Institutional ownership and return volatility in the casino industry

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Abstract

Using a sample that covers all casino companies in Macao from March 2010 to June 2015, this paper investigates the impact of institutional investment on stock return volatility in the casino industry. The results suggest that higher institutional ownership is conducive to lower return volatility on Macao casino stocks. Such volatility also hinges on policy shifts, such as China's anti-corruption campaign, in tourist source communities. In addition, the estimation reveals that both smoking bans and business size significantly decrease return volatility, whereas cross-listing increases return volatility significantly.

Keywords

Institutional ownership, Stock return volatility, Casino industry

Introduction

The casino industry has experienced rapid expansion worldwide for more than two decades despite small setbacks caused by recent financial crises. Casino gambling is used as a key tourist attraction in many jurisdictions to promote local economic growth (Kim et al., 2006; Tsai and Gu, 2006; Walker, 2009). Two trends in casino development are particularly notable. First, modern casinos typically require a large capital base to achieve economies of scale (Eadington, 1999; Wang 2008). A large capacity is built up as casinos perform continuous innovations or marketing to maintain consumer interest. Second, such industrial concentration is reinforced by incorporating casinos into large international hospitality firms (Smith, 2000; Gu and Tam, 2014) through public listing and by exploiting nearby financial markets to raise

investment funds and/or operating capital. Thus, raising financing directly from the capital markets has become a popular fundraising model in the casino industry. In other words, the casino industry has become somewhat capital intensive (Tsai et al., 2011).

Nevertheless, it has been well documented in both the finance and hospitality literature that increased stock return volatility can lead the market to a higher assessment of the firm's risk, thereby raising the required return to shareholders and the firm's cost of capital (Froot et al., 1992; Leung and Lee, 2006). Higher stock return volatility may also render stock-based compensation costlier (by over-rewarding managers) or less effective (by reducing managerial incentives) (Jorgensen, 1998; Hartzell and Starks, 2003). Thus, stabilising stock return volatility is a critical issue confronting the casino industry. However, institutional investors are masters at influencing stock prices, as they often trade in large volumes through programme trading, invest in blocks of stocks, and/or even act as the majority holders of a given firm. Consequently, their transactions can keep stock prices close to fundamental values on some occasions or drive prices away from those values in other contexts (Sias, 1996; Campbell et al., 2001; Chen et al., 2013). Given the growing volume of equity they control, institutional investors play an increasingly important role in the casino industry (Tsai and Gu, 2007a). Therefore, exploring the effects of institutional ownership on stock return volatility in the casino industry has considerable merit.

Macao is a small Chinese city but has grown into the world's largest casino hub in terms of revenue. Its gaming business raked in a record US$45.2 billion in revenue in 2013, seven times more than Las Vegas during the same period (Schwartz, 2015). Macao was formerly much less developed than Hong Kong, but its GDP per capita surpassed that of Hong Kong in 2006 and increased due to its dramatic tourism growth, which measured 28.2% annually over the 2002-2013 period. In 2014, Macao ranked as the world's third wealthiest location in average terms, with GDP per capita reaching US$96,037 (World Bank, 2015). By contrast,

Hong Kong placed 23rd in the same rankings, with a per capita GDP of US$40,169. Six casino firms in Macao run thirty-five casinos, all of which are listed on the Hong Kong Stock Exchange and four of which are also cross-listed on the New York Stock Exchange (Cheung and Lam, 2015). Macao's casino stocks have attracted a certain amount of investment due to Macao's resounding success in gaming and its status as having the most profitable casinos in the world. Nevertheless, Macao's stock prices also experienced wild fluctuations as a result of China's tightening of the Free Travel Scheme in 2008 and its crackdown on corruption in 2014-2015 (Bradsher, 2012; Song et al., 2012; Barnato, 2015). Institutional investors are highly sensitive to those policy shocks and are generally acknowledged to play an increasingly active role in stock trading. As a practical matter, it is therefore important to identify the effects of institutional investor behaviour on Macao's casino stock volatility in conjunction with China's policy changes.

Despite the growing role of institutional investors in stock volatility, only a handful of studies have investigated the effects of institutional ownership on the tourism and casino industry. For instance, Leung and Lee (2006) examine the relationship between the 'Monday effect' and institutional investors. For their part, Tsai and Gu (2007a; 2007b) focus on the effects of institutional ownership on firm performance in the restaurant and casino industries, respectively, while Oak and Dalbor (2008a; 2008b; 2010) investigate institutional investor preferences. However, all of these studies focus on the US, and none address the critical issue of stock return volatility. To fill this knowledge gap, this paper investigates the relationship between institutional ownership and stock return volatility in Macao's casino industry from March 2010 to September 2015. It also estimates the effects of various policy changes on stock return volatility for the industry. The policy indicators used in this analysis include mainland China's anti-corruption campaign, Macao's smoking ban and visa policies. This paper applies random effects and Hausman-Taylor (HT) estimators to panel data from Macao.

Instrumental variable techniques are adopted to address potential endogeneity problems and to increase the econometric efficiency of estimation. This paper also uses different model specifications as a series of sensitivity analyses to check the robustness of the results. A unique feature of the casino business in Macao (i.e., that baccarat play is preferred to slot games) is explicitly included in the regressions to make the analysis more realistic. This paper is an effort to reveal whether institutional investors actively monitor and effectively mitigate the agency problems caused by management-ownership separation, thus reducing stock return volatility, stabilising investment value and lowering the cost of raising capital in the equity market.

The results show that increased institutional ownership reduces stock return volatility for Macao's casino enterprises. This implies that institutional stockholders of Macao's casino firms are largely prudent long-term investors, although they may engage in some speculative trading. These empirical results are robust to various policy changes, different business sizes, and other control variables. This paper establishes that China's anti-corruption campaign impacts the return volatility of Macao's casino stocks significantly and positively, and this evidence is consistent with the widely held perception that Macao's gaming tourism industry rests on high rollers from mainland China, many of whom are corrupt officials in the corporate and public sectors (Zeng, 2008). The estimation reveals that cross-listing Macao's casino stocks adversely affects their return volatility. The intended benefits from cross-listing that are evident in other tourism jurisdictions are not achieved with Macao's casino stocks (Silva and Chavez, 2008; Koh and Lee, 2011). It is also found that smoking bans significantly decrease return volatility while helping to achieve the policy goal of improved health. Finally, business size matters, as both gaming revenue and baccarat play are related significantly and negatively to return volatility. Certain managerial insights derived from the findings should be useful for both policymakers and business operators.

