

Survival of the Fittest: Standardization by Professional Short-Term Rental Hosts under Severe Uncertainty

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Abstract

Severe uncertainty, such as the COVID-19 pandemic, forces organizations to adapt quickly to survive in the marketplace. This study examines how professional short-term rental hosts enhance unit resilience under market disruptions through standardization, and how this effect is moderated by business size. A survival analysis is conducted using 155,132 observations of Airbnb units operated by professional hosts in Hong Kong between April 2018 and March 2023. Results reveal positive effects of standardization, and the benefits are more pronounced for larger businesses. The findings further identify that the positive effects of standardization become stronger and less reliant on business size during COVID. In contrast, under market growth, the alignment between standardization and business size is more important, where functional standardization benefits larger businesses but may harm smaller ones. This research enriches tourism literature by emphasizing the strategic lens of professionalization. The findings also provide insights for practitioners, platform managers, and policymakers.

Keywords

Short-term rental; Professional host; Survival; Standardization; Business size; Market condition; Big data analytics

1. Introduction

Over the past few years, the short-term rental industry has experienced unprecedented growth, driven by booming tourism demand and the rise of online platforms like Airbnb (Zervas et al., 2017). The peer-to-peer model of short-term rentals has led to significant economic benefits for hosts, evolving from spare room subletting to an increasingly professionalized sector (Dogru et al., 2020). However, the rapid growth was abruptly interrupted by the COVID-19 pandemic, which severely impacted the tourism industry and led to a sharp decline in visitor arrivals worldwide (Eugenio-Martin et al., 2023). This drastic decrease in demand posed substantial survival threats to lodging properties, especially for short-term rentals (Kourtiti et al., 2022).

Given these challenges, understanding the factors that ensure survival becomes crucial. Current literature on the survival of hospitality firms has primarily focused on hotels and restaurants, examining factors such as firm age, size, ownership, financial status, and strategies to counter unfavorable external conditions (Gémar et al., 2016; Lado-Sestayo et al.,

2016). In contrast, few studies have addressed short-term rentals, focusing either on the micro attributes of an individual unit or macro conditions like city and platform which is uniform for all involved listings (Fan et al., 2023; Kourtiti et al., 2022; Leoni, 2020).

Prior literature leaves a critical gap at the meso-level of inter-unit coordination, which has become particularly important under the rise of professional hosts in the short-term rental market. Professional hosts refer to those who operate two or more entire properties simultaneously (Chen et al., 2023). They are identified to outperform their nonprofessional peers by generating higher revenues (Kwok & Xie, 2019). However, managing multiple listings also introduces distinct challenges. Operational complexity grows exponentially with business size, often leading to a decline in quality (Xie & Mao, 2017). As both revenue and service quality are key determinants of unit resilience in the short-term rental sector (Hu et al., 2025), the most critical task for professional hosts is to coordinate across multiple units to enhance efficiency and create synergies.

Therefore, this study addresses the meso-level gap by examining the strategy of standardization, which has been applied widely in various industries to achieve efficient inter-unit coordination (Park & Jang, 2022; Winter et al., 2012). In the context of short-term rentals, it refers to maintaining consistency among units managed by the same host (Zhang et al., 2023). We therefore aim to examine how this strategy influences unit survival. In addition, we explore how its effectiveness is shaped by business size, which is closely linked to operational complexity, and how these relationships vary under different market conditions.

This study conducts a survival analysis on Airbnb properties managed by professional hosts between April 2018 and March 2023 in Hong Kong. This market saw a travel ban from January 2020 to March 2023, making it the ideal setting for a representative case of market disruption. Standardization is quantified by measuring the functional and aesthetic similarity between a focal unit and its sister units under the same host. The operationalization of aesthetic standardization is based on design style scores predicted by a pre-trained machine learning model. Business size is represented by the number of units managed by a professional host. Market condition is classified into growing and declining periods, with the COVID outbreak serving as the temporal cutoff. Subsequently, Kaplan-Meier analysis and Cox regressions are performed to assess the impacts on unit survival.

This study offers several contributions. Theoretically, it extends the understanding of strategic coordination across units, showing how host professionalization is shaping crisis management in the short-term rental industry. The findings provide nuanced insights into strategic adaptation, highlighting a dynamic interplay between host strategy, internal condition (i.e.,

business size), and external environment (i.e., market disruption). In addition, understanding these dynamics also provides broader insights into the tourism industry, reflecting the evolutionary perspective of how businesses expand and adapt in dynamic markets. Practically, the findings offer valuable guidance for short-term rental practitioners, platforms, and policymakers.

2. Literature Review

2.1 Survival

Survival is a pervasive topic that has been extensively examined across multiple fields (e.g., Josefy et al., 2017). Severe uncertainty is a leading contributor to firm failure (Dreyer & Grønhaug, 2004), requiring a deeper understanding of how strategic decisions can improve survival (Pérez-Rodríguez & Hernández, 2023a). Such knowledge is particularly important in the hospitality and tourism industry due to the sector's inherent susceptibility to external shocks, such as economic downturns, natural disasters, and global health crises (Chathoth & Olsen, 2005; Ritchie & Jiang, 2019). For example, Gémar et al. (2016) and Lado-Sestayo et al. (2016) identified that hotels launched during the economic crisis beginning in 2008 had a higher failure rate. Similarly, recent studies have explored the survival challenges posed by the COVID-19 pandemic (Kaushal & Srivastava, 2021), highlighting the ongoing vulnerability of the tourism industry to external disruptions.

To address survival challenges, hospitality and tourism firms need to strategize accordingly (Jiang et al., 2022). In addition to relatively stable factors like firm size, age, and location (Lado-Sestayo et al., 2016; Park & Jang, 2022), previous studies have explored adaptative approaches that firms can implement to enhance their resilience and longevity. These approaches include marketing strategies (Li et al., 2022), financial management (Gémar et al., 2016), innovation and diversification strategies (Zach et al., 2021).

While prior hospitality and tourism literature has explored a wide range of determinants in the context of hotels and restaurants, little attention has been given to the survival of short-term rentals. However, it faces unique challenges compared to traditional lodging sectors. Although some large players managing portfolios of hundreds of properties have emerged as the platform matures, the majority of hosts still operate on a smaller scale between 2 to 10 listings (Deboosere et al., 2019; Gao & Li, 2024), even without professional training in hospitality management. This limits their ability to effectively to navigate external challenges (Jhaver et al., 2018).

Some previous studies have attempted to understand the factors that determine short-term rental units' resilience at the micro and macro levels (Fan et al., 2023; Kourtiti et al., 2022;

Leoni, 2020). At the micro level (i.e., property-level), for example, Leoni (2020) identified the influence of property type, location, instant bookability, and the number of reviews on Airbnb properties' resilience to COVID-19 with data from Spain. A subsequent study based on Beijing introduced additional factors such as capacity, facilities, review ratings, and pricing (Fan et al., 2023). From the macro perspective, Kourtiti et al. (2022) examined how the city in which a unit is located affects short-term rentals' vulnerability to the pandemic. More macro factors like regional short-term rental supply, tourism specialization, and the degree of platform professionalism were explored by Fan et al. (2023).

However, research on the meso-level, which involves inter-unit coordination, is still sparse. Such meso-level coordination captures the key differences between operating a single listing and managing a portfolio of multiple properties, which is especially important given the growing trend of professional hosts in the short-term rental industry (Dogru et al., 2020).

2.2 Professionalization of Short-Term Rentals

Short-rental platforms have exhibited a growing trend of professionalization, featured by a substantial share of revenues generated by professional hosts driven by profit-seeking motives (Dogru et al., 2020; Xie & Chen, 2019). These professional hosts, defined as short-term rental operators who manage two or more entire homes simultaneously (Chen et al., 2023), differ significantly from those who engage in hosting primarily for home-sharing purposes. These hosts are increasingly adopting more professional and sophisticated management strategies to enhance their properties' competence (Boto-Garcia et al., 2021), which leads to enhanced occupancy rate and revenue performance (Kwok & Xie, 2019).

However, professionalization also brings new challenges. As business size grows, multi-unit hosts face greater operational complexity. Managing multiple units not only increases the sheer volume of tasks but also intensifies the need for coordination across units (Zhang et al., 2023). The increased operational complexity reduces efficiency (Pérez-Rodríguez & Hernández, 2023b) and undermines service quality (Bulchand-Gidumal et al., 2019; Xie & Mao, 2019).

As both performance and service quality are important determinants of business survival, there are mixed perspectives in short-term rental literature on professional hosts' resilience to market crises. Some research reveals that professional hosts tend to demonstrate higher unit survival across both pre- and during-COVID periods (Gao & Li, 2024; Kourtiti et al., 2022; Leoni, 2020). However, there are also studies arguing that professional hosts are more prone to exit during market crises, as operational complexity and costs increase while income is disrupted (Dolnicar & Zare, 2020).

Given the co-existence of benefits and challenges, we argue that professionalization alone is insufficient in ensuring success. More importantly, whether professional hosts can sustain their business under market uncertainties depends on how they manage the complexities that come with business expansion, particularly through strategic coordination across units, to achieve operational efficiency and economies of scale.

