Double down: economic downturn and increased competition impacts on casino gaming and employment

Byron Marlowe
Carson College of Business, Washington State University Tri-Cities, Richland, Washington, USA
Tianshu Zheng
College of Human Science, Iowa State University of Science and Technology, Ames, Iowa, USA
John Farrish
College of Agricultural Sciences, Southern Illinois University Carbondale, Carbondale, Illinois, USA
Jesus Bravo
Carson College of Business, Washington State University Tri-Cities, Richland, Washington, USA, and
Victor Pimentel
College of Business, New Mexico State University, Las Cruces, New Mexico, USA

Received 19 October 2019
Revised 15 March 2020
Accepted 29 April 2020

Abstract

Purpose – The purpose of this study was to create a more balanced, comprehensive and valid illustration of the relationships between casino gaming volume and employment during economic downturns in urban and rural locations in nondestination gaming states.

Design/methodology/approach – This study analyzes gaming volumes and employment prior, during and after the recession of 2007–2009, using a time series with intervention analysis on a monthly coin in, table drop and regression analysis on employment impacts of casinos.

Findings – Findings indicate that while there was a slight drop in gaming revenue and employment figures during the economic downturn, nondestination gaming locations such as Indiana proved relatively resilient to an economic downturn.

Originality/value – The Great Recession had no significant impact on gaming volume because gamblers chose to spend their more limited entertainment dollars on less expensive gaming options; in other words, casinos closer to home requiring the expenditure of fewer dollars on travel and/or hotel rooms. The current pandemic and pressures of the macro-environment again threaten the US gaming and casino market with an economic downturn and the results of this study are as timely as ever for hospitality professionals and social scientists to understand the behavior of casinos in recessionary environments.

Keywords Time series analysis, Economic downturn, Casino gaming

Paper type Research paper

Introduction

The casino and gaming industries are generally considered resistant to economic downturns. That notion was laid to rest by the Great Recession of 2007–2009, during which the casino

International Hospitality Review
Vol. 34 No. 1, 2020
pp. 105-124
Emerald Publishing Limited
2516-8142
DOI 10.1108/IHR-10-2019-0023

industry in the United States as a whole experienced a significant drop in business (Zheng, 2014). Most existing research on gaming-related economic impact has focused on traditional gaming destinations such as Atlantic City, New Jersey and Las Vegas, Nevada. Until the work of Zheng *et al.* (2013), no research addressed nondestination gaming performance during an economic downturn. Their results suggested that nondestination gaming locales' gaming performance, measured by volume, showed resistance to the economic downturn. Their study was limited, however, as it examined results from only one nondestination gaming state. The present study proposed to test the hypothesis that nondestination gaming locations are more resistant to recessionary pressures than destination locations by investigating another significant, nondestination gaming location on the basis of gaming volume and employment.

With a total state-wide win of $2.641*bn* in 2018 (Indiana Gaming Commission, 2018), Indiana ranks fourth in the United States based on gross gaming revenues (American Gaming Association, 1999–2016). Casino gaming was legalized in Indiana in 1993, and its first casino opened in 1995. Since then Indiana has relied almost exclusively on the regional, local drive-in markets of Indianapolis, Chicago, Cincinnati and Louisville for most of its gaming volume. In 2012, the Chicagoland, IL/Indiana drive-in market was the third-largest casino market in the United States behind Atlantic City, NJ and Las Vegas, NV (American Gaming Association, 1999–2016).

Competition does not merely occur among separate entities, e.g. casinos and gambling halls, but also regions. According to the Indiana Gaming Commission (Indiana Gaming, 2016), Indiana has been susceptible to decreased gaming volume and casino employment because of the introduction of gaming in neighboring states like Illinois and Ohio. Illinois and Ohio are two of the midwestern regional casino markets that continue to expand gaming operations and compete for casino market share with Indiana. Many gamblers who once flooded southeast Indiana's three riverboat casinos now spend their money in Ohio (Sikich, 2014). Largely because of emerging gaming competition in Ohio, which legalized gaming in 2012, gaming revenues were down $242.5*m* in Indiana in 2013 (Sikich, 2014).

This is not the first time that emerging competition affected gaming markets in the United States. Both the slot coin-in and table drop models reported a significant decrease in Atlantic City gaming volumes at the onset of legalized gaming in Pennsylvania (Repetti and Jung, 2014). Smaller gaming volumes weakened state tax collections and, in many cases, reduced payments to local communities relying on gaming to pay for a significant portion of their services (Sikich, 2014). The financial benefits derived from gaming-related taxation and employment, and higher personal income, enable communities to allocate resources to things such as the quality of family life and cleanliness of the physical environment surrounding casinos (Wan, 2012). Also, the casinos have been instrumental to the improvement of local infrastructure, especially near casino locations. These infrastructural improvements primarily were designed to improve access to casinos, both in terms of transportation and also telecommunication systems (Wan, 2012).

The comparative lack of access to gaming is a competitive disadvantage for a nondestination gaming destination, such as Indiana, where annual gaming volume declined from its peak in 2007 (Indiana Gaming Commission, 1993–2018). The combination of more recent economic volatility, and the drop in gaming revenues, has triggered industry stakeholder concerns about the sustainability of expansion within the gaming industry (Li *et al.*, 2010). If such trends continue, customer spending on casino games and related employment could be substantially reduced, also threatening the development of local tourism-based economies, and even the welfare of host economies (Li *et al.*, 2010). Efforts to understand the economic impact of an economic downturn in repeater markets, and to support casino capacity planning in those markets, will benefit from the understanding gained by investigating gaming volumes and employment levels before, during and after the Great Recession in nondestination gaming states.

Research suggests that community perceptions of casino operations can vary according to legal jurisdiction (Janes and Collision, 2004). In impoverished and disadvantaged

communities, in both urban and rural areas, societal perceptions of gaming are mostly positive because casinos are believed to bring a measure of economic stability, as opposed to other forms of entertainment. Thus, casinos are considered a financial solution to problems rather than an economic cost (Janes and Collision, 2004). This economic stability is perceived to enhance not only employment income and local taxes but also improved infrastructure such as schools, hospitals and medical facilities (Janes and Collision, 2004).

Overall, local casino operations in both urban and rural areas were regarded primarily as favorable to "host economies" (Walker and Jackson, 2007, p. 593), as an essential part of the community infrastructure, and as a hedge against prevailing local and national economic conditions (Janes and Collision, 2004). Such positive economic impacts are facilitated, in part, by investing casino revenues back into local economies and community infrastructure (Akee *et al.*, 2015). Their (Akee *et al.*, 2015) research indicated that gaming revenues have, in some areas, dramatically uplifted both the physical and psychological outlook for key stakeholders in those communities.

Although historically considered by many to be mostly recession-proof, the casino/gaming industry has not exactly been immune from the ill effects of economic downturns (Etzel, 2001). As noted by scholars, the gaming industry did see a decline in both revenues and stock prices as the US economy deteriorated in 2007 (Repetti and Kim, 2010). In their study, Repetti and Kim (2010) found that a casino's company size had a significantly positive impact on its systematic risk during the 2007 recession. They posit that perhaps companies expanded too fast with new properties during 2005–2008, thereby unwittingly increasing their chances of financial troubles during the recession. Moreover, several authors indicate that other financial crises bought on by catastrophic events such as the 9/11 attacks, can also have detrimental financial effects on the casino/gaming industry.

