

Hotel Pricing Strategies in Miami's Brickell and Coral Gables Neighborhoods

by

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This thesis was prepared under the direction of the candidate's thesis advisor, Dr. Warren Wm. McGovern, and has been approved by the members of her supervisory committee. It was submitted to the faculty of The Honors College and was accepted in partial fulfillment of the requirements for the degree of BS in Biological/Physical Sci - Data Analys.

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## ABSTRACT

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In this thesis, titled “Hotel Pricing Strategies in Miami’s Brickell and Coral Gables Neighborhoods,” various statistical techniques and data analytics were employed to examine the current hotel industry in Miami’s Brickell and Coral Gables neighborhoods. The central research question examines the prevalence of dynamic pricing in this hotel sector and attempts to identify the most cost-effective time to book hotel rooms in these neighborhoods. The initial hypothesis sought to be proven or disproven is that dynamic pricing is widely used in the hotel industry, meaning there will be a specific time for cost-effective bookings. Moreover, this thesis sought to uncover how hotels in these neighborhoods set their prices for select dates and attempt to categorize them by revenue management techniques. While the research provides insights into the hotel pricing strategies in Brickell and Coral Gables, it acknowledges its limitations due to the sample size and the duration of data collection. These constraints prevent broad generalizations about Miami’s entire hotel market.

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# Chapter 1: Introduction

This chapter introduces the history, uses, and implications of pricing strategies in the hospitality industry. Specifically, dynamic pricing, yield management, and revenue management are discussed in detail to set the stage for the research portion of this thesis. By reviewing past literature on pricing tactics and discussing the Miami hotel market, this section will provide background on the factors that influence the pricing of the selected 19 hotels discussed in the evidence section.

## Section 1.1: Dynamic Pricing

The first crucial contribution to dynamic pricing was introduced in the 19th century by Antoine Augustin Cournot in his mathematical models of pricing problems. According to Den Boer (2015), Cournot identified the optimal selling prices for the price-demand relation of products in this model. He proved that to find the price that generates the most revenue, the slope, or derivative, of when the revenue curve hits zero must be calculated. If this relationship forms a concave shape, there is only one optimal price ([4] Den Boer, 2015). Moreover, Cournot introduced the concept of elastic demand, meaning, due to the nature of demand and pricing, as price increases, demand usually decreases, but the revenue only sometimes decreases.

In the 19th century, Cournot's findings were not widely accepted and were not revisited for several decades; however, with the introduction of the digital age, his original model, which was static and focused on quantity decisions in a duopolistic market setting, continued to be researched and improved ([4] Den Boer, 2015). These improvements included dynamic models which incorporated time, as the introduction of computing severely impacted dynamic pricing. Data could be collected at a rate that allowed for the actual application of dynamic pricing rather

than just models. The faster rate of data collection combined with personalized algorithms and the ability to reference past data caused dynamic pricing to emerge as excellent choice for businesses looking to implement a pricing model ([18] Priester, 2020).

When dynamic pricing was first implemented in the 20th century, it operated on a few fundamental principles. The central strategy of dynamic pricing utilizes algorithms, such as reinforcement learning, decision trees, and bayesian model, and data analytics, which allows businesses to analyze economic factors influencing pricing ([6] Dynamic pricing models: Types, algorithms, and best practices., 2024). The algorithms are designed to quickly intake vast amounts of data and transform it into business insights that respond to market signals. Dynamic pricing begins with data collection; this data can become knowledge that goes into sales transactions, market trends, customer behavior, and various business insights. It is then analyzed to extract information about optimal pricing strategies and how pricing will affect demand and sales outcomes. The algorithms continue to learn by adjusting strategies and collecting new data ([4] Den Boer, 2015).

Many experts in the hospitality industry have adapted the principles of dynamic pricing to meet the unique needs of selling hotel rooms, and dynamic pricing has now become widely used in the hospitality industry, according to Talon-Ballester et al. (2022). A specific sector of the hospitality industry drives hotel room pricing, referred to as hotel revenue management (RM); RM has evolved immensely with the introduction of new technology and has been characterized by the implementation of open pricing and one-to-one pricing, which are subsets of dynamic pricing ([22] Talón-Ballester, 2022). Moreover, RM is a broader discipline that aims to maximize revenue and encompasses dynamic pricing.

Overall, the progression from the foundational principles outlined by Cournot to today's customer-centric pricing strategies outlines the impact of dynamic pricing on the hospitality industry. It is widely accepted that dynamic pricing is a predominate pricing strategy used by most hotels, as it is the best way for hotels to optimize revenue and enhance the booking experience. There are numerous third-party providers of algorithms on the internet that advertise to hotels to assist in harnessing the power of dynamic pricing. These partners offer revenue management systems that use real-time market data to automate pricing decisions. Ultimately, it is up to the hotel to decide how to price its rooms competitively. Still, with the said benefits of dynamic pricing, it is likely that most hotels would choose to become more data-driven and efficient.

## **Section 1.2: Yield Management**

This thesis will now discuss a broader strategy in which dynamic pricing is pivotal – Yield Management. While this thesis does not seek to uncover if the selected hotels are using yield management techniques due to being unable to access important operational data and decision-making processes, it is essential to recognize the framework in which dynamic pricing plays a role. Yield management, according to Donaghy (1995), is a profit maximization strategy that the hotel industry has adopted by adjusting room prices in response to demand, within the constraints of relatively fixed room capacity.

Yield management tactics are known to have been first used by the airline industry following deregulation in the 1970s. In this sector, yield management attempts to identify which seats are the hardest to sell according to historical demand patterns and then prices those seats at discounted rates. This causes the last available seats on a flight to be sold at higher prices, maximizing revenue as the day of the flight approaches and demand increases. Furthermore,

yield management, which has evolved from the airline industry, is now a strategic approach applied in various industries for controlling supply and demand to maximize revenue ([5] Donaghy, 1995).

In the hotel industry, yield management aims to maximize profit by adjusting room prices in response to changing demand for a relatively fixed number of rooms. Moreover, it looks at demand fluctuations and attempts to align pricing strategies to ensure room prices reflect market conditions. While yield management and dynamic pricing appear similar, yield management accounts for more than just real-time pricing adjustments based on supply and demand. Yield management evaluates other elements, such as current occupancy levels, to adjust room prices for profit maximization ([5] Donaghy, 1995).

According to Owusu Boahen et al. in their analysis "Assessing the Benefits of Yield Management in the Hospitality Industry in Kumasi Metropolis of Ghana," the core strategies of yield management in the hospitality industry are inventory management, overbooking practices, duration control of stays, and pricing differentiation. Together, these strategies work to fill occupancy rates and do so at the best possible price. This maximizes the hotel's revenue and reflects customer value. Yield management allows for room rates to be dynamically adjusted while analyzing factors such as operational capacities and consumer patterns. Yield management works best under a specific set of conditions; when there is fixed capacity, market segmentation, fluctuating demand, perishable inventory, and considerable fixed cost – yield management is a great strategy to implement ([3] Boahen, 2013).

Boahen demonstrated the impact of yield management on a specific region's hospitality industry, Kumasi Metropolis of Ghana. In Kumasi, yield management increased cost savings, productivity, operations, and revenue, which could be seen through increased cash flow,

reductions in operation costs, and improvements in the hotel's performance. Additionally, the study detailed the importance of using advanced technology and implementing staff training in the technology for yield management to be a successful strategy ([3] Boahen, 2013).

### Section 1.3: Revenue Management

Transitioning from the application of yield management as explored by Boahen in the context of Kumasi's hotel sector, the broader realm of Revenue Management (RM) will now be discussed. To provide an overview – dynamic pricing is one facet within the larger realm of yield management, which, in turn, is encompassed within the even broader expanse of Revenue Management. While dynamic pricing focuses on adjusting room rates in real-time based on market conditions and yield management takes it a step further by balancing available rooms and pricing, revenue management is the larger term that dynamic pricing and yield management fall under, along with other pricing strategies.