3. Hypotheses Development

3.1 Standardization

An effective strategy commonly employed by multi-unit businesses to reduce operational complexity and maintain consistent service quality is standardization. This strategy refers to keeping a high consistency across product offerings, e.g. short-term rental units (Samiee & Roth, 1992). In prior literature, various dimensions of standardization have been examined, including but not limited to product functionalities and aesthetics (Gemser & Leenders, 2001; Winter et al., 2012). This study focuses on these two dimensions, as they both play critical roles in customer perceptions and host operations in the short-term rental sector (Cheng et al., 2019). More specifically, functional standardization refers to the uniformity in amenities, such as room features and basic provisions, that are consistent across different rental units (Tassey, 2000). Aesthetic standardization focuses on the visual and design elements, ensuring that the look, feel, and ambiance of the rental properties follow a consistent style (Reimann et al., 2010).

In service industries, previous studies have identified the benefits of standardization on business longevity across various sectors (Park & Jang, 2022; Winter et al., 2012). For example, Winter et al. (2012) found that standardized products tend to have lower failure rates than non-standardized offerings within the same franchise across multiple service sectors. Similarly, Park and Jang (2022) found that coffee chains with a high degree of standardization outperformed their non-standardized rivals in survivability.

In the short-term rental context, standardization may improve unit survival by enhancing cost management and operational efficiency (Lawrence, 2020; Ritzer, 1992). First, standardization allows units to reduce costs. Units that are highly standardized enable hosts to engage in bulk purchase of supplies and maintenance, or orchestrate management solutions (Ritzer, 1992; Zhang et al., 2023). For example, if multiple units under the same host are furnished with the same lamps or decorated with the same styling elements, the host might receive quantity discounts and can build long-term partnerships with suppliers. Among these units, one with a high similarity to its sister units can enjoy these cost-effective resources (Tsai, 2000). Cost-efficiency can be further translated into competitive advantages that secure unit survival (Cuypers et al., 2021).

Second, standardization can impact unit survival through operational efficiency. With highly standardized units, hosts can streamline their operations. These operations can be further improved through multiple iterations applied to similar unit settings (Lawrence, 2020; Pennings et al., 1994). This process can expedite various aspects, such as responses to customer inquiries or property maintenance. These operational efficiencies contribute to heightened service stability and quality (Fließ & Kleinaltenkamp, 2004). Units that share common attributes are likely to benefit from these advantages that potentially bolster their survival prospects (Csaszar & Siggelkow, 2010). Given the efficiency gains of standardization, we hypothesize that:

H1: Standardization positively affects unit survival in the short-term rental context.

3.2 Business Size

While standardization can reduce costs and enhance operational efficiency, its effectiveness is often contingent on business size. Previous studies in service industries have shown that a large business size is an important precondition that enables standardization to realize economies of scale (Rumelt et al., 1991; Weng & Wang, 2006). Business expansion allows units to achieve more cost efficiency through high inter-unit consistency from volume discounts, spread of fixed costs, and efficient allocation of resources (Reynolds, 1997). Furthermore, the operational complexity, exacerbated by business size, necessitates enhanced operational efficiency, which is facilitated by standardization. Thus, the positive impacts of standardization on survival generated through efficiency might be accentuated for larger businesses.

For small businesses, limited scale reduces the potential benefits of standardization (Gao & Li, 2024). In some cases, standardization may even introduce new challenges, such as reduced flexibility and heightened concentration risks (Canales, 2014; Tang & Jang, 2011). Forcing one unit to adhere to standardized design may reduce the listing's adaptability to evolving market conditions and customer preferences (Liker et al., 1999). Additionally, sharing similar characteristics with sister units can increase concentration risks, as they may experience off-seasons simultaneously, making it difficult to obtain financial support from each other (Kaniovski et al., 2008). This challenge is particularly severe for small businesses because hosts tend to be less professional to adapt efficiently or leverage other strategies like dynamic pricing to mitigate revenue fluctuations (Abrate et al., 2022). Therefore, the impact of standardization on unit survival is likely to be amplified by business size, leading to the hypothesis that:

H2: The positive effect of standardization on unit survival is stronger for larger businesses in the short-term rental context.

3.3 Market Conditions

Environmental conditions are pivotal in determining strategic outcomes, including firm survival (Patel, 2011). Prior research in the business field has examined a variety of environmental conditions, including industry evolution, policy and regulations, and market conditions (Chathoth & Olsen, 2005). Among these aspects, market conditions attract great attention because of great uncertainty associated with customer demands (Shou et al., 2013).

Various factors can lead to fluctuations in consumer demand, including economic conditions, global events, and pandemics (Kuo et al., 2008; Nicolau, 2012). Some factors may lead to a critical market shock, especially for the hospitality and tourism industry (Gössling et al., 2020). For example, pandemics caused sudden drops in demand due to lockdowns and travel restrictions, creating a sharp market contraction (Onyeaka et al., 2021). The external market shifts precipitate an acute crisis for firms, fundamentally altering their demands for strategic management. The effectiveness of many strategies, such as innovation and corporate social responsibility activities, has changed accordingly (Qiu et al., 2021). We argue that market conditions largely shape the effects of standardization and business size on short-term rental unit survival.

In a growing market, the role of standardization tends to be less critical. Market growth reflects a resource-munificent environment, where firms are presented with a wider range of strategic options (Jogarathnam et al., 1999). Therefore, professional hosts can leverage strategic alternatives, such as luxury positioning or premium pricing (Kwok & Xie, 2019; Sánchez-Pérez et al., 2020), during expansion to generate extra profits that help offset losses resulting from operational complexity. As a result, the reliance on standardization diminishes. In contrast, when market demand declines, strategic options shrink (Jogarathnam et al., 1999). Hosts face larger tighter resource constraints, making the efficiency gains from standardization more valuable and its role more critical for survival.

When market demand grows, the importance of alignment between standardization and business size may diminish. Resource munificence in a growing market provides firms with greater opportunities (Aldrich, 2008; Jogarathnam et al., 1999). Under high demand, market growth can buffer the negative effects of misalignment between firm size and strategy (Kabadayi et al., 2007). Firms are rewarded more by external conditions, reducing the requirement for a fit between business size and standardization. However, in a declining market, competition intensifies. Firms face larger pressure to optimal internal strategic configurations. Under such constraints, the alignment between standardization and business size becomes more critical, as only well-matched strategies can ensure cost efficiency and support business survival. Therefore, we hypothesize that:

H3: The positive effect of standardization on short-term rental survival is stronger in a declining market.

H4: The positive moderating effect of business size on the standardization-survival relationship is stronger in a declining market.

4. Methodology

4.1 Data

We test the hypotheses with data from Airbnb market in Hong Kong for two reasons. First, Hong Kong is one of the most reputable and internationalized destinations in Asia, attracting a significant influx of international tourists which results in a massive and diverse Airbnb supply. This allows us to draw generalizable findings on short-term rental survival. Second, Hong Kong experienced a sharp downturn in its tourism market due to strict travel restrictions and its reliance on inbound tourism from international visitors. This situation provides an ideal context to compare strategic outcomes under varying market conditions.

The data is collected from the website “Inside Airbnb”, a widely used data source in short-term rental studies (Fan et al., 2023). The sample includes all Airbnb units operating in Hong Kong between April 2018 and March 2023, with detailed unit information, including amenities, cover photos, and other features. The end point is set because it is the time when the HK government officially announced the relaxation of travel restrictions.

We operationalize professional hosts as those who operate two or more active entire homes concurrently within the same month (Chen et al., 2023). This status may change month-to-month based on their activity. These professional hosts demonstrate great differences in survival patterns from the nonprofessional hosts. Figure 1 shows the trend of Hong Kong’s Airbnb supply. The dashed line shows the number of units regardless of host type. It first grew and stabilized, but then sharply declined during COVID. This trend shows the vulnerability of the Airbnb market in Hong Kong. In contrast, the number of units supplied by professional hosts remained more stable over time, suggesting greater resilience.