For example, in the wake of the 9/11 attacks, both air travel and tourism in general around the country experienced abrupt and severe reductions. As flights to gaming areas, such as Las Vegas, carried less and less passengers, hotel occupancy rates plummeted (Eisendrath *et al.*, 2008). Accordingly, casinos unavoidably instituted severe workforce reductions (Eetzel, 2001; Weissenstein, 2001) that inadvertently caused ill will among the local labor force. Additionally, in an attempt to attract more clients to the area, casinos also needed to reduce their nightly room rates (Berns, 2001). Lastly, many casinos also had to scale back or postpone major expansion/renovation projects they had planned prior to 9/11 (Eisendrath *et al.*, 2008). Therefore, the responses undertaken by casinos during the financial crises described above seem to indicate that the gaming industry is indeed impacted by economic declines.

Literature review

Historically, the expansion of commercial casinos passed through two stages (Zheng *et al.*, 2013). The first stage, in response to the Great Depression in 1929, was designed to stimulate the Las Vegas, Nevada economy during the 1930s, leveraging legalized gambling as a strategic method of economic development. Commercialized casino gaming was designed to stimulate the host community's economies (Zheng *et al.*, 2013). The second stage in the development of commercial casinos started in the late 1980s and continues today (Coulter *et al.*, 2013; Richard, 2010). The 1990s witnessed the unprecedented rapid development of the commercial casino industry in many nondestination casino states, including Native American and riverboat casinos, which were legalized in Louisiana, Illinois, Iowa and Indiana, among others (Wiley and Walker, 2011). In contrast, the Strip in Las Vegas, a destination for casino gaming, had not seen a casino-resort open since 2010 when The Cosmopolitan of Las Vegas began operations.

Hotel and casino market participants in the US have enjoyed a sustained period of profitable growth for almost a decade since the Great Recession. The deep economic decline of 2009 was

impactful, with Gross Operating Profits contracting 28.6%. Hotels have averaged an annual 7.9% bottom-line gain through 2016 since the Great Recession. The recovery of the rooms industry is apparent, even though competition and supply have increased, suggesting weaker gains in the future (CBRE, 2019). As reported in the CBRE Trends in the Hotel Industry USA Edition (2019), industry profits increased a comparatively meager 2.3% in 2018, only marginally better than the 2017 gain of 2.2%. The outlook for 2019 and 2020 calls for continued low-single-digit profit growth, and perhaps a slight decline in profits in 2021 as the economy slows.

The recovery from the Great Recession of 2007–2009 is now a decade in the making and was solidified by the high economic growth experienced in the US since late 2016. Lower than historical norms of new lodging construction (STR, 2019) throughout the lodging industry, both casino and noncasino, continue to contribute to record high occupancy levels (STR, 2019). The lodging industry remains healthy, but the potential for threats to ownership prosperity through a severe economic downturn remains. CBRE (2019) research revealed that elevated levels of economic uncertainty in the US since 2008 have negatively impacted both hotel demand and the ability of managers to increase room rates. Consequently, profit levels have been weakened.

Several articles across the casino gambling literature have examined the aforementioned effects of external economic factors. Eisendrath *et al.* (2008) analyse the impacts of the events of September 11, 2001, on certain gaming business volume on the Las Vegas Strip, using intervention analysis indicated Eisendrath showed that in only five months the strip was fully recovered.

Zheng (2014) examined the impact of the Asian financial crisis on Las Vegas casino drops of baccarat and pai gow, two games favored and mainly played by Asians, Zheng's (2014) findings proved that the impact of the crisis on Las Vegas casinos was much worse than indicated by the revenue gap in previous studies.

Repetti and Jung (2014) show how Atlantic City casinos were hit by both the 2007–2009 recession and the addition of legalized gaming in Pennsylvania at about the same time, resulting in a significant decrease of slot coin-in.

Horváth and Paap (2012) analyze the effect of financial and economic crisis between 1959 and 2010 on gambling activities using time series analysis, concluding that downturns, casino gambling and parimutuel are expected to experience a fall-back in demand and income.

Zheng *et al.* (2013) discuss the "recession-proof" status of the gaming industry, specifically in Iowa after the 2008 recession, their findings suggest that even when table drop was slightly affected after 2008, it started to recover in late 2010, they also proved that monthly admission was not affected by the 2008 recession, and even showed a significant increase after it.

Yoo and Kitterlin (2012) took a comparative approach and examined the relational impact during the economic recession and after the economic recession. The data showed that the casino operation increased the amount of return on investment of economic relational benefits for loyal customers during the recession in an effort to maintain business during hard times.

Conner and Taggart (2009) explore the impact of the 2007 economic recession across Connecticut Indian Country, focusing on two of the most successful and recognizable Class III operations in the industry, the Mashantucket Pequot and the Mohegan Indian casinos.

Eadington (2011) examines the economic events and other factors that affected the casino industry after the 2007–2009 economic recession and their implications for the future of casino and gaming markets in America and Europe. Olason *et al.* (2015) study found that after all three major banks in Iceland went bankrupt in 2008 gambling went up significantly.

Zheng *et al.* (2016) used autoregressive integrated moving average (ARIMA) with intervention analysis to examine weekly stock indices of the hotel segment and the casino hotel segment in comparison with the S&P 500 index, results show that casino hotel firms were affected at the beginning of the recession and hotel firms and S&P 500 firms were not affected until nine months later.

Raab and Schwer (2003) used an autoregressive conditional heteroskedasticity model to measure the short- and long-term impact of the Asian crisis on Las Vegas gaming revenues. The authors conclude that baccarat wins have experienced a temporary decline since the Asian crisis began. Fluctuations in exchange rates, do not, however, fully explain this decline. Furthermore, the model's findings suggest the devaluation of the currencies of Japan, Korea, Taiwan and Hong Kong has no significant long-term impact on baccarat revenues in Las Vegas.

Garrett (2004) explored the effects of casinos on employment in six Midwestern states and found that rural counties that adopted casino gaming experienced increases in household casino employment over urban regions with casinos in those states. The ability of rural communities to adapt to hospitality employment correlates to the findings offered by Perdue *et al.*, 1999. Garrett (2004) claimed that rural communities can benefit more from gambling than their urban counterparts. This situation is especially the case when government management in rural communities opts to adopt casino operations and allocate the status of gambling to that of a "major or predominant industry" (Garrett, 2004). This outcome is not as likely in more economically developed, urban areas, where gaming results in a comparatively smaller impact because of the presence of other industries and stronger economic infrastructure. However, Garrett (2004) did not explore whether there were differences in employment levels between urban- and rural-based communities during economic downturns.

In both urban and rural regions with casino gaming, higher employment and higher county or state tax revenue from gaming volume is the expectation of private and public investors alike. The primary trigger for increased wealth and prosperity of an economic region is the increase in disposable income, which in turn is derived from increased employment. Therefore, statistics relating to gaming volume, and casino employment, helped create the analytical framework for this study.

