proportion greater than .5, it is acceptable since it is only for one variable.

Table 2

Collinearity Diagnostics

Before Recession								
				Variance Proportions				
Dimension	Eigenvalue	Condition Index	ROA	Liabilities as % of assets	Asset Turnover	Quick Ratio	EBIT Growth Rate	Market Cap (in Billion $)
1	3.963	1.000	.00	.00	.01	.00	.00	.01
2	1.098	1.900	.08	.00	.00	.00	.33	.00
3	.960	2.032	.08	.00	.02	.00	.15	.14
4	.727	2.335	.05	.00	.01	.01	.06	.58
5	.160	4.970	.01	.00	.77	.13	.12	.13
6	.081	7.015	.37	.12	.19	.43	.14	.13
7	.011	19.088	.40	.87	.00	.43	.20	.01
During Recession								
				Variance Proportions				
Dimension	Eigenvalue	Condition Index	ROA	Liabilities as % of assets	Asset Turnover	Quick Ratio	EBIT Growth Rate	Market Cap (in Billion $)
1	3.446	1.000	.00	.00	.01	.01	.01	.01
2	1.614	1.461	.11	.00	.00	.03	.05	.02
3	.908	1.948	.01	.00	.00	.14	.05	.34
4	.657	2.289	.00	.00	.03	.10	.11	.33
5	.274	3.544	.48	.01	.03	.23	.41	.02
6	.078	6.648	.28	.31	.57	.15	.11	.22
7	.022	12.466	.12	.67	.37	.33	.27	.05

Results before the Recession (2005-2006)

Table 3 shows the descriptive statistics including the mean and standard deviation for the 19 observations. As can be seen in Table 5, the absolute value of the correlation coefficient between all six factors and the beta before the recession was .768. From the regression model, the 58.9% of variation in Beta (systematic risk) was explained by the variation in the six financial variables: Return on Assets, Liabilities as % of assets, Asset Turnover ratio, Quick Ratio, EBIT Growth Rate, and Market Capital. This result indicates that the model was significant, $F (6, 12) = 2.87, p < .1$. Thus, there was a linear relationship between the six financial variables and Beta (Table 4).

Table 3

Descriptive Statistics Before the Recession

	Mean	Std. Deviation	N
Beta	1.7473	1.69519	19
Profitability (Return on Assets)	3.3200	8.26190	19
Leverage (Liabilities as % of assets)	71.7053	27.94092	19
Efficiency (Asset Turnover)	.6837	.39985	19
Liquidity (Quick Ratio)	1.1282	.53922	19
Growth rate (EBIT Growth Rate)	-.1044	1.35599	19
Size (Market Capital)	3.0206	5.85036	19

Table 4

Model Summary Before the Recession

Model	R	R Square	Std. Error of the Estimate
	.768	.589	1.33

The magnitude of the partial regression coefficient depends, among others, on the units in which the variable is measured (e.g., Size = US$ in billions; Leverage = %). To make the partial regression coefficients more comparable, this study used standardized coefficients (Z score) (Norušis, 2005). The positive standardized coefficient (β) of .512 indicates that there was a statistically significant ($p < .05$) linear relationship between efficiency (measured by asset turnover ratio) and a casino company's systematic risk (measured by Beta). A casino company's size also showed a significant linear relationship with the company's systematic risk ($\beta = .585$, t =2.866, $p < .05$). That is, for every positive degree increase in Asset Turnover Ratio, the predicted Beta will increase by .512; and for every positive degree increase in Market Capital, the predicted Beta will also increase by .585. On the other hand, there were insignificant associations between the other financial variables and Beta (Table 5).