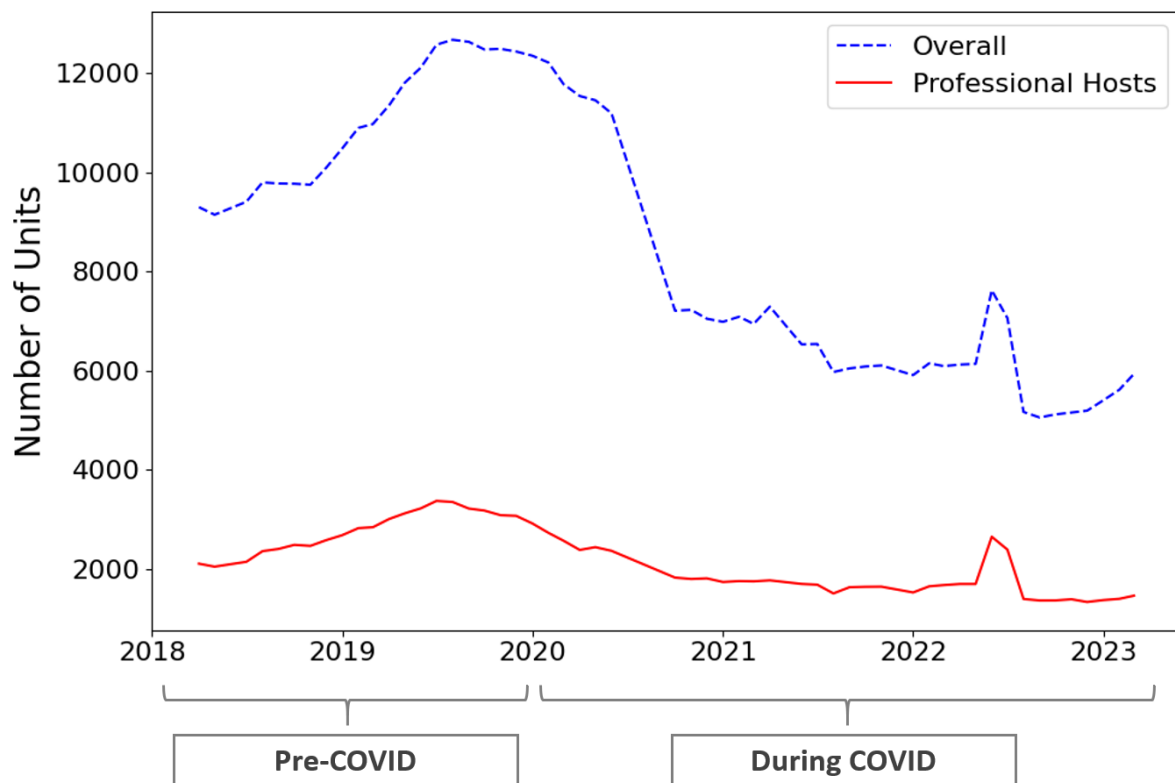


Figure 1. Unit supplies over time

Figures 2 and 3 compare the quarterly patterns of new entries and exits for nonprofessional and professional hosts, respectively. Nonprofessional hosts (Figure 2) exhibit a high rate of exits during COVID-19, with exits surpassing new entries by a substantial margin. In contrast, professional hosts (Figure 3) demonstrate more resilience, with relatively balanced entries and exits. It further highlights the ability of professional hosts to withstand market disruptions. Therefore, exploring if this advantage originates from the structure of larger businesses and how these hosts realize such benefits is of great importance.

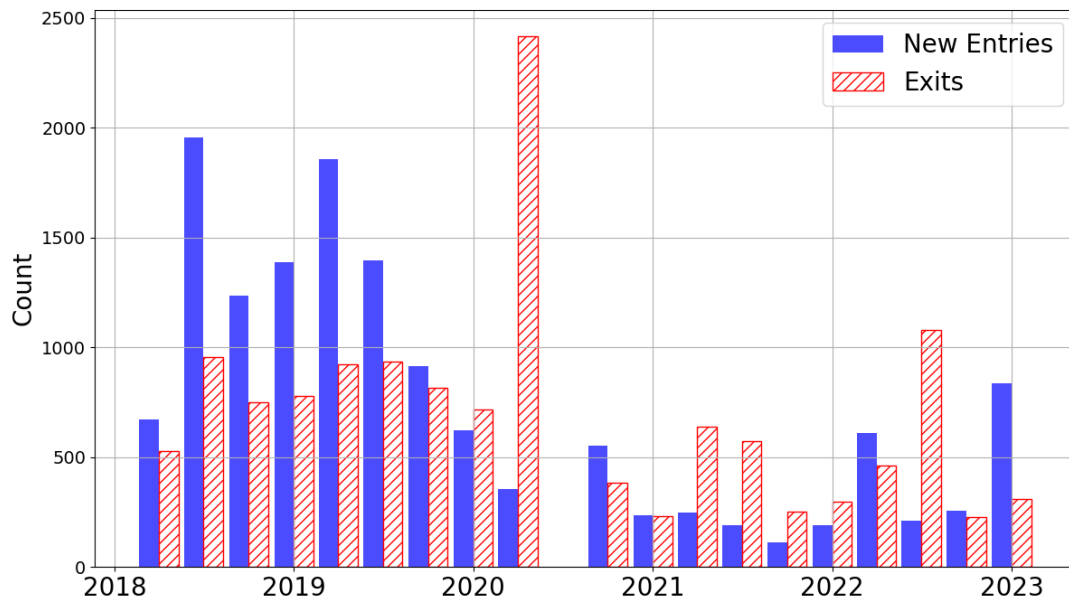


Figure 2. Number of new entries and exits for nonprofessional hosts by quarter

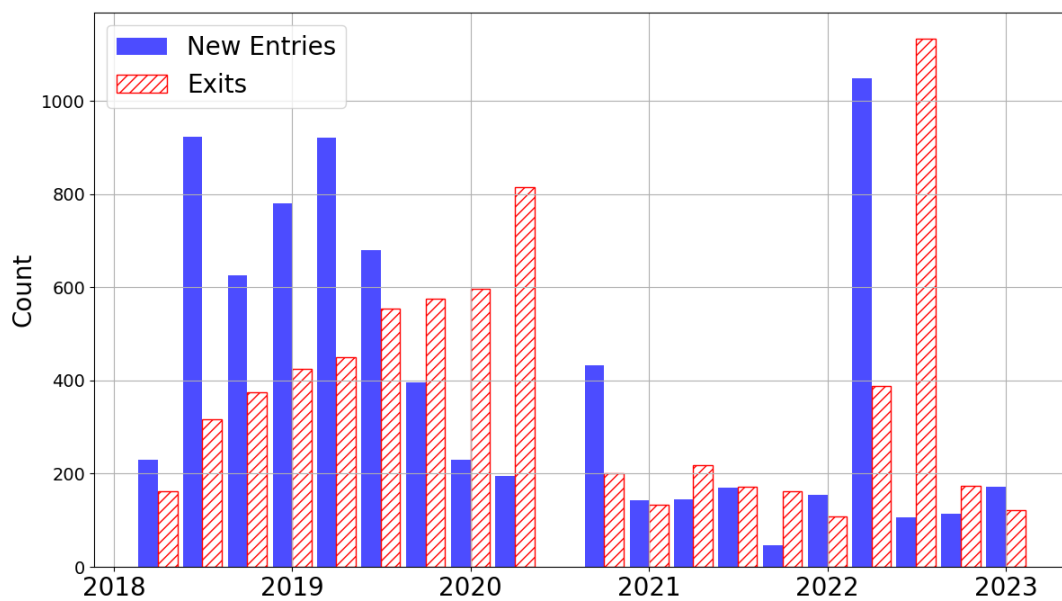


Figure 3. Number of new entries and exits for professional hosts by quarter

To provide a deeper understanding of the sample of professional hosts used in this study, we conduct an auxiliary analysis comparing professional vs nonprofessional hosts based on host and property attributes. A logit regression is estimated using a binary indicator for professional host status as the dependent variable, with unit-level features as independent variables. The results presented in Appendix A show that, although professional hosts offer listings with features like instant booking and higher responsiveness, their listings receive

inferior customer feedback with significantly lower review ratings and fewer monthly reviews. Additionally, professional hosts tend to charge lower prices. This signifies that professional hosts differ significantly from their nonprofessional peers. They quality challenges but tend to prioritize efficiency, which enables scalability. Therefore, it is important to focus on professional hosts and understand how they coordinate across units to sustain their unique competitive advantages.

4.2 Key Variables

4.2.1 Business Size and Market Conditions

This study aims to investigate how business size and standardization affect unit survival across different market conditions. In terms of **market condition**, we use a dummy variable that distinguishes between the pre-COVID and during-COVID periods based on significant changes in the tourism market. Hong Kong's tourism market experienced substantial growth before the COVID-19 pandemic, with total visits reaching 55.91 million in 2019. However, this number sharply declined to 3.57 million in 2020, further dropping to 0.09 million in 2021 and 0.60 million in 2022 (Genius, 2024). Accordingly, we categorize the period before January 2020 as the pre-COVID growing market. In contrast, the period from January 2020 onwards is treated as the during-COVID declining market.

Following previous studies (Gao & Li, 2024; Ye et al., 2019), we measure **business size** by the number of active listings a professional host manages within the same month. Figure 4 presents a boxplot comparing business sizes across two market conditions. The results show a clear increase in business size during the pandemic, with the median rising from 7 to 14. This indicates that the short-term rental market became more consolidated, with larger professional hosts dominating the supply, further emphasizing the resilience of larger businesses during periods of disruption.

