Evaluating the performance of Macao's gaming industry

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Ⅰ. Research Motivation and the purpose of research

Research Motivation

- Motivation

1. Macau casino gaming business has achieved amazing achievements since the year 2004 and it certainly caused a great deal of international attention, particularly in the world gaming industry.
2. Although there are many casino and hotels in Macau, are they all operating efficiently? Questions deserved to be answered.

The purpose of research

- The stringently competitive nature of the casino entertainment market in the Macao necessitates that managers fully utilize knowledge expertise to increase efficiency in operations management.

- Therefore, this study employs data envelopment analysis (DEA) model to estimate the efficiency and productivity of the casino entertainment industry in Macao.

Ⅱ. Literature review

Literature review

- Gu (2002) conducted financial ratio analysis to identify performance gaps in the casino entertainment industry between the United States and Europe by analyzing revenue efficiency, profitability and cost performance.

- Jang and Yu (2002) analyzed return on hotel and casino investment based on financial data, indicating casinos are extremely effective in using assets to generate revenue.

Literature review

- Lin and Lee (2008) combined the Grey system method with financial criteria to discuss the operational performance of casinos.

- Lee and Park (2009) focused on factors involving the financial performance of casinos, in which they examined how corporate social responsibility (CSR), firm value and profitability for hotels and casinos are related.

Research Methodology

- 1. Malmquist productivity index (hereafter MPI) measures efficiency in a dynamic sense, is calculated to compare many casinos in Macau. Basically the bigger the MPI, the better the dynamic efficiency.
- Technical efficiency (TE) is calculated to measure the operation efficiency in a static sense. Basically, TE ranges between 0 and 1.

Research methodology (1/2)

The MPI are as follows:

$$\mathrm{MPI}^{t,t+1} = \left[\frac{\mathrm{TE}^{t}\left(q^{t+1}, x^{t+1}, y^{t+1}\right)}{\mathrm{TE}^{t}\left(q^{t}, x^{t}, y^{t}\right)} \times \frac{\mathrm{TE}^{t+1}\left(q^{t+1}, x^{t+1}, y^{t+1}\right)}{\mathrm{TE}^{t+1}\left(q^{t}, x^{t}, y^{t}\right)} \right]^{\frac{1}{2}}$$

$$= \frac{\mathrm{TE}^{t+1}\left(q^{t+1}, x^{t+1}, y^{t+1}\right)}{\mathrm{TE}^{t}\left(q^{t}, x^{t}, y^{t}\right)} \left[\frac{\mathrm{TE}^{t}\left(q^{t}, x^{t}, y^{t}\right)}{\mathrm{TE}^{t+1}\left(q^{t+1}, x^{t+1}, y^{t+1}\right)} \times \frac{\mathrm{TE}^{t}\left(q^{t+1}, x^{t+1}, y^{t+1}\right)}{\mathrm{TE}^{t+1}\left(q^{t}, x^{t}, y^{t}\right)} \right]^{\frac{1}{2}}$$

$$= \mathrm{PTEC}^{t,t+1} \times \mathrm{TC}^{t,t+1}$$

where PTEC and TC represent the pure technical efficiency change and the technical change, respectively.

Research methodology (2/2)

Min $$\rho = \frac{1 - \frac{1}{m}\sum_{i=1}^{m} s_i^- / x_{ik}^a}{1 + \frac{1}{s}\sum_{r=1}^{s} s_r^+ / y_{rk}^a}$$

s.t. $$x_{ik}^a = \sum_{j=1}^{N} \lambda_j x_{ij}^b + s_i^-, \qquad i = 1, \ldots, m,$$

$$y_{rk}^a = \sum_{j=1}^{N} \lambda_j y_{rj}^b - s_r^+, \qquad r = 1, \ldots, s,$$

$$\lambda_j, s_i^-, s_r^+ \geq 0,$$

Ⅳ. Empirical analysis

4.1. Data resources and variable choice

- The empirical data have been taken from 11 casinos in Macau during 2009 to 2011 periods (from the Annual Report of casino).

- In terms of the choice of input variables,

① VIP tables numbers

② Mass tables numbers

③ Slots

- In terms of the choice of output variables,

① Total revenue=VIP tables revenue + mass tables revenue + slots revenue

4.2. Descriptive statistics of variables

Years		VIP tables numbers	Mass tables numbers	Slots	Total revenue
2009	Mean	114	265	1,033.27	9,264,420.82
	Std. Dev.	78.90	174.29	695.96	4,549,255.06
	Maximum	287	711	2412	16,894,416
	Minimum	14	60	166	1,073,700
2010	Mean	145.55	280.09	1,086.09	19,599,551.55
	Std. Dev.	104.37	170.93	642.01	14,437,137.18
	Maximum	328	687	2395	56,010,000
	Minimum	14	60	192	1,337,800
2011	Mean	141.55	299.55	1,030.00	20,348,664.36
	Std. Dev.	144.02	156.60	571.94	12,657,047.85
	Maximum	412	597	1956	40,706,000
	Minimum	11	63	176	17,83,200