Table 5

Coefficients of Financial Variables Before the Recession

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.250	2.322		.107	.916
Profitability (Return on Assets)	-.113	.070	-.552	-1.617	.132
Leverage (Liabilities as % of assets)	-.013	.023	-.213	-.570	.580
Efficiency (Asset Turnover)	2.172	.851	.512	2.553	**.025***
Liquidity (Quick Ratio)	.680	.846	.216	.803	.437
Growth rate (EBIT Growth Rate)	-.337	.302	-.270	-1.117	.286
Size (Market Capital)	.170	.059	.585	2.866	**.014***

Note. Dependent Variable: Beta (Systematic Risk)

* $p < .05$

Results during the Recession (2007-2008)

Table 6 shows the descriptive statistics including the mean and standard deviation for the 19 observations. The absolute value of the correlation coefficient between all six factors and the beta during recession was .863. That is, the 74.5% of variation in Beta (systematic risk) was explained by the variation in the six financial variables: Return on Assets, Liabilities as % of assets, Asset Turnover ratio, Quick Ratio, EBIT Growth Rate, and Market Capital. This result indicates that the model was significant, $F(6, 12) = 5.849$, $p < .01$. Thus, there was a strong linear relationship between the six financial variables and Beta during the recession (Table 7).

Table 6

Descriptive Statistics During the Recession

	Mean	Std. Deviation	N
Beta	1.8079	.66591	19
Profitability (Return on Assets)	.0442	10.24512	19
Leverage (Liabilities as % of assets)	72.4305	32.67676	19
Efficiency (Asset Turnover)	.5953	.31643	19
Liquidity (Quick Ratio)	1.6531	2.70273	19
Growth rate (EBIT Growth Rate)	.3964	1.61314	19
Size (Market Capital)	2.7388	5.59141	19

Table 7
Model Summary During the Recession

Model	R	R Square	Std. Error of the Estimate
	.863	.745	.412

Table 8 shows the magnitude of each financial variable related to Beta separately. The positive standardized coefficient (β) of .573 indicates that there was a statistically significant ($p < .05$) linear relationship between a casino company's leverage (measured by liabilities as % of assets) and its systematic risk (measured by Beta). A casino company's size also had a significant effect on its systematic risk ($\beta = .605$, t =3.695, $p < .01$). Specifically, for every positive degree increase in Liabilities as % of assets, the predicted Beta will increase by .573; and for every positive degree increase in Market Capital, the predicted Beta will also increase by .605. The other four financial variables turned out to be insignificant (Table 8).

Table 8
Coefficients of Financial Variables During the Recession

	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.880	.505		1.743	.107
Profitability (Return on Assets)	-.005	.016	-.081	-.327	.750
Leverage (Liabilities as % of assets)	.012	.005	.573	2.381	.035*
Efficiency (Asset Turnover)	-.226	.436	-.107	-.517	.614
Liquidity (Quick Ratio)	.018	.051	.074	.356	.728
Growth rate (EBIT Growth Rate)	-.027	.098	-.066	-.278	.785
Size (Market Capital)	.072	.019	.605	3.695	.003**

Note. Dependent Variable: Beta (systematic risk)

* $p < .05$; **$p < .01$

Discussions & Implications

Table 9 shows the results of this study as compared to the hypotheses. Firm size is the only financial variable that is significant and positively correlated to Beta both before and during the recession, but this is opposite of the predicted correlation. Previous studies also predicted that firm size would be negatively correlated to Beta (Kim, Ryan, & Ceschini, 2007; Lee and Jang, 2007), however firm size turned out to be positively correlated to Beta in this study. This inconsistent finding could be caused by the fact that gaming companies had expanded too fast with new properties during 2005-2008. Such expansion could lead to the higher competition and the market saturation and, in turn, higher chance of bankruptcy. Consequently, these firms may be subject to high default risk. Further investigation into why this occurred should be conducted in future research.