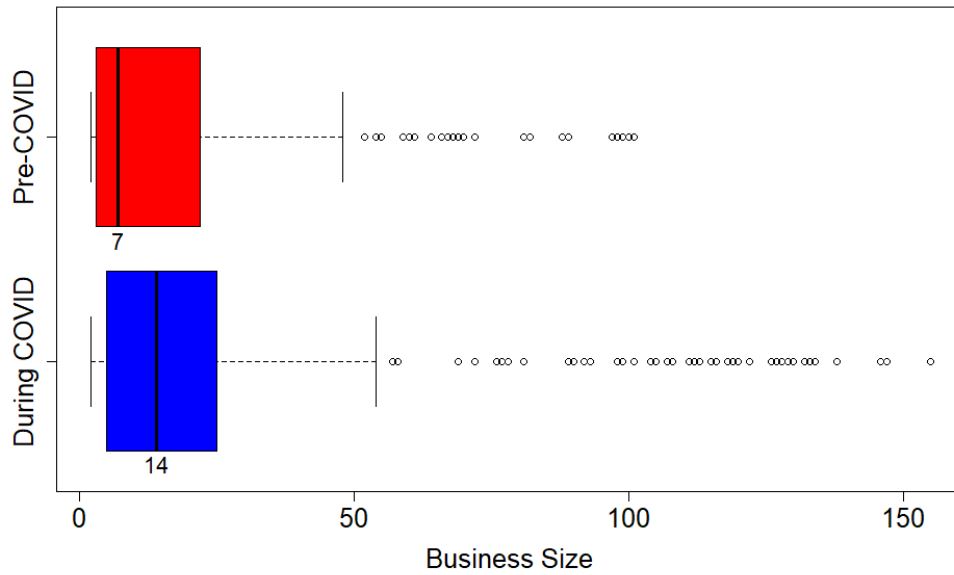


Figure 4. Boxplot of business size across market conditions

4.2.2 Standardization

This study operationalizes standardization by assessing the degree of similarity between a focal unit and other units managed by the same host. When measuring standardization, we first implement a pairwise comparison between the focal unit and each sister unit, then use the average similarity score of all compared pairs to denote the degree of standardization of the focal unit. Standardization is measured in two dimensions: functional and aesthetic.

Functional standardization (FuncStd) is quantified based on amenities, such as Wi-Fi and coffee makers, as these utilitarian elements reflect the units' functionalities. The similarity degree of functional design between every two units is measured by a Jaccard Similarity Score (Zhang et al., 2023), which evaluates the presence or absence of specific amenities in each unit. The Jaccard Similarity Score is calculated by dividing the number of shared amenities by the total number of unique amenities across both units, resulting in a value between 0 and 1, where a higher score indicates greater similarity in functional design. In the following equation, $Amenity_{it}$ denotes the Amenity set offered in unit i at time t . Each focal unit i is compared against other n sister units managed by the same host. The average score is used to denote the focal unit's functional standardization degree.

$$FuncStd_{it} = \frac{1}{n} \sum_{j=1}^n JaccardSim(Amenity_{it}, Amenity_{jt}) \quad (1)$$

Aesthetic standardization (AesStd) is measured by analyzing unit cover photos, which are considered to embed rich information reflecting unit aesthetic styles (Rahimi et al., 2016). To quantify aesthetic styles, this study implements a deep learning model (Zhang et al., 2024),

which is built on a widely-used convolutional neural network structure, VGG-16 (Simonyan & Zisserman, 2014). This model can predict the aesthetic design styles of short-term rental cover photos by representing them with a probabilistic distribution over four distinct interior design styles: casual, classic, modern, and natural. Each style has a score between 0 and 1 and the sum of four styles equals to 1. In the following equation, $Style_{it}$ represented the design styles scores of unit i at time t .

$$AesStd_{it} = \frac{1}{n} \sum_{j=1}^n CosineSim(Style_{it}, Style_{jt}) \quad (2)$$

4.3 Survival Analysis

This study analyzes unit survival for multi-unit hosts in the Hong Kong Airbnb market. There are multiple ways to operationalize survival with different measures of mortality (Josefy et al., 2017). Following previous short-term rental survival studies, we use market exit as a mortality measure, defining exit as listings that are no longer present in the dataset for the remainder of the observation period (Hu et al., 2025). Figure 5 shows the distribution of unit longevity, which is highly right-skewed, with most short-term rental units exiting within the first few months.

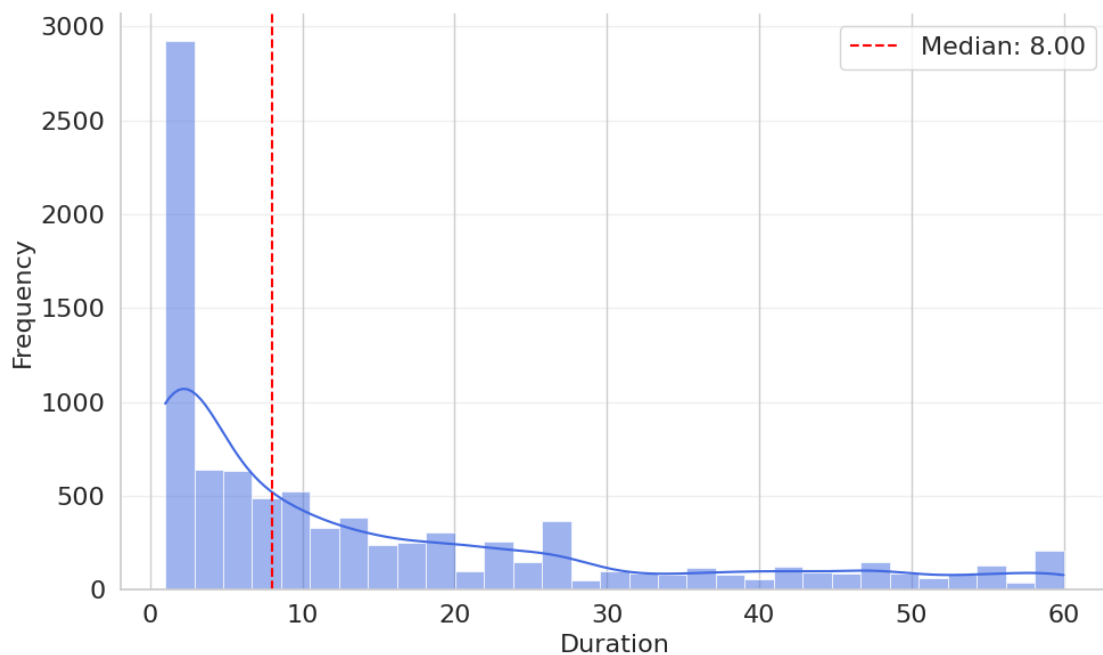


Figure 5. Distribution of unit longevity

Several techniques are available for survival analysis, ranging from non-parametric to parametric models. Parametric models are not suitable for this study because they require a clear distribution of survival time, but it is challenging to predefine a survival distribution due to market fluctuations and inherent unpredictability (Kalbfleisch & Prentice, 2011). Therefore,

this study adopts non-parametric and semi-parametric models.

A non-parametric model, i.e., Kaplan-Meier estimator, is employed to compare survival functions across groups (Kaplan & Meier, 1958). To investigate the impacts of business size and standardization on unit survival, we also implement a semi-parametric model, that is proportional hazard regression, as known as Cox regression (Cox, 1972). This model is appropriate for this study because it is more flexible and relies less on assumptions about the shape of the hazard function or the distribution of survival times. In addition, it allows us to conduct simultaneous analysis of several time-dependent covariates. Moreover, Cox proportional hazards models are estimated using a maximum likelihood approach, which is computationally efficient and scalable, making it well-suited to the large-scale data in this research. The function of hazard rate $h(t)$ is specified as:

$$h(t) = h_0(t) * e^{\sum x_i \beta_i}$$

In this equation, $h_0(t)$ is the baseline hazard with $T = 1$ in April 2018 and $T = 60$ in March 2023. The sample is right-censored and left-truncated. This research accommodates both right censoring and left truncation, given that many units remain active at the end of the sampling period, while the majority were already operational at the study's onset. Consequently, the survival duration is calculated based on the active time within the sample period. For the cases where units delist but later re-enter the market, they are treated as missing values in the inactive months. These missing values between the start and end times can be handled by Cox regression (Therneau et al., 2017), which accommodates gaps in observation periods without biasing the survival estimates. To control for temporal confounders such as policy changes and seasonality, we estimate the Cox regression model with month strata. This approach accommodates temporal variations by estimating baseline hazards separately for each month (Woo et al., 2024).

We first estimate the baseline model using the full dataset with a set of control variables that have been identified as key determinants of unit survival in previous studies (Leoni, 2020). These variables include unit features and host features. More detailed descriptions of these control variables can be found in Table 1. Subsequently, the key variables of standardization, business size, and their interactions are progressively added to the Cox regression models. To further explore how the effects vary across market conditions, we conduct separate analyses for two subsets: the pre-COVID and during COVID stages. Table 2 provides descriptive statistics of the variables involved. After removing rows with missing values, our analysis incorporates 155,132 monthly observations.