The remainder of this paper is organised as follows. Section 2 consists of a literature review and hypothesis development. Section 3 discusses the methodologies and data. Section 4 presents the empirical results and addresses their robustness. Section 5 concludes the paper.

Literature review

The relationship between institutional ownership and stock volatility has been the focus of academic research and policy debates for over two decades (Bae et al., 2004; Li et al., 2011; Chen et al., 2013). Previous studies reveal two dichotomous effects of institutional ownership on stock volatility. First, institutional shareholders can stabilise stock prices by effectively monitoring the firms and by minimising information asymmetries and agency problems. On the one hand, institutional investors can use their professional knowledge and voting power to improve firm efficiency and reinforce more effective corporate governance. Moreover, institutional investors' long-term investment is associated with greater information gathering and fewer assessment errors (Shleifer and Vishny, 1986; Ruiz-Mallorquí and Santana-Martín, 2011). On the other hand, many institutional investors are also fiduciaries investing on behalf of their clients, and such institutional investors are generally governed by the Prudent Man Rule, as required by their clients/regulators (Del Guercio, 1996). Therefore, they are likely to choose less-volatile stocks as suitable instruments for safer investments (Sias, 1996; Ferreira and Matos, 2008).

Second, institutional investors can destabilise stock prices by attempting to make easy money or quick profits. Such institutional investors are looked upon as short-term traders seeking speculative profits by acquiring information advantages or looking to meet idiosyncratic portfolio needs (David and Kochhar, 1996; Elyasiani and Jia, 2010). In addition, some institutional investors may engage in noise trading as a speculative strategy (Brown and Brooke, 1993), which can be destabilising and lead to market excesses. The common belief is

that institutional investors are more inclined than individual investors to engage in herding behaviour in stock markets (Lakonishok et al., 1992). Thus, institutional investors' herding behaviour can destabilise stock prices when their trading volumes are large relative to those of individual investors (Koutmos, 2014).

To the best of our knowledge, only six studies have investigated the impact of institutional ownership on firms in the tourism industry and/or the casino industry in particular. Leung and Lee (2006) investigate the relationship between institutional investors and Monday effects in US tourism stocks during the 1981-1999 period. By classifying tourism stocks into four different industry segments, including lodging, restaurant, amusement/recreation and airlines, they recognise different patterns among the four sectors and reveal that the Monday returns of tourism stocks are strongly associated with the percentage of stock owned by institutional investors and that the Monday effect may thus be primarily attributed to those stock portfolios with low institutional ownership. Tsai and Gu (2007a) examine the impact of institutional ownership on firm performance in the restaurant industry in the US during the 1999-2003 period and find a positive endogenous relationship between institutional ownership and firm performance in the restaurant industry. Tsai and Gu (2007b) investigate the relationship between firm performance and institutional ownership in a sample of 24 casino companies in the US between 1999 and 2003, and their results suggest that institutional ownership is a significant and positive determinant of firm performance, as measured by Tobin's Q. Oak and Dalbor (2008a) study institutional investors' preferences in terms of lodging stocks in the US between 1981 and 2003. Their results indicate that institutional investors prefer to invest in the stocks of lodging firms that are well capitalised and that have high investment-to-asset ratios and high debt ratios. Oak and Dalbor (2008b) examine the impact of dividend policy on institutional holdings for hotel companies in the US and find that institutions tend to prefer real estate investment trusts (REITs) as well as large firms with

substantial capital expenditures, regardless of REIT status. Oak and Dalbor (2010) investigate the effects of brand equity on institutions in a sample of lodging firms in the US from 1980 to 2005 and find that institutional investors favour lodging firms with higher brand equity, lower debt ratios and smaller sizes. However, none of these studies consider the casino industry in Macao.

It is well known that gambling is a deep-rooted tradition in Chinese culture (Loo et al., 2008; Tse et al., 2010) and that Macao is the only place in China in which gambling is legal. Given the significant and large Chinese population and China's impressive economic performance over the most recent two decades, the prospects for the casino industry in Macao have been bright. Hence, this paper assumes that institutional investors in Macao's casino stocks are long-term investors who have strong incentives to use their managerial skills and professional knowledge to influence managers to improve firm performance. In addition, since 2009, the Macao government has held 'Responsible Gambling Awareness Week' annually to promote responsible gambling and to reduce adversities caused by gaming. This event is meant to educate the public as well as the gaming industry about the dangers of gaming addictions and to assist gaming participants in developing responsible attitudes toward gaming. In 2011, the Macao government also established the 'Responsible Gaming Work Preparation Unit' to develop responsible gaming policies and general implementation measures. These tremendous efforts made by Macao's government to promote responsible gaming may make investing in Macao's casino stocks fall more in line with the Prudent Man Rule, which is followed by the majority of institutional investors (Maginn et al., 2007). Moreover, as more-volatile stocks may be viewed as 'not prudent' by institutional investors' clients/regulators under the Prudent Man Rule, those institutions investing in Macao's casino stocks may be more willing to help stabilise the stock price. Based on the foregoing, this paper thus proposes the following hypothesis.

Hypothesis 1*:* Greater institutional ownership is associated with lower return volatility in

Macao casino stocks.

Research methodology

The sample covers all six casino companies operating in Macao that are listed on the Hong Kong Stock Exchange, including Sands China Ltd. (HK: 1928), MGM China Holdings Ltd. (HK: 2282), Wynn Macau Ltd. (HK: 1128), Melco Crown Entertainment Ltd. (HK: 6883), Galaxy Entertainment Group Ltd. (HK: 0027) and SJM Holdings (HK: 0880). Four of these companies are cross-listed on the New York Stock Exchange. This sample consists of 348 firm-month observations from March 2010 to June 2015. Bloomberg provides data on institutional ownership from March 2010 onward that include daily stock returns, daily stock turnover, the percentage of outstanding shares held by institutions and the number of various institutions. Macao's gross gaming revenues from all types of gaming and from casino receipts from gamblers' baccarat play were obtained from the Macao Statistics and Census Service Bureau; these data can also be found at the Macao Gaming Inspection and Coordination Bureau. The number of officials from mainland China facing prosecution for corruption on a monthly basis was collected from an NGO website (www.fanfuzhi.com/tongji.html). Information regarding Macao's smoking ban and its visa policy was taken from the Macao Health Policy Association and the Macao Public Security Police Force, respectively.