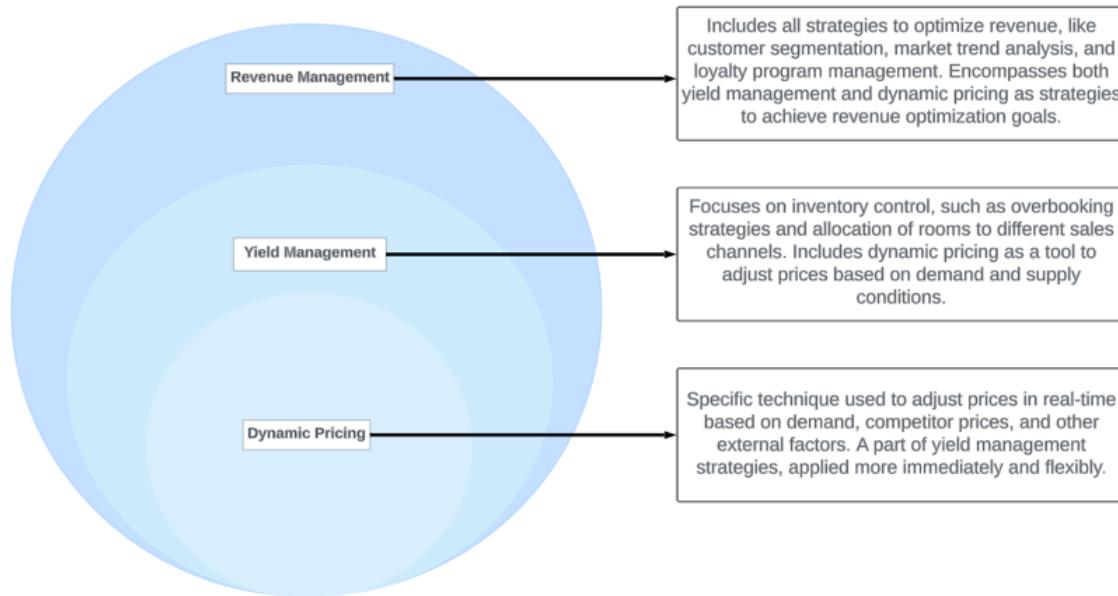


Figure 1: Diagram of encompassment of revenue management, yield management, and dynamic pricing.

In the past, RM was based on a static model, meaning all hotel rooms were sold at a set price depending on factors such as the season. However, open pricing in the hotel industry has allowed hotels to dynamically adjust pricing to match rates with fluctuating demand levels and price different room types accordingly. Additionally, hotels can eliminate restrictions such as length of stay and attract more customers, ultimately maximizing revenue and filling hotel rooms. One-to-one pricing takes dynamic pricing a step further, allowing more personalization of pricing derived from customer data. It customizes prices to individual guests and considers their booking preferences, history, and value. This strategy aims to build a long-term connection between the guest and the hotel, increasing profits and returning customers ([22] Talón-Ballesteros, 2022).

RM in the hospitality sector can be structured in a few ways, including in-house operations, corporate oversight, or third-party outsourcing. RM teams decide and implement pricing strategies, meaning they can vary by hotel. Hotels decide on different RM strategies based on size, scale, and preference, each offering different advantages. In a study by Altin et al. (2017), it was proven that hotels using corporate revenue management strategies rather than in-house or third-party showed superior financial performance. This means that flexible strategies may be needed to maximize revenue for different types of hotels. Furthermore, a stable RM system requires the flexibility to adjust prices in response to market demands and leverage broader market insights through different channels. The chosen implementation strategy will influence a hotel's ability to use dynamic pricing strategies, impacting their revenue optimization ([2] Altin, 2017).

Building on the understanding of RM strategies, reference prices play an important role in dynamic pricing scenarios implemented by RM. Reference prices, as investigated by Viglia et

al. (2016), are consumer expectations that serve as benchmarks for their individual evaluation of the fairness of prices against historical prices and competitive offerings; however, they are not static, as they are dynamically shaped by the consumer's previous room rates and the market rates set by competition. Additionally, the study showed that consumers' reference prices are highly reliant on the sequence of price adjustments made by the hotels. The pattern of price adjustments made over time can shape consumers' expectations and willingness to pay, as it causes a sense of predictability or unpredictability for the pricing ([28] Viglia, 2016).

Some RM teams may choose to refrain from implementing dynamic pricing strategies as it could cause customers to view the hotel as unfair. Supporting this claim, Viglia et al. proved that as hotels adjust prices to account for competing hotels, customers' reference prices decrease. This means that customers may view dynamic pricing as unfair, and hotels must carefully choose how to implement dynamic pricing to increase revenue but maintain customer loyalty. Furthermore, understanding how price adjustments and competition affect reference prices is crucial in revenue management, as hotels need to carefully consider how dynamic pricing will be perceived in their sector.

#### **Section 1.4: Miami's Hotel Industry**

This section aims to provide an overview of Miami's hotel market, introducing important background information to frame the study. With Miami's significant growth from a post-WWII destination to a tourism hub, Miami's tourism market allows for an interesting backdrop. Narrowing the focus to the Coral Gables and Brickell neighborhoods, insights are offered into how these areas capitalize on Miami's tourism landscape and their appeal. This overview aims to introduce the history of the Miami neighborhoods where the hotels researched in this thesis reside.

The tourism market in Miami has changed drastically in the past century. Looking back to post World War II, Miami was notably a leisure destination for tourists and retirees that flocked to the warm weather and beaches, attracting around two million visitors a year by 1940 ([16] Mohl, 1982). At this time, Miami began to emerge as a primary tourist destination, and the economy began to be shaped by the abundance of new visitors. This caused an increase in hotel construction, particularly in Miami Beach, where the number of hotels increased by nearly 100 new hotels in around 13 years. The increased supply of hotels caused an increase in tourists, reaching 5.5 million by 1960 and more than doubling by 1980. Tourism became central to Miami's economy, particularly as Miami began to see international visitors from Europe and Latin America in 1945 as City officials promoted air travel to Miami ([16] Mohl, 1982).

The Coral Gables neighborhood was chosen for this thesis as it represents a unique but also common hotel market. Its commonality as a suburb reflects the typical needs of the suburban hotel market. However, Coral Gables stands out due to its proximity to major tourism hot spots, rich heritage, and status as a residential yet commercial area. Michelle A. Sebree (1990) established that Coral Gables was planned by George Merrick in the 1920s. He wanted to design a suburb that combines homes, businesses, and leisure in a Mediterranean Revival style. He drew inspiration from Spanish, Italian, and Moorish styles, featuring plazas, fountains, and landscapes that catered to an upscale living experience. Coral Gables became what Merrick envisioned and began to draw in travelers seeking the modern charm mixed with the historical appeal Coral Gables offered. Though Coral Gables has evolved from the 20s and now features higher-density construction, it still maintains a thriving hotel market that caters to tourist and business sectors ([20] Sebree, 1991).

Similarly, the Brickell neighborhood was selected due to its unique position in the market. Brickell has developed into a significant business district – attracting business-related tourists and high-class travelers from across the globe. In Paul S. George and Casey Picketts' novel, Miami's Brickell Avenue Neighborhood, the Brickell neighborhood was said to have once been a 'subtropical wildness' that has developed into a neighborhood of tourist attractions and single-family homes in the last 150 years. The Brickell neighborhood was first sought after in 1871 by William and Mary Brickell, who set down roots next to the Miami River and opened a busy trading post. Over time, Brickell continued to develop, and through the 1980's to early 2000's, skyscrapers, condos, and financial centers began to be built. By the early 2000s, Brickell established its place in the market as a central business district, residential area, and entertainment spot ([8] George, 2020).

Miami is known for its significant tourism; according to Visit Florida, it is currently a top destination for international and domestic visitors. The influx of diverse visitors allows for a tourism-driven market that plays a crucial role in the local economy. Therefore, it could be hypothesized that Miami hotels would utilize dynamic pricing models to optimize revenue and provide better customer experiences. Overall, this research will glimpse the selected revenue management strategy, dynamic pricing, for a central tourism hub, highlighting how other tourism-driven markets may implement pricing strategies.

### **Section 1.5: Coral Gables and Brickell Hotels**

This section will highlight the diverse hotel market of Miami, focusing specifically on the hotels in this study. While this thesis encompasses 19 hotels, not all are mentioned within this section. An emphasis is placed on the hotels with a rich history in Miami that have helped shape the area's hotel landscape or new construction within the hotel market. While only selected

hotels will be mentioned for their significance and history in this section, a comprehensive sentiment analysis has been performed on 18 of the 19 hotels in a later section. The sentiment analysis results give an overview of how guests feel about each hotel.