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Table 1. Variable description

Variable	Description
Exit	Whether a unit exits market (exit = 1, otherwise 0)
Functional standardization	Amenity similarity between the focal unit and other units managed by the same host
Aesthetic standardization	Aesthetic style similarity between the focal unit and other units managed by the same host
Business size	Number of units managed simultaneously by the professional host in a given month
Market condition – COVID	A categorical variable indicating if the market condition is before or during COVID (Pre-COVID; COVID)
Max guests	Maximum number of guests that can be accommodated in the focal unit
Min nights	Minimum night stay required by host
Price	Average daily price (HKD)
No. of cumulative reviews	Total number of customer reviews the focal unit has received
No. of incremental reviews	Number of new reviews the focal unit receives within a given month
Review rating	Average rating of guest reviews received by the unit
Instant bookability	Whether the unit can be booked instantly (Instant bookable =1, otherwise 0)
Cancellation	Cancellation policy for the unit (flexible, moderate, strict, super strict)
Host tenure	Number of days since the focal unit's operator became an Airbnb host to the end of sample period
Response time	Level of time taken to respond to guests' inquiries (1: within an hour, 2: within a few hours, 3: within a day, 4: a few days or more)
Response rate	The rate of new inquiries and reservation requests a host responded to
Superhost	Whether a host has a Superhost badge (superhost = 1, otherwise 0)
Region	The geographic location of the unit (Hong Kong Island, New Territories, Kowloon, Outlying Islands)

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Table 2. Descriptive statistics of variables

Variable	Mean	Std	Min	Max
Exit	0.04	0.20	0	1
Functional Standardization	0.48	0.19	0	1
Aesthetic Standardization	0.54	0.15	0	1
Business size	23.98	32.13	2	155
Market condition: Pre-COVID	0.30	---	---	---
Market condition: COVID	0.70	---	---	---
Max guests	1.65	1.38	0	21
Min nights	18.99	23.14	1	600
Price	646.87	1668.07	51	249,861
No. of cumulative reviews	16.42	43.00	0	1005
No. of incremental reviews	4.78	12.37	0	173
Review rating	3.21	2.02	0	5
Instant bookability	0.25	0.43	0	1
Cancellation: Flexile	0.31	---	---	---
Cancellation: Moderate	0.13	---	---	---
Cancellation: Strict	0.56	---	---	---
Cancellation: Super Strict	0.003	---	---	---
Host tenure	2678.56	806.40	57	4764
Response time	1.69	0.78	1	4
Response rate	93.40	15.96	0	100
Superhost	0.19	0.39	0	1
Region: Hong Kong Island	0.50	---	---	---
Region: New Territories	0.06	---	---	---
Region: Kowloon	0.40	---	---	---
Region: Outlying Islands	0.04	---	---	---

5. Results and Discussion

The first objective of this research is to identify how standardization influences unit survival. We compare Kaplan-Meier survival curves for high and low levels of standardization. As shown in Figures 6 and 7, the results are consistent across two standardization dimensions: functional and aesthetic. Units with higher levels of standardization show higher survival probabilities in general, particularly during the COVID-19 period. A significant difference in survival rates ($p < 0.001$) is identified across the categories in each graph (Figures 6-7). These graphs highlight the benefits of high standardization.

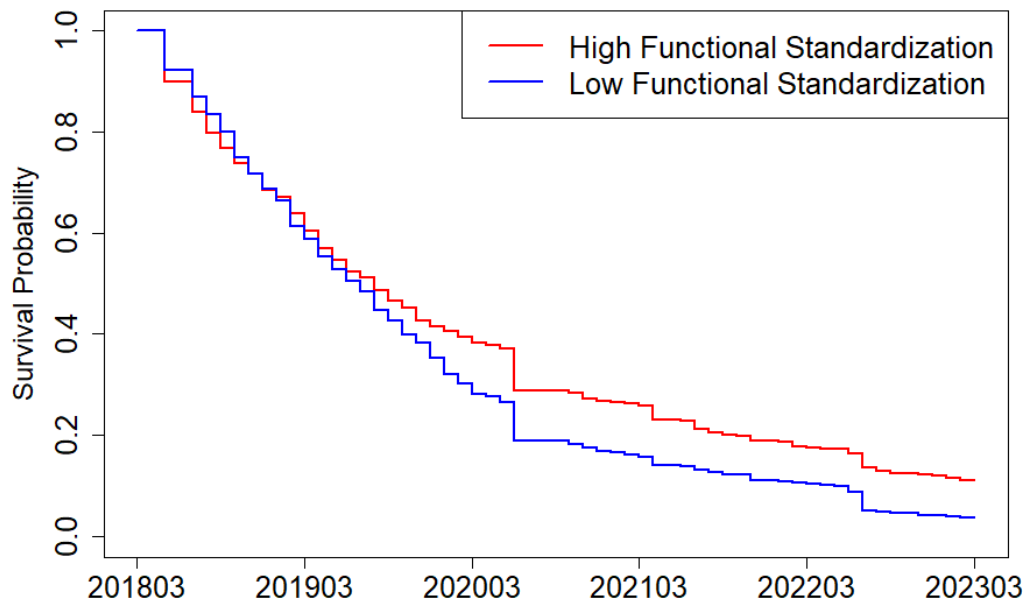


Figure 6. Kaplan-Meier survival curves for different levels of functional standardization

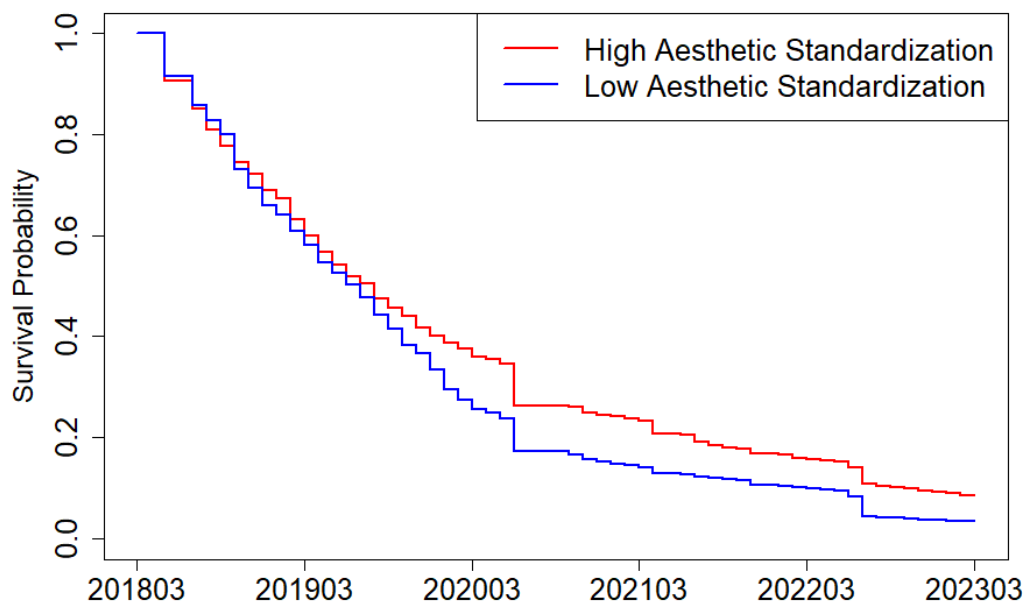


Figure 7. Kaplan-Meier survival curves for different levels of aesthetic standardization

The Cox regression models were subsequently estimated to identify the effects of standardization and the moderation effect of business size under different market conditions. We first estimate the models on the full dataset, with the results presented in Table 3. Then, we conduct separate analyses for the pre-COVID and during-COVID periods to identify the influence of changing market conditions (Table 4). In this step, as standardization degree and business size are both continuous, we standardize them to mitigate potential bias caused by multicollinearity. Additionally, variables including max guests, min nights, price, number of cumulative reviews, number of incremental reviews, review rating, and host tenure are log-

transformed to reduce data scale variability.

Overall, the models demonstrate good fit. The baseline model (model 1) achieves a concordance score of 0.746, indicating that it correctly predicts the order of survival times for approximately 74.6% of unit pairs. By including the key variables, the concordance score increases to 0.751. This shows an improvement in predictive accuracy. When separating the subsets, the concordance score is approximately 0.7 for the pre-COVID period and around 0.8 for the during-COVID period. The likelihood ratio tests and score (logrank) tests further validate the goodness-of-fit. Wald tests serve to confirm the significance of individual predictors.

In terms of coefficient interpretation, positive values indicate an increase in the hazard rate (i.e., a higher risk of exit), whereas negative coefficients suggest a decrease. The hazard ratios (HR) are also displayed, which provide a more intuitive understanding of the impacts. A value smaller than 1 indicates a reduction in the hazard rate, signifying improved survival prospects, while a value greater than 1 indicates an increased hazard rate, signifying higher risk of exit. As the key variables were standardized, the reported hazard ratios reflect the change in risk associated with a one standard deviation increase in each predictor.