Methodology

The present study examined how the Great Recession of 2007–2009 affected the nondestination gaming state of Indiana's gaming industry. Through analysis of gaming volumes and employment levels if casinos before, during and after the recession, this study assessed economic impact, if any, as a result of a recessionary economic cycle. It is of crucial benefit to evaluate accurately casino gaming during the recessionary economic cycle because the resulting understanding of such a cycle can improve the power of modeling to forecast future performance of casinos in economic downturns. Therefore, this study analyzed gaming volumes and employment prior, during and after the recession of 2007–2009, using a time series with intervention analysis throughout Indiana and, more specifically, a regression analysis on employment in urban and rural areas where casino gaming is licensed was also conducted.

Three counties and six casinos were considered urban counties and casinos in this study. In 2015, total annual casino employment and gaming volume in these urban areas, according to the Indiana Gaming Commission (2016), accounted for 6,463 casino employees and $9,978,748,305 in total gaming volume.

Five counties and five casinos were considered rural counties and casinos in this study. In 2015, total annual casino employment and gaming volume in these rural areas, according to the Indiana Gaming Commission (2016), accounted for 5,461 casino employees and $6,415,918,081 in total gaming volume.

In 2015, total annual casino employment and gaming volume in the state of Indiana, according to the Indiana Gaming Commission (2016), accounted for 11,924 casino employees and $16,394,766,386 in total gaming volume.

This study hypothesized that nondestination gaming markets, such as Indiana, represent a more stable source of gaming volume during economic downturns than is the case in destination gaming states. A second hypothesis was that both urban and rural casino gaming employment would not be negatively impacted during an economic downturn because nondestination gaming markets are thought to produce consistent gaming volumes. The quantitative research methodology employed enabled the researcher to utilize the time series model as a method for analysis to confirm or deny the hypotheses.

Time series with intervention analysis

Time series is an analytical tool that facilitates the ordered sequence of data points measured at successive points in equally spaced time intervals. It possesses the unique capability to measure one variable, recording at successive points in equally spaced time intervals. For the purpose of this study time series analysis directed at casino gaming, on monthly casino slot coin-in and table drop was observed. To model and analyze a time series, it is critical to comprehend the unique characteristics of the data. Time series data are usually examined to (or "intending to") the discovery of a historical pattern that can be exploited in the preparation of a forecast (Marlowe, 2017). Given the nature and purpose of this study and the characteristics of time series data, ARIMA with intervention analysis method was chosen for data analysis. This method can be used to identify and measure the impact of an exogenous event by examining the structural breaks of a time series data (Box *et al.*, 2008; and Box and Tiao, 1975). Through examining whether there are differences between the actual time series data after an exogenous event and what the data could be if the exogenous did not occur, ARIMA with intervention analysis tells whether the differences, if any, are statistical significant and the magnitude of the differences. Seasonal ARIMA (SARIMA) with intervention analysis determines whether an external intervention has a statistically significant impact on a time series and if it can quantify the impact. An identified quantified impact, which is the amount that is either more or less than what is expected, represents the difference between the actual time series and what the time series would have been if there were no intervention. Specifically, a time series is split into two data sets at the intervention point and the SARIMA model is developed based on the time series before the intervention point can be applied to the original time series in order to examine and determine the impact.

ARIMA with interventional analysis technique has been widely used by researchers and practitioners to examine the impact of an event. Many hospitality-related studies used this methods to examine and measure impact of exogenous events. For example, Zheng *et al.* (2013) examined the impact of the 2007 recession on US restaurant stocks using ARIMA with intervention analysis; Zheng (2014) also used this method to measure the changes of weekly US RevPar during the 2007 recession; and Ming *et al.* (2011) analyzed the impact of SARS outbreak on Japanese tourism demand for Taiwan. In fact, ARIMA with intervention analysis is the only technique that can be used to test and measure the impact of an event on a time series, and it has been proven effective.

Therefore, using ARIMA with intervention analysis, this study investigated Indiana's gaming volume and whether it was significantly affected by the 2007–2009 economic downturn. The focus on statewide gaming, as well as urban and rural county's gaming volume, allows this study to examine the performance of Indiana's gaming industry through the recession, from the demand side as a whole and based on population proximity to the casino operations.

This study followed a three-step ARIMA model fitting procedure: identification, estimation and diagnostics. This study attempts to identify the possible significant impact the recession had on monthly coin-in and table drop within the Indiana gaming industry in both urban and rural counties as well as the possibility of recovery for each variable after the

recession. This will be facilitated by six SARIMA tests with intervention analysis coupled with identical procedures, which are performed on six-monthly time series.

Data and methods

ARIMA with intervention analysis was employed to examine statewide aggregated monthly slot coin-in, table drop and admission. To model seasonal effects of time series data, this study generalized an ARIMA model to a SARIMA model by including seasonal autocorrelations and seasonal moving average terms. A seasonal model can be denoted as SARIMA $(p,d,q)(P, D,Q)_n$, where

p = the number of autoregressive terms;
d = the number of nonseasonal differences;
q = the number of moving average terms;
P = the number of seasonal autoregressive terms;
D = the number of seasonal differences;
Q = the number of seasonal moving average terms;
n = the number of periods in seasonal cycles (e.g. 12 for monthly time series).

Given the purpose of this study, SARIMA with intervention analysis was employed to test whether Indiana's gaming volume was significantly affected by the recession and the lag time and magnitude of the impact, if any. For impact and recovery analysis, this study considered the beginning and the ending of the recession, December 2007 and July 2009, respectively, as two external events. Two SARIMA models were applied to each time series, and an intervention analysis was employed on every identified SARIMA model. Therefore, a total of six SARIMA with intervention analyses were performed. For this study, the impact was defined as a significant decrease in gaming volume after the recession started; and the impact month was defined as the month a significant decrease was observed. Recovery was defined as a significant increase in gaming volume after the recession ended; the recovery month was defined as the month the significant increase was observed. Because this study presumed that there is a causal relationship between casino gaming volume and casino employment, this study regressed casino employment against gaming volume from different aspects of gaming volume.

Data collection

Data were collected from the Indiana Gaming Commission website (Indiana Gaming Commission, 1993–2018). This study used monthly time series data due to the nature of this study and the available data. Monthly coin-in, table drop and admission from January 1999 through May 2016 were collected from monthly reports that are publicly available on the website of Indiana Gaming Commission (Indiana Gaming Commission, 1993–2018).

Data analysis

Given the purpose of this study, SARIMA with intervention analysis was employed to test whether Indiana's gaming volume was significantly affected by the recession, and the lag time and magnitude of the impact, if any. Using SAS ETS software, this study fitted SARIMA models on three monthly time series and performed intervention analysis on each of the adequately fitted models to identify and measure the possible significant impact the recession had on Indiana gaming volume, and the lag time of the impact if any.

