



---

# COVID-19 AND ITS AFTER-EFFECTS ON MACAU'S GAMING INDUSTRY

Fanli Zhou<sup>1</sup>, Thomas Schrier<sup>2</sup>, Tianshu Zheng<sup>3</sup>

<sup>1</sup>Assistant Professor, College of Business Administration, Fujian Jiangxia University, China

<sup>2</sup>Associate Professor, Department of Apparel, Events, and Hospitality Management, Iowa State University, USA

<sup>3</sup>Associate Professor, Department of Apparel, Events, and Hospitality Management, Iowa State University, USA

## Abstract

This study measured the magnitude of Covid-19's impact on the casino gaming industry in Macau, analyzed the current Asian gaming market, and provided an overview of the industry outlook in the post-Covid era. Using the Time Series analysis techniques, statistically significant decreases in all sections of the industry have been identified and quantified. In addition, quarterly gaming revenue for the future three years were forecasted. Based on current market conditions and the results of data analyses, this study suggests that: 1) a more diversified tourism and gaming service portfolio is needed; 2) collaborations with surrounding areas need to be established; 3) Macau's gaming industry will need to explore new markets for future sustainable growth; 4) the rebound of Macau's gaming industry in the near future will largely depend on China's COVID policy.

## Keywords

Casino, COVID-19, Gaming Industry, Macau, Time Series, Tourism

---

## 1. INTRODUCTION

As of July 2022, there have been approximately 55 million confirmed COVID-19 cases and 6 million deaths related to COVID-19 worldwide (WHO, 2022). Its impact on the world economy far exceeded those of the Great Recession. All sectors have been affected and many of the world's largest employers have seen a decrease in revenues (Sand, 2020). The hospitality and tourism industry has been one of the hardest-hit industries by the pandemic (Nicola et al., 2020), and the gaming industry is no exception. The global gaming market was estimated to drop from USD\$521.6 billion in 2019 to USD\$495.6 billion in 2020 at a compound annual growth rate (CAGR) of -5% (Business Wire, 2020).

Macau, the largest gaming hub in the world with gross gaming of MOP\$360 billion, seven times the amount of the Las Vegas Strip in 2013 (CNBC, 2022), experienced catastrophic changes through the pandemic. The gross gaming revenue during the first half of 2022 was only MOP\$26.2 billion (VOA Chinese, 2022). Given the current quarantine policies, market competition, and global uncertainties, Macau's gaming industry might not be able to rebound immediately after the pandemic. The purpose of this study is to examine the performance of Macau gaming industry during the COVID-19 pandemic and identify possible directions for future growth.

## 2. LITERATURE REVIEW

### 2.1 The Gaming Industry during the Pandemic

In reaction to the COVID-19 global crisis, many national governments enacted sweeping moves against the outbreak. They implemented prevention measures such as travel restrictions to reduce the number of international travelers, goods, and services across countries and regions (Lim, 2020); or social distancing policies for individuals to reduce the number of close contacts (Abel & McQueen, 2020). During the early phases of the pandemic, all casinos in the United States were mandated to close. As the restrictions were slowly lifted, the gaming industry struggled. In Nevada, for instance, after casinos were permitted to reopen, only 87.9 percent of casino hotels and resorts were open by mid-July 2020 with mandated requirements for social distancing and face masks inside casino resorts properties (Lim, 2020). Such measures resulted in a substantial decline in casino spending and hindered economic recovery. In addition, the pandemic caused significant disruption in sports betting as most major sporting

events at the international, regional, and national levels were either canceled or postponed. In summary, the pandemic had a catastrophic impact on the global gaming industry.

### **2.2 Macau's Gaming Industry during the Pandemic**

Macau's economy relies on the mono-economy of casino gaming. As such, Macau's economy experienced a severe contraction during the first quarter of 2020 when the lockdown measures to contain the COVID-19 outbreak hit the gaming, hotel, and tourism industry. The amount of visitors plunged 689% and GDP was down 48.7% in the first three months of 2020, (Macau Statistic and Census Service, 2020). In addition, tourists from mainland China who visited Macau during the 2020 October Golden Week plummeted by 83.6% year-on-year (Inside Asian Gaming, 2020).

Some previous studies explored the impact of COVID-19 on Macau's gaming industry from various perspectives. For example, Chau et al. (2021) had in-depth interviews with twelve casino executives and concluded that COVID-19 caused the revenues of mass-market, high-stake areas, and VIP rooms to drop dramatically. Lim and To (2021) investigated the impact of COVID-19 on the gaming industry using ARIMA, correlation, and regression analyses on longitudinal data to explore the relationship between Macau's gross gaming revenue and tourist arrivals and demonstrated that the Macau gaming industry experienced an unprecedented drop due to the significant decrease of number of tourist arrivals.

However, no known study has tested the statistical significance and the magnitude of COVID-19's impact on Macau's gaming industry, examined current market condition and potential directions for future growth, or reasons that prevent Macau's gaming industry from quickly recovering. Based on the results of time series analyses and the current increasingly competitive market, this study also provides the industry and policy makers with suggestions for future developments of Macau's gaming industry.