Based on Model 1, which estimates the baseline model with only control variables, Models 2 and 3 progressively introduce the key variables and their interactions. Model 2 examines the effects of standardization in both functional and aesthetic dimensions. The results show that both types of standardization significantly reduce hazard rate, with negative coefficients of -0.143 and -0.060, respectively. The corresponding hazard ratio of functional standardization is 0.867, indicating a 13.3% reduction in the hazard rate for each standard deviation increase. Similarly, the hazard ratio of aesthetic standardization is 0.942, reflecting a 5.8% reduction in the hazard rate. These findings support H1, demonstrating that both functional and aesthetic standardization enhance unit survival. It indicates that the benefits of standardization observed in traditional service industries also apply to the professional hosts in the unique short-term rental context (Gemser & Leenders, 2001; Winter et al., 2012).

The benefits of standardization reflect the short-term rental sector's transition from pure home-sharing, which emphasizes personalization and flexibility, toward a more professionalized model prioritizing consistency, scalability, and streamlined operations (Dogru et al., 2020; Fan et al., 2023). It provides empirical evidence of the professionalization trend in the short-term rental sector from an strategic perspective (Zhang et al., 2023).

Model 3 examines the moderation effect of business size. The interaction terms produce

coefficients of -0.976 ($p < 0.001$) for functional standardization and -0.128 ($p < 0.001$) for aesthetic standardization. These results suggest that the benefits of standardization are amplified by business size. It reflects the ability of larger businesses to leverage standardization practices more effectively, likely due to heightened efficiency gains (Kaufmann & Eroglu, 1999). On the contrary, for small businesses, standardization may provide limited benefits or even intensify challenges, such as reduced flexibility (Grewal & Tansuhaj, 2001) and heightened concentration risks (Tang & Jang, 2011). Therefore, H2 is supported.

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Table 3. Cox regression results for the full dataset

	DV: Hazard Rate					
	Full Set					
	Model1		Model2		Model3	
	β	HR	β	HR	β	HR
Key Variables						
Functional Standardization			-0.143***	0.867	-0.271***	0.763
Aesthetic Standardization			-0.060***	0.942	-0.127***	0.881
Business Size			-0.167***	0.846	-0.320***	0.726
Functional Standardization * Business size					-0.297***	0.743
Aesthetic Standardization * Business size					-0.128***	0.880
Control Variables						
Max guests (log)	0.131***	1.140	0.099**	1.104	0.107**	1.113
Min nights (log)	-0.357***	0.700	-0.309***	0.734	-0.283***	0.754
Price (log)	0.111***	1.117	0.101***	1.106	0.099***	1.104
No. of total reviews (log)	-0.010	0.990	-0.031*	0.969	-0.031*	0.969
No. of incremental reviews (log)	-0.135***	0.874	-0.130***	0.878	-0.123***	0.884
Review rating (log)	-0.235***	0.791	-0.221***	0.802	-0.216***	0.806
Instant bookability	0.555***	1.742	0.497***	1.644	0.477***	1.611
Cancellation						
- Moderate	-0.060	0.942	-0.051	0.950	-0.070	0.932
- Strict	0.048	1.049	0.065*	1.067	0.037	1.038
- Super strict	-0.626*	0.535	-0.708*	0.493	-0.725**	0.484
Host tenure (log)	-0.481***	0.618	-0.418***	0.658	-0.420***	0.657

Response time	-0.041	0.960	-0.059**	0.943	-0.054*	0.947
Response rate (log)	-0.178***	0.837	-0.156***	0.856	-0.157***	0.855
Superhost	-0.226***	0.798	-0.269***	0.764	-0.269***	0.764
Region						
- Hong Kong Island	0.059	1.061	0.117	1.124	0.183*	1.201
- New Territories	0.983***	2.672	1.000***	2.718	1.059***	2.883
- Kowloon	0.010	1.010	0.067	1.069	0.112	1.119
Number of events	6,568		6,568		6,568	
Concordance	0.746 (se=0.003)		0.748 (se=0.003)		0.751 (se=0.003)	
Likelihood ratio test	5,635***		5,833***		5,993***	
Wald test	5,675***		5,852***		5,716***	
Score (logrank) test	7,328***		7,606***		7,625***	

Note: * p < 0.05, ** p < 0.01, *** p < 0.001. HR refers to Hazard Ratio.

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Table 4. Cox regression results for subsets (Pre-COVID and During COVID)

	DV: Hazard Rate							
	Pre-COVID				During COVID			
	Model4		Model5		Model6		Model7	
	β	HR	β	HR	β	HR	β	HR
Key Variables								
Functional Standardization	-0.043	0.958	-0.227***	0.797	-0.197***	0.821	-0.295***	0.745
Aesthetic Standardization	-0.031	0.969	-0.101***	0.904	-0.074***	0.929	-0.136***	0.873
Business Size	-0.004	0.996	-0.298***	0.742	-0.210***	0.811	-0.317***	0.728
Functional Standardization * Business size			-0.403***	0.668			-0.232***	0.793
Aesthetic Standardization * Business size			-0.130***	0.878			-0.120***	0.887
Control Variables								
Max guests (log)	-0.099	0.906	-0.086	0.918	0.264***	1.302	0.270***	1.310
Min nights (log)	-0.362***	0.696	-0.294***	0.745	-0.291***	0.747	-0.276***	0.759
Price (log)	0.131***	1.140	0.127***	1.135	0.072**	1.075	0.070***	1.073
No. of cumulative reviews (log)	-0.246***	0.782	-0.247***	0.781	0.032*	1.033	0.031	1.031
No. of incremental reviews (log)	0.023	1.023	0.036	1.037	-0.078***	0.925	-0.074***	0.929
Review rating (log)	-1.117***	0.327	-1.117***	0.327	-0.059	0.943	-0.056	0.946
Instant bookability	0.497***	1.644	0.455***	1.576	0.462***	1.587	0.450***	1.568
Cancellation								
- Moderate	-0.433***	0.649	-0.467***	0.627	0.157**	1.170	0.144**	1.155
- Strict	-0.301***	0.740	-0.340***	0.712	0.197***	1.218	0.179***	1.196

- Super strict	0.627	1.872	-0.625	0.535	-0.785	0.456	-0.808*	0.446
Host tenure (log)	-0.060	0.942	-0.121	0.886	-0.478***	0.620	-0.470***	0.625
Response time	-0.261***	0.770	-0.249***	0.779	0.018	1.018	0.020	1.020
Response rate (log)	-0.298***	0.742	-0.282***	0.754	-0.119***	0.888	-0.123***	0.884
Superhost	-0.681***	0.506	-0.682***	0.506	-0.132**	0.876	-0.133**	0.875
Region								
- Hong Kong Island	0.313*	1.368	0.419***	1.520	0.120	1.127	0.161	1.175
- New Territories	0.867***	2.380	0.929***	2.531	1.109***	3.032	1.153***	3.167
- Kowloon	0.397**	1.488	0.465**	1.592	-0.063	0.939	-0.032	0.969
Number of events	2,427		2,427		4,141		4,141	
Concordance	0.701 (se=0.006)		0.702 (se=0.006)		0.805 (se=0.003)		0.805 (se=0.003)	
Likelihood ratio test	1,446***		1,518***		4,920***		4,990***	
Wald test	1,518***		1,591***		4,709***		4,565***	
Score (logrank) test	1,710***		1,788***		6,559***		6,559***	

Note: * p < 0.05, ** p < 0.01, *** p < 0.001. HR refers to Hazard Ratio.

When comparing the results across two market conditions: pre-COVID and during COVID (Table 4), significant differences were identified. During the COVID period, Models 6 and 7 reveal clear benefits of standardization. In contrast, at the pre-COVID stages, the effects of standardization were insignificant when assessed independently (Model 4). It indicates that standardization is of great importance during the declining market, providing empirical evidence for H3.

However, when the interaction terms are included, the coefficients of standardization become significant (Model 5). This finding highlights the importance of alignment between business size and standardization in the growing market.

The insignificant coefficients in Model 4 may result from a mixture of positive and negative effects, where standardization benefits larger businesses but results in adverse outcomes for smaller ones. To determine the critical threshold at which standardization provides net benefits, we calculated the turning point. Specifically, it occurs when the benefits of standardization are offset by the discounts associated with business size, calculated by solving the equation: $-0.271 + (-0.403) * \text{business size} = 0$. The threshold occurs at -0.563 standard deviations from mean, equivalent to an original business size of 5.89. It indicates that functional standardization provides net benefits only for businesses with a size of 6 or more. This turning point can be observed in Figure 8, which visualizes the predicted hazard ratio under different degrees of functional standardization during the pre-COVID period.