Impact analysis

This study first developed SARIMA models for identifying the impact of the recession. For the impact analysis, monthly data from January 1999 through the month that had the lowest

value after the recession started were used. Because slot coin-in and admission reached the lowest level in December 2008, monthly time series from January 1999 through December 2008 were used for model fitting; table drop volume reached its lowest level in July 2008, so monthly time series from January 1999 through July 2008 was used for table drop time-series impact analysis.

To identify any significant impact of the recession on the Indiana gaming industry, this study employed an intervention analysis using an iterative approach and performed intervention analysis repeatedly on each time series until a significant impact was identified or until the end of the time series. The starting month for all impact identifying intervention analysis was December 2007, the month the recession began. The results of SARIMA with intervention analysis identified a significant decrease in table drop volume in December 2007. No significant impacts were found for the coin-in slot and admission time series. Results of impact analysis for intervention are listed in Table 1 below.

Recovery analysis

Similar to the procedure used for impact analysis, we examined 18 different SARIMA models with different AR, MA and seasonality terms for recovery analysis. Using Akaike information criterion (AIC) and SBC criteria, we found the best-fitting model for each of the three-time series. For coin-in, table drop and admission time series, the best-fitting parsimonious models are SARIMA $(2, 1, 0)\ (0, 1, 1)_{12}$, SARIMA $(0, 1, 1)\ (0, 1, 0)_{12}$ and SARIMA $(2, 1, 0)\ (0, 1, 1)_{12}$, respectively. All parameter coefficients are highly significant at the 0.05 significance level, as shown in Table 2 below.

In the diagnostic phase, we examined the autocorrelation of residuals at lag 6, 12, 18 and 24 for each of the fitted models to determine whether the residuals are white noise. As listed in Table 3, the high p-value for each χ^2 statistic suggests that each model adequately fitted the data and captured the patterns in the raw monthly time series.

To perform time-series intervention analysis for the possible recovery of the Indiana gaming industry from the recession, this study conducted a similar iterative intervention analysis. In this case, the starting month for all recovery-identifying intervention analysis was July 2009, the first month after the recession. In other words, to identify possible recovery on each time series, intervention analysis was performed from July 2009, repeated in the following months if no significant recovery was identified for the Indiana gaming industry from the 2007–2009 recession. Results indicated that, among the two gaming volume variables, of slot coin in and table drop, only monthly table drop was significantly affected by the 2007 recession. The effect of the recession on monthly table drop was $3,859,954, indicating that the monthly table drop continuously increased, and the increase

Table 1. Summary of impact identification

Parameter	Estimate	t-statistic	p-value
Impact identified			
Monthly slot coin-in			
No significant decrease has been identified			
Monthly table drops			
MA_1	0.06363	11.54	<0.0001
SMA_{12}	0.26423	3.41	0.0006
Month of December 2007	−3,859,954	−4.17	<0.0001
Monthly admissions			
No significant decrease has been identified			

Parameter	Coefficient	*t*-statistic	*p*-value
Models for recovery identifying			
Monthly slot coin-in: SARIMA (2, 1, 0) (0, 1, 1)$_{12}$ without constant term			
AR_1	−0.73533	−7.96	<0.0001
AR_2	−0.46122	−4.72	<0.0001
SMA_{12}	0.59426	4.99	<0.0001
Monthly table drops: SARIMA (0, 1, 1) (0, 1, 0)$_{12}$ without constant term			
MA_1	0.64117	7.71	<0.0001
Monthly admissions: SARIMA (2, 1, 0) (0, 1, 1)$_{12}$ without constant term			
AR_1	−0.51775	−5.16	<0.0001
AR_2	−0.26028	−2.43	0.0151
SMA_{12}	0.57141	4.69	<0.0001

Table 2. Recovery analysis – summary of estimates of model parameters

Lag	χ^2	df	*p*-value
Models for recovery identifying			
Monthly slot coin-in			
6	3.83	3	0.2804
12	13.11	9	0.1578
18	21.00	15	0.1367
24	30.32	21	0.0858
Monthly table drops			
6	2.21	5	0.8190
12	10.42	11	0.4927
18	13.19	17	0.7234
24	16.58	23	0.8292
Monthly admissions			
6	3.82	3	0.2819
12	11.90	9	0.2188
18	20.16	15	0.1659
24	32.18	21	0.0561

Table 3. Recovery analysis – summary of autocorrelation check results

could have been $3,859,954 if the structure of the time series was not affected by the economic downturn.

Employment impact regression analysis

To better understand the employment impact of Indiana's gaming volume through the 2007–2009 recession, this study also performed regression analysis to examine the possible causal relationship between annual payroll employments by the annual casino and gaming volumes and to measure the changes in the employment mean levels of the payroll employment through the recession. Two regression analyses were performed on each gaming volume measure for urban and rural. Another two regression analysis was employed on statewide coin-in and table drop volume. Two more regression analysis was applied to urban and rural total gaming volume. Finally, this study also examined the relationship between total gaming volume and total casino employment in Indiana using linear regression. A total of nine

regression analyses were performed. Annual employment data and gaming volume data were obtained from the website of the Indiana Gaming Commission (2016).

Next, this study examined the indirect effect of the recession on Indiana casino payroll employment as testing the possible economic impact on the gaming industry by the recession. Because of the possible lag time of the effect, this study examined the period 2008–2011 as the possible effecting year on the casino employment. If the recession has affected the Indiana casino industry, in this study it was presumed that Indiana casino employment will be affected as well. This statement, however, needs to be examined before making any further judgments and conclusions.

In order to achieve the goal stated above, this study conducted a linear regression analysis. Annual urban, rural and total casino employment data along with annual gaming volume for coin-in and table drop were collected from Indiana Gaming Commission annual reports (2016), which are publicly available on their website. Since this study is based on the assumption that there is a causal relationship between casino gaming volume and casino employment, casino employment was regressed against gaming volume. To include a recession effect on the linear regression, a dummy variable was introduced in each linear regression. Four different dummy variables, as listed in Table 4, tested separately.

For each value for annual data, four dummy variables were tested iteratively to identify the changes in mean levels of employment during different time periods. If none of the coefficients of the dummy variables were significant, it was concluded that there is no significant effect of the recession on casino employment. It was predicted that no significant impact on casino employment occurred because the Indiana casino industry was not affected by the recession (except table drop) based on the conclusion of the impact and recovery analysis. The test models are listed in Table 5.

Each of these nine models (each model iteratively tests four dummy variables) to identify the potential effect of the recession on payroll employment in different time periods. Kolmogorov–Smirnov tests (K–S) and Durbin–Watson tests (D–W) were performed to check the normality and serial correlations in the residuals. The results of the linear regression are listed in Table 6. The results of D–W tests are around two, suggesting that error terms from regression models are white noise, evidence of an adequate fit. Furthermore, at a 5% significance level, p-values of all the K–S tests indicate that the residuals in all regression models are typically distributed, again suggesting the adequateness of the regression models for the data set. Adjusted R^2 for all models is higher than 80%, suggesting that more than 80% of the variation in employment data are captured by the change of the corresponding gaming volume in each model and dummy variable.