This panel-data model takes a cross-section of listed casino firms and is specified as follows:

Return volatility = f (Institutional ownership, Policy changes, Other control variables). (1)

One proxy for firm-level stock return volatility (*VOL*) is used as the dependent variable of regressions in Eq. (1), following Bae et al. (2004), Li et al. (2011) and Chen et al. (2013). This variable is the logarithm of squared daily returns, which is calculated as follows:

$$Volatility_i = \frac{1}{n}\sum_{t=1}^{n} \ln(return_{it}^2) \ ,$$

where $return_{it}$ is the daily stock return and n is the number of trading days in one month.

Two measures of institutional ownership (*IO*) are used to determine the ownership stake in a company that is held by institutional investors such as financial organisations, insurance companies, investment firms, mutual funds, pension funds, private foundations or other similar large entities. The first measure (*IO-P*) is the percentage of outstanding shares held by institutions, and the second measure (*IO-N*) is the logarithm of the number of institutions. Common practice was followed whereby data were collected for *IO-P* and *IO-N* at the end of each month.

Three variables are included in the regressions to control for policy effects on casino stock volatility. First, *ANTI-CORR* is used to capture the influence of China's anti-corruption policy on Macao gaming. This variable records the number of officials facing prosecution for corruption in mainland China. It is commonly acknowledged that government corruption hinders economic development. The effects of anti-corruption measures in both emerging economies and developed countries are increasingly becoming the focus of attention among academic researchers and policymakers (Mauro, 1995; Ehrlich and Lui, 1999; Mo, 2001; Glaeser and Saks, 2006). China's anti-corruption legislation represents one of the key reforms implemented under Xi Jinping's administration. President Xi has vowed to crack down on a variety of corrupt officials at all levels, whether these officials are 'tigers' or 'flies' (Bradsher, 2012). Given that the majority of visitors to Macao come from mainland China, that most of the high rollers engaging in VIP gambling are corrupt mainland officials and that 55-75% of gross gaming revenues derive from VIP operations in Macao (Gu and Tam, 2014), China's anti-corruption legislation must lead to higher investment return volatility in Macao's casino industry.

Second, *SMOKE* measures the intensity of Macao smoking bans at various stages of implementation. The data were collected from the official website of the Macao Health Policy Association (https://sites.google.com/site/macaohp). This measure takes on a value of zero for the lack of a smoking ban from March 2010 to December 2011, a value of one for the less restrictive smoking ban from January 2012 to December 2012, a value of two for the stricter smoking ban from January 2013 to December 2014 and a value of three for the complete smoking ban from January 2015 to June 2015. A higher value indicates a more restrictive smoking ban. This policy, albeit good for health (Wildman and Hollingsworth, 2013), can have uncertain impacts on business performance in the casino sector (Adda and Cornaglia, 2010). The effects of smoking bans on stock return volatility may thus also be positive or negative.

Third, *VISA* is the local immigration policy used to control the entry, stay and exit of tourists. The data were obtained from the official website of the Macao Public Security Police Force (www.fsm.gov.mo/psp/eng/main.html). This variable takes on a value of zero for the two loose visa policy periods from January 2010 to June 2014 and from July 2015 to September 2015 (phase 1), respectively, and a value of one for the restrictive visa policy regime spanning from July 2014 to June 2015 (phase 2). Governments spend considerable resources on branding and marketing to make their cities or countries attractive destinations for tourism, exports and/or foreign direct investment (Kotler et al., 1993; Anholt, 2002; Kotler and Gertner, 2002). However, for unrelated reasons, governments may at times tighten visa regulations to limit the cross-border movement of people; such a tightening of policies reduces the effects of marketing and branding to some extent (Song et al., 2012). A strict visa policy is occasionally used in Macao to address pathological gambling among some visitors, which can have an adverse impact on its tourism industry and the stock volatility of Macao enterprises.

Five other control variables make the estimation more precise. *GREVENUE* stands for growth in gross gaming revenue earned by Macao companies and can be used as a reliable measure of tourism development (Wang and Godbey, 1994; Kim et al., 2006). As a demand-driven business, casino hinges directly on tourist arrivals, and spending sprees by those visitors are important for casino profit making and tax revenue generation. *GBACCARAT* refers to the growth in gaming revenue reaped by casinos from gamblers' baccarat play. Baccarat business is much more important for revenue generation in Macao than slot gaming because, as opposed to their US counterparts, Chinese gamblers love baccarat table games and seldom play slot machines (Liu and Wan, 2011). These two variables are used to control for the effects of casino industry size on casino stock volatility. *Trend* is a time tendency used to improve the estimation. This variable must be included for Macao because all of its key economic factors exhibit clear trends over time. As an apparent factor affecting stock volatility, *TURNOVER* is the daily stock turnover measured as the ratio of daily trading volume to the monthly share number. Naturally, a quicker turnover leads to greater volatility while also implying higher liquidity (Hartzell and Starks, 2003; Ferreira and Matos, 2008; Elyasiani and Jia, 2010). *CROSS* is a dummy variable equal to one if a firm is cross-listed on both the Hong Kong and New York Stock Exchanges and zero if listed only on the Hong Kong market. This variable is included in the regressions to determine whether there are any benefits to cross-listing Macao casino firms, which is a benefit that has been touted by financial analysts in other industries (Bailey et al., 2006).

Eq. (1) is a panel-data regression model that takes a cross-section of listed casino firms, whose numbers of observations are different because Macao's casino firms were listed on stock exchanges at different points. This unbalanced panel model is estimated using the random effects method because the fixed effect estimator is excluded by the Hausman test. The lagged value of return volatility is included in the set of regressors to control for the

impact of autocorrelation (Li et al., 2011; Chen et al., 2013). The Wald test is used to assess the overall significance of the regression models. Although institutional ownership can impact stock return volatility, the reverse may also be possible because volatility is a corporate characteristic that attracts the attention of institutional investors. For example, mutual funds tend to prefer highly liquid stocks (Ferreira and Matos, 2008). Thus, there could be endogeneity between institutional ownership and stock volatility, and an instrumental variable treatment is thus required to handle this potential problem. For this purpose and following the literature, this paper simply uses the lagged value of a suspected endogenous regressor in a random effects world (Adam et al., 2012). To check the robustness of the results, an HT estimator is used as an instrumental variable technique, which includes both the between and within variations of strictly exogenous variables as instruments for the time-invariant regressors that are correlated with individual effects (Baltagi et al., 2003).