## **3. METHODOLOGY**

### **3.1 Time Series Analysis**

Time series data consist of a series of data points that are measured over a period of time. By investigating the patterns of data to adapt a time series to a model, time series modeling has the reasonable capacity to investigate and identify historical trends and fluctuations in associated patterns to forecast future activity (Zheng, 2014). Time series analysis can be useful to examine how economic variables change over time (Kenton, 2020). In the context of tourism research, time series models are frequently applied to forecast tourism and hotel industry demand because of their simple implementation and reasonable capacity to capture historical patterns (Song et al., 2019).

Autoregressive, Integrated, Moving Average (ARIMA) model is one of the most common procedures for identifying a trend in a time series to eliminate the effect of auto-regression, seasonality and moving average (Yaffee, 2000). In an ARIMA model, a non-stationary time series is transformed to stationary by applying finite differencing of the data points (Adhikari & Agrawal, 2013). ARIMA can enhance predictive accuracy while maintaining the number of parameters minimum (Zhai, 2005). Another strength of the ARIMA model is that it can reflect the impact of an intervention by including the explanatory variables (Vandaele, 1983).

While ARIMA models are for non-seasonal data, time series data often exhibit seasonal effects, particularly those from the hospitality, gaming, and tourism industry. As such, greater attention for tourism demand forecasting has been placed on the Seasonal ARIMA (SARIMA) model due to the seasonality feature in tourism activity (Song & Li, 2008). To accommodate and model seasonality, SARIMA was generalized by Box and Jenkins. In SARIMA models, seasonality in data can be eliminated by seasonal differencing and allow the data to achieve stationarity (Box & Jenkins, 1970). A SARIMA model is typically presented as  $(p, d, q) (P, D, Q)_n$ , where  $p$  represents the autoregressive terms,  $d$  represents the number of nonseasonal differences;  $q$  represents the moving average terms;  $P$  represents seasonal autoregressive terms;  $D$  represents the number of seasonal differences;  $Q$  represents the seasonal moving average terms;  $n$  represents the number of periods in seasonal cycles (e.g. 4 for quarterly time series).

### **3.2 ARIMA with Intervention Analysis**

ARIMA with intervention analysis is an extension of the time series technique based on the ARIMA model (Nelson, 2000). Since time series are often influenced by external events, for example, policy changes, marketing campaigns, and changes in the economic environment (Zheng et al., 2013), the intervention analysis can quantify the exogenous events by detecting the structural breaks of the data and estimate the magnitude of changes in data pattern trends before and after the intervention (McDowall et al., 1980; Bowerman et al., 2005; Box et al., 2008).

Regarding gaming-related literature, ARIMA models present great advantages in analyzing time series data, particularly in dealing with gaming data (Eisendrath, 2005). Some studies applied ARIMA with intervention

analysis to detect and measure the impact of the economic recession on the gaming industry. Zheng et al. (2013) examined Iowa's gaming industry's performance during and after the 2007-2009 recession by analyzing monthly slot coin-in, table drop, and admission from December 2001 through June 2012. Marlowe et al. (2020) investigated relationships between casino gaming volume and employment during economic downturns in Indiana by examining monthly coin in, table drop and using regression analysis on casinos' employment impacts.

Therefore, this study adopted the ARIMA with Intervention Analysis technique to test and measure the magnitude of COVID-19's impact on Macau's gaming industry in terms of quarterly gaming revenue. In addition, quarterly Baccarat and Slot Machine revenue for the next two years were estimated using ARIMA models.

### 3.3 Variables & Data Collection

Baccarat has become the most popular, as well as the most profitable, table game offered in Macau casinos (Lam, 2005). According to gaming statistics released by the Macau Gaming Inspection and Coordination Bureau, VIP Baccarat and Baccarat (non-VIP, Baccarat hereafter) contributed 88% of Macau's total gaming revenue in 2021, which suggests that Macau's gaming industry practically relies on a single game: Baccarat. In other words, gross gaming revenues from VIP Baccarat and Baccarat directly reflect the overall performance of Macau's gaming industry.

Liu et al. (2020) broadly divided Macau's gaming industry into three sections: VIP Baccarat, slot machines, and mass market. Mass market includes Baccarat and quite a few small games such as Blackjack, Paikao, Mahjong, Stud Poker, Lucky Wheel, Texas Holdem and Craps. However, given the popularity of the game of Baccarat in Macau, small games contribute only a minor percentage of Macau's total gaming revenue, around 6% in 2021. Therefore, this study focused quarterly revenues from VIP Baccarat, Baccarat, and slot machines, which contributed 32.8%, 55.7%, and 5.4% of the gross gaming revenue in 2021, respectively. Data for the analysis were retrieved from the Macau Gaming Inspection and Coordination Bureau website, consisting of quarterly data from the first quarter of 2005 to the first quarter of 2022.

## 4. DATA ANALYSIS & RESULTS

### 4.1 Model Development

Using Python 3.9 (Spyder 5.1.5), this study performed Seasonal Autoregressive Integrated Moving Average (SARIMA) analyses on Macau's quarterly VIP Baccarat revenue, quarterly slot machine revenue, and quarterly Baccarat revenue (non-VIP) to identify statistical significance and measure the magnitudes of revenue changes in those three variables through the pandemic.