All four dummy variables for each of the nine linear models are insignificant, except in the case of model 3, which is an urban table drop–urban employment relationship regression model. Those results indicate that the mean value of Indiana urban employment in 2009 and beyond was significantly lower than what it was before 2009. This result is also partly

Dummy variable (2008)	0: 2005–2007 1: 2008–2015
Dummy variable (2009)	0: 2005–2008 1: 2009–2015
Dummy variable (2010)	0: 2005–2009 1: 2010–2015
Dummy variable (2011)	0: 2005–2010 1: 2011–2015

Table 4.
Summary of dummy variables

Models	Dependent variable	Independent variable
Model 1	Urban payroll employment	Coin-in (Urban) Dummy variable
Model 2	Rural payroll employment	Coin–in (Rural) Dummy variable
Model 3	Urban payroll employment	Table drop (Urban) Dummy variable
Model 4	Rural payroll employment	Table drop (Rural) Dummy variable
Model 5	Urban payroll employment	Total volume (coin-in + table drop) Dummy variable
Model 6	Rural payroll employment	Total volume (coin-in + table drop) Dummy variable
Model 7	Casinos' total payroll employment	Coin-in (statewide) Dummy variable
Model 8	Casinos' total payroll employment	Table drop (statewide) Dummy variable
Model 9	Casinos' total payroll employment	Total gaming volume (coin-in + table drop) – Statewide Dummy variable

Table 5.
Summary of different models

consistent with the SARIMA with intervention analysis for table drop, where a significant decrease in table drop has been identified due to the recession. Furthermore, the mean levels of employment associated with different periods and gaming volume were not affected in all other eight tested cases.

Discussion and implications

The importance of understanding changes in gambling activities during recessions can be beneficial for several parties (Horvath and Paap, 2012). Such insights can inform casinos on how to optimize allocation of their resources, such as personnel, the supply of snacks and drinks, and promotional activities, to name a few. The present study sought to shed some light on the relationships between casino gaming volume, employment and economic downturns in nondestination gaming locations.

First, it is apparent from the various time-series analyzes that the 2007–2009 recession did not impose any significant impact on gaming volumes in Indiana. Statistical analysis further indicated that the monthly average gaming volume, which includes table drop and coin-in, depicted only a relatively minor drop in Indiana during the 2007–2009 period compared to the monthly average gaming volume during 1999–2007; this difference was not statistically significant. The results of statistical analysis of gaming volume in Indiana are remarkably similar to the results of the Zheng *et al.* (2013) investigation into gaming volume in Iowa, another nondestination gaming state. That study found a statistically significant decrease in table game drop but as table games represented such a small portion of drop-in repeater markets, the number of table games dollars lost due to the recession was not practically significant.

Although these findings are significant and informative, future research should investigate what other factors may have contributed to our results. For example, studies have shown that during times of economic recession, casinos may adjust their gaming offerings in response to a faltering economic climate. Research by Conner and Taggart (2009) indicated that sizable layoffs of casino employees, coupled with increasing the number of gaming machines on the floor, are adjustments that casinos can make to combat the effects of decreased gaming volume. These types of adjustments make sense considering the potential

Table 6.
Summary of regression analysis results

	Coefficient	*t*-stat	*p*-value	Adj. R^2 (%)	*F*-stat	*p*-value	D-W	K-S
Model 1								
Constant	1929.48379	1.52	0.1672	82.81	25.08	0.0004	1.771	>0.15
Coin-in	4.46E-07	4.79	0.0014					
Dummy variable (2008)	217.88377	0.67	0.5189					
Constant	4307.33775	3.54	0.0076	86.00	31.70	0.0002	1.488	>0.15
Coin-in	2.78E-07	3.04	0.0161					
Dummy variable (2009)	−453.52771	−1.54	0.1614					
Constant	4610.04428	3.63	0.0067	86.72	33.64	0.0001	2.514	>0.15
Coin-in	2.51E-07	2.58	0.0328					
Dummy variable (2010)	−519.28853	−1.72	0.1245					
Constant	4644.16366	4.08	0.0035	87.82	37.06	<0.0001	2.366	>0.15
Coin-in	2.45E-07	2.75	0.0251					
Dummy variable (2011)	−549.46755	−1.98	0.0825					
Model 2								
Constant	1830.6346	3.24	0.0119	95.48	106.57	<0.0001	2.075	>0.15
Coin-in	4.74E-07	10.87	<0.0001					
Dummy variable (2008)	−98.92278	−0.45	0.6658					
Constant	1115.75943	1.64	0.14	95.76	114.05	<0.0001	2.01	0.12
Coin-in	5.24E-07	9.80	<0.0001					
Dummy variable (2009)	217.56288	0.87	0.41					
Constant	1300.40166	1.82	0.1061	95.52	107.63	<0.0001	2.215	>0.15
Coin-in	5.12E-07	8.85	<0.0001					
Dummy variable (2010)	138.38011	0.53	0.6115					
Constant	1498.54593	2.07	0.0723	95.39	104.45	<0.0001	2.085	>0.15
Coin-in	4.97E-07	8.24	<0.0001					
Dummy variable (2011)	56.93118	0.21	0.8401					
Model 3								
Constant	3847.37532	5.31	0.0007	87.20	35.06	0.0001	2.438	>0.15
Table drop	0.00000286	5.79	0.0004					
Dummy variable (2008)	−268.37586	−1.27	0.2408					

(*continued*)

Table 6.

	Coefficient	*t*-stat	*p*-value	Adj. R^2 (%)	*F*-stat	*p*-value	D-W	K-S
Constant	4776.07696	7.81	<0.0001	93.31	70.77	<0.0001	1.998	>0.15
Table drop	0.00000223	5.30	0.0007					
Dummy variable (2009)	−539.5992	−3.22	0.0122					
Model 4								
Constant	1272.44933	1.98	0.0835	95.08	97.55	<0.0001	2.225	>0.15
Table drop	0.00000696	10.39	<0.0001					
Dummy variable (2008)	−145.45445	−0.64	0.5407					
Constant	1009.36303	1.31	0.2269	94.83	92.70	<0.0001	2.002	>0.15
Table drop	0.00000718	8.79	<0.0001					
Dummy variable (2009)	−21.36427	−0.08	0.9358					
Constant	956.28257	1.17	0.2746	94.82	92.62	<0.0001	2.003	>0.15
Table drop	0.00000723	8.16	<0.0001					
Dummy variable (2010)	−0.25065	0.00	0.9993					
Constant	1112.0608	1.36	0.2119	94.86	93.21	<0.0001	1.972	>0.15
Table drop	0.00000707	7.75	<0.0001					
Dummy variable (2011)	−61.62127	−0.22	0.8297					
Model 5								
Constant	2115.9462	1.80	0.1089	84.02	27.30	0.0003	1.857	>0.15
Total volume (coin-in + table drop)	3.91E-07	5.03	0.001					
Dummy variable (2008)	166.91823	0.55	0.5943					
Constant	4233.07105	3.75	0.0056	87.40	35.67	0.0001	1.592	>0.15
Total volume (coin-in + table drop)	2.56E-07	3.34	0.0103					
Dummy variable (2009)	−437.48038	−1.59	0.1503					
Constant	4464.60995	3.58	0.0072	87.45	35.85	0.0001	2.574	>0.15
Total volume (coin–in + table drop)	2.37E-07	2.74	0.0255					
Dummy variable (2010)	−480.67976	−1.61	0.147					
Constant	4503.9517	3.91	0.0045	88.19	38.34	<0.0001	2.341	>0.15
Total volume (coin–in + table drop)	2.31E-07	2.84	0.0219					
Dummy variable (2011)	−507.8011	−1.80	0.1095					

(*continued*)

Table 6.