Empirical results

Data descriptions

This paper provides an overview of Macao's gaming tourism stocks here using the descriptive statistics presented in Table 1. The monthly average volatility of stock returns is -8.59 when measured as the logarithm of squared returns. On average, institutions own 54% of the outstanding shares of Macao's casino stocks; when separated and counted, these institutions consist of a set of 202 various institutions, suggesting that those institutions are the major investors in Macau's casino stocks. The average daily trading volume is almost 20% of the outstanding shares each month. The average cross-listing as a zero-or-one dummy variable is 0.63 in the sample period, which spans 5.25 years, indicating active cross-listing by Macao casino firms. The average number of officials dismissed due to corruption charges in mainland China is approximately 20 per month, although this number can reach 110 during the sample

period. Moreover, the sample period covers four stages of smoking bans in Macao casinos, which vary from no ban to two partial bans and a full ban. During 21% of the sample period, a strict visa policy was in place, and the remainder of the time there was only a loose visa policy. Gross gaming revenue in Macao has grown at a rate of 1.32% per month on average, whereas the baccarat business has grown at 1.26% per month in revenue terms. The correlation matrix of all variables (see Appendix 1) shows that multicollinearity is not a serious problem in the data.

(Table 1 inserted here)

The correlation matrix of all variables is provided in Appendix 1. Information in this table shows that stock volatility is correlated with all of its potential determinants to varying degrees, and the correlation with turnover rates is relatively high as anticipated. Furthermore, the policy variables and other control variables are more or less correlated with each other, with baccarat business receipts correlated highly with gross gaming revenue as expected. Overall, multicollinearity is not a serious problem in the data; yet, this paper still pays attention to variables suspected of being collinear and includes them only in separate regressions to ensure estimation reliability.

Main results

A random effects estimator is used in the empirical analysis of return volatility on Macao's casino stocks. The estimation results are presented in Table 2, and a brief interpretation of those results is given as follows. First, the estimates for the coefficients on institutional ownership (*IO-P*) are significant and negative across all regressions, implying that increased institutional investment leads to less volatility in Macao casino stocks. This finding supports the hypothesis and appears to be consistent with those for non-gaming businesses in other economies (Sahut et al., 2011; Chen et al., 2013). The result is robust to policy changes, size

effects and other control variables, lending support to the stabilisation view of institutional equity ownership.

Second, three estimated policy effects are reported as follows. (1) *ANTI-CORR* in mainland China makes a significantly positive contribution to return volatility on Macao casino stocks, which is also widely assumed. This result indicates that casino gaming is vulnerable to external shocks, such as anticorruption actions taken by primary tourist source communities. Macao must really diversify its customer base to reduce its external vulnerability. (2) The coefficient estimate for *SMOKE* is significantly negative, indicating that stricter smoking bans dampen the return volatility on casino stocks on top of the intended effect of health improvement. (3) The estimated coefficient on *VISA* is positive but insignificant, which reveals that visa policy tightening is bad, albeit weakly, for gaming businesses and may increase stock return volatility.

Third, the coefficients for both *GBACCARAT* and *GREVENUE* carry a significantly negative estimate, indicating that stock return volatility tends to fall as the size of the gaming industry grows, which is particularly true for the growth of the baccarat business. This result is in line with previous research demonstrating that business size does matter for modern casino firms because they must be large in size to achieve economies of scale.

Finally, there are several longitudinal and other effects that merit some discussion and attention. (1) More cross-listing does not help reduce stock volatility and is thus bad for gaming business expansion, as evidenced by the positive estimate for the coefficient on *CROSS*. This estimate is statistically significant and robust, suggesting the importance of focusing solely on nearby stock markets to lower the cost of capital (Cheung and Lam, 2015). (2) The coefficient estimate for *TURNOVER* is significantly positive, which is consistent with the literature (Li et al., 2011; Chen et al., 2013). In the casino industry – as in many other industries – higher turnover in stock trading leads to greater volatility in returns on investment.

(3) The coefficient on *LagVOL* is estimated as significant and positive, suggesting the existence of a positive autocorrelation in the risk of return. This result is consistent with the findings of previous studies (Li et al., 2011; Chen et al., 2013). (4) The coefficient on *Trend* is estimated to be negative, which is as expected and significant in most of the regressions. This result reflects Macao's realities, as the time trends are clear among various economic indicators. Those indicators primarily trend upwards, which is good for reducing volatility.

(Table 2 inserted here)

Robustness checks

A variety of robustness tests are conducted to obtain the main results. First, following Cornett et al. (2007) the number of institutional investors (*IO-N*) is used as an alternative measure of institutional ownership to study its influence on stock return volatility (see Table 3). Second, to mitigate potential endogeneity, a lagged variable (*Lag IO-P*) is used to examine the effects of past institutional ownership on contemporaneous return volatility. Institutional investors may affect current management decisions and improve future earnings while preferring stocks with high liquidity (see Table 4). Third, a different estimator, the HT estimator (Hausman and Taylor, 1981), is used to investigate whether the results in Table 2 would be affected by the assumption of endogeneity in alternative regressions (see Table 5). This method allows for the time-invariant regressors (such as the *CROSS* and *VISA* dummy variables) to be correlated with the latent individual effects. It is legitimate to apply this approach to the Eq. (1) regressions because the number of exogenous time-varying variables exceeds that of the endogenous time-invariant variables. The HT estimator can be more efficient than the fixed- and random-effects models in terms of estimating the coefficients on time-invariant regressors. In general, the new estimation results presented in Tables 3-5 are quite similar to those in Table 2 in terms of the signs and statistical significance of the estimates. Once again, a lower

level of stock volatility is associated with a greater degree of institutional ownership after controlling for policy changes and size effects. The estimation results for policy changes and other control variables also have similar significance and the same signs as the Table 2 regressions.

(Tables 3-5 inserted here)

Conclusion

This paper explores the potential determinants of return volatility on casino stocks in Macao, the world's largest hub of casino tourism. The central concern is the impact of institutional ownership on return volatility. Strong evidence is found that higher institutional ownership lowers return volatility in Macao's casino industry. This finding is robust to the different model specifications and various control variables used in the estimation. Those controls are used to derive the impact of policy and the effects of size on gaming stock volatility. Moreover, China's anti-corruption campaign increases Macao's stock volatility significantly. This finding dovetails with the widespread perception that business cycles in Macao depend in large part on policy variations in mainland China. Furthermore, both gross gaming revenue and casino baccarat business are related significantly and negatively to stock return volatility. This finding implies that business size matters in stabilising (decreasing the volatility of) investment returns in Macao's casino industry. The estimation shows that smoking bans (enacted and enforced due to health concerns) also decrease return volatility significantly. This result seems to provide an economic justification for the local anti-smoking policy. Additionally, according to the estimation, the cross-listing of casino stocks contributes significantly and robustly to casino stock volatility. This result may appear surprising because international cross-listing is generally considered to diversify the investment portfolio, thus lowering the cost of capital. The adverse effect of the cross-listing may be due to increased

information asymmetries (Dahlquist and Robertsson, 2001), which arise because the casino business is operated in Macao but affected by underlying policy made in Beijing while investment funds are raised in Hong Kong and New York.

