University of Massachusetts Amherst
ScholarWorks@UMass Amherst

Travel and Tourism Research Association:
Advancing Tourism Research Globally

2012 ttra International Conference

Productivity of U.S. casinos and casino hotels, 1997—2007

Wesley S. Roehl
School of Tourism and Hospitality Management Temple University

Follow this and additional works at: https://scholarworks.umass.edu/ttra

Productivity of U.S. casinos and casino hotels, 1997—2007

Wesley S. Roehl
School of Tourism and Hospitality Management
Temple University

ABSTRACT

This paper evaluates the productivity of casinos and casino hotels in the USA in order to identify factors (both regulatory and managerial) that contribute to efficient operation. This paper uses data from the Economic Census (1997, 2002, and 2007) that captures employment, payroll, and revenue data for both commercial and Indian casinos. A portfolio of performance measures was used to describe casino and casino hotel performance aggregated at the state level. Results support the existence of economies of size and of scale, market influences, and productivity growth over time.

Keywords: *casino, performance, productivity, revenue, labor cost, value added per employee.*

INTRODUCTION

Casino style gambling has spread throughout the USA over the past 25 years. Once limited to Nevada (1931-1977), and then to Nevada and Atlantic City (1978-1988), by 2010 37 US states offered land or riverboat based casinos, racinos, video lottery terminals (electronic gaming devices administered by a state lottery commission that play like slot machines) and/or Class II or Class III Indian gaming (American Gaming Association, 2011). The growth in the number of business models (land based casino, riverboat casino, etc.) operating under a wide variety of state and local (and a hybrid of federal oversight and state-tribal compacts for Indian gaming) regulatory regimes makes evaluating performance challenging. However, in the competitive environment of the 21st century the ability to evaluate performance and reevaluate how the casino does business is critical (Huggett, 2012; O'Donnell, Lee, & Roehl, 2012). Therefore, the purpose of this paper is to evaluate the productivity of casinos and casino hotels in the USA in order to identify factors (both regulatory and managerial) that contribute to the efficient operations of these firms.

BACKGROUND

Productivity measures the economic performance of the resources employed in creating the casino product (Keller & Bieger, 2007). For tourism and hospitality firms "variations in productivity are caused by differences in production technologies, resource availability, input quality, and economies of scale and size" (Tyrrell & Martens, 2007, p. 221). Despite the growth in legalized gambling, there have been few studies investigating productivity among gaming firms (Paton, Siegel, & Williams, 2010). Evidence from the studies that have investigated casino performance would lead one to anticipate variation in performance due to both business model and regulatory system. For example, Gu (2002) compared US casinos in general, and Nevada and Las Vegas Strip casinos in particular, to casinos in the Netherlands and France. He noted that the European casinos outperformed the US casinos across a number of accounting based performance ratios. Similarly, Tsai and Gu (2007) found that publicly traded casino firms with substantial institutional ownership had different performance outcomes than did publicly traded firms with less institutional ownership. In another study focusing on publicly traded US casinos Kang, Lee, and Yang (2011) described an inverted U shaped relationship between casino product

diversification and performance. O'Donnell, Lee, and Roehl (2012) found evidence that size affected performance within the Atlantic City casino industry with bigger casinos doing better.

One thing all these studies had in common was that they used accounting / finance based measures of performance that are typically available only from publically traded firms or, in the case of Atlantic City, from state policy that makes substantial amounts of casino-level data on inputs and outputs available to the public. Attempts to evaluate performance across other US jurisdictions are complicated by the lack of equivalent data. This is especially true for Indian gaming. The National Indian Gaming Commission (NIGC) (www.nigc.gov) reports highly aggregated data; most individual tribal governments keep data on their inputs and outputs private. The NIGC reports gross Indian gaming revenue of $26.5 billion in 2010; this is a considerable amount when compared to the $36.5 billion in gross revenue for commercial casinos reported by the American Gaming Association (AGA, 2011). One of the goals of this paper was to take advantage of data collected in the Economic Census which records data from both commercial and Indian casinos in order to explore productivity across a number of casino settings.

METHODS

Every 5 years the US Census Bureau conducts the Economic Census. This combines a census of businesses with paid employees together with data from administrative records to complete a snap shot of the US economy. The North American Industry Classification System (NAICS) includes a pair of relevant codes: 71321 Casinos (except casino hotels) and 72112 Casino Hotels. Data on number of establishments, revenue, annual payroll, and number of paid employees is reported at different levels of geography (for example, US, state, county, etc.). Indian gaming is included in these counts due to the government-to-government relationship between the Census Bureau and recognized tribal governments. There are two drawbacks to the Economic Census, however. First, because of the mandate of confidentiality, not all collected data is reported. For example, if there are two casinos in a state, such as in Connecticut, information other than the number of firms will be suppressed since one firm could deduce the other's details from the published total. Similarly, there are other instances where data is suppressed to maintain confidentiality over different levels of aggregation. The second weakness is that casino-style gambling based on video lottery terminals (administered by state government through a lottery agency) is not included under either NAICS 71321 or 72112. So the performance of the "casino" portion of racino business in Delaware, New York, Rhode Island, and West Virginia is not available. However, consistent data on both inputs (employees and payroll) and output (revenue) for both commercial and Indian gaming in numerous jurisdictions argues for the use of this data set.