Table 9
Hypotheses results

	Financial ratio	Predicted Correlation	Results- Before Recession	Results - During Recession
H1	Return on Assets	Negative	Negative	Negative
H2	Liabilities as % of Assets	Positive	Negative	Positive*
H3	Assets Turnover Rate	Negative	Positive*	Negative
H4	Quick Ratio	Positive	Positive	Positive
H5	EBIT Growth Rate	Positive	Negative	Negative
H6	Market Capital	Negative	Positive*	Positive**

*$p < .05$; **$p < .01$

Asset turnover was found to be a significant determinant of Beta before the recession of 2007 which is consistent with Gu and Kim's findings (1998). However, this study found that Asset turnover is positively correlated to Beta before the recession. Asset turnover was found to be negatively correlated to beta during the recession but was not statistically significant. This result shows during non-recession times the higher the asset turnover, the higher the risk. Gu and Kim (1998) postulated that the negative correlation between assets turnover ratio and beta indicate efficient assets management can lead to a lower systematic risk for gaming companies. The inconsistent result found in this study implies that although gaming companies had achieved high assets efficiency before the recession, it was not vital enough to reduce the companies' systematic risk. One of the reasons could be the fast expansion of gaming capacity in a saturated market during 2005-2006. The implication for gaming companies is that financial managers should control not only asset turnover ratio (which is related to operating activities), but also other ratios related to financing and investing activities.

Liabilities (as a percentage of assets) was not found to be significant before the recession, but was found to be significant and positively correlated during the recession. This finding is consistent with previous studies which posited that higher leverage leads to higher risk because shareholders have more risk since there is more debt which needs to be paid before they get paid. It is also consistent with Gu's study (1993) which suggests hospitality firms are sensitive to economic downturn. It would be critical for the gaming companies to manage debt and reduce the financial risk associated with it, especially during the recession.

Other financial variables (i.e., Quick ratio, Return on assets, and EBIT growth rate) turned out to be insignificant determinants of Beta during both the non-recessionary and recessionary periods (Table 9). The insignificant relationship between quick ratio and beta is not consistent with finding in a Borde's study (1998): if the available resources are not being invested in assets which can generate higher returns than cash, beta could increase. Thus, the gaming companies should realize that excess liquidity may not always infer that resources are being imprudently invested.

The insignificant relationship between return on assets and a firm's beta could be attributed to the relatively high fixed assets that are common in the gaming industry. A gaming firm cannot easily adjust its assets in the short run; thus as the company's earning decreases, the return on assets will decrease. The decreased return on assets of a gaming company may not increase the investors' perceived risk because if the gaming company needs to liquidate, its high fixed assets will cover their investments.

The relationship between EBIT growth and beta was also found to be insignificant. This means that investors do not correlate a gaming company's growth with its risk.

Growth is common in the gaming industry with the increase of legalized gaming in the US and internationally; therefore, the gaming investors may not be as concerned as those in other industries.

Limitations and Future Research

The major limitations of this study are the number of years and the sample size. Both of these are out of the control of the researchers. The current recession has only just started and the most recent information has been sampled. This study could be done again with adding more years prior to the recession and averaging those. This study could also be extended to include more years and to include a dummy variable for before, during, and after recession and not run the data as sub samples but as a complete sample set.

The sample size is also a concern, but as noted above this is a concern with all gaming studies that has been conducted. Since there are only a limited number of publicly traded gaming companies, there is only so much data. By increasing the number of years used and not averaging the years, more companies can be included. The downside of this is that more companies may be included in some years than others, and the factors that turn out to be significant may be due to some companies coming in, dropping out, or merging rather than due to the companies' financial factors that are being evaluated. This study could also be extended once the recession has ended and a couple years have passed to explore both what the full effect of the recession was and what gaming companies did after the recession.

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Appendix: List of companies used

Ameristar Casinos, Inc.
Archon Corporation
Boyd Gaming Corporation
Century Casinos Inc.
Dover Downs Gaming & Entertainment
Empire Resorts, Inc.
Global Casinos, Inc.
Isle Of Capri Casinos, Inc.
Las Vegas Sands Corporation
MGM Mirage
Monarch Casino & Resort, Inc.
MTR Gaming Group, Inc.
Nevada Gold & Casinos, Inc.
Penn National Gaming, Inc.
Pinnacle Entertainment, Inc.
Riviera Holding Corporation
Trans World Corporation
Trump Entertainment Resorts
Wynn Resorts Limited