The preceding findings should be useful to both policymakers and the casino industry. In general, policymakers should encourage casino firms to attract more long-term institutional investors for the purposes of fundraising for future expansion. These investors not only help to reduce firms' cost of capital by stabilising stock prices, but also help to increase firm value by effectively monitoring casino firms (in particular) and by minimising information asymmetries and agency problems. Consequently, economic development could become sustainable. Specifically, to maintain the confidence of long-term institutional investors, both policymakers and casino firms should make great efforts to fulfil the business ethics criterion, which is an important aspect of the Prudent Man Rule that governs most long-term institutional investors. In Macao, for instance, casino operators might meet their ethical obligations by continuously promoting the concept of 'responsible gambling'. Second, as size does matter in the casino industry, policymakers may impose strict control over the barriers to entry in this industry, such that casino firms might maintain forecasted prosperity more easily. This is an underlying factor in attracting long-term institutional investors, as these investors need a market to invest in that can deliver superior financial returns. Finally, a moderately diversified economy may benefit not only Macao society as a whole, but also the casino industry in Macao. Therefore, policymakers may have to consider offering tax relief to promote mass-marketed business, initiating tax hikes to discourage VIP-focused operations and granting tax credits to encourage industrial diversification. Meanwhile, casino operators should reduce their external vulnerability through various dimensions of diversification, such as by diversifying away from the VIP gaming business and towards mass-market operations, from a narrow customer base (e.g., mainland Chinese customers for current casino operators

in Macao) and towards a greater variety in tourist sources and from casino gaming and towards integrated MICE (meetings, incentives, conferences and exhibitions) casino businesses.

References

Adam A, Katsimi M and Moutos T (2012) Inequality and the import demand function. *Oxford Economic Papers* 64(4): 675-701.

Adda J and Cornaglia F (2010) The effect of bans and taxes on passive smoking. *American Economic Journal: Applied Economics* 2(1): 1-32.

Anholt S (2002) Nation branding: A continuing theme. *Journal of Brand Management* 10(1): 59-60.

Bae KH, Chan K and Ng A (2004) Investibility and return volatility. *Journal of Financial Economics* 71(2): 239-263.

Bailey W, Karolyi GA and Salva C (2006) The economic consequences of increased disclosure: Evidence from international cross-listings. *Journal of Financial Economics* 81(1): 175-213.

Baltagi BH, Bresson G and Pirotte A (2003) Fixed effects, random, effects or Huasman-Taylor? A pretest estimator. *Economics Letters* 79(3): 361-369.

Barnato K (2015) How China's anti-corruption drive is hurting growth. *World Economy*, CNBC, December 4, available at: http://www.cnbc.com/2015/12/04/how-chinas-anti-corruption-drive-is-hurting-growth.html.

Bradsher K (2012) China's anticorruption commission investigates senior official. *The New York Times*, December 5.

Brown KC and Brooke BA (1993) Institutional demand and security price pressure: The case of corporate spinoffs. *Financial Analysts Journal* 49(5): 53-56.

Campbell JY, Lettau M, Malkiel BG, et al. (2001) Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk. *Journal of Finance* 56(1): 1-43.

Chen MH, Kim WG and Kim HJ (2005) The impact of macroeconomic and non-macroeconomic forces on hotel stock returns. *International Journal of Hospitality*

Management 24(2): 243-258.

Chen Z, Du J, Li D, et al. (2013) Does foreign institutional ownership increase return volatility? Evidence from China. *Journal of Banking and Finance* 37(2): 660-669.

Cheung MY and Lam D (2015) Comparing the price of sin: Abnormal returns of cross-listed casino gaming stocks in the Hong Kong and US markets. *International Journal of Hospitality Management* 45: 73-76.

Cornett MM, Marcus AJ, Saunders A, et al. (2007) The impact of institutional ownership on corporate performance. *Journal of Banking and Finance* 31(6): 1771-1794.

Dahlquist M and Robertsson S (2001) Direct foreign ownership, institutional investors, and firm characteristics. *Journal of Financial Economics* 59(3): 413–440.

David P and Kochhar R (1996) Barriers to effective corporate governance by institutional investors: Implications for theory and practice. *European Management Journal* 14(5): 457-466.

Del Guercio D (1996) The distorting effects of the prudent-man laws on institutional equity investments. *Journal of Financial Economics* 40(1): 31-62.

Eadington WR (1999) The economics of casino gambling. *Journal of Economic Perspectives*. 13(3): 173-192.

Ehrlich I and Lui FT (1999) Bureaucratic corruption and endogenous economic growth. *Journal of Political Economy* 107(S6): 270-293.

Elyasiani E and Jia J (2010) Distribution of institutional ownership and corporate firm performance. *Journal of Banking and Finance* 34(3): 606-620.

Ferreira M and Matos P (2008) The colors of investors' money: The role of institutional investors around the world. *Journal of Financial Economics* 88(3): 499-533.

Froot K, Perold A and Stein J (1992) Shareholder trading practices and corporate investment horizons. *Journal of Applied Corporate Finance* 5: 42-58.

Glaeser EL and Saks RE (2006) Corruption in America, *Journal of Public Economy* 90(6): 1053-1072.

Gu XH and Tam PS (2014) Tax incidence and price discrimination: An application of theories to gambling markets. *China Economic Review* 28: 135-151.

Hartzell JC and Starks LT (2003) Institutional investors and executive compensation. *Journal of Finance* 58(6): 2351-2374.

Hausman JA and Taylor WE (1981) Panel data and unobservable individual effects. *Econometrica* 49(6): 1377-1398.

Jorgensen B (1998) Hedging and performance evaluation. Harvard Business School Working paper.

Kim HJ, Chen MH and Jang SC (2006) Tourism expansion and economic development: The case of Taiwan. *Tourism Management* 27(5): 925-933.

Koh Y and Lee S (2011) Cross-listing effect of U.S. casino companies: Risk-adjusted performances. *International Journal of Hospitality Management* 30(4): 1055-1058.

