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The Impacts of Liberalization in Casino-based Economy —The Case of Macao

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Abstract: Gambling industry is mostly regulated in the early development on account of the possible negative effects it may occur. Theoretically, a deregulated industry would lead to a more efficient allocation of economic resources in accordance with market demand. This study aims to evaluate the economic impacts of gambling liberalization in the case of Macao. The economic variables of GDP per capita, population, lands, and the government tax are investigated and the statistically significant economic growth after gambling liberalization is found in Macao. Accordingly, the economic performances are predicted to trace the continuing influences. Research results demonstrate that the casino-based economy keeps growing even during and after the economic recession.

Key words: Macao; gambling; liberalization; casino-based economy; economic impact
JEL codes: O4

1. Introduction

Gambling is of concern because of the industry growth (Siu, 2007), the derived tax revenue (Schubert et al., 2012; Koo et al., 2007), the acquired local economy (Wan, 2012; Ng, 2006), and urban development it brings about (Balsas, 2013). Casino-based economy, a process of stimulating the economic growth through the proliferation of full scale, destination-resort casinos (Loveman, 2011), may provoke the development of other industries (Bernhard et al., 2007; Hang & Penny, 2011). However, on account of the negative effects it may induce, it is mostly regulated in the early development like the cases in Germany (Ludwig et al., 2013), Netherlands (Goudriaan, 2013), UK (Etches, 2011), and Macao (Zheng & Hung, 2012). Theoretically, a deregulated industry would lead to a more efficient allocation of economic resources in accordance with market demand (Littlewood, 2011). Countries, provinces or municipalities are increasingly liberalizing their legislation and adopting various forms of gambling in hope of reaping economic and developmental benefits that are usually associated with gambling operations (Zagorsek, 2009). This study examines the impacts of regulation relaxation, and predicts the economic performance after the liberalization to trace the continuing influences. Macao is studied in this research not only because it is the world gaming capital, but also because it have been developed as a casino-based economy with a rich mix of contemporary integrated casinos (Wong & Wu, 2013).

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2. Literature Review

2.1 The Background of Liberalizing Gambling Industry in Macao

With a gaming history stretch back for more than 3 centuries, Macao was renowned as “Monte Carlo of the Orient”. In 2006, Macao became the world’s leading gaming destination in terms of gaming revenue and by mid-2008 had surpassed the gaming revenues of Las Vegas and Atlantic City combined. Before the ending of monopoly in 2002, there are 3 important changes of grant of this industry (Gaming Inspection and Coordination bureau Macao SAR, 2013). In 1930, “HouHeng Company” won the monopoly concession for operating all forms of approved casino games. This grant terminated the debate among gambling stalls over streets and lanes from 16th century. Besides, “HouHeng” was considered as a pioneer in the gaming business as it had innovated the sprawling gaming sector like offering complimentary Chinese opera shows, free fruits, cigarettes and snacks to the patrons.

In 1937, Macao gaming industry had undergone a revolutionary uplift. The government passed a Decree Law to integrate the operations of different games. The casino monopoly concession was granted to “Tai Heng Company”. Until 1961, the 119th Governor of Macao Jaime Silvério Marques designated Macao as a “permanent gaming region” and officially positioned Macao as a low taxation region and regarded gaming and tourism as its major economic activities. Marques had also further defined the meaning of gaming as “Any game with results that are unpredictably and randomly generated and win purely by one’s luck is called games of fortune”. At this time, the new casino monopoly concessionaire was registered as Sociedade de Turismo e Diversões de Macao (STDM) in 1962.

Before Macao was returned to China’s sovereignty in 1999, there were numerous discussions and studies under different perspectives on liberalizing the gaming industry. In fact, the Portuguese Macao Government had made considerations and preparations on over ruling the monopoly system in the gaming industry. For instance, back in 1986, the Legislative Assembly had enacted Law no. 10/86/M, stipulating “the number of concessions granted to be limited to 3 at a maximum”.