	Coefficient	*t*-stat	*p*-value	Adj. R^2 (%)	*F*-stat	*p*-value	D-W	K-S
Model 6								
Constant	1788.5116	3.16	0.0134	95.53	107.74	<0.0001	2.07	>0.15
Total volume (coin-in + table drop)	4.44E-07	10.93	<0.0001					
Dummy variable (2008)	−100.20678	−0.46	0.66					
Constant	1100.57274	1.61	0.1456	95.76	114.00	<0.0001	1.994	0.129
Total volume (coin-in + table drop)	4.89E-07	9.80	<0.0001					
Dummy variable (2009)	203.66547	0.82	0.4374					
Constant	1266.49322	1.77	0.1145	95.55	108.43	<0.0001	2.184	>0.15
Total volume (coin–in + table drop)	4.79E-07	8.88	<0.0001					
Dummy variable (2010)	132.58366	0.51	0.6243					
Constant	1461.64621	2.02	0.0786	95.43	105.42	<0.0001	2.065	>0.15
Total volume (coin-in + table drop)	4.65E-07	8.28	<0.0001					
Dummy variable (2011)	52.74429	0.19	0.8508					
Model 7								
Constant	3580.49066	4.52	0.002	97.90	234.56	<0.0001	1.861	>0.15
Coin-in (statewide)	4.66E-07	15.61	<0.0001					
Dummy variable (2008)	150.38633	0.60	0.5681					
Constant	4207.87349	4.37	0.0024	97.83	226.82	<0.0001	2.014	>0.15
Coin-in (statewide)	4.45E-07	12.00	<0.0001					
Coin-in (statewide)	−83.84024	−0.29	0.78					
Constant	4526.01575	4.59	0.0018	97.92	236.27	<0.0001	2.176	>0.15
Coin-in (statewide)	4.33E-07	11.12	<0.0001					
Dummy variable (2010)	−189.43964	−0.64	0.5378					
Constant	5042.96358	5.67	0.0005	98.23	2.32	<0.0001	2.32	>0.15
Coin-in (statewide)	4.12E-07	11.46	<0.0001					
Dummy variable (2011)	−375.1398	−1.38	0.2048					
Model 8								
Constant	4841.24004	4.08	0.0035	94.50	86.86	<0.0001	2.179	>0.15

(*continued*)

Table 6.

	Coefficient	*t*-stat	*p*-value	Adj. R^2 (%)	*F*-stat	*p*-value	D-W	K-S
Table drop (statewide)	0.00000459	9.38	<0.0001					
Dummy variable (2008)	−470.58381	−1.27	0.2393					
Constant	5572.96014	4.22	0.0029	95.15	99.02	<0.0001	1.414	>0.15
Table drop (statewide)	0.00000427	7.74	<0.0001					
Dummy variable (2009)	−657.51794	−1.70	0.1268					
Constant	4678.90753	2.57	0.0329	93.67	75.04	<0.0001	1.568	>0.15
Table drop (statewide)	0.00000459	5.94	0.0003					
Dummy variable (2010)	−315.64653	−0.60	0.5622					
Constant	4361.18703	2.20	0.0593	93.49	72.86	<0.0001	1.363	>0.15
Table drop (statewide)	0.00000471	5.47	0.0006					
Dummy variable (2011)	−213.36939	−0.37	0.7235					
Model 9								
Constant	3649.64221	4.55	0.0019	97.84	227.32	<0.0001	1.94	>0.15
Total gaming volume (coin-in + table drop)	4.25E-07	15.37	<0.0001					
Dummy variable (2008)	103.90728	0.41	0.6937					
Constant	4260.79815	4.45	0.0021	97.84	227.48	<0.0001	2.03	>0.15
Total gaming volume (coin-in + table drop)	4.06E-07	12.02	<0.0001					
Dummy variable (2009)	−119.25037	−0.41	0.6891					
Constant	4427.00129	4.41	0.0023	97.88	232.00	<0.0001	2.2	>0.15
Total gaming volume (coin-in + table drop)	3.99E-07	11.01	<0.0001					
Dummy variable (2010)	−171.92993	−0.58	0.5804	98.13	262.68	<0.0001	2.242	0.088
Constant	4890.82033	5.26	0.0008					
Total gaming volume (coin-in + table drop)	3.82E-07	11.11	<0.0001					
Dummy variable (2011)	−336.85534	−1.19	0.2683					

savings from reducing emphasis on more labor-intensive table games such as poker, blackjack and roulette in order to cut employee costs (Conner and Taggart, 2009). In essence, offering a substitutable product that may yield a similar or higher rate of return, such as more slot machines on the floor, is a strategy that casinos can employ during tough times. Future research is needed to continue building on our understanding of what drives casinos to alter their gambling options during economic downturns.

Additionally, the results of this study, buttress the findings of Zheng *et al.* (2013) that repeater market (nondestination) casinos are far more resistant to recessionary pressures than are destination markets. This study hypothesized that consumer spending habits changed as a result of the Great Recession. Discretionary gaming dollars were redirected, with gamblers choosing to spend their limited entertainment dollars on less expensive gaming options. In other words, gamblers chose casinos closer to home, reducing expenditures on travel and hotel rooms. The results of the present study support that conclusion.

Moreover, the results of the current study are consistent with previous research that found that, of the three gambling activities considered (casino gambling, lottery and pari-mutuel wagering mostly associated with horse-racing, greyhound racing), only lottery consumption, because of its low price, seemed "recession-proof" (Horvath and Paap, 2012). They (Horvath and Paap, 2012) suggested that "consumers with less discretionary dollars left at the end of their budget probably look for cheaper forms of entertainment". As noted above, less expensive gambling options, such as casinos that are closer to home, seem to be viable choices for consumers looking to continue gambling but not spend as much money doing it. Destination options, on the other hand, necessarily require both transportation and accommodation expenses. In other words, the lower overall price of local casino options allow consumers to continue gambling even during times of recession.

The recession of 2007–2009 was an economic downturn of substantial significance for both the Indiana and the national economy. It exerted considerable influence on the structure of personal expenses and gaming priorities for individuals. There was a substantial lag between the moment of the initial impact of the recession, and the change of consumerist pattern, partially because people still had access to savings and available instruments of credit for a year after the onset of the crisis. While disposable personal income decreased, partially due to affects on employment and partially because of economic anxiety, the components of consumption may have also been reprioritized. Consequently, nondestination gaming states such as Indiana may have benefited from consumers deciding to game closer to home.