Kotler P and Gertner D (2002) Country as brand, product, and beyond: A place marketing and brand management perspective. *Journal of Brand Management* 9(4): 249-261.

Kotler P, Haider DH and Rein I (1993) *Marketing places: Attracting investment, industry and tourism to cities, states and nations.* New York: Free Press.

Koutmos G (2014) Positive feedback trading: A review. *Review of Behavioral Finance* 6(2): 155-162.

Lakonishok J, Shleifer A and Vishy RW (1992) The impact of institutional trading on stock prices. *Journal of Financial Economic* 32(1): 23-43.

Leung WK and Lee TS (2006) Institutional investors and the Monday effect on tourism stocks. *International Journal of Hospitality Management* 25(3): 348-372.

Li D, Nguyen QN, Pham PK, et al. (2011) Large foreign ownership and firm-level stock return

volatility in emerging markets. *Journal of Financial and Quantitative Analysis* 46(04): 1127-1155.

Liu XM and Wan YK (2011) An examination of factors that discourage slot play in Macau casinos. *International Journal of Hospitality Management* 30(1): 167-177.

Loo JM, Raylu N and Oei TPS (2008) Gambling among the Chinese: A comprehensive review. *Clinical Psychology Review* 28(7): 1152-1166.

Maginn JL, Tuttle DL, McLeavey DW, et al. (2007) *Managing Investment Portfolios: A Dynamic Process*. John Wiley & Sons, Inc., Hoboken, New Jersey.

Mauro P (1995) Corruption and growth. *Quarterly Journal of Economy* 110(3): 681-712.

Mo PH (2001) Corruption and economic growth. *Journal of Comparative Economics* 29(1): 66-79.

Oak SH and Dalbor MC (2008a) Institutional investor preferences for lodging stocks. *International Journal of Hospitality Management* 27(1): 3-11.

Oak SH and Dalbor MC (2008b) The impact of dividend policy on institutional holdings: Hotel REITs and non-REIT hotel corporations. *Journal of Hospitality Financial Management* 16(1): 1-17.

Oak SH and Dalbor MC (2010) Do institutional investors favor firms with greater brand equity?: An empirical investigation of investments in US lodging firms. *International Journal of Contemporary Hospitality Management* 22(1): 24-40.

Ruiz-Mallorquí M and Santana-Martín D (2011) Dominant institutional owners and firm value. *Journal of Banking and Finance* 35(1): 118-129.

Sahut JM, Gharbi S and Gharbi HO (2011) Stock volatility, institutional ownership and analyst coverage. *Banks, Markets & Investors* 110: 21-30.

Schwartz DG (2015) United States Commercial Casino Revenues. Center for Gaming Research, University of Nevada at Las Vegas, available at:

http://gaming.unlv.edu/reports/national_annual_revenues.pdf

Shleifer A and Vishny RW (1986) Large shareholders and corporate control. *Journal of Political Economy* 94(3 Part 1): 461-488.

Sias R (1996) Volatility and the institutional investor, *Financial Analysts Journal* 52: 13-20.

Silva AC and Chavez GA (2008) Cross-listing and liquidity in emerging market stocks. *Journal of Banking & Finance* 32(3): 420-433.

Smith J (2000) Gambling taxation: Public equity in the gambling business. *Australian Economic Review* 33(2): 120-144.

Song H, Gartner W and Tasci A (2012) Visa restrictions and their adverse economic and marketing implications - Evidence from China. *Tourism Management* 33(2): 397-412.

Tsai H and Gu Z (2006) A preliminary examination of the relationship between the stock market and casino gaming. *Journal of Travel and Tourism Marketing* 20(2): 63-73.

Tsai H and Gu Z (2007a) Institutional ownership and firm performance: Empirical evidence from U.S. based publicly traded restaurant firms. *Journal of Hospitality and Tourism Research* 31(1): 19-38.

Tsai H and Gu Z (2007b) The relationship between institutional ownership and casino firm performance. *International Journal of Hospitality Management* 26(3): 517-530.

Tsai H, Pan S and Lee J (2011) Recent research in hospitality financial management. *International Journal of Contemporary Hospitality Management* 23(7): 941-971.

Tse S, Yu AC, Rossen, F, et al. (2010) Examination of Chinese gambling problems through a socio-historical-cultural perspective. *The Scientific World Journal* 10: 1694-1704.

Walker DM (2009) The economic effects of casino gambling: A perspective from the U.S. In: *The Global Gaming Management Seminar Series*, Macao Polytechnic Institute, October 23, available at: http://walkerd.people.cofc.edu/pubs/Walker_Macao_ss.pdf

Wang P and Godbey G (1994) A normative approach to tourism growth to the year 2000.

Journal of Travel Research 33(1): 32-37.

Wang WY (2008) The explosive growth of global gambling. *China Times*, Taiwan, July 15, available at: http://news.ifeng.com/opinion/200807/0715_23_653779.shtml.

Wildman J and Hollingsworth B (2013) Public smoking bans and self-assessed health: Evidence from Great Britain. *Economics Letters* 118(1): 209-212.

World Bank (2015) *World Development Indicators,* available at: http://data.worldbank.org/

Zeng ZL (2008) An analysis of the characteristics of high rollers from mainland China. *Journal of Macao Polytechnic Institute* 30: 11-23.

Table 1. Descriptive statistics

Variables	No. of Obs.	Mean	Std. Dev.	Min.	Max.
VOL	348	-8.5919	-0.6619	-10.612	6.4316
IO-P	348	0.5428	0.3172	0	1
IO-N	348	202	126	0	491
TURNOVER	348	0.1986	0.1489	0.0006	1.2220
CROSS	348	0.6322	0.4829	0	1
ANTI-CORR	348	20.104	29.219	0	110
SMOKE	348	1.3448	0.9937	0	3
VISA	348	0.2069	0.4057	0	1
GBACCARAT	348	0.0126	0.0881	-0.1511	0.1686
GREVENUE	348	0.0132	0.0836	-0.1425	0.1608

Notes: *VOL* is the log of squared daily return. *IO-P* is the percentage of outstanding shares held by institutions. *IO-N* is the number of institutional shareholders. *TURNOVER* is the ratio of daily trading volume to shares outstanding each month. *CROSS* is a dummy variable equal to one if the firm is listed on both the Hong Kong and New York Stock Exchanges and zero if listed on only one exchange. *ANTI-CORR* is the number of corrupt officials dismissed per month in mainland China. *SMOKE* is assigned a value equal to zero for the lack of a smoking ban from March 2010 to December 2011, one for the partial ban from January 2012 to December 2012, two for the stricter ban from January 2013 to December 2014 and three for the complete ban from January 2015 to June 2015. *VISA* is a dummy variable equal to zero for the loose visa policy from January 2010 to June 2014 and one for the restrictive visa policy from July 2014 to June 2015. *GBACCARAT* is the growth rate of gaming receipts per month from baccarat business. G*REVENUE* is the growth rate of gross revenue from all gaming businesses per month.