In August 2001, the Legislative Assembly of Macao passed the Law no. 16/2001 “Legal Framework for the Operations of Casino Games of Fortune”, which stipulated the operation requirement, eligibility of major shareholders and management of the casinos and gaming tax that should be submitted. Upon the expiry of the concession of STDM on 31 December 2001, the Macao SAR decided to grant out 3 gaming concessions, in an effort to inject new dynamics to the gaming industry and to lie a strong foundation for further future development in gaming, reinforcing the policy direction set by the Macao SAR:“tourism, gaming, conventions and exhibitions as the ‘head’, and the service industry as the ‘body’, driving the overall development of other industries.”

In 2002, the new concession was granted to Sociedade de Jogos de Macau (“SJM”), a subsidiary of STDM, Galaxy Casino, S.A. (“Galaxy”), and Wynn Resorts (Macao) S.A. (“Wynn”). In December of the same year, the Macao SAR had made an alteration on the Galaxy’s Concession Contract, which is, to allow Galaxy to have a sub-concession relationship with the Venetians Macao S.A. (“Venetian”). Following the issuance of the first sub-concession, the SJM and the Wynn had also subsequently signed a sub-concession with the MGM Grand Paradise, S.A. (“MGM”) and the Melco PBL Jogos (Macau), S.A. (“Melco PBL”) on 20 April, 2005 and 8 September, 2006 respectively.

In May 2004, the first casino of Venetian, Casino Sands, was opened. It was the first ever gaming investment project developed by an American company in Asia. In the same year, the Galaxy’s first project, Casino Waldo,

also commenced operations. For the Wynn, its first casino hotel had the stone-laying ceremony in June 2004 and celebrated its grand opening in September 2006. The Melco PBL got control of the Mocha slot lounges in September 2006 and its first casino, Casino Crown (with name changed to Casino Altira now), opened in May 2007. In December of the same year, MGM's first casino also entered into operation.

As of the year end of 2012, there were a total of 35 casinos in Macao, with 23 casinos located in the Macao Peninsula and 12 casinos in the Taipa Island. Among the total number of casinos, the SJM has 20 casinos; Galaxy has 6 casinos; the Venetian has 4 casinos; Melco Crown (formerly known as "Melco PBL") has 3 casinos; Wynn and MGM each has 1 casino.

2.2 The Economic Impacts of Gambling Industry

Actually, on the economic perspective, whether gaming should be promoted or legalized has always been controversial (Zheng & Hung, 2012). One view sees gambling from a liberal perspective and considers it an ordinary kind of sport or popular entertainment which can stimulate economic growth, create employment, and draw in revenue for government. People who espouse this view propose to legalize casino gambling and turn it into a highly profitable industry (Rephann, 1997; Walker, 2007). Others propose that the economic links with the host communities are limited (Jenkins, 1982; Wall, 1997). Up-scale resorts are usually owned and managed by external large metropolitan investors (Wong & Rosenbaum, 2012; Eadington, 1995). Casino resorts provide the full-service complex to internalize visitor expenditures within the resort precinct (Stanton & Alislabie, 1992). The casino resorts cannibalize the business activities (Rose, 1995), customers (Garrett, 2004; MacIsaac, 1995), and employment (Wan & Kong, 2008). Most of the income may finally go outsiders (Rephann, 1997). The significant boost to national tourism industry does not benefit the local economy (Eadington, 1995).