Findings indicate that while there was a slight drop in gaming revenue and employment figures during this period, nondestination gaming locations such as Indiana proved relatively resilient to the recession, but they also were more vulnerable to external factors such as emerging competition from neighboring states. Evidence suggests that the gaming industry located in urban areas was more likely to impact the urban employment environment during the 2007–2009 recession than was evident in the rural areas in which the gaming industry is located. As noted above, perhaps some of the employment numbers from the period were due to the need for casinos to cut labor costs associated with table games. However, the relationship between casinos and employment is much more profound than just reallocating resources.

A fuller understanding of this relationship involves a consideration of the location of the casino as well as the required skill level of its workforce. Garrett (2004) suggested that understanding for *whom* casinos impact employment is an important question to consider when investigating differences between urban and rural casinos. For example, casinos in rural areas with a relatively less-skilled local workforce will draw skilled labor from outside

of the area. If this labor maintains its residence outside of the rural area, then unemployment figures in the rural area will remain unchanged (Garret, 2004). Thus, the typical promise of increased employment for local areas, which is used as an argument for building more casinos, may not always be realized (Garrett, 2004). Because the employment effects of casino gaming are challenging to quantify, future research in this area should consider this question to develop a clearer picture of the relationship between casinos and employment figures.

A limitation of this study was that it examined only a single nondestination gaming state with urban and rural casinos. Comparing another nondestination gaming market with both urban and rural gaming locals to Indiana's (and Iowa's) would help better understand how other nondestination casino destinations performed based on population density in similar states during an economic downturn. Also, future research should be conducted on casino employment behavior during economic downturns using a time series with intervention analysis to help support local policy and economic development officials in their economic forecasting. Such research would be particularly valuable for communities where casinos are responsible for employing a high percentage of residents . Because of the significance of the increased wages and taxes in areas where gaming exists, the social impacts of employment through an economic downturn are consequential. Moreover, as fears of a weaker economy loom on the horizon (Greifeld *et al.*, 2019).

Finally, observations from Ruiz Estrada *et al.* (2020) share that tourism, international trade and air transportation sectors were negatively affected by the recent impact of coronavirus disease 2019 (COVID-19) on China and continues to threaten their casino industry. In Macau, China, an international gaming destination for the casino sector, the impact was recognized as gaming volume plummeted by 87.8% in February, 2020 month-on-month, year-on-year due to the temporary shutdown of gaming facilities since the onset of COVID-19 leaving leading US operators affected due to their exposure through casino investment in Macau (Reuters, 2020). The impending threat of a US economic downturn for gaming stakeholders both destination and nondestination, urban or rural as defined in this paper supports Zheng *et al.* (2013) in concluding that gaming companies should diversify casino holdings in order to strike a balance between higher profit destination properties and smaller repeater market casinos in order to protect themselves from the effects of future recessions.

References

Akee, R.K., Spilde, K.A. and Taylor, J.B. (2015), "The Indian gaming regulatory act and its effects on American Indian economic development", *Journal of Economic Perspectives*, Vol. 29 No. 3, pp. 185-208.

American Gaming Association (1999-2016), *State of the States*, available at: https://www.americangaming.org/sites/default/files/research_files/aga_sos2013_rev042014.pdf (accessed 5 August 2016).

Berns, D. (2001), "Gaming's recovery to take time: [final edition]", *Las Vegas Review - Journal,* available at: https://search.proquest.com/docview/260096463?accountid=14902.(accessed 10 March 2020).

Box, G.E.P. and Tiao, G.C. (1975), "Intervention analysis with applications to economic and encironment problems", *Journal of the American Statistical Association,* Vol. 70 No. 349, pp. 70-79.

Box, G.E.P., Jenkins, G.M. and Reinsel, G.C. (2008), *Time Series Analysis, Forecasting and Control*, 4th ed., John Wiley & Sons, Hoboken, NJ.

CBRE Hotels Research (2019), *TRENDS in the Hotel Industry, Edition*, Coldwell Banker Richard Ellis, Atlanta.

Conner, T.W. and Taggart, W.A. (2009), "A research note on the impact of the economic recession on Indian gaming in connecticut", *Indigenous Policy Journal,* Vol. 23 No. 3, available at: https://ipjournal.wordpress.com/table-of-contents/research/.

Coulter, R.L., Hermans, C.M. and Parker, R.S. (2013), "Religiosity and generational effects on gambling: support for and opposition to introducing casino gambling in a non-gambling tourist entertainment environment", *Journal of Business Research*, Vol. 66 No. 9, pp. 1682-1688, doi: 10.1016/j.jbusres.2012.12.015.

Eadington, W.R. (2011), "After the great recession: the future of casino gaming in America and Europe", *Economic Affairs*, Vol. 31 No. 1, pp. 27-33.

Eisendrath, D., Bernhard, B.J., Lucas, A.F. and Murphy, D.J. (2008), "Fear and managing in Las Vegas: an analysis of the effects of September 11, 2001, on Las Vegas strip gaming volume", *Cornell Hospitality Quarterly*, Vol. 49 No. 2, pp. 145-162.

Etzel, B. (2001), "Recession-Proof No Longer Las Vegas hit hard by events; riverboat casinos fare much better", *Investment Dealers Digest*, Vol. 67 No. 38, available at: https://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=9036237&site=ehost-%20live" \o.

Garrett, T.A. (2004), "Casino gaming and local employment trends", F*ederal Reserve Bank of St. Louis: Review*, January/February, Vol. 86 No. 1, pp. 9-22.

Greifeld, K., Carson, R. and Ainger, J. (2019), *Bond Rally Charges on with 30-year Treasury Bonds below 2%*, available at: https://www.bloomberg.com/news/articles/2019-08-14/u-k-yield-curve-inverts-for-first-time-since-financial-crisis (accessed 14 August 2019).

Horváth, C. and Paap, R. (2012), "The effect of recessions on gambling expenditures", *Journal of Gambling Studies*, Vol. 28 No. 4, pp. 703-717.

Indiana Gaming Commission (2016), *Annual Report to the Governor*, available at: https://www.in.gov/igc/files/FY2016-Annual.pdf (accessed 22 April 2019).

Indiana Gaming Commission (2018), *Annual Report to the Governor*, available at: https://www.in.gov/igc/files/FY2018-Annual.pdf (accessed 22 April 2019).

Indiana Gaming Commission. (1993-2018), *Annual Reports to the Governor*, available at: https://www.in.gov/igc/files/FY2018-Annual.pdf (accessed 12 April 2018).

Janes, P.L. and Collison, J. (2004), "Community leader perceptions of the social and economic impacts of Indian gaming", *UNLV Gaming Research and Review Journal*, Vol. 8 No. 1, p. 2.

Li, G., Gu, X. and Siu, R.C.S. (2010), "The impacts of gaming expansion on economic growth: a theoretical reconsideration", *Journal of Gambling Studies*, Vol. 26 No. 2, pp. 269-285, doi: 10.1007/s10899-009-9165-5.

Marlowe, B. (2017), *The Economic and Social Impact of the Gaming Industry during Economic Downturns*, Doctoral dissertation, Iowa State University, Ames.