Table 2. Impacts of institutional ownership on return volatility (random-effects panel data approach)

Dep. Var.: *VOL*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag VOL	0.2172***	0.2085***	0.1818***	0.2146***	0.2009***	0.2014***	0.1669***	0.1673***
	(4.44)	(4.27)	(3.61)	(4.37)	(4.08)	(4.09)	(3.29)	(3.30)
IO-P	-0.2941***	-0.2306*	-0.2820**	-0.2769**	-0.2681**	-0.2677**	-0.2531**	-0.2527**
	(-2.58)	(-1.95)	(-2.49)	(-2.36)	(-2.35)	(-2.34)	(-2.15)	(-2.15)
TURNOVER	2.0607***	1.9354***	1.9894***	2.0267***	1.9782***	1.9786***	1.9026***	1.9027***
	(7.46)	(6.85)	(7.23)	(7.20)	(7.13)	(7.13)	(6.78)	(6.78)
CROSS	0.2432***	0.2378***	0.2340***	0.2417***	0.2341***	0.2343***	0.2248***	0.2249***
	(3.29)	(3.23)	(3.19)	(3.27)	(3.18)	(3.18)	(3.07)	(3.08)
Trend	-0.0054***	-0.0109***	0.0073	-0.0067**	-0.0102***	-0.0102***	0.0010	0.0009
	(-2.66)	(-3.15)	(1.38)	(-2.34)	(-3.33)	(-3.33)	(0.14)	(0.13)
ANTI-CORR		0.3508*					0.2800	0.2852
		(1.95)					(1.16)	(1.18)
SMOKE			-0.2511***				-0.2380**	-0.2378**
			(-2.60)				(-2.38)	(-2.38)
VISA				0.0680			-0.1910	-0.1963
				(0.64)			(-1.35)	(-1.38)
GBACCARAT					-1.1362**		-1.1876*	
					(-2.08)		(-1.90)	
GREVENUE						-1.1957**		-1.2663*
						(-2.09)		(-1.92)
Constant	-6.9300***	-6.8912***	-7.3290***	-6.9227***	-6.8804***	-6.8753***	-7.2458***	-7.2393***
	(-16.10)	(-16.06)	(-16.16)	(-16.07)	(-16.04)	(-16.02)	(-15.91)	(-15.90)
Wald test	147.26	152.27	156.54	147.41	153.06	153.08	164.1400	164.2866
[*p*-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Hausman test	6.52	5.79	6.34	6.24	5.93	5.92	5.81	4.25
[*p*-value]	[0.1635]	[0.2154]	[0.1753]	[0.1820]	[0.2048]	[0.2051]	[0.2140]	[0.3732]
R-square overall	0.3047	0.3125	0.3185	0.3056	0.3136	0.3136	0.3308	0.3310
Observations	342	342	342	342	342	342	342	342

Notes: The definitions for all notations are given in the notes of Table 1. *Lag* refers to a one-year lag. *Trend* denotes the time trend. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3. Regression results with *IO-N* as an alternative institutional ownership measure (Robustness check 1)

Dep. Var.: *VOL*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag VOL	0.2217***	0.2087***	0.1828***	0.2164***	0.2039***	0.2044***	0.1681***	0.1684***
	(4.53)	(4.27)	(3.62)	(4.40)	(4.13)	(4.14)	(3.31)	(3.32)
Log(IO-N)	-0.0509**	-0.0496**	-0.0543**	-0.0501**	-0.0472*	-0.0472*	-0.0507**	-0.0507**
	(-2.06)	(-2.02)	(-2.21)	(-2.02)	(-1.91)	(-1.91)	(-2.08)	(-2.07)
TURNOVER	2.0186***	1.9269***	1.9679***	1.9823***	1.9398***	1.9404***	1.8784***	1.8785***
	(7.24)	(6.91)	(7.11)	(7.07)	(6.94)	(6.94)	(6.76)	(6.76)
CROSS	0.2324***	0.2273***	0.2223***	0.2305***	0.2236***	0.2238***	0.2142***	0.2143***
	(3.13)	(3.09)	(3.02)	(3.11)	(3.03)	(3.03)	(2.93)	(2.93)
Trend	-0.0067***	-0.0129***	0.0073	-0.0088***	-0.0117***	-0.0117***	-0.0010	-0.0011
	(-3.53)	(-4.19)	(1.36)	(-3.38)	(-3.98)	(-3.99)	(-0.15)	(-0.16)
ANTI-CORR		0.4411**					0.3724	0.3766
		(2.55)					(1.57)	(1.59)
SMOKE			-0.2716***				-0.2409**	-0.2408**
			(-2.81)				(-2.41)	(-2.41)
VISA				0.1194			-0.1702	-0.1753
				(1.15)			(-1.20)	(-1.23)
GBACCARAT					-1.2061**		-1.0639*	
					(-2.21)		(-1.70)	
GREVENUE						-1.2706**		-1.1392*
						(-2.22)		(-1.73)
Constant	-6.7450***	-6.7123***	-7.1695***	-6.7392***	-6.7068***	-6.7014***	-7.0684***	-7.0627***
	(-15.44)	(-15.49)	(-15.65)	(-15.44)	(-15.43)	(-15.42)	(-15.42)	(-15.41)
Wald test	143.85	152.67	154.66	145.32	150.40	150.45	163.66	163.81
[*p*-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Hausman test	4.89	4.64	4.64	4.79	4.79	4.79	4.25	4.25
[*p*-value]	[0.2991]	[0.3266]	[0.3264]	[0.3095]	[0.3095]	[0.3091]	[0.3732]	[0.3734]
R-square overall	0.2998	0.3131	0.3158	0.3025	0.3099	0.3099	0.3302	0.3304
Observations	342	342	342	342	342	342	342	342

Notes: The definitions for all notations are given in the notes of Table 1. *Lag* denotes a one-year lag. *Log* denotes logarithmic. *Trend* denotes the time trend. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 4. Regression results with *Lag(IO-P)* as an alternative institutional ownership measure (Robustness check 2)