4.3. Results and analysis (1/2)

(1) Casinos	(2) ID	(3) TE* 2009	(4) TE* 2010	(5) TE* 2011	(6) PTEC*	(7) TC*	(8) MPI*
Wynn Macau	1	1.000	0.524	1.000	1.232	1.791	2.208
MGM	2	0.421	0.228	0.655	1.558	1.660	2.587
Star World	3	1.000	0.639	1.000	2.377	1.555	3.696
Venetian	4	0.379	0.191	0.889	2.343	3.314	7.765
Plaza	5	0.535	0.314	0.558	1.042	2.220	2.312
Sands	6	0.686	0.224	1.000	1.948	2.993	5.830
Melco Crown	7	0.679	0.378	0.828	1.219	2.039	2.486
Grand Lisboa	8	1.000	1.000	0.874	0.709	2.156	1.529
Lisboa	9	1.000	0.301	0.463	0.321	2.675	0.859
Casino de Porte 16	10	0.599	0.190	0.563	0.940	2.106	1.979
Casino Emperor Palace	11	0.438	0.148	0.336	0.769	2.089	1.606
Mean efficiency of overall		0.703	0.376	0.742	N/A	N/A	N/A
Mean productivity of overall		N/A	N/A	N/A	1.314	2.236	2.987

4.3. Results and analysis (2/2)

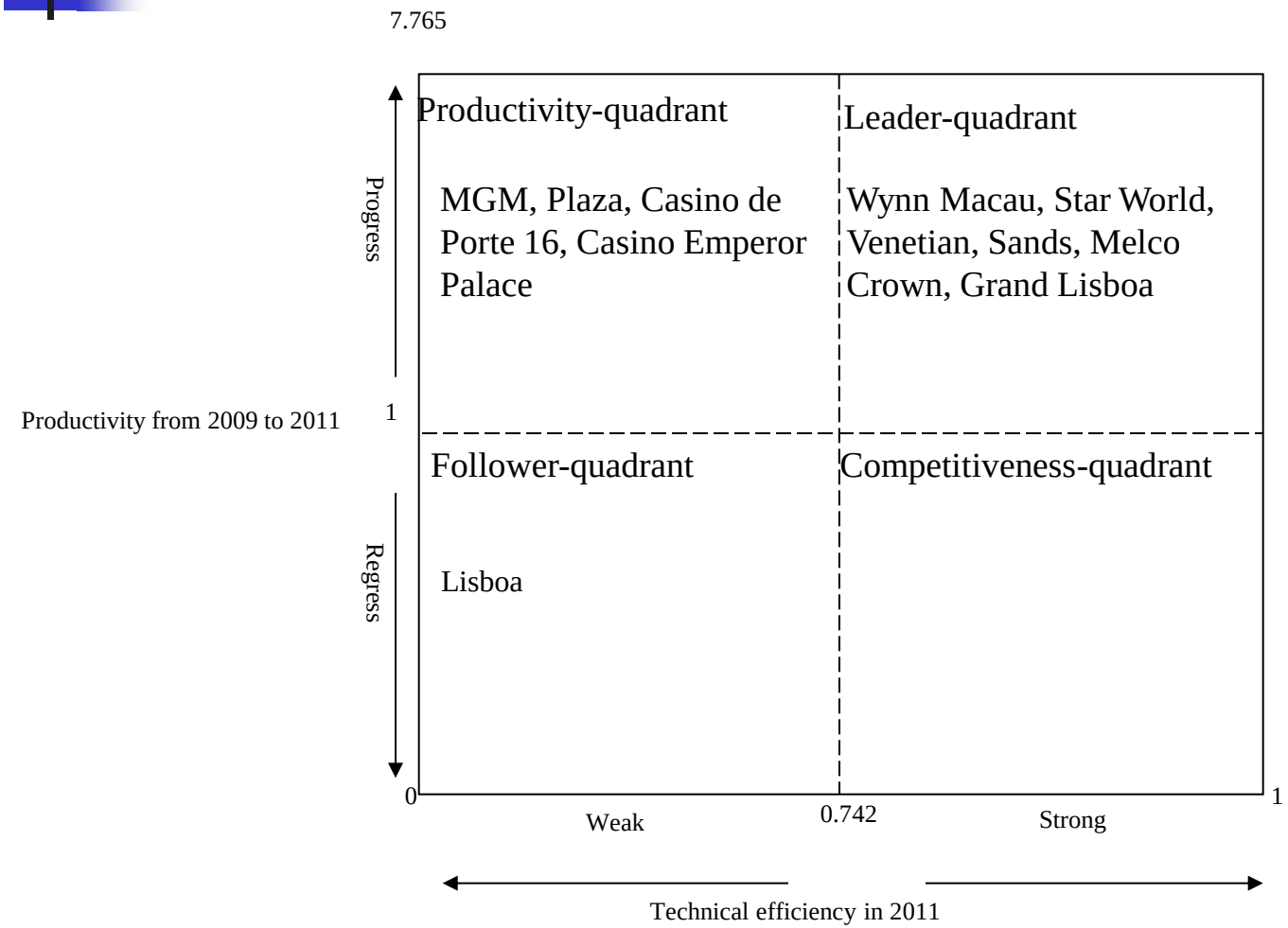

Figure 1. The managerial decision-making matrix

V. Conclusions

Conclusion

- Casinos have high operational risks and belong to a much more competitive environment than commercial hotels.
- Performance evaluation is thus a critical aspect of casino management because it can provide information deemed essential for coordinating casino resources.

- The empirical results shows that the technical efficiencies of the casinos performed in the year 2011 was better than 2010 for Macao's gaming industry .
- The productivity (MPI) of Macao's casinos is making progress during 2009 to 2011.

Thank you for your listening