Actually, the real contribution to the local economy depends on the government policy. Singapore experienced a significant growth with the development of gambling industry based on regulating the outsider to actually contribute the local economy in terms of tax, employment, and infrastructure (Ng, 2006). In spite of the proper government policy, understanding the significant boost to national economy is the first step to evaluate the industry. The most proposed economic benefits brought by gambling industry is the wage increases (Wan, 2012; McLain & Maheshwari, 2006), especially in rural areas (Boger et al., 1999). Besides, population including tourists (Nunkoo & Ramkissoon, 2010) and residents (Shaw & Coles, 2007; Beatty & Fothergill, 2004) will be increase to access the casino service and job opportunities. Land use is considered to be compatible and complementary to the environment (Stiles & See-Tho, 1991). Besides, government tax is another important issue since it is one of the direct contributions to the local economy (Schubert et al., 2012; Koo et al., 2007). This study thus evaluate the economic impacts based on the analysis of GDP per capita, population, land, gambling tax, and government total tax.

3. Methodology

To evaluate the impacts of liberalization in casino-based economy, this study firstly reviews the development of gambling industry in Macao. Secondly, the macroeconomic indicators are analyzed by Wilcoxon signed-rank test to examine the significance of difference before and after the year of gambling liberalization of 2002. The period of after—is collected from year 2002 to 2012. Before—period is thus stretched from 2001 back to 1991 to make the paired difference test. Thirdly, indicators are predicted by Grey Model to trace the continuing influences. The year of 2008 is regarded as the possible turning point of economic performance because of the financial crisis (Horváth & Paap, 2012), this study thus predicts the economic indicators of year 2013 to 2015 based on the data

from 2008 to 2012.Research design of this study is show as Figure 1.

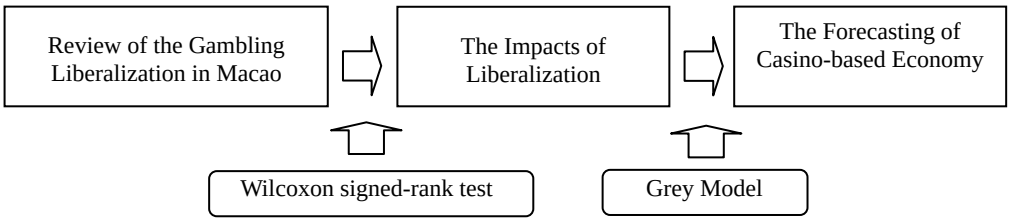

Figure 1 Research Design

No single parameter of measurement can draw a full picture of the variations impacts of casino liberalization on the Macao society (Zheng & Hung, 2012). While indicators such as GDP per capita, population, land, gambling tax, and government tax are chosen in this research to understand the overall economic performance. The measurements are collected from secondary data regularly published by the Statistics and Census Service of the Macao Special Administrative Region from 1991 to 2012.

4. Results and Discussion

4.1 The Difference before and after Liberalizing the Gambling Industry

Liberalization of casino gaming industry in 2002 apparently marks the turning point of the Macao economy. Economic indicators of GDP per capita, population, land, gambling tax, and government tax all show how Macao regain the forces to grow after the deregulation.

Table 1 shows the descriptive statistics of the economic indicator before and after the year of 2002. The data are collected from 1991 to 2001 to present the economic performance before liberalization, while those of 2002 to 2012 are used to show the situation after liberalization. Liberalization makes the growth of 2.36 times on GDP per capita, 1.22 times on population, 1.3 times on land, 8.06 times on gambling tax, and 2.93 times on government tax.

Table 1 Descriptive Statistics

	Mean	SD	Minimum	Maximum
Before liberalization (1991~2001)				
GDP per capita	14580.7000	1181.16290	12352.00	16032.00
Population	416.0500	17.93725	380.90	436.30
Land	21.9790	2.55416	18.70	25.80
Gambling tax	719.1000	132.79094	546.00	967.00
Government tax	1895.1000	237.10028	1482.00	2203.00
After liberalization (2002~2012)				
GDP per capita	34364.6000	16249.25093	15567.00	67247.00
Population	506.0000	43.72538	440.50	557.40
Land	28.5900	1.09184	26.80	29.90
Gambling tax	5794.1000	4531.78592	1318.00	14172.00
Government tax	7451.7000	5628.18611	1905.00	18124.00