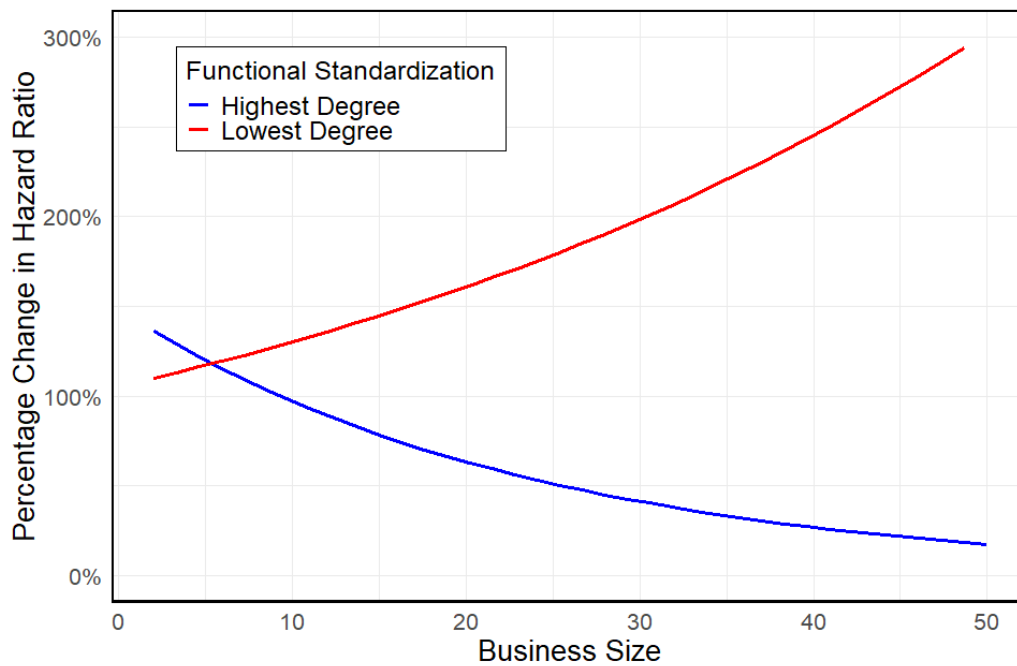


Figure 8. Predicted hazard ratio by business size under different degrees of functional standardization (Pre-COVID)

However, when calculating the turning point for aesthetic standardization, it yields a threshold of -0.992 for business size, which is equivalent to a negative value. This suggests a constantly positive effect of aesthetic standardization across varying business sizes. Figure 9 shows that the effect of high aesthetic standardization remains consistently lower in hazard ratio compared to low aesthetic standardization. However, the combined effect of aesthetic standardization is also insignificant, it may result from a curvilinear relationship, where the effects of aesthetic standardization initially decline to negative then rebound when business size grows. Future research could explore whether this nonlinear pattern exists and explore the underlying mechanisms.

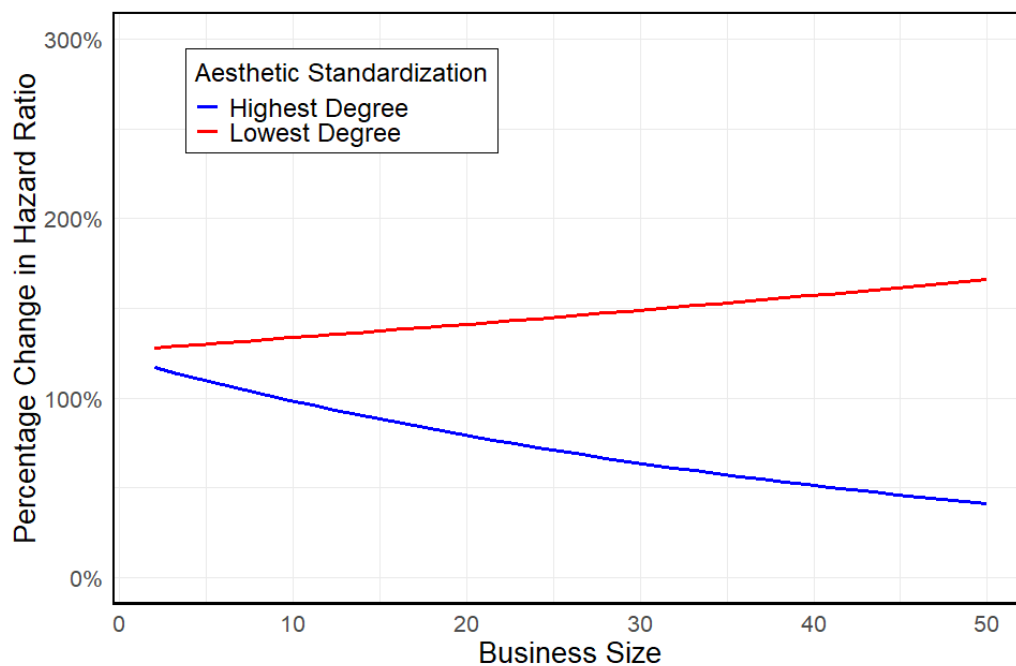


Figure 9. Predicted hazard ratio by business size under different degrees of aesthetic standardization (Pre-COVID)

Comparing the cox regression results across two market conditions (Models 5 and 7), the interaction between standardization and business size shows stronger positive effects in the growing market (-0.403 and -0.130) than in the declining one (-0.232 and -0.120). This further confirms that the alignment between standardization and business size is more critical in a growing market but becomes less important when market demand declines during COVID. Therefore, H4 hypothesizing the heightened moderation effect during market decline is rejected.

The varying importance of alignment between standardization and business size across market conditions is clearly observed in Figures 8 to 11. During COVID, the advantages of high standardization over low standardization emerged even for small businesses (Figures 10 and 11). It might be because the pandemic increases safety-related costs, such as more frequent sanitization of amenities and decorations, requiring businesses to reduce expenses through streamlined processes regardless of their sizes.

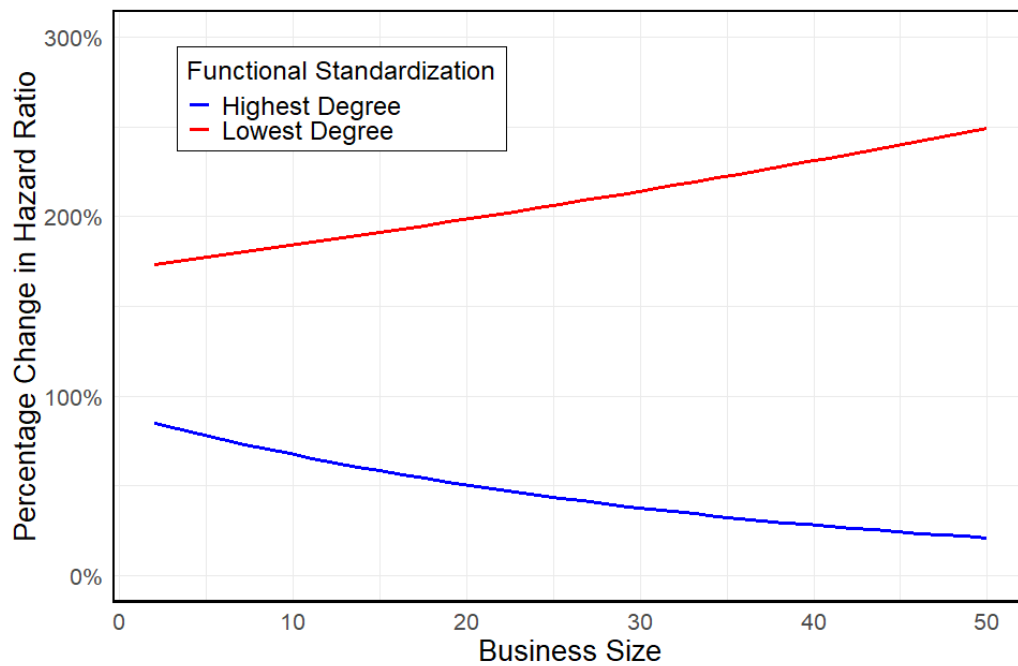


Figure 10. Predicted hazard ratio by business size under different degrees of functional standardization (During COVID)

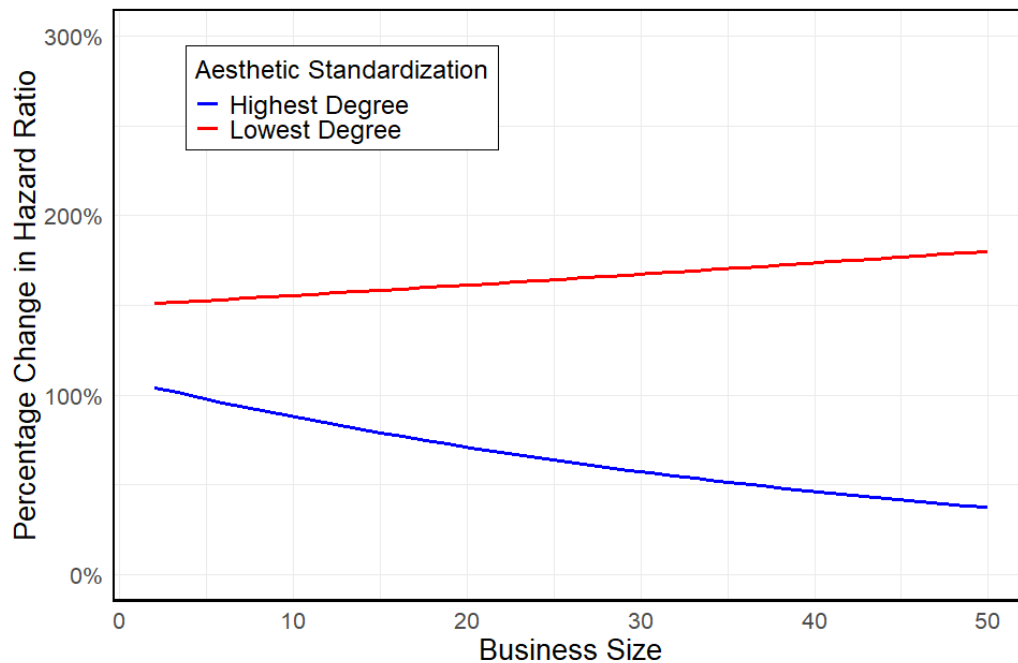


Figure 11. Predicted hazard ratio by business size under different degrees of aesthetic standardization (During COVID)