Quarterly data from the first quarter of 2005 through the quarter with the lowest value after the COVID-19 pandemic began were used for modeling. Therefore, quarterly time series from the first quarter of 2005 through the second quarter of 2020 were used for model fitting for VIP Baccarat and Baccarat; and from the first quarter of 2005 through the third quarter of 2020 was used for slot machines. For SARIMA model developing, this study followed the three-step Box-Jenkins modeling approach, which is a statistically sophisticated time series extrapolating method that fits ARIMA models by modeling autocorrelations, such as the correlations between data points and forecasting errors (Box et al., 2008).

Step one is identification. To determine SARIMA models, data need to be inspected multiple times. Sequence plots were created to view the time series of each variable. After visually checked the time series' stationarity, Augmented Dicky-Fuller (ADF) tests were then employed to check the stationary. The results of ADF tests indicated that except for VIP Baccarat, the other two variables became stationary when the time series took the first order differencing. On the other hand, the p-value was significant after the second-order differencing for VIP Baccarat time series. Step two is estimation. Multiple models and parameters were estimated in this step. By considering AIC criteria, the best-fitting SARIMA models for three variables were presented in Table 1. Step three is diagnostics. Ljung-Box tests were performed to ensure all models fit the data adequately. The results of Ljung-Box tests in Table 2 show the high p-value for each  $\chi^2$  test statistic, which suggest that the raw quarterly time series patterns have been identified and all models for COVID-19 impact analysis fit data adequately

| Parameters   | Coefficient | z-statistic | p-value |
|--|-------------|-------------|---------|
| <i>Quarterly VIP Baccarat: SARIMA (0,2,1) (0,1,1)<sub>4</sub></i>  |             |             |         |
| ma.L1  | -0.44       | -2.06       | 0.04    |
| ma.S.L4  | -0.72       | -4.92       | 0       |
| <i>Quarterly Baccarat: SARIMA (2,0,0) (0,1,0)<sub>4</sub></i>      |             |             |         |
| ar.L1  | 1.56        | 7.88        | 0.00    |
| ar.L2  | -0.81       | -4.35       | 0.00    |
| <i>Quarterly Slot Machines: SARIMA (0,1,1) (0,1,0)<sub>4</sub></i> |             |             |         |
| ma.L1  | 0.42        | 3.28        | 0.001   |

Table 1. Summary of Estimates of Model

|                                | Lag | $\chi^2$ | p-value |
|--------------------------------|-----|----------|---------|
| <i>Quarterly VIP Baccarat</i>  | 4   | 0.20     | 1.00    |
|                                | 8   | 1.93     | 0.98    |
|                                | 12  | 2.69     | 1.00    |
|                                | 16  | 4.18     | 1.00    |
| <i>Quarterly Baccarat</i>      | 4   | 0.62     | 0.96    |
|                                | 8   | 0.70     | 1.00    |
|                                | 12  | 1.50     | 1.00    |
|                                | 16  | 2.81     | 1.00    |
| <i>Quarterly Slot Machines</i> | 4   | 0.14     | 1.00    |
|                                | 8   | 1.61     | 0.99    |
|                                | 12  | 3.25     | 0.99    |
|                                | 16  | 5.64     | 0.99    |

**Table 2. Summary of Ljung-Box  $\chi^2$  Statistic**

#### 4.2 SARIMA with Intervention Analysis

Using the SARIMA models developed, an intervention analysis was performed on each of the three time series variables. This study used an iterative method and performed intervention analysis repeatedly on each time series until a significant impact was identified or until the end of the time series. Since the World Health Organization (WHO) announced the COVID-19 outbreak as an international public health concern on January 30th, 2020 (WHO, 2020), the intervention analyses for all three variables started in the first quarter of 2020. The results shown in Table 3 indicate that all three variables were significantly affected by COVID -19 in the first quarter of 2020. The effect of COVID-19 on quarterly VIP Baccarat revenue, Baccarat revenue, and slot machines revenue were MOP\$15,601 million, MOP\$18,502 million, and MOP\$2,679 million, respectively.

| Parameters                     | Estimate  | T      | p-value |
|--------------------------------|-----------|--------|---------|
| <i>Quarterly VIP Baccarat</i>  |           |        |         |
| ma.L1                          | 0.44      | 3.66   | 0       |
| ma.S.L4                        | 0.87      | 6.50   | <.0001  |
| First Quarter of 2020          | -15601.00 | -5.06  | <.0001  |
| <i>Quarterly Baccarat</i>      |           |        |         |
| ar.L1                          | 1.52      | 15.31  | <.0001  |
| ar.L2                          | -0.68     | -6.69  | <.0001  |
| First Quarter of 2020          | -18502.00 | -14.78 | <.0001  |
| <i>Quarterly Slot Machines</i> |           |        |         |
| ma.L1                          | 0.28      | 2.18   | 0.03    |
| First Quarter of 2020          | -2679.00  | -11.72 | <.0001  |