Ming, J.C.H., Lim, C. and Kung, H. (2011), "Intervention analyisis of SARS on Japanese tourism demand for Taiwan", *Quality and Quantitiy*, Vol. 45 No. 1, pp. 91-102.

Olason, D.T., Hayer, T., Brosowski, T. and Meyer, G. (2015), "Gambling in the mist of economic crisis: results from three national prevalence studies from Iceland", *Journal of Gambling Studies*, Vol. 31 No. 3, pp. 759-774.

Perdue, R.R., Long, P.T. and Kang, Y.S. (1999), "Boomtown tourism and resident quality of life: the marketing of gaming to host community residents", *Journal of Business Research*, Vol. 44 No. 3, pp. 165-177.

Raab, C. and Schwer, R.K. (2003), "The short-and long-term impact of the Asian financial crisis on Las Vegas Strip baccarat revenues", *International Journal of Hospitality Management*, Vol. 22 No. 1, pp. 37-45.

Repetti, T. and Jung, S. (2014), "Cross-border competition and the recession effect on atlantic city's gaming volumes", *UNLV Gaming Research and Review Journal*, Vol. 18 No. 2, pp. 23-38.

Repetti, T. and Kim, J. (2010), "Analyzing the relationship between systematic risk and financial variables in the casino industry", *UNLV Gaming Research and Review Journal*, Vol. 14 No. 2, available at: https://digitalscholarship.unlv.edu/grrj/vol14/iss2/4.

Reuters Business News (2020), *Macau's Gaming Revenues Tumble 87.8% in February Overe Coronavirus Impact*, available at: https://www.reuters.com/article/us-macau-revenues/macaus-gaming-revenues-tumble-87-8-in-february-over-coronavirus-impact-idUSKBN20O1HH (accessed 2 March 2020).

Richard, B. (2010), "Diffusion of an economic development policy innovation: explaining the international spread of casino gambling", *Journal of Gambling Studies*, Vol. 26 No. 2, pp. 2287-2300, doi: 10.1007/s10899-009-9166-4.

Ruiz Estrada, M.A., Park, D. and Lee, M. (2020), "The evaluation of the final impact of wuhan COVID-19 on trade, tourism, transport, and electricity consumption of China", *Tourism, Transport, and Electricity Consumption of China*, (accessed 9 March 2020).

Sikich, C. (2014), *Indiana Casinos Lose Millions to Ohio Competitors*, available at: http://www.indystar.com/story/money/2014/06/14/casinos-luck/10534623/ (accessed 22 September 2016).

STR (Smith Travel Research) (2019), *US Hotel Construction up 5.5% in October*, available at: https://str.com/press-release/str-us-hotel-construction-55-october (accessed 24 January 2020).

Walker, D.M. and Jackson, J.D. (2007), "Do casinos cause economic growth?", *American Journal of Economics and Sociology*, Vol. 66 No. 3, pp. 593-607.

Wan, Y.K.P. (2012), "The social, economic and environmental impacts of casino gaming in Macao: the community leader perspective", *Journal of Sustainable Tourism*, Vol. 20 No. 5, pp. 737-755.

Weissenstein, M. (2001), "Job cuts: workers feel cutbacks: [final edition]", *Las Vegas Review - Journal*, available at: https://search.proquest.com/docview/260144924?accountid=14902.

Wiley, J.A. and Walker, D.M. (2011), "Casino revenues and retail property values: the detroit case", *The Journal of Real Estate Finance and Economics*, Vol. 42 No. 1, pp. 99-114, doi: 10.1007/s11146-009-9171-5.

Yoo, M. and Kitterlin, M. (2012), "Maintaining your loyal customers during hard times: an observation from the gaming industry", *FIU Hospitality Review*, Vol. 30 No. 1.

Zheng, T. (2014), "What caused the decrease in RevPAR during the recession? An ARIMA with intervention analysis of room supply and market demand", *International Journal of Contemporary Hospitality Management*, Vol. 26 No. 8, pp. 1225-1242, doi: 10.1108/IJCHM-05-2013-0192.

Zheng, T., Farrish, J., Lee, M.L. and Yu, H. (2013), "Is the gaming industry still recession-proof? A time series with intervention analysis of gaming volume in Iowa", *International Journal of Contemporary Hospitality Management*, Vol. 25 No. 7, pp. 1135-1152, doi: 10.1108/IJCHM-10-2012-0187.

Zheng, T., Farrish, J. and Kitterlin, M. (2016), "Performance trends of hotels and casino hotels through the recession: an ARIMA with intervention analysis of stock indices", *Journal of Hospitality Marketing and Management*, Vol. 25 No. 1, pp. 49-68.

Further reading

Gu, Z. (1999), "The Impact of the Asian financial crisis on Asian gaming activities: an examination of Las Vegas strip casino drops", *Current Issues in Tourism*, Vol. 2 No. 4, pp. 354-365.

Gu, Z. (2003), "Analysis of Las Vegas Strip casino hotel capacity: an inventory model for optimization", *Tourism Management*, Vol. 24 No. 3, pp. 309-314, doi: 10.1016/S0261-5177(02)00073-0.

Heizer, J. and Render, B. (2007), *Operations Management*, Pearson Prentice Hall, New Jersey.

Henderson, H.D. (1922), *Supply and Demand*, Nisbet and Company, London, Vol. 1.

Ianieri, B. (2015), *More A.C. Casino Closures? Moody's Thinks So*, available at: http://www.pressofatlanticcity.com/business/more-a-c-casino-closures-mmoody-s-thinks-so/article_d9c03a28-97bb-11e5-a3ba-8bd119cf7cad.html (accessed 10 April 2016).

Lee, S.K. and Jang, S.S. (2012), "The real estate risk of hospitality firms: examining stock-return sensitivity to property values", *International Journal of Hospitality Management*, Vol. 31 No. 3, pp. 695-702, doi: 10.1016/j.ijhm.2011.09.005.

Marriott (2015), *Marriott International to Acquire Starwood Hotels and Resorts Worldwide, Creating the World's Largest Hotel Company*, available at: http://www.news.marriott.com/2015/11/marriott-international-to-acquire-starwood-hotels-resorts-worldwide-creating-the-worlds-largest hote.html (accessed 11 December 2015).

Mayock, P. (2015), *Strong US Data Makes for Happy Hoteliers*, available at: http://www.hotelnewsnow.com/Article/15563/Strong-US-data-makes-for-happy-hoteliers (accessed 14 November 2015).

Moody's Investor Service (2015), *Economic Outlook 2015—Casino Gaming Atlantic City*, available at: https://www.moodys.com/ (accessed 11 December 2015).

Pullman, M. and Rodgers, S. (2010), "Capacity management for hospitality and tourism: a review of current approaches", *International Journal of Hospitality Management*, Vol. 29 No. 1, pp. 177-187, doi: 10.1016/j.ijhm.2009.03.014.

U.S. Hotel (2015), *Construction Pipeline for July 2015 up 11.0% over 2014*, available at: http://www.hotelnewsresource.com/article85078.html (accessed 11 December 2015).

Corresponding author
Byron Marlowe can be contacted at: byron.marlowe@wsu.edu