Dep. Var.: *VOL*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag VOL	0.2172***	0.2086***	0.1831***	0.2147***	0.2011***	0.2016***	0.1683***	0.1687***
	(4.44)	(4.27)	(3.64)	(4.37)	(4.08)	(4.09)	(3.32)	(3.33)
Lag IO-P	-0.2943**	-0.2293*	-0.2731**	-0.2769**	-0.2665**	-0.2663**	-0.2414**	-0.2414**
	(-2.57)	(-1.93)	(-2.39)	(-2.35)	(-2.32)	(-2.32)	(-2.04)	(-2.04)
TURNOVER	2.0604***	1.9341***	1.9828***	2.0265***	1.9768***	1.9774***	1.8925***	1.8929***
	(7.46)	(6.84)	(7.19)	(7.19)	(7.11)	(7.12)	(6.73)	(6.73)
CROSS	0.2423***	0.2371***	0.2332***	0.2409***	0.2333***	0.2335***	0.2241***	0.2242***
	(3.28)	(3.22)	(3.18)	(3.26)	(3.17)	(3.17)	(3.06)	(3.06)
Trend	-0.0053**	-0.0108***	0.0070	-0.0066**	-0.010***	-0.010***	0.0005	0.0005
	(-2.56)	(-3.08)	(1.32)	(-2.27)	(-3.25)	(-3.26)	(0.08)	(0.07)
ANTI-CORR		0.3499*					0.2872	0.2921
		(1.94)					(1.19)	(1.21)
SMOKE			-0.2439**				-0.2306**	-0.2304**
			(-2.52)				(-2.31)	(-2.31)
VISA				0.0668			-0.1897	-0.1951
				(0.63)			(-1.34)	(-1.37)
GBACCARAT					-1.1276**		-1.1735*	
					(-2.06)		(-1.87)	
GREVENUE						-1.1882**		-1.2538*
						(-2.07)		(-1.90)
Constant	-6.9359***	-6.8957***	-7.321***	-6.928***	-6.885***	-6.880***	-7.2369***	-7.2305***
	(-16.11)	(-16.06)	(-16.13)	(-16.07)	(-16.05)	(-16.03)	(-15.88)	(-15.87)
Wald test	147.1790	152.1329	155.8560	147.3103	152.8650	152.9086	163.4397	163.6039
[*p*-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Hausman test	6.33	5.74	6.17	6.08	5.78	5.77	5.70	5.69
[*p*-value]	[0.1758]	[0.2193]	[0.1869]	[0.1933]	[0.2164]	[0.2167]	[0.2228]	[0.2232]
R-square overall	0.3046	0.3123	0.3175	0.3054	0.3133	0.3134	0.3299	0.3301
Observations	342	342	342	342	342	342	342	342

Notes: The definitions for all notations are given in the note of Table 1. *Lag* refers to a one-year lag. *Log* denotes logarithmic. *Trend* denotes the time trend. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 5. Regression results using the Hausman-Taylor panel data approach (Robustness check 3)

Dep. Var.: *VOL*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag VOL	0.2148***	0.2072***	0.180***	0.2132***	0.1998***	0.2004***	0.1658***	0.1662***
	(4.40)	(4.24)	(3.58)	(4.35)	(4.06)	(4.07)	(3.27)	(3.28)
IO-P	-0.3322***	-0.2370*	-0.2924**	-0.2895**	-0.2765**	-0.2761**	-0.2603**	-0.2599**
	(-2.65)	(-1.88)	(-2.46)	(-2.33)	(-2.33)	(-2.33)	(-2.12)	(-2.12)
TURNOVER	2.1419***	1.9930***	2.041***	2.0851***	2.0184***	2.0188***	1.9395***	1.9396***
	(7.53)	(6.88)	(7.25)	(7.24)	(7.14)	(7.15)	(6.79)	(6.79)
CROSS	0.2499***	0.2455***	0.239***	0.2482***	0.2386***	0.2388***	0.2288***	0.2290***
	(3.01)	(2.98)	(2.95)	(3.02)	(3.00)	(3.00)	(2.91)	(2.91)
Trend	-0.0050**	-0.011***	0.0075	-0.0064**	-0.010***	-0.010***	0.0012	0.0012
	(-2.39)	(-3.00)	(1.40)	(-2.20)	(-3.24)	(-3.25)	(0.18)	(0.17)
ANTI-CORR		0.3419*					0.2734	0.2787
		(1.88)					(1.13)	(1.16)
SMOKE			-0.250***				-0.2386**	-0.2384**
			(-2.59)				(-2.39)	(-2.39)
VISA				0.0620			-0.1924	-0.1977
				(0.58)			(-1.36)	(-1.39)
GBACCARAT					-1.1232**		-1.1887*	
					(-2.06)		(-1.90)	
GREVENUE						-1.1819**		-1.2672*
						(-2.06)		(-1.92)
Constant	-6.9649***	-6.921***	-7.356***	-6.952***	-6.902***	-6.897***	-7.2679***	-7.2613***
	(-16.14)	(-16.08)	(-16.19)	(-16.09)	(-16.06)	(-16.05)	(-15.93)	(-15.92)
Wald test	145.5962	149.8595	154.5422	145.3836	151.4359	151.4604	162.5373	162.6843
[*p*-value]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Observations	342	342	342	342	342	342	342	342

Notes: The definitions for all notations are given in the notes of Table 1. *Lag* refers to a one-year lag. *Log* denotes logarithmic. *Trend* denotes the time trend. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Appendix 1. Correlation matrix

	VOL	*IO-P*	*IO-N*	*TURN -OVER*	*CROSS*	*ANTI -CORR*	*SMOKE*	*VISA*	*GBACCARAT*
IO-P	-0.106**								
IO-N	-0.113**	0.725***							
TURNOVER	0.359***	0.275***	0.204***						
CROSS	-0.074	-0.134**	-0.169***	-0.496***					
ANTI-CORR	-0.141***	0.215***	0.380***	-0.062	0.048				
SMOKE	-0.374***	0.381***	0.446***	-0.226***	0.097*	0.697***			
VISA	-0.133**	0.169***	0.319***	-0.038	0.037	0.843***	0.595***		
GBACCARAT	0.116**	-0.279***	-0.375***	0.080	-0.070	-0.787***	-0.704***	-0.752***	
GREVENUE	0.117**	-0.277***	-0.374***	0.080	-0.070	-0.785***	-0.703***	-0.756***	0.999***

Notes: The definitions for all notations are given in the notes of Table 1. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.