The results of Wilcoxon signed-rank test are shown in Table 2. All the economic indicators present positive ranks. That is, all the measurements are higher after 2002. Mean ranks are 5.5, and sums of rank are 60.5 (=

11*5.5). The number of negative ranks, indicating lower measurements after 2002, is 0; the number of positive ranks, indicating higher measurements after 2002, is 11; and the number of ties indicating indifferent measurements before and after 2002, is 0. Z-values of GDP per capita, population, land, gambling tax, and government total tax are -2.803, -2.803, -2.805, -2.803, and -2.803, respectively. The model is found to be significant with p-values of 0.05. That means, GDP per capita, population, land, gambling tax, and government total tax are statistically significant to be different after 2002. All the economic indicators increase after liberalization.

Table 2 Wilcoxon Signed-Rank Test

	Type of Rank	N	Mean Rank	Sum of Rank	Z-value	P-value[q]
"GDP per capita after 2002" – "GDP per capita before 2002"	Negative Ranks	0[a]	0	0	-2.803[p]	0.005
	Positive Ranks	11[b]	5.5	60.5		
	Ties	0[c]				
	Total	11				
"Population after 2002" – "Population before 2002"	Negative Ranks	0[d]	0	0	-2.803[p]	0.005
	Positive Ranks	11[e]	5.5	60.5		
	Ties	0[f]				
	Total	11				
"Land after 2002" –"Land before 2002"	Negative Ranks	0[g]	0	0	-2.805[p]	0.005
	Positive Ranks	11[h]	5.5	60.5		
	Ties	0[i]				
	Total	11				
"Gambling tax after 2002" –"Gambling tax before 2002"	Negative Ranks	0[j]	0	0	-2.803[p]	0.005
	Positive Ranks	11[k]	5.5	60.5		
	Ties	0[l]				
	Total	11				
"Government tax after 2002" –"Government tax before 2002"	Negative Ranks	0[m]	0	0	-2.803[p]	0.005
	Positive Ranks	11[n]	5.5	60.5		
	Ties	0[o]				
	Total	11				

Note: a: GDP per capita after 2002 < GDP per capita before 2002
b: GDP per capita after 2002 > GDP per capita before 2002
c: GDP per capita after 2002 = GDP per capita before 2002
d: Population after 2002 < Population before 2002
e: Population after 2002 > Population before 2002
f: Population after 2002 = Population before 2002
g: Land after 2002 < Land before 2002
h: Land after 2002 > Land before 2002
i: Land after 2002 = Land before 2002
j: Gambling tax after 2002 < Gambling tax before 2002
k: Gambling tax after 2002 > Gambling tax before 2002
l: Gambling tax after 2002 = Gambling tax before 2002
m: Government tax after 2002 < Government tax before 2002
n: Government tax after 2002 > Government tax before 2002
o: Government tax after 2002 = Government tax before 2002
p: Based on Negative Ranks
q: Two tailed significance levels

4.2 The Forecasting of Economic Performance

Liberalization is demonstrated to be beneficial to the casino-based economy in the first part of this study. The next question is: how long and how strong will this positive effect last? According to the information from American Gambling Association, gambling and gambling revenues started to decrease in 2008. Revenue in the national commercial casino sector dropped about 4.7% compared to 2007. Gross gaming revenues went down every month since February 2008 compared to the same month of the previous year, and as the recession got worse, monthly revenue decreases have become more significant (Horváth & Paap, 2012). To test the continuing influences of gambling industry liberalization, this study predicts the GDP per capita in Macao from 2013 to 2015 based on the data from 2008 to 2012. Grey Model (Deng, 1982) is applied to forecast under uncertainty. The following illustration details the method used to construct the model adopted herein by creating a sequence of one order linear moving GM (1,1) (Deng, 2000).