**Table 3. Summary of COVID-19 Impact Identification**

#### 4.3 Forecasting

Using the SARIMA models, this study also forecasted quarterly Baccarat revenue and quarterly slot machine revenue for the future three years (Table 4). Although VIP Baccarat contributed a significant portion of Macau's gaming revenue, its revenue has been decreasing rapidly since the beginning of 2022. VIP Baccarat generated MOP\$1,155 million in the 3<sup>rd</sup> quarter of 2022, compared to MOP\$5,959 million in the 3<sup>rd</sup> quarter of 2021. This likely was caused by the arrest of Alvin Chau and subsequent shutdowns of Suncity Group's VIP clubs. Since Macau is one of the biggest casino junket destinations in the world, junkets account for the majority of Macau's gaming revenue. This incident has had a profound impact on Macau's VIP Baccarat. As such, the future of the VIP section of Macau's gaming industry is unclear. Therefore, future VIP Baccarat revenue was not estimated.

| Date   | Baccarat | Slot Machines |
|--------|----------|---------------|
| 2022Q3 | 9091     | 1154          |
| 2022Q4 | 11092    | 1223          |
| 2023Q1 | 10826    | 1181          |
| 2023Q2 | 12769    | 1499          |
| 2023Q3 | 9878     | 1231          |
| 2023Q4 | 11759    | 1300          |
| 2024Q1 | 11173    | 1258          |
| 2024Q2 | 12760    | 1577          |
| 2024Q3 | 9613     | 1309          |
| 2024Q4 | 11400    | 1378          |
| 2025Q1 | 10870    | 1336          |
| 2025Q2 | 12605    | 1654          |
| 2025Q3 | 9620     | 1386          |
| 2025Q4 | 11522    | 1455          |

**Table 4. Forecasting results of Non-VIP segments (in millions MOP)**

## 5. CONCLUSION & DISCUSSION

Using Seasonal Autoregressive Integrated Moving Average (SARIMA) time series modeling technique, this study identified statistically significant decreases in Macau's quarterly VIP Baccarat revenue, Baccarat revenue, and slot machine revenue immediately after the COVID-19 pandemic started. These decreases are catastrophic. Given that the quarterly average revenue of Baccarat and slot machines before the outbreak were MOP\$14,634.76 million and MOP\$2,437.05 million, respectively, the decreases identified (shown in Table 3) were more than 100% of the averages.

Although the decrease in VIP Baccarat revenue was only 47.57% of its average quarterly revenue, the change was significant. Zhou et al. (2022) examined the impact of China's anti-corruption campaign on Macau's gaming industry and found that VIP Baccarat was the only section affected and its revenue had been decreasing since 2013 when the campaign started. As such, the 47.57% decrease since the start of the COVID-19 pandemic had a contributing effect to the already decreasing revenue from the anti-corruption campaign. In addition, the recent Suncity Group case and its ripple effects have further worsened the VIP Baccarat performance. Overall, these results indicate that the COVID-19 pandemic had a devastating impact on Macau's gaming industry.

Macau has a gaming centric mono-cultural economy. Its economy largely relies on the tax revenue from the gaming industry whose performance solely relies on inbound tourists. Lim & To (2021) noted that the abrupt decrease of inbound tourists due to travel restrictions directly affected Macau's gaming revenue. It is without a doubt that Macau's gaming industry and Macau's economy will not see a rebound until all travel restrictions are completely lifted. However, recovery will be challenging, even after the world has reopened after the COVID-19 pandemic.

Unlike any other tourism or gaming destination in the world, Macau serves only one market: China. The considerable number of Chinese tourists was an important determinant in the development of Macau's gaming industry (Du, 2007). Since the Chinese government began its Individual Visit Scheme in 2003 to make it possible for mainland Chinese citizens to travel to Macau freely, the number of visitors from mainland China has increased exponentially. As such, Macau's gaming industry has also increased exponentially. In the 1<sup>st</sup> quarter of 2022, 91.7% of Macau's inbound visitors were from mainland China. Visitors from Hong Kong and Taiwan accounted for only 7.4% and 0.9%, respectively. According to the DICJ (2005-2022), from 2005 to 2022, annual Baccarat revenue increased from MOP\$10,448 million to MOP\$120,773 million (an 884% increase), and slot machine revenue increased from MOP\$1,250 to MOP\$15,138 (a 1111% increase). Annual revenue from VIP Baccarat increased from MOP\$28,864 million in 2005 to MOP\$212,535 million in 2014 and started to decrease in 2014 after China started its anti-corruption campaign.

The rapid growth of the gaming industry directly contributed to Macau's economy. Macau's GDP per capital reached USD\$93,022 in 2014, when the United States had USD\$55,123 during the same time period (World Bank). CNBC dubbed Macau the "wealthiest place on earth" (CNBC, 2019). This miracle was entirely created by Chinese visitors. Therefore, if Macau's gaming industry is to rebound it is almost entirely dependent on how and when the Chinese government will change or adjust its zero COVID policy as well as how China's economy will recover, which may not be a quick process. As Dr. Tianshu Zheng mentioned on Expresso (2022), due to factors such as travel restrictions, the zero COVID policy, frequent unpredictable and large-scale lockdowns, a challenging economy, and unemployment in China, Macau's gaming industry unlikely will see a strong rebound anytime soon.