The first hotel to be discussed is the AC Hotel by Marriott Miami Brickell, a newer construction launched in 2022 by Robert Finvarb Companies and Concord Hospitality in the Brickell neighborhood. The modern 22-story complex features 156 total rooms. A key highlight of the hotel is its rooftop pool, fitness center, and event space, designed for both business and leisure travelers. The AC Hotel is part of a dual-branded complex that shares its space with the Element Miami Brickell; both are individual entities but are intertwined to blend the local urban area and experiences of luxury. The AC Hotel side is distinguished by its lobby, whose architecture features dark stone, masculine artwork, and warm wood. It is designed to contrast the natural light and openness of the Element Miami Brickell and enhance the distinct personalities of each hotel ([7] East, Miami serves as Anchor Hotel for brickell city centre – ... , n.d.).

According to the Pinnacle Advisory Group, the introduction of the AC Hotel by Marriot Miami Brickell into Miami's landscape offers a model case of the economic contributions new hotel constructions can bring to a city. Through direct impacts, including revenue from the hotel's operations and employment for various staff positions, the construction of new hotels helps advance local economies. Fiscal impacts from new hotels, like the AC Hotel, help support new public amenities and help to improve infrastructure. They can also have indirect impacts, such as advantages for local businesses and contractors ([24] The economic impact of Hotel Development, 2015). Furthermore, as discussed by Acquisition International, the development of the AC Hotel invites competition, which encourages other developers to invest in the area and

diversify the hospitality offerings. Overall, constructing a modern hotel like the AC Hotel is a strategic investment that can benefit Brickell and Miami ([25] The economic impact of Hotel Development, 2020).

EAST Miami Hotel, which opened in May 2016, is another significant development in Miami's Brickell neighborhood and was a part of the Brickell City Centre project by Swire Properties. This project, valued at \$1.05 billion and spanning 5.4 million square feet, marked the first venture of the Hong Kong-based Swire Hotels brand in the United States. EAST Miami was designed to offer a unique and modern feel and includes 352 rooms. The hotel's architecture and design were led by the Miami-based firm Arquitectonica, with interiors by Los Angeles-based Studio Collective, emphasizing modern and traditionally styled blended buildings. EAST Miami offers unique features like a rooftop bar and garden as well as restaurants like Sugar and Quinto La Huella.

Similarly to the AC Hotel, the construction of EAST Miami also demonstrates the importance of new construction to a neighborhood. However, EAST Miami stands out as it has partnerships with local businesses, such as Panther Coffee and the YoungArts Foundation, which enhances guest experiences and contributes to the visibility of local businesses. Partnerships like this can lead to growth opportunities for local businesses as they provide a platform to reach customers beyond their traditional market. Also, hotels prioritizing local partnerships are often seen as more integrated in their communities, and EAST Miami demonstrates a shift towards social responsibility (SOURCE). Another significant contribution of EAST Miami is the increase in jobs for Miami residents, as they have employed hundreds of local residents while transitioning higher-level staff from their Hong Kong properties to ensure the hotel is successful.

The following hotel to be discussed is a boutique hotel in Coral Gables called Hotel St. Michel. Unlike the newer constructions discussed previously, the building was initially developed in the 1920s and operated as a retail and office building under Karp. The offices were eventually converted into hotel rooms as the building transitioned into The Hotel Sevilla. Following the conversion into a hotel, in 1979, the building was purchased by Stuart Bornstein and Alan Potamkin and renamed Hotel St. Michel. Anthony Zink designed the building and saw extensive renovations in 1979; however, original pieces, such as the brass manual controlled elevator, still reside. Hotel St. Michel offers 28 unique rooms for guests, each with its own style, and the fine-dining restaurant Zucca Ristorante on the first floor ([1] About: Miami Florida hotel st. michel. , n.d.).

Boutique hotels like Hotel St. Michel can add charm and value to the local neighborhood. According to Wheeler IV, in his paper "Understanding the Value of Boutique Hotels," boutique hotels are essential to preserving the history of a city as they make adaptive use of historical landmarks, which, in turn, allows the revitalization of buildings that may appear outdated. Additionally, boutique hotels can lead to innovation within the hotel industry, as they do not fit the mold of a typical hotel. This can cause niche markets within the hospitality industry and encourage competition among traditional hotels. Wheeler also mentioned that boutique hotels are becoming increasingly popular, which means they are evolving to customer preferences and helping shape the market ([29] Wheeler, 2006).

Hotel Indigo Miami Brickell is an IHG owned Boutique hotel in Miami's Brickell neighborhood near Brickell City Centre. Hotel Indigo was opened in 2020 and features 140 rooms. The hotel was designed by Angel Sanchez, an architect and fashion designer from Coleman+Sanchez Studio. The Hotel Indigo chain is known for its architectural style, which

attempts to fuse past and present by incorporating the history of neighborhoods throughout its design style. This specific hotel location is in Brickell, so they took inspiration from an archaeological site near the hotel. The site was found to be inhabited by the Tequesta people, who were the earliest known inhabitants of the Brickell neighborhood 2000 years ago. The ancient site can be seen in the artwork and style of the hotel, as Hotel Indigo is inspired by the history and people that make up each neighborhood ([17] Pet-friendly boutique hotels in Miami: Hotel Indigo Miami Brickell., n.d.) ([23] The Art of Design: Hotel Indigo infuses spaces with unexpected ... , n.d.).

Due to Hotel Indigo's design and conception, it could be classified as a lifestyle hotel. According to Kosar in their paper on "Lifestyle Hotels – New Paradigm of Modern Hotel Industry," a lifestyle hotel is defined as a hotel that "combines living elements and activities into functional design, giving guests the opportunity to explore the experience they desire (44)." Moreover, a lifestyle hotel uses art and design aiming to offer guests an immersive experience that integrates living elements and activities. By drawing inspiration from the site of the indigenous Tequesta civilization, the hotel offers guests a unique connection to the local history and culture of the Brickell neighborhood ([23] The Art of Design: Hotel Indigo infuses spaces with unexpected ... , n.d.). This can make guests feel connected to the hotel and shows that Hotel Indigo was designed with a socially responsible conscience, as it is clear they researched the area before attempting to profit from it ([14] Kosar, 2014).

Finally, the last hotel for discussion is the Biltmore Hotel in Coral Gables – arguably the most well-known hotel in this study. The Biltmore Hotel has a vibrant history in Coral Gables; starting in 1924, George E. Merrick joined forces with hotelier John McEntee Bowman to create a prominent landmark in Merrick's newly envisioned city. Fourteen months and 10 million

dollars later, the Biltmore Hotel opened its doors in 1926. The Biltmore operated as a hotel for two decades, until WWI and WWII, when it was converted into an Army Air Forces Hospital and then the University of Miami's School of Medicine. Operations continued until 1968, when the Biltmore shut down; the building remained empty aside from a failed restoration of the hotel. Finally, in 1992, the Biltmore was returned to the standards of its past glory when Gene Prescott of Seaway Hotels Group took control of the property and invested 10-years and \$40 million into renovations ([10] Hotel deals coral gables: Miami florida hotel deals. , 2024).

The Biltmore Hotel is now registered as a historical landmark and is known as an upscale resort. It is home to the Biltmore Golf Course, designed by Donald Ross, seven estate restaurants, a tennis club, a spa, and even afternoon tea. The Biltmore prides itself on being a symbol of sophistication and provides grounds for many extravagant events, such as weddings. Like the Hotel St. Michael, though on opposite ends of the pricing spectrum, the Biltmore Hotel represents the critical history of Coral Gables and blends modern amenities with old history ([10] Hotel deals coral gables: Miami florida hotel deals. , 2024).

Overall, this section has explored a diverse set of 5 hotels that contribute to the Miami hotel market and details the contributions of hotels to the city's economic, cultural, and architectural makeup. From new developments like the AC Hotel by Marriott Miami Brickell and EAST Miami, which show the city's inclination towards innovation and economic expansion, to history embodied within Hotel St. Michel and the iconic Biltmore Hotel, modern developments and tradition shape the Miami hospitality industry. The diversity of establishments means that Miami can cater to many types of travelers, and tourism can further boost the city's economy. Additionally, this section shows the relationship between a community and its hotels, showing how the success of one is connected to the success of the other.

## Section 1.6: Amenities

Amenities are crucial in determining the range at which hotels can set their prices. Moreover, hotels must consider various factors, such as size, age, location, and corporate chains, to set prices in a range that customers deem fair and reasonable. The amenities can also shape hotels' pricing strategies to optimize revenue and remain competitive. According to Hung et al. (2010), one of the more critical determinants of hotel room pricing is the hotel's size. Larger hotels with more rooms give consumers the assumption that more amenities and services will be offered than a smaller competitor. This assumption that more amenities will be provided allows larger hotels to charge higher prices and prove the added value to the customer ([11] Hung, 2010).