In addition, during COVID (Figures 10 and 11), the gap between high and low standardization does not expand dramatically with business size as it did at the pre-

COVID stage. It suggests that larger businesses benefit from standardization similarly to smaller businesses. In other words, standardization became beneficial during COVID with less dependence on business size. There are two potential reasons. First, the pandemic-induced market disruption made cost efficiency crucial for all businesses (Dolnicar & Zare, 2020), reducing the relative importance of size as a necessary condition to realize the benefits of standardization. Second, with the market becoming more concentrated by larger players (Bianco et al., 2025), larger businesses gained extra competitive advantages during the pandemic which reduced their reliance on standardization. As a result, moderating effect of business size diminished in the declining market. Future studies are recommended to explore if this decreased dependence is driven by pandemic-related costs or by the market concentration trend.

On the contrary, the alignment between standardization and business size was more pronounced at the pre-COVID stage. As is shown in Figures 8 and 9, both high and low standardization exhibit steeper slopes. It indicates that business size significantly determines the benefits of standardization. Although standardization works for larger businesses, its impact is minimal or even detrimental for small businesses. This highlights the need for hosts to be agile in adapting their standardization strategies to align with business size. The heightened importance of fit reflects the competitive pressures in a growing market. During COVID, such strategic pressure might be lessened by market concentration (Baum & Korn, 1996), as larger businesses gained more control.

When comparing the two dimensions of standardization, standardizing functionalities (Figures 8 and 10) shows a greater chance of benefits than standardizing aesthetics (Figures 9 and 11). It might be because the maintenance of functionalities requires more operational costs, therefore, standardizing these aspects leads to greater benefits, which ultimately contribute to higher competence. In contrast, aesthetic standardization may involve higher upfront costs but does not require that much continuous input over time. In addition, aesthetic design is more influenced by shifting trends, intensifying the challenges of inflexibility associated with standardization, whereas utilitarian preferences toward functionality remain relatively stable.

Control variables, such as minimum nights, price, instant bookability, response rate, and superhost, yield results consistent with previous studies (Fan et al., 2023; Kourtiti et al., 2022; Leoni, 2020). However, there are also variables demonstrating significant differences across two market conditions, such as maximum guests, number of cumulative and incremental reviews, review rating, and cancellation policy. For

maximum guests, our finding aligns with Hu et al. (2025), indicating that property capacity negatively affects unit survival during COVID, while this effect is weaker in the pre-COVID period. In contrast, the effect of review rating identified in this study differs from prior findings. While Hu et al. (2025) reported a stronger positive effect, we find that review rating has an insignificant impact on survival during COVID. This deviation may be attributed to our sample focus on professional hosts. Future studies could further explore how host type moderates the signaling value of review ratings, particularly under varying market conditions.

Another interesting finding is the effect of the number of incremental reviews, which can serve as the proxy for listing-specific demand. The results show that during the COVID period, higher incremental reviews reduced the likelihood of market exit, indicating that units with high popularity were more likely to survive. However, this effect was insignificant in the pre-COVID period. This suggests that in a growing market, even listings with high demand might be strategically closed by professional hosts, which reflects active market exits for proactive portfolio management. Future research could further investigate the motivations behind such strategic exits and explore more precise methods to distinguish between active and passive market exit.

For robustness check, we also conducted an Accelerated Failure Time analysis, which takes survival time as the dependent variable (Wei, 1992). The model assumes a specific distribution for the survival times. For this analysis, we use the Weibull distribution, which is flexible and commonly used in previous studies (Cader & Leatherman, 2011). A positive coefficient indicates an increase in survival time, implying a reduced risk of market exits. The results are displayed in Appendix B, validating that the findings of this research are stable and consistent across different modeling approaches.

6. Implications and Limitations

This study examines the influence of standardization and business size on the survival of short-term rental units under varying market conditions. The empirical findings validated the benefits of standardization. It is also confirmed that standardization is more effective for larger businesses. In addition, standardization becomes more important in general during COVID regardless of business size, signifying the declined importance of business size for achieving the benefits of standardization. The results provide valuable contributions to understanding survival dynamics within the short-term rental market.

Theoretically, this study advances the understanding of strategic management in the short-term rental market by examining inter-unit coordination, which complements previous studies mainly focusing on individual listings or macro environments (Deboosere et al., 2019; Fan et al., 2023; Kourtiti et al., 2022; Leoni, 2020). This meso-level perspective sheds light on the unique challenges and opportunities confronted by professional hosts. The findings reveal how economies of scale manifests through standardization, which help explain why professional hosts excel in business competence and resilience (Kwok & Xie, 2019). It encourages future research to explore other coordination strategies across multiple units, further facilitating our understanding of host professionalization in this evolving market.

Moreover, it enriches tourism literature by reflecting the professionalization trend of short-term rentals from a strategic lens. Previous studies have primarily examined professionalization focusing on what host operate, such as the number and type of properties (Chen et al., 2023; Fan et al., 2023), whereas this research shifts the focus to how hosts operate, emphasizing strategic practices. This marks a shift in the short-term rental sector from the original home-sharing model, which offered unique experiences, to a more replicable and efficiency-driven mode (Dogru et al., 2020).

The research also contributes to strategic adaptation literature by demonstrating how the interplay between strategy, firm internal context and external environment influences firm survival. It highlights the importance of adapting business strategies based on both internal features (i.e., business size) and external market conditions (i.e., COVID crisis). The results also reveal that alignment between business size and standardization tends to vary with market conditions, reflecting how environmental disruptions shift the strategic landscape for firms. The declined importance strategic fit during the COVID stage also emphasizes that studies analyzing market condition should consider the joint influences of resource munificence, market concentration, and unique challenges posed by the crises.

From a practical perspective, the study offers valuable insights for short-term rental practitioners, online platform managers, and policymakers. It provides short-term rental professional hosts with efficient and adaptive strategies. They are recommended to standardize their aesthetic designs regardless of business size or market conditions. However, in the functional dimension, hosts need to align business size with appropriate levels of standardization to enhance unit survival. This match between business size and standardization is particularly importance in a growing market dominated by small players. For almost half of them with business sizes smaller

than 6, it is recommended to diversify their offerings in functionalities. In contrast, larger businesses are suggested to enhance inter-unit consistency.

For online platform providers like Airbnb, these findings can inform platform coordination. Platforms could offer features that facilitate standardization strategies, such as tools to easily replicate successful units or analytics to gauge customer preferences across different properties. Additionally, this study can help platforms craft policies that support hosts in navigating market fluctuations, further promoting a stable and thriving short-term rental ecosystem. Moreover, it also contributes to policy-making discourse, presenting actionable insights for stabilizing short-term rental markets amid environmental disruptions such as a pandemic.

There are some limitations constraining this study. A major limitation lies in the scope of our sample selection. The hypotheses are tested using data from a single city, Hong Kong, which introduces an element of geographical bias, as it may happen with every sample, considering that local tourism idiosyncrasies could influence the survival patterns of short-term rentals. As such, we suggest future studies to incorporate data from a broader array of cities to re-evaluate the relationship between standardization and survival in different contexts. Furthermore, this study includes only region dummies to account for locational heterogeneity. Future research is encouraged to revisit this topic when more scalable Bayesian Spatial Survival Models become available to better capture fine-grained spatial spillover effects.

Additionally, our investigation focused on general market condition, specifically concerning the COVID pandemic. More nuanced demand status for each specific listing also exerts substantial influence on survival pressure, offering additional insights into short-term lease hosts' behaviors. Therefore, we recommend that future research reassess this topic by incorporating different levels of demand conditions. Moreover, this study focuses on two contrasting market conditions of growing versus declining without examining more stable periods. Future research could investigate how the effects of standardization strategies manifest in more stabilized contexts.

Moreover, variations in customer types may also shape the effectiveness of standardization strategies, as different traveler segments (e.g., business vs. leisure) may hold distinct preferences. Future studies could explore how these demand-side differences interact with host strategies to influence unit survival. Lastly, competition within the short-term rental market does not operate in a vacuum. It also involves interplay with hotels and long-term rentals. Understanding the dynamics between

long-term rental, short-term rental, and hotel supplies could provide richer insights and add an intriguing layer of complexity to this field of study. Consequently, we urge future research to explore these potential interactions.

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