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Modelling casino hospitality business cycles

This study decomposes the casino hospitality business cycles of Las Vegas and Macao into high-growth states (HGS) and low-growth states (LGS) using a Markov switching model. The casino gaming sector in Macao experiences greater fluctuations than the sector in Las Vegas due to more volatility in tourism flows; that is, Macao has a slightly higher HGS and a considerably lower LGS than Las Vegas. Las Vegas's hospitality cycle appears to be more robust than Macao's, although both hospitality cycles are desirably asymmetric. Various factors, including external business cycles and supply-side factors, affect local hospitality cycles. In terms of policy suggestions, the study's results suggest that promotional marketing must be strengthened in Las Vegas, and Macao must diversify its industrial base.

Keywords: business cycle, hospitality cycle, casino gaming

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1. Introduction

Tourism and hospitality are heavily influenced by business cycles. Business cycles, which consist in fluctuations around the growth trend in gross domestic product (GDP), are primarily triggered by changes in aggregate demand, although changes in technology and investment also play a role. Tourism destination tourist flows may be affected by business cycles in the destination's source markets because demand in the tourism sector is determined by income levels. It is no coincidence that hospitality cycles in tourism destinations follow business cycles in tourism

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source markets and are mediated by tourism flows. Typical travel destinations, as small open economies, are prone to growth volatility. In this study, the authors examine two of the world's largest gaming and tourism cities: Macao and Las Vegas. As demonstrated by periods of rapid expansion and sharp contraction, the casino gaming industry is characterised by wild volatility in both regions. With the aim of promoting sustainable tourism development in these two small open economies, the study attempted to identify effective policy solutions to facilitate the creation of stable growth in the hospitality sector.

The hospitality cycle in Las Vegas is a notable example of how business cycles affect the hospitality sector. Excluding the current restrictions due to the Covid-19 pandemic, casino tourism in Las Vegas is a long-term success story. However, the city has dealt with two major disruptions. Nevada's rapid growth in tourism and hospitality made it one of the top three fastest growing states in the US throughout the last four decades of the 20th century (Eadington, 1999). Until 11 September 2001, the industry was booming in Las Vegas and elsewhere in Nevada. Yet, despite once being considered recession-proof, the tourism and hospitality industries were vulnerable to this adverse event, with casinos becoming quiet and hotel rooms largely vacant. It took until 2005 for the city to regain its footing as the nation's favourite playground thanks to efforts by the state and local governments (Schwartz, 2006). The terrorist attack caused the strong recession, which lingered for years, and during this time net losses by their companies forced many employees to take early retirement. Numerous casino hospitality projects were cancelled or postponed, and some that continued faced financial difficulties. In 2010, the local economy improved, and this growth accelerated after 2013 as the number of visitors from international sources grew, especially visitors from China and other Asian countries (Sheng and Zhao, 2016).

Macao is a successful example of the casino hospitality industry in China, however it has also had bitter experiences with the pitfalls inherent in gambling tourism (Hao et al., 2017). In 2003, the Free Travel Policy (FTP) of mainland China (MC) began to spur economic growth in Macao. The FTP entitles mainland Chinese to visit Macao to partake in gambling (which is prohibited in the rest of the country). Over a three-year period, Macao became the top casino destination in the world, surpassing Las Vegas in terms of gross gaming revenue (GGR). A steep GGR growth of 28.2% per year throughout the 2002–2013 period drove Macao's GDP growth to 13.0% per year on average. At the time, the GGR of Macao was seven times that of Las Vegas (US$ 45.2 billion). Consequently, Macao's GDP per capita rose to within the top three globally and was more than twice that of Hong Kong (Sheng, 2014). However, a 49.4% drop in GGR and a 28.9% decline in GDP occurred between 2013Q4 and 2016Q2, resulting in massive unemployment among migrant workers and large wage reductions among resident workers (Sheng, et al., 2017). This dependence on the casino hospitality industry makes Macao susceptible to external

shocks. Several events demonstrate this, such as the tightening of the FTP during the 2008–2009 period and the anti-corruption campaign during the 2014–2016 period under Xi Jinping's administration. Two severe economic recessions followed these exogenous tourism shocks, with the second being far worse than the first (Li and Sheng, 2018). Despite the economic recovery that has been ongoing since 2016Q3, the instability of Macao's economy continues to be a concern, given the vulnerability of the city's gaming industry to external shocks.