A hotel's age is also a significant determinant of hotel pricing. Hung et al. found that the age of a hotel negatively affects room rates, meaning older hotels may not be able to charge as much due to the assumption that they have a lack of modern amenities. This insufficiency can cause customers to expect adjustments in pricing, so they feel they are getting the correct value for their money. Hung et al. specifies that this is particularly the case for hotels categorized as high-end ([11] Hung, 2010).

Amenities significantly determine a hotel's pricing strategy, and the range room rates can be set. Customers are willing to pay different rates based on the amenities offered, such as basic in-room features or luxury services. The type of amenity can directly impact how guests perceive the hotel. Kim et al. 2017 proves that hotels that use sustainable practices and modern amenities are increasingly appealing to guests and can charge higher room rates ([13] Kim, 2017). Hotels and RM teams must consider what is essential to their sector of guests and the type of customer

they are trying to bring in the door, so they can offer the corresponding amenities to have justifiably higher room rates.

Top 10 most useful hotel amenities (N=565).

Amenities	Total	Gender		Ethnicity			Trip purpose		Type of hotel		
		Female	Male	Caucasian	Asian	Others	Leisure	Business	Luxury	Mid-priced	Economy
Wi-Fi/Internet	105(18.6%)	40(14.1%)	65(23.1%)	58(20.4%)	35(17.6%)	12(14.6%)	76(17.0%)	28(24.3%)	45(19.8%)	55(19.9%)	5(8.1%)
Bed	104(18.4%)	56(19.7%)	48(17.1%)	52(18.3%)	35(17.6%)	17(20.7%)	77(17.3%)	26(22.6%)	36(15.9%)	53(19.2%)	15(24.2%)
Washroom	38(6.7%)	19(6.7%)	19(6.8%)	16(5.6%)	14(7.0%)	8(9.8%)	32(7.2%)	5(4.3%)	12(5.3%)	19(6.9%)	7(11.3%)
Television	32(5.7%)	16(5.6%)	16(5.7%)	17(6.0%)	14(7.0%)	1(1.2%)	29(6.5%)	3(2.6%)	10(4.4%)	19(6.9%)	3(4.8%)
Shower	22(3.9%)	10(3.5%)	12(4.3%)	11(3.9%)	7(3.5%)	4(4.9%)	18(4.0%)	3(2.6%)	10(4.4%)	9(3.3%)	3(4.8%)
Swimming pool	19(3.4%)	8(2.8%)	11(3.9%)	10(3.5%)	4(2.0%)	5(6.1%)	15(3.4%)	4(3.5%)	12(5.3%)	6(2.2%)	1(1.6%)
Bath amenities	17(3.0%)	11(3.9%)	6(2.1%)	8(2.8%)	5(2.5%)	4(4.9%)	13(2.9%)	4(3.5%)	6(2.6%)	8(2.9%)	3(4.8%)
Hair dryer	15(2.7%)	12(4.2%)	3(1.1%)	7(2.5%)	8(4.0%)	0(0.0%)	13(2.9%)	2(1.7%)	4(1.8%)	7(2.5%)	4(6.5%)
Shampoo	14(2.5%)	8(2.8%)	6(2.1%)	6(2.1%)	5(2.5%)	3(3.7%)	12(2.7%)	2(1.7%)	4(1.8%)	7(2.5%)	3(4.8%)
Beverages	13(2.3%)	9(3.2%)	4(1.4%)	4(1.4%)	5(2.5%)	4(4.9%)	13(2.9%)	0(0.0%)	7(3.1%)	4(1.4%)	2(3.2%)

Figure 2: List of Top 10 most useful hotel amenities, as found by Cindy Yoonjoung Heo and Sunghyup Sean Hyun

Top 10 least useful hotel amenities identified by hotel consumers (N=363).

Amenities	Total	Gender		Ethnicity			Trip purpose		Type of hotel		
		Female	Male	Caucasian	Asian	Others	Leisure	Business	Luxury	Mid-priced	Economy
Telephone	25 (6.9%)	17(9.7%)	8(4.3%)	12(6.6%)	10(7.2%)	3(6.7%)	19(6.6%)	6(8.5%)	12(8.5%)	10(5.4%)	3(1.6%)
Coffee machine	23 (6.3%)	6(3.4%)	17(9.0%)	8(4.4%)	14(10.1%)	1(2.2%)	15(5.2%)	8(11.3%)	9(6.3%)	12(6.5%)	2(11.1%)
Television	23 (6.3%)	13(7.4%)	10(5.3%)	7(3.9%)	13(9.4%)	3(6.7%)	20(6.9%)	2(2.8%)	7(4.9%)	14(7.5%)	2(1.1%)
Mini-bar	22 (6.0%)	11(6.3%)	11(5.9%)	10(5.5%)	9(6.5%)	3(6.7%)	17(5.9%)	5(7.0%)	7(4.9%)	14(7.5%)	1(0.5%)
Iron	13 (3.6%)	6(3.4%)	7(3.7%)	7(3.9%)	5(3.6%)	1(2.2%)	11(3.8%)	2(2.8%)	4(2.8%)	8(4.3%)	1(0.5%)
Stationery	12 (3.3%)	4(2.3%)	8(4.3%)	6(3.3%)	3(2.2%)	3(6.7%)	8(2.8%)	4(5.6%)	3(2.1%)	8(4.3%)	1(0.5%)
Cologne/perfume	12 (3.3%)	5(2.8%)	7(3.7%)	6(3.3%)	4(2.9%)	2(4.4%)	11(3.8%)	1(1.4%)	5(3.5%)	6(3.2%)	1(0.5%)
Slippers	11 (3.0%)	6(3.4%)	5(2.7%)	8(4.4%)	3(2.2%)	0(0.0%)	6(2.1%)	5(7.0%)	6(4.2%)	5(2.7%)	0(0.0%)
Bath tub	11 (3.0%)	6(3.4%)	5(2.7%)	6(3.3%)	4(2.9%)	1(2.2%)	10(3.4%)	1(1.4%)	6(4.2%)	5(2.7%)	0(0.0%)
Safe	8 (2.2%)	4(2.3%)	4(2.1%)	2(1.1%)	4(2.9%)	2(4.4%)	8(2.8%)	0(0.0%)	3(2.1%)	3(1.6%)	2(1.1%)

Figure 3: List of Top 10 least useful hotel amenities, as found by Cindy Yoonjoung Heo and Sunghyup Sean Hyun

**Table 5**  
 Top 15 branded amenities recalled by hotel consumers.

Branded item	Frequency		
	Setting 2	Setting 3	Total
Chanel No.5 perfume	42	39	81
Bose headphone	34	39	73
Nespresso coffee machine	35	25	60
L'occitane hand cream	32	26	58
Samsung television	33	17	50
Aveda shampoo	29	21	50
Hermes perfume	17	33	50
Osim massage devices	20	12	32
Aesop	11	19	30
Evian water	8	14	22
Jo Malone room spray	7	12	19
B&W Zeppelin music player	10	4	14
Perrier sparkling water	4	10	14
Fresh body polish	7	4	11
Pellegrino sparkling water	3	7	10

Figure 4: List of Top 15 branded amenities recalled by hotel consumers, as found by Cindy Yoonjoung Heo and Sunghyup Sean Hyun

While a hotel's age and size impact guest perception, it is because of the inference that these two factors will determine the amenities being offered. A study by Cindy Yoonjoung Heo and Sunghyup Sean Hyun details what amenities drive up room rates and guest willingness to pay. They made a comprehensive list, as shown in Figures 2 and 3, detailing the ranking of hotel amenities and their value to guests. Wi-Fi was the highest on the list of most useful hotel amenities, meaning it was the most valued by guests; the telephone was the least valuable. This highlights the shift to the modern age and the implication that hotels need to quickly adjust to what customers value. Additionally, as shown in Figure 4, they found that high-end products such as Nespresso machines and Chanel perfume were considered memorable amenities and improved guest reception. Interestingly, the study showed that customers are willing to pay for upgraded amenities like the Osim massage device ([9] Heo, 2015). Overall, the ranked list proved that luxury amenities would allow hotels to charge more as they directly impact guests' willingness to pay.