Table 3 Economic Indicators from 2008 to 2012

Year	GDP per capita	Population	Land	Gambling tax	Government total tax
2008	38,552	543.1	29.2	5,237	6,385
2009	39,761	533.3	29.5	5,539	7,205
2010	52,918	540.6	29.7	8,597	11,061
2011	67,247	557.4	29.9	12,457	15,372
2012	76,615	582.0	29.9	14,172	18,124

Source: Statistics and Census Service of the Macao Special Administrative Region, 2013.

Macao primitive sequence $x^{(0)}$ is constructed based on GDP per capita from 2008 to 2012 in Table 3. That is

$$x^{(0)} = (38{,}552,\ \ 39{,}761\ \ 52{,}918\ \ 67{,}247,\ \ 76{,}615)$$

One order AGO sequence of $x^{(1)}$ is derived as

$$x^{(1)} = (38{,}552\ \ \ 78{,}313,\ \ \ 131{,}231\ \ \ 198{,}278,\ \ \ \ \ 275{,}093)$$

In addition, matrix B and constant vector y_n are accumulated as

$$\beta = \begin{bmatrix} -58{,}432.5 & 1 \\ -104{,}772 & 1 \\ -164{,}854.5 & 1 \\ -236{,}785.5 & 1 \end{bmatrix}, \quad y_n = \begin{bmatrix} 78{,}313 \\ 131{,}231 \\ 198{,}478 \\ 275{,}093 \end{bmatrix}$$

$\hat{a}$ is acquired as

$$\hat{a} = \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} -0.2066027 \\ 29960.64891 \end{bmatrix}$$

The forecast model of GDP in Macao is acquired by substituting a and b into forecasting equation to obtain the following:

$$\hat{x}^{(0)}(k) = -145{,}015.759654\ \ e^{0.2066027\ \ (k-1)}\left(1 - e^{-0.2066027}\right) \tag{1}$$

By substituting k = 2,3,4,5 into Equation (1), the total forecast values of GDP per capita in Macao is obtained as 38,552, 42,128, 51,796, 63,683 and 78,297 from 2008 to 2012, respectively. The sequence of reduction is:

$$\hat{x}^{(0)} = (38{,}552\ \ \ 42{,}128\ \ \ 51{,}796\ \ \ 63{,}683\ \ \ 78{,}279)$$

The forecast value, actual value and residual error can be obtained by substituting $x^{(0)}(k)$ and $x^{(0)}(k)$, k = 2,3,4,5 into forecasting equation separately. Given k = 6,7,8 from forecasting equation, this research forecasts the GDP per capita in Macro from 2013 to 2015 to be 96,266, 118,359, and 145,521, respectively.

Table 4 shows the forecast value, real value and the residual error of GDP per capita in Macao. The average residual error is 3.89%, and the average of accuracy is 96.11%. These statistics suggests the good predictive ability of this model.

Table 4 Forecast Value, Real Value and Residual Error of GDP per Capita in Macao

Year	k	Real value	Forecast value	Residual (%)
2008	1	38,552	38,552	0
2009	2	39,761	42,128	5.95
2010	3	52,918	51,796	2.12
2011	4	67,247	63,683	5.30
2012	5	76,615	78,297	2.20
2013	6	-	96,266	-
2014	7	-	118,359	-
2015	8	-	145,521	-

Repeating the foregoing steps, the data of population, land, gambling tax, and government total tax are operated to construct the predictive formulas as the followings:

$$\text{Population: } \hat{x}^{(0)}(k) = -17{,}051.485451\ e^{0.0296199\ (k-1)}\left(1 - e^{-0.0296199}\right) \quad (2)$$

$$\text{Land: } \hat{x}^{(0)}(k) = -6{,}241.8857144\ e^{0.0046995\ (k-1)}\left(1 - e^{-0.046995}\right) \quad (3)$$

$$\text{Gambling tax: } \hat{x}^{(0)}(k) = -14{,}584.272321\ e^{0.2793356\ (k-1)}\left(1 - e^{-0.2793356}\right) \quad (4)$$

$$\text{Government tax: } \hat{x}^{(0)}(k) = -19{,}100.112793\ e^{0.2769051\ (k-1)}\left(1 - e^{-02769051}\right) \quad (5)$$