This study used Macao and Las Vegas, which are fast growing but volatile economies, as case studies of hospitality cycles. While Markov switching models (MSM) are widely used in macroeconomics to study business cycles, few studies examine the effect of a single industry on an economy. In particular, there is a lack of research on the tourism industry and hospitality cycle and a dearth of knowledge about the gaming industry cycle. This paper discusses Las Vegas and Macao from a new perspective (Deng et al., 2020). Most other studies, such as Moore and Whitehall (2005) and Merida et al. (2016), applied vector autoregressive (AR) methods to examine local and external cycles. Using data simulations, these theoretical studies investigated the effect of business cycle fluctuations in source markets on hospitality cycles in destination markets. In contrast, this study examines the specific effects of multiple factors characterising external business cycles on local hospitality cycles.

Some studies employ this two-stage treatment to detect the channels, such as international trade and exchange rates, through which external factors affect the local hospitality industry (Sheng, 2011). By incorporating both external and internal factors, the authors identified more factors that drive local hospitality cycles, the model used in this study also accounts for cyclical factors. In the panel data regression of gaming hospitality cycles, system estimation rather than a fixed-effect model was used, which allowed to compare the two destinations in a heterogeneous manner even though they share some customers.

The gambling and hospitality sectors in Macao and Las Vegas constitute a large share of their regions' GDPs, making them ideal settings for the analysis of business cycles. This study should help to fill the gaps in the literature. A thorough analysis of the hospitality cycles and the potential determinants of gaming hospitality cycles in the two largest gaming hospitality destinations in the world provides local tourism bureaus and hospitality managers with much needed evidence of the effects of specific strategies. The empirical results will be useful to local governments seeking to address the vulnerability of their tourism sectors. Economic volatility can be studied in other industries using the same method (Sheng and Wan, 2017).

In Section 2, the authors briefly review the relevant literature. The MSM analysis is presented in Section 3. The paper concludes by providing policy recommendations in Section 4.

2. Literature review

After briefly reviewing the literature on hospitality and economic cycles, the relevant studies in tourism and hospitality (Croes and Ridderstaat, 2017) and economics (Sheng and Nascimento, 2021) are examined in more detail. Although the trend is largely stable, policymakers and macroeconomic theorists are often concerned by the fluctuations, which are often characterised by business booms and recessions. Approaches to business cycles can be divided into two broad categories. Heterodox economists distrust smooth growth trends and consider them to be prone to large and frequent shocks that permanently alter GDP. Traditional and neo-Keynesian models emphasise supply shocks (Sheng, 2012), whereas real business cycle models focus on demand shocks because of their propagating effects.

AR integrated moving averages and Kalman filter models (Campbell and Mankiw, 1987). Despite their computational convenience, both approaches fail to fully capture the observed asymmetrical characteristics of business cycles due to their use of linear modelling. MSM can address this challenge of time-series analysis (Hamilton, 1989) using regime switching regression. Non-linear filters can be used to estimate non-stationary series with AR processes. AR can traverse through unknown states and change over time according to the state in which it occurs. It is assumed that the time it takes to switch from one state to another and the duration of each state are both determined by a Markov probability matrix. MSM are used to study asymmetric behaviour in economics, finance, social science, and political science.

Due to their lack of importance to large economies, hospitality cycles have attracted limited research attention. Prior to 2010, relatively few studies explored the business cycles of national economies (e.g. Gonzalez and Morales, 1996; Greenidge, 2001; Sheng, 2018). More recently, travel destinations have been treated as small open economies and a growing number of studies examined their cyclical movements. In these economies, local hospitality development drives growth, but cross-border tourism promotion also affects business cycles due to the cyclical nature of the economy in the source market (Sheng, Li, and Gao, 2019; Sheng, Yin and Zhang 2022). This study focuses on the links between a local tourism and hospitality industry and movements in its source market.