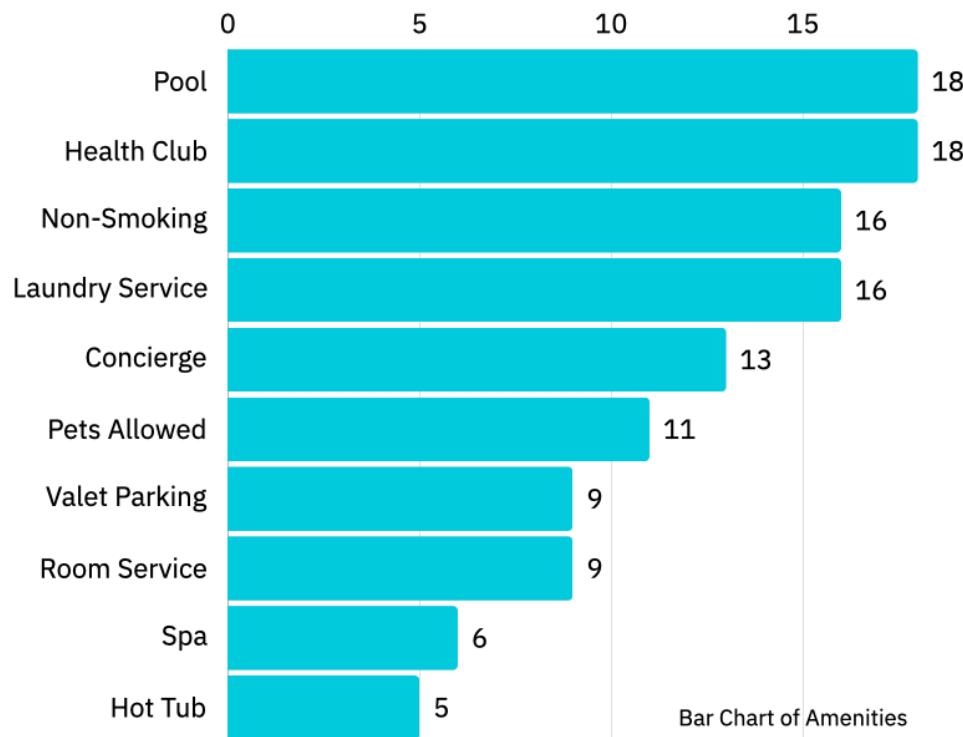


Figure 5: Bar Chart of the number of hotels offering each observed amenity.

Hotel Name	# of Rooms	# of Floors	Year Built	Check in	Non-smoking	Meals	Pool	Spa	Pets Allowed	Pet Fee	Valet Parking	Room Service	Health Club	Laundry Service/Room	Hot Tub	Concierge
<b>AC Hotel by Marriot Miami Brickell</b>	156	22	2021	4:00pm	11:00am	yes	no	yes	yes	yes	no	no	yes	yes	no	no
<b>The Gabriel Miami Downtown</b>	129	14	2015	4:00pm	11:00am	yes	no	yes	yes	no	yes	no	yes	no	yes	yes
<b>Hotel AKA Brickell</b>	201	9	2004	4:00pm	11:00am	yes	Breakfast	yes	yes	no	yes	yes	yes	yes	yes	yes
<b>EAST Miami</b>	332	40	2015	3:00pm	12:00pm	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	no
<b>SLS Brickell</b>	124	10	2016	3:00pm	11:00am	yes	no	yes	yes	yes	yes	no	yes	yes	no	yes
<b>Hotel Indigo Miami Brickell</b>	140	15	2020	4:00pm	12:00pm	yes	no	yes	yes	yes	no	yes	yes	yes	no	yes
<b>CitizenM Miami Brickell</b>	252	20	2022	2:00pm	11:00am	yes	no	yes	no	no	no	no	yes	yes	no	yes
<b>Hampton Inn &amp; Suites Miami Brickell</b>	221	9	2011	3:00pm	12:00pm	yes	Breakfast	yes	no	no	yes	yes	yes	yes	yes	yes
<b>Atwell Suites Miami Brickell</b>	90	8	2022	11:00am	4:00pm	no	no	yes	no	no	no	no	yes	yes	no	no
<b>Novotel Miami Brickell</b>	275	12	2016	3:00pm	12:00pm	no	Continental Plan	yes	yes	yes	no	yes	no	no	no	yes
<b>Hyatt Centric Brickell Miami</b>	208	16	2017	4:00pm	11:00am	yes	no	yes	yes	yes	yes	yes	yes	yes	no	yes
<b>Four Points by Sheraton</b>	103	10	2015	3:00pm	12:00pm	yes	no	yes	no	no	no	no	yes	yes	no	no
<b>Courtyard Miami in Coral Gables</b>	165	6	1971	3:00pm	12:00pm	yes	no	yes	no	no	no	no	yes	yes	no	yes
<b>Thesis Hotel Miami</b>	245	9	1987	4:00pm	11:00am	yes	no	yes	yes	yes	yes	yes	yes	yes	no	no
<b>Hyatt Regency Coral Gables</b>	254	14	1987	3:00pm	12:00pm	yes	no	yes	no	yes	yes	yes	yes	yes	yes	yes
<b>Aloft Coral Gables</b>	137	1	2017	3:00pm	12:00pm	no	no	yes	no	yes	no	no	yes	yes	no	no
<b>Biltmore Hotel</b>	210	15	1926	3:00pm	12:00pm	yes	no	yes	yes	yes	yes	yes	yes	yes	no	yes
<b>Hotel St. Micheal</b>	70	2	1926	3:00pm	12:00pm	yes	no	no	no	no	no	no	yes	yes	no	yes
<b>Hotel Ponce De Leon</b>	74	3	1923	3:00pm	11:00am	yes	no	no	no	no	no	no	no	no	no	yes

Figure 6: A list of the 19 Miami hotels in this thesis and their respective amenities.

Data was collected on the amenities for all 19 hotels in this thesis, as shown in Figure 6.

The amenities collected were number of rooms, number of floors, year built, check-in time, check-out time, smoking status, meals included, pool, spa, pets allowed, valet parking, room services, health club, laundry, hot tub, and concierge. These amenities can affect consumers' willingness to pay and overall room satisfaction. Interestingly, as Heo and Hyun found, Wi-Fi is a highly valued amenity, evidenced by all 19 hotels offering it. This shows that customers highly value Wi-Fi, and hotels can be negatively impacted if they do not remain competitive by offering it.

Due to these hotels' location in Miami, Florida, it is unsurprising that pools are offered by all except one hotel, as shown in Figure 5 - Hotel St. Michel. This lack of a pool option may position Hotel St. Michel as a lower-priced hotel due to the assumption that most Miami hotels will offer pools. Furthermore, swimming pools were ranked 6<sup>th</sup> on Cindy Yoonjoung Heo and Sunghyup Sean Hyun list of top ten amenities, meaning it has been proven as a valued amenity. Additionally, spa services are offered by 6 of the 19 hotels, marking it as a less common amenity, meaning it may be a luxury amenity that only higher-priced hotels offer or perhaps less valued by customers. The same reasoning applies to hot tubs, as only 5 of the 19 hotels provide a hot tub. However, this may be accounted for by Miami's warm weather and lack of need for hot tubs.

When it comes to pet-friendly services, the data shows a split trend. While some hotels, such as Hotel AKA Brickell and EAST Miami, allow pets, others do not. This could influence the choice of guests traveling with pets or, on the other hand, guests who are allergic to or do not like pets. Additionally, some of the hotels that allow pets also charge a pet fee. This may mean

that hotels are attempting to capitalize on the perceived value of offering accommodations for pets, as suggested by the positive reception of luxury amenities pointed out by Heo and Hyun.

Furthermore, the year built can provide insight into the property's age, which, according to Hung et al., can significantly impact the perceived value of a property. Customers may look to see if a hotel feels outdated or has been renovated since the original construction to ensure they are modern enough to offer the amenities and experience reflected by the price. However, the notion that older hotels hurt pricing may only sometimes be the case, as the Biltmore Hotel was built in 1926 and commands some of the highest prices and perceived customer value due to its status as a classic hotel with historical significance.

Overall, by looking at the amenities the selected hotels offer, it can be seen how they play into guests' perceptions and revenue management's ability to optimize revenue. Each of the hotels offer different amenities, from necessities to high-class luxury offerings, catering to different market segments. These different amenities can shape hotel customer reviews, becoming highlighted in online feedback. Customers frequently comment about the quality and availability of different amenities in online reviews, such as the cleanliness of the pool or the non-reliant internet connection. These amenities can have further reach than just guest experience, as they could impact potential bookings due to online reviews.

