Response to Invited Reader 1

We are grateful for the comments of the anonymous reader. We response as follows.

1) COMMENT: "The paper can make more contributions to the field with a theoretical model. The casinos have at least four types of customers (smoking and non-smoking gamblers and non-gamblers).... The authors can think about the game theory approach to develop a solid theoretical foundation for the paper."

Answer: Considering the suggestions of the anonymous reader, we have decided to include a theoretical model which we had developed in our earlier draft. The model analyzes the dominant strategy of a casino facing smoking bans.

"The expected profits of the casinos

The accounting profit of gaming product *i* can be calculated as follows:

$$\pi_i = \rho_i * q_i - c_i \tag{1}$$

where p_i refers to the price, q_i refers to the demanded quantity, and c_i refers to the typical operating cost of gaming product *i*. Since it is very difficult for a casino employee to provide sufficient evidence of damage to health due to working in the smoking work environment, the legal cost for second hand smoking health damage compensation claimed by casino employees is not yet a realistic threat to the casinos in Macao. Due to this consideration, we don't include this type of cost in Equation (1).

We **c**onsider a general linear differentiated product demand curve for gaming product *i* facing substitutes gaming product *j* as in Deneckere and Davidson (1985).

$$q_{i} = V_{i} - \alpha \ p_{i} - \gamma (p_{i} - \frac{1}{N} \sum_{j=1}^{N} \ p_{j})$$
(2)

The impacts of a smoking ban enter the demand function through changing the value (V) that patrons are willing to attach to the gaming activities according to their smoking preferences. Assuming the price of product *j* does not change under a smoking ban, we simplify and rewrite Equation (2) as

$$q_i = V_i(s) - \alpha p_i \tag{3}$$

where *s* refers to the degree of smoking convenience in a casino. For each gaming product *i*, there are three types of patrons playing this game. *Type-One* patrons are indifferent to the smoking ban environment. Thus, the gaming demand of *Type-One* patrons (q_{1i}) will not be affected by any smoking ban. *Type-Two* patrons are the smoking hard-core patrons, who play fewer games when they have to leave the gaming table to smoke. The gaming demand of *Type-Two* patrons (q_{2i}) is expected to decrease under a smoking ban. *Type-Three* patrons are the leisure players, who prefer a non-smoking environment and will stay and play games only a non-smoking environment. The gaming demand of *Type-Three* patrons (q_{3i}) is expected to increase under a smoking ban. Therefore, the profit of casino *i* can be written as follows:

$$\pi_i = p_i * (q_{1i} + q_{2i+} q_{3i}) - c_i$$
(4)

The impacts of a smoking ban (partial or total one) can be shown as:

$$\frac{\partial \pi_{i}}{\partial s} = p_{i} \left(\frac{\partial V_{2i}}{\partial s} + \frac{\partial V_{3i}}{\partial s} \right) - \frac{\partial c_{i}}{\partial s}$$
(5)

Since Type-One patrons (q_1) are indifferent to the smoking ban, their gaming demand does not change after smoking ban. $\frac{\partial V_{2i}}{\partial s} > 0$ means that Type-Two patrons have lower gaming demand when there is less smoking convenience under the restrictions of a smoking ban. $\frac{\partial V_{3i}}{\partial s} < 0$ means that there is higher gaming demand by Type-Three patrons if there is a smoking ban. $\frac{\partial c_{i}}{\partial s} < 0$ means that a casino's operating cost under a smoking ban will be higher, because extra costs occur in order to install or renovate the ventilation systems.

Based on Equation (5), we cannot predict precisely the direction of the actual impacts on the expected profitability of a casino, because each casino has a different patron mix and has varying costs to meet the air quality standard under smoking bans. Ultimately, whether the smoking bans are expected to be, on net, positive or negative for casino firms, is an empirical one. "

Reference:

Deneckere, R., & Davidson, C. (1985). Incentives to form coalitions with Bertrand competition. The RAND Journal of economics, 473-486.

2) COMMENT: " It is also important to clarify what is known or unknown about the share of smoking/non-smoking gamblers/non-gamblers in the literature. This evidence will help the policy maker and the casino itself optimize the smoking ban policies."

Answer: With respect to the Anonymous Reader's suggestion, we will add the following information in our final manuscript.

"Smoking prevalence among the patrons

It is commonly believed that smoking prevalence among casino patrons is higher than that of the general population; however empirical evidence shows that the higher smoking rate is true only among problem gamblers (Grant et al., 2008; McGrath and Barrett, 2009). Among studies using samples drawn from the community, many have found that the casino patrons on average smoke at a rate similar to that of the general public (Pritsos, et al, 2008; Babb, et al, 2014;).

The smoking prevalence rates of the visitors to Macao vary noticeably according to their original regions. In 2012, the smoking rates among male adults in mainland China, Hong Kong and Taiwan were 52.9%, 18.7% and 35% respectively, while the smoking rates among the female adults were as low as 2.4%, 4% and 4% respectively (Dan *et al.*,2014; Census and Statistics Department of Hong Kong SAR, 2013; Health Promotion Administration of Taiwan, 2010).

Following the assumption that the smoking prevalence among gaming patrons reflects the population (Pritsos, et al, 2008; Babb, et al, 2014), the weighted average smoking prevalence of Macao visitors, based on their originalities, is calculated to be 18% overall and 34.8% among male visitors.

The smoking rate varies on the gaming venues. The casino managers in Macao reported that 80-90% of male gaming patrons on the venues of SJM Holdings (the leading traditional casino firm in Macao) were seen to be smokers (Stradbrooke, 2012; Macao Daily Times, 2010)."

Reference:

Babb, S., McNeil, C., Kruger, J., & Tynan, M. A. (2014). Secondhand smoke and smoking restrictions in casinos: A review of the evidence. *Tobacco Control*, , tobaccocontrol-2013-051368.

Dan, X., Yuankai, S., & Chen, W. (2014). Tobacco in China. The Lancet, 383(9934), 2045-2046.

- Grant, J. E., Kim, S. W., Odlaug, B. L., & Potenza, M. N. (2008). Daily Tobacco Smoking in Treatment-Seeking Pathological Gamblers: Clinical Correlates and Co-occurring Psychiatric Disorders. *Journal of Addiction Medicine*, 2(4), 178-184.
- Macau Daily Times. (June 9, 2010). Smoking ban to harm casino revenues. *Macau Daily Times*. Retrieved from http://www.macaudailytimes.com.mo/macau/13235-Smoking-banharm-casino-revenues.html

- McGrath, D. S., & Barrett, S. P. (2009). The comorbidity of tobacco smoking and gambling: A review of the literature. [Review]. *Drug and Alcohol Review*, *28*(6), 676-681.
- Pritsos, C. A., & Muthumalage, T. (2015). The impact of commonly used air filters in eliminating the exposure to secondhand smoke constituents. *Environ.Sci.: Processes Impacts*, *17*(3), 543-551.
- Stradbrooke, S. (2012). Will smoking ban butt out Macau'S mass market growth? *Gambling News with an Edge,* (December 13), 11 January 2016.

3) COMMENT: "Some field experiments will be interesting to demonstrate the scale of the smoking ban on smoking customers' behavior change and the spill-over effects on non-smoking customers' behavior change."

Answer: We agree with the Anonymous Reader. In our future research projects, we will consider to conduct fields experiments as suggested above.