A growing number of studies discuss the cyclical nature of tourist flows (Guizzardi and Mazzocchi, 2010; Papatheodorou et al., 2010). Most of these studies focus on the tourism demand in specific destinations (Smeral, 2012; 2016). This kind of demand is driven largely by tourists' income, which is influenced by business cycles in their home markets. Furthermore, given the slow reaction of the travel cycle to the business cycle, the past value of the source country's business cycle might provide a useful guide when forecasting the current value of tourism at tourist sites. According to Smeral (2012), fluctuations in economic activity can be viewed as the cause of fluctuations in travel demand.

Empirical studies show that business cycles and tourism demand cycles are strongly correlated. Guizzardi and Mazzocchi (2010) argued that the broader economic cycle significantly influences the tourism cycle. As they noted, there is always a recurring gap between the turning point of the business cycle and the cycle of tourism demand. More recent studies (Kozic, 2014, Sheng, Gu and Guo in press) looked at the lagged effects of hospitality cycles (asymmetry, amplitude, and diffusion). These patterns allow the managers of tourism destinations to benefit from global economic slowdowns if they predict them in due time. A tourism location can experience cycles resulting from various factors (such as maturity). The life cycle theory provides a more comprehensive explanation of these phenomena (Moore and Whitehall, 2005). Considering such findings, policy makers might be able to introduce countercyclical policies to mitigate the effects of external shocks on local economies. Several of these studies are empirical but need further development in terms of the model specifications and the techniques used for estimation. Moreover, theoretical models of the underlying economics are necessary for such investigations.

3. MSM discussion

This section presents a brief overview of Hamilton's (1989) two-state MSM. As it is commonly assumed that empirical data sets contain random errors, the analysis of a time series of financial data is usually nondeterministic. This phenomenon may be influenced by observed and unobserved variables, the latter are referred to as state variables. Institutional transition dynamics are caused by the transformation of related states over time according to deterministic or stochastic laws. The discrete state-space model, which considers the Markov transformation of a specific financial framework, is the only model used in this study. This analysis is intended to evaluate the stochastic growth process from a rough time series acquired over period t. MSM can provide reliable projections of the economic state under a business cycle and yield the growth rate associated with expansions and contractions. Among the many advantages of MSM is their ability to identify patterns over time and to guarantee regime permanence and their flexible implementation, all of which mitigate the difficulties associated with using linear AR models to forecast and perform specification tests.

In this paper, the time-series properties of a gaming hospitality cycle are studied using an econometric model. *TR*, the total revenue generated from operations in a casino resort, is seen as a comprehensive indicator of the state of the business cycle of the industry. It is a key variable, as it represents the market interactions between the supply and demand forces in cross-border gaming markets.

The selected economic model also explains how shocks originating in source markets are transmitted through tourist flows into destination markets in the form of tourism revenues. The study's findings suggest that external business cycles

propagate so strongly (or weakly) that the shock to the external cycle can affect local business cycles and have strong or long-lasting (or slight and transient) effects.

A two-state MSM is developed as growth and revenue *TR* in the first stage of the estimation:

$$Z_t = \mu_{S_t} + \sum_{k=1}^{q} \Theta_k L^k Z_t + \sigma_{S_t} \varepsilon_t, \tag{1}$$

where ϕ_k's are coefficients of an order-q autoregressive process $AR(q)$, L is the lag operator, $S_t = \{0,1\}$ denotes two unobserved states of the hospitality cycle, and $\varepsilon_t \sim$ i.i.d. $N(0,1)$ is the white noise.