### **Section 1.7: Sentiment Analysis**

Sparks and Browning's article (2011), explores how booking behavior is shaped by customer reviews. Throughout the study, they proved that positive reviews of hotels lead to a higher hotel reputation and ultimately increased bookings among potential guests. On the other hand, negative reviews showed a decrease in potential guest bookings and caused the hotel's pricing strategies to be flexible to mitigate the effects of poor reviews. Moreover, hotels must

take customer feedback seriously and attempt to implement changes that can help guest perception and increase positive reviews ([21] Sparks, 2011).

Sparks and Browning's article also discusses an important concept known as consumer trust. They detail how online reviews sway trust and play a role in influencing potential guests' decision to book with the hotel. The article details that when customers see the hotel as trustworthy, they are more inclined to stay, which is determined by previous guests' experience with the trustworthiness of the hotel. This can lead to a cycle of increased bookings, as good reviews lead to potential bookings and good experiences, which can, in turn, lead to more good reviews. On the other hand, negative reviews do not result in a virtuous cycle of bookings and, therefore, hotels must increase bookings by decreasing revenue; they offer discounts or services to help draw in customers and gain trust ([21] Sparks, 2011).

Sparks and Browning's research proved the impact of customer sentiment on hotel bookings, trust, and pricing strategies, highlighting the importance of implementing changes in response to customer feedback. Microsoft Azure's sentiment analysis tool was used to evaluate TripAdvisor's online reviews and quantify the sentiments expressed in customer reviews for the 19 hotels in this study. Moreover, sentiments refer to the emotions individuals express through text or images ([19] Raza, 2021).

In a paper by Raza et al. (2021), the sentiment analysis process was detailed. They share that sophisticated algorithms mimic the structure of the human brain, and deep learning techniques, such as Long Short Term Memory networks (LSTMs), are employed to predict patterns and make decisions. Microsoft Azure is a cloud computing service offering sentiment analysis as a tool to analyze textual data and identify the sentiment expressed. Azure categorizes

writing into four categories: positive, neutral, negative, or mixed. Azure utilizes pre-trained models like LSTMs to increase the accuracy of the analysis.

Microsoft Azure allows businesses to analyze customer feedback and make decisions based on reviews. Ultimately, it interprets textual emotions and evaluates sentences or documents to assign them a sentiment score of 0 to 1. Higher scores indicate higher confidence in the given sentiment and vice versa. In this thesis, a comprehensive analysis using Azure's sentiment analysis tool was performed on TripAdvisor reviews for the set of hotels, excluding Novotel Miami due to the absence of reviews—the analysis aimed to show the overall sentiment conveyed by the guests' reviews of each hotel.

Hotel Name	Sentiment Score	Average Price
Hotel Ponce De Leon	14.05383	130
Four Points by Sheraton	13.64399	182
Hotel St. Micheal	14.09967	189
Aloft Coral Gables	12.56576	191
Courtyard Miami in Coral Gables	11.46344	197
CitizenM Miami Brickell	12.69364	222
Hotel Indigo Miami Brickell	13.8095	228
AC Hotel by Marriot Miami	11.81917	229
Atwell Suites Miami Beach	15.39445	237
Novotel Miami Brickell		248
Hampton Inn & Suites	15.39445	249
THesis Hotel Miami	15.46046	263
Hyatt Regency Coral Gables	14.49868	268
The Gabriel Miami Beach	13.90468	294
Hyatt Centric Brickell	13.65829	298
Hotel AKA Brickell	14.79638	316
SLS Brickell	14.50812	325
EAST Miami	14.00157	409
Biltmore Hotel	13.91567	428

*Figure 7: Sentiment scores and average pricing computed through Microsoft Azure for 18 of the 19 Miami hotels studied as shown. Novotel Miami is excluded due to the absence of reviews.*

The top 20 TripAdvisor reviews for each of the 18 hotels were compiled and organized into a Microsoft Excel spreadsheet. These reviews were selected based on their top appearance in the search results to maintain an unbiased approach. The primary header of each review was selected for sentiment analysis as it effectively summarized the reviewer's opinion, which

streamlined the text for Azure's processing. The goal of using headers was to give Azure direct data to interpret, reducing the likelihood of incorrect sentiments.

The sentiment analysis was performed through the Excel add-in feature for machine learning provided by Azure for each set of hotel reviews. Pivot charts and tables were created in Excel for each hotel, allowing for visualization and sentiment analysis. This approach also allowed for the summarization of individual sentiments into an overall 'Grand Total' score, which shows the collective sentiment for each hotel. A higher Grand Total suggests the hotel received more positive feedback in its top reviews, while a lower total would suggest fewer positive reviews.

The stars, out of 5, and the  $n$  number of reviewers from TripAdvisor were also collected for each hotel. This was conducted to confirm or deny the accuracy of Microsoft Azure's sentiment analysis. Overall, the tool appears to have reasonably reflected the customer's sentiments for each hotel, as shown by TripAdvisor star ratings. For example, the AC Hotel by Marriott Miami Brickell's sentiment score was low at 11.81917, aligning well with its low 3-star rating. This was also the case for Aloft Coral Gables and Hotel Ponce De Leon, which both show moderate sentiment scores and have 3.5-star ratings.

## Bubble Chart of Sentiment Score and Average Price by Hotel Name

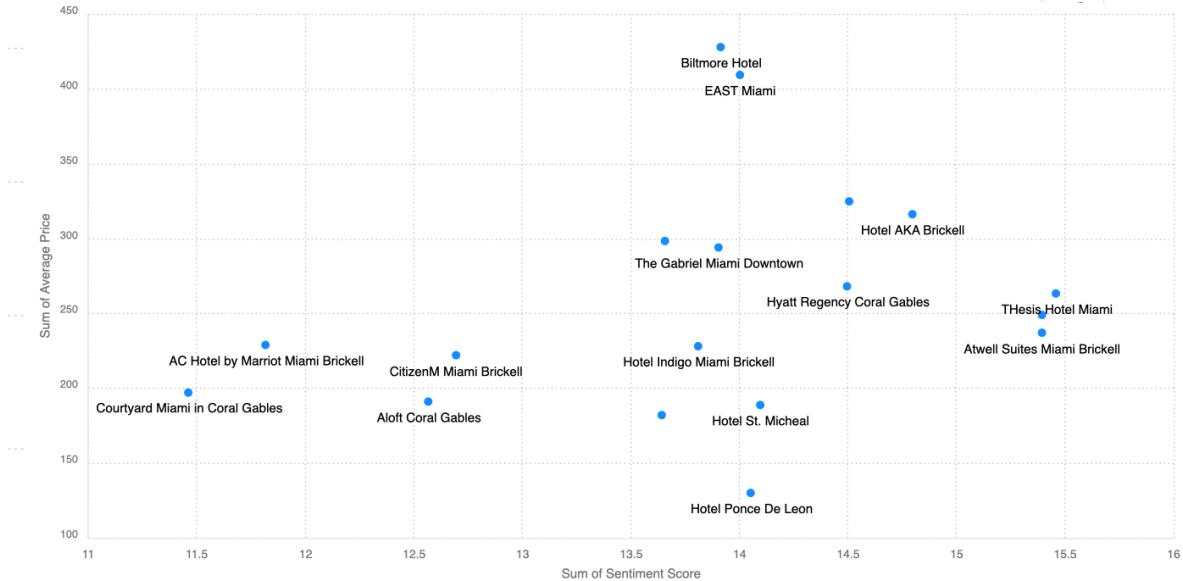


Figure 8: Bubble chart of sentiment scores and average price by hotel name.

When attempting to compare customer sentiment to average price, as shown in Figure 8, no definitive pattern emerges; however, it can be noted that with the expectation of the Biltmore Hotel, EAST Miami, and Hotel Ponce De Leon as outliers, there is an upward trend associated with Sentiment Score and Average Price. This means, relatively, as the Microsoft Azure customer sentiment score increases, so does the average price of the hotel rooms. Outliers such as Hotel Ponce De Leon, with the lowest average room price, would represent a hotel where customers get great value for the price, as it has a high sentiment score compared to other hotels near its price range. The Biltmore Hotel and EAST Miami, with the highest average prices, do not hold the highest sentiment scores, meaning customers may be able to find better value at cheaper hotels.