In addition, Macau's "one-game-for-one-market" business model is very risky and not sustainable. The forecasted revenue (shown in Table 4) suggests future revenue from Baccarat and slot machines, two main revenue sources, will increase very slowly. In other words, there is not much room for further growth in China's mass market with current casino offerings. The Macau government and its gaming industry will need to make changes to embrace more diversified markets with more offerings. This study provides some suggestions for the future development of Macau's gaming industry.

### 5.1 Exploring Other Markets

China's anti-corruption campaign, the COVID-19 pandemic, and the recent investigation of Suncity Group and prosecution of its CEO caused devastating impact on Macau's gaming industry and its economy. When the Chinese government stopped issuing visas for mainland Chinese residents to visit Macau at the onset of the COVID-19 pandemic, the number of visitors from mainland China decreased by 70% during the 1<sup>st</sup> quarter of 2020 and the gaming industry crashed immediately. Almost no visitors came from mainland China in the 2<sup>nd</sup> quarter of 2020, and Macau became a "ghost town" (McCartney, 2021). The heavy reliance on the mainland China market reinforces the fact that Macau has no other options to mitigate a downturn in the gaming industry when the market environment changes (McCartney, 2021).

Therefore, to achieve a healthy and sustainable future growth with the challenge of a diminishing VIP market and limited growth for the mass market in mainland China, Macau's gaming industry will need to explore and identify markets outside of China. In fact, Macau government has always been aware of this weakness and had encouraged the industry to diversify its clientele. Exploring foreign markets was listed as one of the recent gaming

license renewal requirements. To attract more guests from surrounding countries in Asia and the western world, the Macau government and Macau's gaming industry could collaborate in the promotion of Macau by utilizing the image of its safe environment and rich culture heritage, in addition to its gaming and entertainment offerings. Unlike any other gaming destination, Macau is a city with a long history and rich culture heritage. It proudly has 22 sites recognized by UNESCO for cultural and historical significance, which could be very appealing and attractive to visitors worldwide.

Macau needs to shift its image from a Chinese players' playground to an international tourism and gaming destination. Prior to the COVID-19 pandemic, global travel and tourism was one of the fastest growing economic sectors in the world, immediately behind manufacturing (Forbes, 2019). People like to travel and explore. It is expected that, with proper promotions and strategic marketing, Macau will see an increase in the number of inbound visitors, ideally, from all over the world.

### **5.2 Continuing to Promote Junket VIP High Roller Services**

The term junket was invented in Las Vegas to describe an organized trip for high rollers. A junket is a casino business model that high rollers are introduced to a casino by a junket operator who receives compensation, monetary or non-monetary, from the casino. The main responsibility of a junket operator is to attract VIP players to the casino, make reservations, organize trips, and sometimes involve in handling transactions between players and casinos.

Macau had a junket system that was much bigger in scale than any other gaming market in the world. The junket was a crucial part of Macau's gaming industry, and the entire industry as well as casino investors relied on it. At one point in time the junket produced as high as 80% of Macau's gaming revenue from only 5% of its high rollers. However, junket operations started shrinking since the end of 2021 when the Suncity Group investigation started. VIP Baccarat revenue reached MOP\$1,155 million, or 16.5% of the total revenue, during the 3<sup>rd</sup> quarter of 2021. It is impossible to fill this gap through expanding the mass market even with effective marketing and new foreign markets. In other words, without junkets, Macau's gaming industry will never again see the high levels of revenue it once did.

The government is fully aware of the importance of junket operators and high rollers to the gaming industry and has tried to make it more organized and regulated. The Macau Legislative Assembly is currently discussing Macau's new junket laws with focus on clear responsibilities and liabilities for both casinos and junket operators (IAG, 2022). To capitalize on the opportunity Macau's gaming industry should consider promoting its VIP services and establish good relationships with junket operators world-wide to bring high rollers from different regions.

### **5.3 Online Gaming and Sports Betting**

Given its unique characteristics, online gaming makes betting much more accessible and allows casinos to reach "uncultivated markets" by serving players who would not otherwise travel to Macau. As smart phones became popular and the internet became more accessible, the global online gaming industry has been growing rapidly. It is expected that the industry will reach USD\$153.6 billion by 2030 (Grand View Research, 2022). Macau's gaming industry could take advantage of this trend by offering more online gaming and better-designed online betting websites and smart phone apps.

Although online gaming and online sports betting often are considered the same gaming activity, they are not. The online gaming market includes different sections such as online casinos, online sports betting, and online lotteries. Compared to casino games of chances, sports betting is more people-friendly and more acceptable by the public in China and surrounding regions. Particularly in mainland China, where a sports lottery has been offered for almost three decades. In fact, China's sports lottery is the world's second largest lottery and still growing (Forbes, 2018). Online sports betting has great potential, especially in Asia due to its large population. In addition, promoting online sports betting is in line with the Macau's future development plan to host more major sporting events.

### **5.4 More Non-Gaming Activities**

Non-gaming revenue is an important part of a casino's total income. However, it only accounts for about 12% of the total revenue in Macau's gaming industry, whereas it is 65% in Las Vegas (CNBC, 2019). Non-gaming activities have never been fully developed and heavily promoted by casinos in Macau. In China and many Asian regions, casinos are primarily considered a gaming place, and casino visitors are just thought of as only being gamblers. Non-gaming activities such as dining in nice restaurants, watching live music events, and visiting art shows have never been associated with casinos in Macau. Part of the reason for this is that the influx of Chinese visitors, particularly high rollers, to Macau in the past two decades brought incredible amount of wealth and made enhancing and promoting non-gaming activities unnecessary.