Given k = 6,7,8 from forecasting equation, population, land, gambling tax, and government total tax from 2013 to 2015 are forecasted and shown in Table 5. The average residual error of GDP per capita, population, land, gambling tax, and government total tax are 3.89%, 7.40%, 1.69%, 7.90%, 6.7%, respectively, suggesting the good predictive ability of this model.

Table 5 The Forecast Value and Real Value of Economic Indicators in Macao

		2008 (k = 1)	2009 (k = 2)	2010 (k = 3)	2011 (k = 4)	2012 (k = 5)	2013 (k = 6)	2014 (k = 7)	2015 (k = 8)
GDP per capita	Real value	38552	39761	52918	67247	76615			
	Forecast value	38552	42128	51796	63683	78297	96266	118359	145521
	Deviation (%)	0	0.0595	0.0212	0.053	0.022			
POP	Real value	543.1	533.3	540.6	557.4	582			
	Forecast value	543.1	528.94	544.85	561.23	578.1	595.48	613.38	631.82
	Deviation (%)	0	0.0082	0.0079	0.0069	0.0067			
Land	Real value	29.2	29.5	29.7	29.9	29.9			
	Forecast value	29.2	29.541	29.68	29.82	29.96	30.101	30.243	30.385
	Deviation (%)	0	0.0014	0.0007	0.0027	0.002			
Game	Real value	5237	5539	8597	12457	14172			
	Forecast value	5237	6387.4	8445.8	11167	14766	19525	25816	34136
	Deviation (%)	0	0.1532	0.0176	0.1035	0.0419			
Gov	Real value	6385	7205	11061	15372	18124			
	Forecast value	6385	8130.8	10725	14147	18660	24613	32466	42824
	Deviation (%)	0	0.1285	0.0304	0.0797	0.0296			

Economic indicators are predicted to keep increasing after the recession in 2008. Gambling tax expands the most of 32.23%. Secondly, government tax increases 31.90%, and then GDP per capita increases 22.95%.

5. Conclusion, Limitation, and Future Research

This research examines the economic impacts stimulated by the gambling liberalization in terms of GDP per capita, population, lands, gambling tax, government total tax, and finds the statically significant growth in every economic indicator. The research result is in line with Zheng & Hung's study (2012) in evaluating the economic impacts of Casino liberalization in Macao. Zheng & Hung propose that the decision to end casino gambling monopoly immediately set off an exponential growth in GDP. Even in 2008 when the global economy was heavily struck by the financial tsunami, the Macao economy still recorded a 10.7% increase in GDP per capita. Our studies further make the statistic test to proof the positive effects on economic performance by gambling liberalization. Besides, to evaluate the continuing influences of liberalization, the economic performance after recession of 2008 is forecasted. Research results demonstrate that all the economic indicators keep growing even during and after the economic recession. This is different from the research of Horváth & Paap (2012) examining the influence of the business cycle on expenditures of gambling activities in the United States and find that economic recession negatively affects the gambling expenditure. The future research is suggested to understand the reasons why the case in the East is different from that in the West.

The limitation of this study is based on the data collection. Some more economic indicators like employment (Giacopassi et al., 1999; Long, 1996; Pizam & Pokela, 1985), migrant workers (Loi & Woo, 2009; Zheng & Hung, 2012), and price (Zheng & Hung, 2012; Shaw & Coles, 2007) can be included to describe the economic performance more completely. Besides, the economic spillover and positive multiplier effect created by gambling industry (Agarwal, 2012; Vong, 2008; Garrett, 2004) can be considered to provide a stronger illustration and implication to the research findings.

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