Two statistical rules are used to select a time lag length that is appropriate for the $AR(q)$ process of Equation (1). To test whether a regime shift has taken place, H_0: $\mu_0 = \mu_1$ is derived from the Wald statistic:

$$w = \left(\hat{\mu}_0 - \hat{\mu}_1\right)^2 / \left[\hat{v}ar\left(\hat{\mu}_0\right) + \hat{v}ar\left(\hat{\mu}_1\right) + 2\hat{c}ov\left(\hat{\mu}_0, \hat{\mu}_1\right)\right] \sim x^2. \tag{2}$$

Conclusion

The authors studied the effects of business cycles on the casino tourism industry in the two largest gambling cities in the world. Using a two-state MSM, the study first estimated hospitality cycles, and then examined the determinants of hospitality cycles using a structural regression model. The findings are consistent with the literature on this point. Similarly, small tourism-dependent economies show evidence of linked source-destination cycles. This study examines Las Vegas and Macao as distinct but somewhat integrated markets. The findings have implications for policy makers seeking to mitigate tourism vulnerability and economic volatility in both cities. However, local pull factors, such as service offerings, also play a key role. To maintain a high-growth state, Las Vegas must provide marketing campaigns that target Chinese and other Asian customers. Since Macao's economy would otherwise continue to suffer large fluctuations leading to an eventual long-term low growth state, it must diversify its industrial base and pursue sustainable tourism development.

The study provides the following main policy recommendations for the benefit of local tourism authorities and hospitality business managers. Although Las Vegas and Macao have similar hospitality cycles, in particular baccarat players constitute the core of customers in both locations, boosting the casino gaming industry in Las Vegas requires different approaches that boosting the industry in Macao due to three structural differences. First, the Las Vegas hospitality cycle is less volatile, and its two-state asymmetry is more favourable than Macao's; gambling receipts represent only 37% of casino revenue in Las Vegas compared to more than 90% in Macao. Second, in Las Vegas, slot machines generate revenue, whereas Macao relies on table games for its success (Sheng and Gao, 2018). Third, even though Las Vegas

baccarat games made up 47% of table game revenue in 2013 (up from 13% in 1985), this proportion remains lower than that in Macao. During domestic business-cycle downturns, Las Vegas might need to increase its marketing efforts (albeit at a cost) around the globe to smooth gaming hospitality cycles. This should be accomplished by focusing promotion efforts on Chinese investors and new Asian markets. Macao must learn from Las Vegas about mass-market gaming and economic diversification, whereas Las Vegas might benefit from implementing something akin to Macao's offshore tourism marketing programme for VIP hospitality operations (Sheng, 2017a; Sheng et al., 2022).

The lack of natural surroundings and amenities in Macao prevents it from becoming a destination for outdoor/adventure tourism. As such, developing high value-added industries that use a minimal amount of land is a realistic solution to industrial diversification. There are three industries that Macao could take advantage of: (i) meetings, incentives, conferences/conventions, and events/exhibits/expositions (MICE), (ii) sea-boat tourism, and (iii) offshore RMB finance. The city has been building hospitality facilities to allow MICE industry activities, making Macao competitive with nearby cities. Local casino hotels will also benefit from increasing MICE industry activity. South China's Greater Bay Area development plan is likely to generate new MICE business (Sheng, 2016). The Chinese government granted Macao 85 square kilometres of sea territory in 2015 (more than twice its land area); setting up sea-boat hospitality services would be a profitable way to utilise this new natural resource to attract curious tourists. There have been several riverboat casino licences issued by different states in the US to enable gambling, however there are a limited number of regions where this industry is feasible. Although VIP gambling could be extended to sea-boat casino hotels, Macao's sea-boat tourism industry could be expanded beyond traditional gambling tourism (Sheng, 2017b). In addition, RMB transactions outside of MC are now permitted under offshore financing rules. In addition to attracting tourists to Macao for recreational and financial reasons, this non-gaming business could attract many tourists. The fact that Macao has accumulated a huge amount of public savings suggests the need to offer tax incentives to promote the growth of the three industries discussed above, effectively diversifying the economy. To increase the overall stability of the local economy, it will be necessary to develop industries that are less susceptible to adverse conditions, thereby enabling growth to become less volatile and more sustained.

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