Times have changed. It is very unlikely casinos in Macau will ever see the previous levels of high rollers again. Non-gaming revenue are becoming as important as, if not more important than gaming revenue. Restaurants,

bars, nightclubs, shows, and live music options are as important as casino games. Macau casinos will need to diversify services to attract more visitors, particularly those “non-gaming” visitors by creating a Las Vegas style gaming and entertainment industry and boosting non-gaming offerings to bring in more revenue. While focusing on offering more non-gaming activities and retooling the properties, casino marketers also need to focus on “educating” visitors, particularly those in mainland China, that there are many other activities in casinos than betting money on tables and machines. An image of family and fun vacation time in Macau and its casinos will need to be established for future sustainable and healthy growth.

Regardless how successful Macau’s gaming industry will be in bringing visitors from international market, due to its geographic location, culture, and language, the main market will always be China and other regions in Asia. In addition to young people, the senior market in China should also be explored and included in casinos marketing campaigns. Due to many factors such as weather, culture, and a safe living environment, Macau citizens have the 4<sup>th</sup>-longest life expectancy in the world (CIA, 2015). Macau could also present itself as a vacation destination for seniors with many gaming and non-gaming activities offered in casinos.

### **5.5 Casino Gaming Remains to Be the Main Focus**

During his recent government policy address, Mr. Ho Iat-seng, Macau Chief Executive, announced the city will move away from a gaming-centric economy (GGB News, 2022). However, this will be a challenging, if not impossible, transformation for Macau. Gaming activities emerged in Macau in the 16<sup>th</sup> century and were legalized in 1847 when Macau was a Portuguese colony to boost local economy to compete with Hong Kong. Gaming has been the center of Macau’s economy for at least two centuries, and the entire city has been developed to accommodate the gaming industry. Currently Macau’s gaming industry contributes around 80% of Macau’s GDP. While diversifying its economic structure is possible, moving away from gaming will be difficult, especially when the gaming industry has been virtually the only contributor to the economy for such a long time.

Macau opened its door to foreign casino operators more than a decade ago. The lucrative Chinese market and friendly and welcoming business environment attracted world class casino operators included MGM, Las Vegas Sands, and Wynn Resorts. They were so successful in Macau that they decided to shift the focus of their business to Macau. Las Vegas Sands sold its Las Vegas properties The Venetian, Palazzo Resorts, and the Sands Expo Convention Center for USD\$6.4 billion to invest more in Macau and Singapore (Valinsky, 2020). As the president of Las Vegas Sands, Robert Goldstein, said in a statement, Asia is the backbone of Las Vegas Sands, and developments in Macau and Singapore are their center of attention (Brewer, 2021). The rapid development of Macau’s gaming industry keeps attracting new players. Malaysia’s Genting group has made efforts to join the lucrative market and recently submitted an application for a gaming license in Macau. In other words, Macau has a solid image as a gaming hub, well-built infrastructure, and one of the largest gaming markets in the world that attract foreign capital. It would be unwise to ignore this and dampen investors’ enthusiasm by shifting the focus of economic development elsewhere, particularly after billions of dollars have already been invested in casino development and a well-trained labor force for the gaming industry has been created.

Therefore, the gaming industry will remain as the main pillar of Macau’s economy for many years to come. The industry needs to work closely with the government in policy development and rebranding the industry to meet ever changing market demand and effectively cope with unexpected events such as future global economic downturns like what occurred during the COVID-19 pandemic.

## **6. SUMMARY**

Using seasonal ARIMA time series analysis technique, this study identified and measured significant decreases in VIP Baccarat revenue, Baccarat revenue, and slot machine revenue during the COVID-19 pandemic. However, the forecast of Baccarat and slot machine revenues shows slow growth in the future. In addition, this study analyzed the current business environment and market conditions for Macau’s gaming industry and proposed future directions for the industry and policy makers.

Ho Iat-seng and other government officials have repeatedly emphasized that Macau should move away from a gaming-centric economy and the portion of contribution to Macau’s GDP from the gaming industry should be no more than 40% in the future with another 60% from four areas: healthcare, financial, technology, and sports and culture. This is highly unlikely to happen in the near future given that each of those four areas will need heavy capital investments, high research & development expenditures, infrastructure development, and land, which is very scarce in Macau. Therefore, whether intended or not, the gaming industry will remain as the main pillar of Macau’s economy for the foreseeable future. After 180 years of development, Macau has become the largest gaming hub in the world. With a solid image as a gaming and tourism destination, the gaming industry should continue focusing on diversifying both gaming and non-gaming offerings and broadening its market.

However, for Macau’s gaming industry to rebound and expand, or for any industry to grow, visitors will need to be able to travel to Macau freely without any restrictions or quarantine periods.