A portfolio of performance measures was used. Following Tyrrell and Martens (2007) average wage (payroll / employees) and average revenue per unit of labor (revenue / employee) were used since they usually represent the lower and upper boundary for value added per employee. Other measures of performance included revenue, revenue per firm, labor cost, and revenue per capita. Input measures included a pair of variables to indicate regulatory issues—betting limits and Indian only—another indicator variable to identify whether the observation represented casinos or casino hotels, indicators to account for the year the data was generated, two variables—average size and number of firms—that described economies of size and scale in a state, and, again following Tyrrell and Martens (2007), state population, population squared, and median income to account for both demand and cost issues. All dollar based variables were converted to constant 2007 dollars using the CPI-U series (ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt). In total there were 84 observations. An observation represented a year-state-industry (casino or casino hotel) triplet. At the extremes,

some states were represented 6 times while others appeared only once. This was due to both changes in legalization status and suppression of data for confidentiality. In total 23 states were represented across the 3 Census years of 1997, 2002, and 2007. Because these observations are not independent within groups (state) a robust standard error estimation procedure was used to deal with the intragroup correlation. In a situation like this the regression coefficients are not biased due to the intragroup correlations but the coefficients' standard errors are. A robust standard error was estimated.

RESULTS

Results of the performance measures are described in Table 1. High performers for gross revenue are Nevada casino hotels while New Jersey casino hotels topped the revenue per firm list. Indian casinos in Arizona topped the revenue per employee and labor cost lists (where lower is better) but, by 2007 were also offering the highest average wages. Nevada and Mississippi, both states with high volume revenues and relatively small populations, topped the revenue per capita list. Montana and South Dakota made frequent appearances on the bottom of the performance lists. Interestingly in three of the measures triplets composed entirely of Indian casinos both lead and trail. Regression results are presented in Table 2. All six equations were statistically significant. Five of the six equations suggest that the performance of both casinos and casino hotels had improved over time. Distribution of an industry within a state matters; revenue and revenue per firm was positively associated with average firm size. The number of firms in a state had a more complex relationship with performance: more firms were associated with more revenue and higher revenue per capita but also had a positive relationship with higher wages, higher labor cost, and less revenue per firm. Policy variables (bet limits, no commercial casinos (only Indian), and casino vs. casino hotel) tended to be unrelated to the performance variables. Based on the magnitude of the regression coefficients, higher population was associated with both higher wages and with higher revenue per employee.

Table 1
Highest and Lowest Performing State Industry Segments, 1997 to 2007

	Revenue	Average Wage	Revenue per Employee	Labor Cost $\%^2$	Revenue per Firm	Revenue per Capita
Highest	NV 07 CH[1]	AZ 07 C	AZ 97 C	AZ 02 C	NJ 97 CH	NV 97 CH
	NV 02 CH	MI 07 CH	AZ 02 C	AZ 97 C	NJ 07 CH	NV 07 CH
5 highest	NV 97 CH	NJ 97 CH	AZ 07 C	WI 07 CH	NJ 02 CH	NV 02 CH
observations	NJ 97 CH	CO 02 CH	IL 07 CH	IL 02 CH	CA 07 CH	MS 07 CH
	NJ 07 CH	NJ 02 CH	IL 02 CH	NM 97 C	IN 02 CH	MS 02 CH
Mean	$1,653 M	$26,022	$122,504	22.7%	$93.8 M	$516
Median	$588.5 M	$26,900	$118,738	21.8%	$73.8 M	$132
5 lowest	MN 02 C	SD 02 CH	WA 97 C	NV 02 CH	MT 02 CH	FL 07 C
observations	SD 07 C	MT 07 CH	NV 97 C	MT 97 CH	NV 97 C	MT 02 CH
	MT 07 CH	SD 97 CH	MT 07 CH	MT 02 CH	SD 02 C	FL 02 C
	MT 97 CH	MT 02 CH	MT 02 CH	MN 02 CH	SD 97 C	MN 02 C
Lowest	MT 02 CH	MT 97 CH	MT 97 CH	WA 97 C	MT 97 CH	NY 02 C

[1] Two letter state abbreviation; year; C = casino, CH = casino hotel
[2] Labor cost is ranked from lowest to highest; all other measures are ranked from highest to lowest.