### Section 1.8: Personal Motivation

As a current senior at Florida Atlantic University's Harriet L. Wilkes Honors College, concentrating in Data Analytics and minoring in Economics, I have always been intrigued by

merging these two disciplines. Throughout my coursework, I have learned that the core focus of data analytics is to derive meaningful conclusions and spot trends from data. This can be particularly challenging as raw data can be complex to sort through and understand; however, using statistical methods, various algorithms, and advanced software tools, data can be cleaned and transformed into practical knowledge. Data analytics is critical as data holds little power if it cannot be understood and conveyed. Additionally, I have learned many tools and techniques in data analytics and economics, allowing me to analyze economic trends and forecast market behaviors. This intersection has improved my technical skills and enhanced my understanding of the economic implications of data-driven insights.

Furthermore, minoring in Economics has allowed me to gain practical knowledge and add a business approach to interpreting data. It has provided a theoretical backdrop that allows me to look at data through the lens of economic theories and principles, such as market trends and consumer habits. During the summer of 2023, I applied my coursework in both Data Analytics and Economics in a professional setting as a Data Analytics Intern in a Revenue Operations Department. I built pipeline and forecasting models to predict sales trends and optimize revenue streams effectively. My role involved the technical aspects of data manipulation and analysis and required me to integrate economic principles to understand market dynamics.

After completing my internship, I decided to focus on a thesis project that combined economics and data analytics in a real-life setting that would benefit the average person. I became excited about gathering and analyzing actual data to find new understandings. My goal was to look at numbers and turn them into a story that could help people make decisions in the real world. Data Analytics and Economics are comprehensive disciplines that can be applied to

almost every business sector. With that in mind, I knew I had to narrow my project to a specific sector. I decided on the hotel industry due to the relevance of tourism in a post-pandemic world, especially in the context of economic recovery.

I wanted to delve into dynamic pricing, a crucial aspect of hotels' income management. Dynamic pricing is an excellent example of data analytics impacting economic decisions. By studying how hotels in Miami's Coral Gables and Brickell neighborhoods set their prices, I wanted to learn more about how they use data to respond to customers' wants and how the market is changing. Overall, this project is where my studies, professional experience, and personal interests meet. It combines what I have learned in data analytics and economics in an industry that's a big part of Florida's economy. This study will offer valuable ideas about using data analytics to better understand and improve economic practices in the hotel industry.

## Chapter 2: Methodology

### Section 2.1: Data Collection

Over five months, data on room prices from 19 hotels in Coral Gables and Brickell, Miami, FL was gathered. These hotels included: AC Hotel by Marriott Miami Brickell, Aloft Coral Gables, Atwell Suites Miami Brickell, Biltmore Hotel, CitizenM Miami Brickell, Courtyard Miami in Coral Gables, EAST Miami, Four Points by Sheraton, Hampton Inn & Suites Miami Brickell, Hotel AKA Brickell, Hotel Indigo Miami Brickell, Hotel Ponce De Leon, Hotel St. Michel, Hyatt Centric Brickell Miami, Hyatt Regency Coral Gables, Novotel Miami Brickell, SLS Brickell, The Gabriel Miami Downtown, THesis Hotel Miami (sic).

The study focused on the cost of a standard room with a king-size bed in each hotel. The dates selected for monitoring room prices were strategically chosen to cover a range of days, including typical weekends and special holiday periods. Most chosen dates represented Friday and Saturday night stays, reflecting a typical weekend booking pattern. The specific dates were September 22-23 (Friday/Saturday), October 13-14 (Friday/Saturday), November 3-4 (Friday/Saturday), November 24-25, coinciding with the Thanksgiving weekend (Friday/Saturday), December 15-16 (Friday/Saturday), December 23-24, an exception as this was a Saturday/Sunday booking, aligning with the Christmas holiday period. These dates were selected to provide insights into pricing strategies during regular weekends and significant holiday events, which could see variations in hotel booking patterns. Data for each date selected was collected twice a week to monitor fluctuations in the price.

## Section 2.2: Data Sources

Data on each hotel's prices over various dates needed to be collected to answer this project's central research question. Expedia.com, Booking.com, and Hotels.com were selected as the data sources due to their ability to show and compare hotel prices in seconds. This is key in a project where manual data collection is required, as it is effective and time efficient.

Additionally, these third-party booking platforms are among the most popular ways to book a hotel room, and their usage significantly influences consumer choice and perception of hotel pricing.

The decision to use three data sources rather than one stemmed from the common perception held by travelers that specific third-party platforms offer more cost-effective bookings and the common belief that comparing prices across multiple sites in search of the best deal is beneficial. Furthermore, this study investigates whether these platforms vary in pricing for the same hotel rooms or if their prices are consistently similar to confirm or deny whether travelers should check multiple sites. Additionally, to investigate dynamic pricing further, the pricing strategies employed by hotels when listing on multiple third-party platforms could be seen across the three platforms.

For the first four months of data collection, all three platforms were used to collect data and identify discrepancies in room pricing for the selected hotels. The research sought to understand the degree of price variation among these popular booking sites, if any. However, in December, it was observed that the room prices were consistent across Expedia.com, Booking.com, and Hotels.com for all data collection. The consistency in pricing led to a shift in the research approach for time-efficiency reasons, focusing on data from a single website, Expedia.com, for the remainder of the data collection period.

This is a significant finding, as the lack of price variability across the three sites suggests price standardization across significant booking platforms. Additionally, this questions the theory that travelers can find rooms at different rates for the same hotel room by searching different websites. Furthermore, this aspect of the research adds value to the broader understanding of dynamic pricing in the hotel industry, especially in the context of third-party booking platforms.

### **Section 2.3: Data Analysis**

The analysis portion of this research, including organizing and analyzing data, was mainly conducted using Microsoft Excel. This is because Excel has unique features that align well with the needs of the study, such as Excel's spreadsheet format, which effectively structured the extensive dataset collection and created multiple sheets within a single workbook that allowed for the organization of the data. This is because it permitted each hotel's pricing data to be managed individually yet compared collectively. This organization was necessary for handling the complex dataset, including different hotels, dates, and prices.

Furthermore, Excel's built-in calculations made it easy to perform several important calculations for understanding hotel pricing trends. The function 'AVERAGE' was used to find the average price of each hotel for the selected dates. 'MAX' and 'MIN' were also helpful in identifying the highest and lowest prices during the research period. Additionally, the ability to drag down calculations across vast amounts of data made Excel the most effective and efficient choice for this project.

After collecting data, the study also benefited from Excel's visualization features. Charts and graphs, such as time-series graphs and box plots, were used to show significant trends, such as the changes in hotel prices over time. These charts helped identify trends and draw insightful conclusions. Excel's ability to customize charts ensured that these visual representations were

precise and suited to this analysis. The user-friendly design of Excel also made analyzing and visualizing data efficient and approachable. Excel was the optimal choice for this research project during its initial data collection and analysis.

#### **Section 2.4: Sample Selection**

The study's sample size was restricted because of the manual data collection method. Gathering and examining prices for 19 hotels across three websites for different dates every week was very demanding. Therefore, choosing a sample that was both manageable and large enough was important. The 19 hotels included in the study were chosen because they appeared first in the search results on the chosen booking platforms, right after the hotels featured through paid marketing. This method ensured that the selected hotels weren't influenced by promotional tactics and were more reflective of what an average consumer would see when looking for hotels in Miami.

A key factor in choosing these hotels was their price range. The selected hotels usually had room rates between \$120 to \$500 per night. This range was wide enough to see if dynamic pricing strategies differed among hotels with various prices, but it was also narrow enough to keep the hotels comparable. It enabled an analysis of dynamic pricing across various price levels, providing insights into whether higher-priced or moderately priced hotels use different pricing tactics.

The focus on Brickell and Coral Gables in this study was an intentional choice. These areas in Miami are well-regarded and popular with travelers, yet they don't have the intense tourist focus of a place like South Beach. Brickell is known as a business district, while Coral Gables attracts a more mature crowd. This provided a diverse backdrop to study dynamic pricing. Understanding how location and the type of guests influence hotel pricing strategies was

essential, and these neighborhoods offered the right mix for this project. By avoiding areas that are tourist hotspots, the study aimed to gain insights into pricing trends that are more indicative of Miami's general hotel market.

In summary, choosing the 19 hotels from Brickell and Coral Gables was a strategic balance. It considered the practical challenges of manually collecting data and the goal of securing a diverse and representative group of hotels. This selection provided a unique opportunity to study dynamic pricing in Miami's hotel industry, encompassing two market types and areas.