## WORKS CITATION

- Abel, T., & McQueen, D. (2020). The COVID-19 pandemic calls for spatial distancing and social closeness: Not for social distancing!. *International journal of public health*, 65(3), 231-231.
- Akala, A. (2020, January 29). *Coronavirus is a 'wake-up call' for China, Macau Casinos to embrace online gaming*. CNBC. Retrieved October 29, 2022, from <https://www.cnbc.com/2020/01/29/coronavirus-is-online-gaming-wake-up-call-for-macau-casinos.html>
- Box, G. E. & Jenkins, G. (1970). *Time Series Analysis, Forecasting, and Control*. *Francisco Holden-Day*.
- Box, G. E. P., Jenkins, G. M., & Reinsel, G. C. (2008). *Time series analysis: Forecasting and control* (4th ed.). Hoboken, NJ: John Wiley & Sons.
- Bowerman, B. L., Connell, R. T., & Koehler, A. B. (2005). *Forecasting, time series, and regression: An applied approach*. Belmont, CA: Brooks/Cole.
- Brewer, C. (2021). *Sands to sell its Las Vegas properties for \$6.25 billion as it shifts focus to Macao, Singapore*. CNBC. Retrieved October 29, 2022, from <https://www.cnbc.com/2021/03/03/las-vegas-sands-to-sell-its-las-vegas-properties-for-6point25-billion.html>
- Business Wire. (2020, May). *Affects of COVID-19 on the Worldwide Gaming Industry to 2030 - Featuring William Hill, MGM Resorts & Las Vegas Sands Among Others*. Retrieved October 28, 2022, from <https://www.businesswire.com/news/home/20200506005567/en/Affects-of-COVID-19-on-the-Worldwide-Gaming-Industry-to-2030---Featuring-William-Hill-MGM-Resorts-Las-Vegas-Sands-Among-Others---ResearchAndMarkets.com>
- Chau, K. Y., Luo, J. M., & Duan, X. (2021). A Qualitative Investigation of the Impact of COVID-19 on Macau's Gaming Industry. *Journal of Quality Assurance in Hospitality & Tourism*, 23(3), 639-649.
- CIA (2015). *The world factbook*. Retrieved October 29, 2022, from <https://www.cia.gov/the-world-factbook/countries/macau/>
- CNBC (2019). *Why is Macau so rich?* CNBC International. Retrieved October 27, 2022, from <https://www.youtube.com/watch?v=HMaDV4p1Tho>
- CNBC (2022). *Is Macau's gaming industry played out?* Retrieved November 12, 2022, from <https://www.cnbc.com/2014/12/22/is-macaus-gaming-industry-played-out.html>
- DICJ (2005 – 2022). *Gross revenue from different game types of games of fortune*. Gaming Inspection and Coordination Bureau Macau. Retrieved November 2, 2022, from <https://www.dicj.gov.mo/web/en/information/index.html>
- Du, D. X. (2007). Exploring human resource challenges in the casino industry. *Journal of Macau Gaming Research Association*, 4, 24-30.
- Eisendrath, D. (2005). *Estimating the effects of September 11 on Las Vegas strip gaming volume*. University of Nevada, Las Vegas.
- Expresso (2022) *Macau reabre as portas ao turismo, mas casinos continuam na corda bamba* Retrieved October 25, 2022, from <https://expresso.pt/economia/2022-10-06-Macau-reabre-as-portas-ao-turismo-mas-casinos-continuam-na-corda-bamba-b20b548c>
- Forbes (2018). *The world's second largest lottery – in China – is set to become even bigger*. Retrieved October 29, 2022, from <https://www.forbes.com/sites/augustrick/2018/05/30/the-worlds-second-largest-lottery-in-china-is-set-to-become-even-bigger/?sh=6cd507b86355>
- Forbes (2019). *Booming Global Travel And Tourism Is Driving Economies And Job Growth Despite U.S.-China Trade Strains*. Retrieved October 29, 2022, from <https://www.forbes.com/sites/danielreed/2019/03/08/booming-global-travel-tourism-is-driving-economies-and-job-growth-despite-u-s-china-trade-strains/?sh=5517138c2b85>
- GGB News (2022). *Macau plans sharp turn from gaming economy*. Retrieved October 29, 2022, from <https://ggbnews.com/article/macau-plans-sharp-turn-from-gaming-economy/>
- Grand View Research (2022). *Online Gaming Market Size Worth \$153.6 Billion by 2030*. Retrieved November 12, 2022, from <https://www.grandviewresearch.com/press-release/global-online-gaming-market>
- IAG (2022). *Legislative Assembly clarifies liability rules under junket law, government to set annual junket partner limit for concessionaires*. Retrieved November 26, 2022, from <https://www.asgam.com/index.php/2022/11/15/macau-junket-law-may-allow-concessionaires-multiple-junket-partners-as-legislative-assembly-clarifies-liability-rules/>
- Inside Asian Gaming. (2020). *Macau Golden Week concludes with visitation down 85.7%*. Retrieved November 26, 2022, from <https://www.asgam.com/index.php/2020/10/08/macau-golden-week-concludes-with-visitation-down-85-7/>
- Kenton, W. (2020, March 31). *What Is a Time Series?* Investopedia. Retrieved October 29, 2022, from <https://www.investopedia.com/terms/t/timeseries.asp>
- Lam, D. (2005). Slot or table? A Chinese perspective. *UNLV Gaming Research & Review Journal*, 9(2), 69-72.