Table 2
Results of Robust OLS Regression with Standard Errors Adjusted for Clusters of State Observations; Probability Levels for Regression Coefficients and Adjusted Model R^2,
n = 84

	LN Revenue	Average Wage	Revenue per Employee	Labor Cost %	Revenue per Firm	Revenue per Capita
Average Size	**010 (+)**[1]	**033 (+)**	278	787	**000 (+)**	254
Bet Limits	427	410	201	**090 (-)**	220	986
Indian Only	187	387	479	976	784	482
Casino Hotel	761	133	175	269	235	**088 (+)**
Y1997	**075(-)**	**028 (-)**	**009 (-)**	141	**011 (-)**	307
Y2002	**034(-)**	**020 (-)**	**001 (-)**	**031 (+)**	**004 (-)**	538
Number	**000(+)**	**073 (+)**	697	**011 (+)**	**099 (-)**	**000 (+)**
Population	281	**003 (+)**	**045 (+)**	163	198	590
Population^2	551	**003 (-)**	**069 (-)**	294	280	349
Median Inc	769	414	346	**089 (+)**	544	323
Constant	**000 (+)**	**000 (+)**	**003 (+)**	**025 (+)**	528	601
Adjusted R^2	680	474	239	223	933	672

[1] decimal points not shown; bold indicates probability levels ≤ .10; + or – shows direction.

CONCLUSIONS

Each of the six regression models accounted for a substantial amount of variation in the productivity measures. The two measures that are likely upper and lower bounds for value added per employee, average wage and revenue per employee, indicate that productivity in 2007 was higher than in either of the two previous data collection periods. Furthermore, these two equations have R^2 values similar to those reported by Tyrrell and Martens (2007), which helps support the validity of these findings. The results also highlight the market-oriented nature of successful casino gaming. Some of the lowest productivity measures are reported by casinos and casino hotels distant from major markets—Montana and South Dakota. The results also suggest that size matters—that there are economies of both size and scale at work influencing the performance of casino and casino hotels. Both of these last two findings have interesting policy implications, perhaps suggesting that regulatory agencies should encourage size and encourage a market orientation when making location decisions. In today's more competitive environment mere gambling availability may not be able to trump poor location. Some directions for future research are also suggested. The well known relationship between productivity and the business cycle should be further investigated; are casinos and casino hotels really improving their productivity or do these results capture the peak (2007) and valley (2002) of the business cycle (Paton, Siegel, & Williams, 2010)? Scale issues should also be addressed—do the patterns evident at the state level hold when the data is disaggregated to the county or Metropolitan Statistical Area level? Finally, performance involves both financial productivity measures as

well as other outcomes, such as customer satisfaction and resident quality of life. What can we learn about best practices to achieve those outcomes?

REFERENCES

American Gaming Association. (2011). *2011 State of the States*. Retrieved 1/9/2012 from http://www.americangaming.org/files/aga/uploads/docs/sos/aga-sos-2011.pdf.

Gu, Z. (2002). Performance gaps between U.S. and European casinos: A comparative study. *UNLV Gaming Research & Review Journal*, 6(2), 53-62.

Huggett, A. (2012, January 3). 2012 Gaming industry forecast: Introduction. *Casino Enterprise Management*. Retrieved 1/9/2012 from http://casinoenterprisemanagement.com/articles/january-2012/2012-gaming-industry-forecast-introduction.

Kang, K. H., Lee, S. and Yang, H. (2011). The effects of product diversification on firm performance and complementarities between products: A study of US casinos. *International Journal of Hospitality Management*, 30, 409-421.

Keller, P. and Bieger, T. (2007). Tourism and productivity: Introduction. In *Productivity in Tourism*, P. Keller and T. Bieger, Eds. Berlin: Erich Schmidt Verlag, pp. 1-10.

O'Donnell, J., Lee, S. & Roehl, W. S. (2012). Do economies of scale exist in the Atlantic City casino industry? *International Journal of Contemporary Hospitality Management*, 24(1), 62-80.

Paton, D., Siegel, D. S. and Williams, L. V. (2010). Productivity measurement in gambling: Plant-level evidence from the United Kingdom. *Southern Economic Journal*, 76(4), 953-975.

Tsai, H. and Gu, Z. (2007). The relationship between institutional ownership and casino firm performance. *International Journal of Hospitality Management*, 26, 517-530.

Tyrrell, T. and Martens, T. (2007). Tourism industry productivity across metropolitan areas in the US. In *Productivity in Tourism*, P. Keller and T. Bieger, Eds. Berlin: Erich Schmidt Verlag, pp. 221-233.