- Liu, M. T., Dong, S., Chang, S. K. P., & Tan, F. (2020). Macau gaming industry's quick V shape rebound from 2014 to 2019. *Asia Pacific Journal of Marketing and Logistics*, 33(2), 449-473.
- Lim, J. (2020). The Economic Impact of COVID-19: Rebuilding the Las Vegas Economy. *The Lincy Institute Policy Brief*, 1-17. Available at: [https://digitalscholarship.unlv.edu/lincy\\_policybriefs\\_reports/1](https://digitalscholarship.unlv.edu/lincy_policybriefs_reports/1)
- Lim, W. M., & To, W. M. (2021). The economic impact of a global pandemic on the tourism economy: The case of COVID-19 and Macao's destination-and gaming-dependent economy. *Current Issues in Tourism*, 25(8), 1258-1269.
- Macau Statistics and Census Service. (2020). <https://www.dsec.gov.mo/TimeSeriesDatabase.aspx?lang=en-US>
- Macau Yearbook. (2020). Retrieved November 12, 2022, from [https://yearbook.gcs.gov.mo/uploads/yearbook\\_pdf/2021/myb2021cPA01.pdf](https://yearbook.gcs.gov.mo/uploads/yearbook_pdf/2021/myb2021cPA01.pdf)
- Marlowe, B., Zheng, T., Farrish, J., Bravo, J., & Pimentel, V. (2020). Double down: economic downturn and increased competition impacts on casino gaming and employment. *International Hospitality Review*, 34(1), 2516-8142.
- McDowall, D., McCleary, R., Meidinger, E. E., & Hay Jr, R. A. Jr. (1980). *Interrupted time series analysis*, Sage Publications Inc.
- McCartney, G. (2021). The impact of the coronavirus outbreak on Macao. From tourism lockdown to tourism recovery. *Current Issues in Tourism*, 24(19), 2683-2692.
- Nelson, J. P. (2000). Consumer bankruptcies and the bankruptcy reform act: a time-series intervention analysis, 1960–1997. *Journal of Financial Services Research*, 17(2), 181-200.
- Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Iosifidis, C., ... & Agha, R. (2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International journal of surgery*, 78, 185-193.
- O'Connor, D. (2020, September 23). *Macau Lawmaker Calls for Online Gaming to Provide COVID-19 Relief*. Casinos Org. Retrieved October 29, 2022, from <https://www.casino.org/news/macau-lawmaker-calls-for-online-gaming-to-provide-covid-19-relief/>
- Sand, D. (2020). *COVID-19 and the great reset: Briefing note #26, October 7, 2020*. McKinsey. Retrieved from: <https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business#>
- Song, H., & Li, G. (2008). Tourism demand modelling and forecasting—A review of recent research. *Tourism Management*, 29(2), 203–220.
- Song, H., Qiu, R. T., & Park, J. (2019). A review of research on tourism demand forecasting: Launching the Annals of Tourism Research Curated Collection on tourism demand forecasting. *Annals of Tourism Research*, 75, 338-362.
- Spectrum. (2020). *Annual Top Trends in Gaming*. <https://www.spectrumgaming.com/gamingtrends/>
- Vandaele, W. (1983). *Applied time series and Box-Jenkins models* (No. 04; HB3730, V3).
- Valinsky, J. (2020). *GOP mega-donor Sheldon Adelson considers selling his Las Vegas Sands casinos*. CNN Business. Retrieved from <https://www.cnn.com/2020/10/27/investing/las-vegas-sands-sale-sheldon-adelson/index.html>
- VOAChinese (2022) *Macau's gaming industry face changes*. Retrieved November 12, 2022, from <https://www.voachinese.com/a/covid-is-pushing-macau-casinos-to-the-brink-20220705/6645623.html>
- World Bank. *GDP per capital data*. Retrieved November 12, 2022, from <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=US>
- World Health Organization. (2020, March). *WHO Director-General's opening remarks at the media briefing on COVID-19*. Retrieved October 29, 2022, from <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
- World Health Organization. (2022, July). *WHO Coronavirus (COVID-19) Dashboard*. Retrieved October 29, 2022, from <https://covid19.who.int/>
- Yaffee, R. A., & McGee, M. (2000). *An introduction to time series analysis and forecasting: with applications of SAS® and SPSS®*. Elsevier.
- Zhai, Y. (2005). *Time series forecasting competition among three sophisticated paradigms* (Doctoral dissertation, University of North Carolina at Wilmington).
- Zheng, T., Farrish, J., Lee, M. L., & Yu, H. (2013). Is the gaming industry still recession-proof?. *International Journal of Contemporary Hospitality Management*, 25(7), 1135-1152.
- Zheng, T. (2014). What caused the decrease in RevPAR during the recession?. *International Journal of Contemporary Hospitality Management*, 26(7), 1225-1242.
- Zhou, F., Zheng, T., & Schrier, T., & Farrish, J. (2022) Examining the impact of China's corruption crackdown: a forecast for Macau's tourism and gaming industry. *Tourism and Hospitality*, 3(3), 752-764. <https://doi.org/10.3390/tourhosp3030046>