### **Section 2.5: Ethical Considerations**

This research maintained ethical standards throughout its duration. Initially, through web scraping, there was an effort to collect data from three chosen booking websites (Expedia.com, Booking.com, and Hotels.com). Web scraping uses a script or a software tool to automatically gather website information. It usually involves the script browsing the website as a user would, but it is programmed to automatically extract specific information, like room prices in this instance. However, it became clear that this data collection method breached the websites' terms and conditions, which did not allow automated data extraction. The approach was changed to uphold the ethical standards of the research and respect these terms. Data was then gathered manually each week. This adjustment ensured adherence to legal and ethical standards, as all information was sourced from publicly accessible areas without violating website policies.

## Chapter 3: Evidence

This chapter provides a detailed examination of room rates across various Online Travel Agencies (OTAs) and aims to uncover evidence supporting or refuting the use of dynamic pricing strategies by the 19 selected hotels. By analyzing trends and pricing platforms, the insights gained from this analysis are pivotal in attempting to understand the pricing strategies leveraged by RM teams within the Miami hotel sector.

### **Section 3.1: Analysis of Booking Platforms**

The interaction between hotels and Online Travel Agents, known as third-party booking platforms, plays a crucial role in the hospitality industry. Hotels utilize OTAs to reach a broader customer base, but this involves paying OTAs significant commission costs, typically between 15% and 30%. Hotels encourage customers to book directly through their websites to offset these costs. According to Toh et al. (2011), achieving rate parity - maintaining consistent prices across various platforms - is generally easier for smaller hotels because they have less influence on the market. In contrast, larger hotels often offer different rates, providing special deals or exclusive room types on their websites to attract direct bookings ([26] Toh, 2011).

The way that OTAs operate also influences this situation. Toh, Raven, and DeKay mention two main models: the agent and merchant models. In the agent model, OTAs receive a commission after a booking is finalized, with guests paying the hotel directly. Conversely, In the merchant model, OTAs buy rooms at a lower wholesale rate and then sell them at a higher price. This difference affects how room rates are set and how profits are shared.

When discussing how hotels set their prices on third-party websites, it is essential to consider these factors. Hotels may adjust their prices on these sites depending on the demand,

seasonality, and the number of rooms they have available, ultimately affecting how much room rates can change on OTA platforms. Understanding this relationship and the different ways Online Travel Agents work helps explain the pricing strategies hotels use on third-party websites. This knowledge is critical for managing hotel revenues effectively.

Kerry Medina and Alex Hadwick, in their report 'The State of Hospitality Distribution: Direct Bookings,' uncovered that specific OTAs, such as Expedia.com, Booking.com, and Hotels.com, have cemented their status in the travel industry by gaining consumer's trust. This trust is shown in the volume of repeat bookings these platforms receive due to their user-friendly interface and perceived value for money. Traditional hotel chains back these major OTAs in the amount of consumer trust and loyalty. The impact of consumer trust is highlighted in Expedia's financial performance, as the report details that Expedia Group Inc. surpassed its earnings estimates in 2018, with a revenue jump of 12% year-over-year to \$11.2 billion ([15] Medina, 2019).

In the five months of data collection for this study, the price variations across Expedia.com, Hotels.com, and Booking.com suggest several implications. There was a consistency in room pricing across these OTAs, which indicates that the observed hotels are adopting a uniform pricing strategy to maintain consistency and avoid customer confusion due to price discrepancies across channels. This approach aligns with the rate parity concept often observed in smaller hotels with less bargaining power ([26] Toh, 2011). Medina and Hardwick's insights into the challenges hotels face with OTAs, including the struggle to maintain direct customer relationships amidst the commission's structures, emphasize the complexities these hotels may face in distribution strategies.

Moreover, this uniformity suggests a possible deviation from dynamic pricing strategies, where variations in room rates would be expected across platforms based on demand and competition. The absence of variation could mean that the select hotels prefer a consistent pricing model over frequent adjustments based on market conditions, contrary to the more aggressive pricing tactics discussed by Medina and Hadwick, where OTAs and hotels deal with rate parity issues and the pressure from competition to offer more cost-friendly rates.

Additionally, the observed pricing uniformity may reflect shared distribution and pricing approaches among the hotels selected in this study. This may indicate that these hotels prefer straightforward pricing tactics and could represent a broader trend within the hotel industry toward standardized pricing models, as suggested by Madina and Hadwick, where consistency in pricing is favored over more complex dynamic pricing models that vary between OTAs. The insights from Medina and Hadwick's report and the findings from the data collection point towards the studied hotels reflect a deliberate approach by hotels to navigate the intricate landscape of online distribution. By adhering to a uniform pricing strategy, the hotels aim to simplify the booking experience and present themselves as transparent and trustworthy options in a market flooded with variable rates. While potentially reducing the flexibility afforded by dynamic pricing, this strategy prioritizes consumer trust and loyalty—a crucial asset in the competitive hospitality industry.

### **Section 3.2: Analysis of Cost-Effective Booking Period**

This section explores whether there is a most economical time to book a hotel is, looking at two main parts: “Christmas Data” and “Overall Data.” First, the data collected leading up to Christmas weekend, December 23-24, was analyzed to uncover if there is an ideal time to land a good deal for seasonal room rates. As the data collected for Christmas encompasses the most

extended period, it provided the strongest comprehensive analysis. Next, the overall data for all other dates collected is analyzed to see if any conclusions match the discoveries from the Christmas data findings. By analyzing patterns, this section aims to offer advice for travelers looking to make the most of their budget.

## **Christmas Data**

When booking a hotel room, travelers often want to book at the most cost-friendly time and obtain the best deal for their hotel. Typically, prospective hotel guests have a perceived notion of when the best time to book a hotel is and will navigate through different prices until they believe they have found the optimal one. Jang et al., in their article "Last-minute hotel-booking behavior: The impact of time on decision-making" provides a deeper look into how customers' price perceptions correlate with the timing of bookings ([12] Jang, 2019).

Jang et al. highlights how the rising use of mobile technology has increased flexible booking practices and has caused revenue management to shift their tactics. Moreover, because consumers can easily and quickly look up if a hotel room has dropped in price and rebook, revenue management has had to implement new strategies to mitigate consumer response time. Mobile technology has also allowed for an increase in last-minute bookings, as hotels have been able to dynamically change their price to cater to last-minute deal-seeking customers ([12] Jang, 2019).

Consumers can access real-time price updates through mobile internet, leading different types of customers to begin to arise. According to Jang et al., many customers believe that if they wait until the last minute to make reservations, they will get the best room rates, as hotels begin to adjust prices to try and fill unbooked rooms. However, other customers hold the more traditional belief that booking well in advance is safer and cheaper, specifically during peak

travel seasons or when traveling to popular destinations. The difference in consumer booking strategies proves the difficulty of finding the optimal time to book and the complexity of pricing within the hotel sector.

Against the backdrop outlined by Jang et al. of varying consumer beliefs and behaviors, a statistical analysis was performed using Excel to identify the most cost-effective booking dates for all 19 hotels in this study. Hotel room prices were collected 19 times leading up to the weekend of December 23-24, 2023, for Christmas data; the total number of observed prices across the 19 dates and 19 hotels was 335. First, the minimum price for each hotel over the observed dates was determined. Subsequently, the deviation of the day's price from its minimum price was calculated for each hotel and on each date. This step involved subtracting the minimum price from the price on each specific date, quantifying how much each hotel's price fluctuated above its lowest observed rate.

Next, to compile this data, the deviations for all hotels on each date were summed and then divided by 19, the number of hotels, to calculate an average price deviation for each date. This average reflected the overall price fluctuation compared to the minimum rates across the hotel spectrum. The reasoning behind this approach was to normalize the price data and to identify a baseline metric for comparison. This allowed for understanding when prices were generally above or below their usual rates. The objective was to identify the date with the average deviation closest to zero, meaning the most cost-effective booking period.

This calculation approach led to the identification of November 21st, 2023, as the date with the lowest average deviation from the minimum prices, meaning it was the optimal day for cost-effective hotel bookings. Additionally, dates were ranked based on their average deviation from the minimum prices, from the closest to the furthest from zero. The dates, starting with the

lowest, are as follows: 21-Nov, 23-Dec, 14-Nov, 24-Nov, 19-Dec, 13-Dec, 31-Oct, 27-Oct, 24-Oct, 20-Oct, 29-Sep, 16-Sep, 22-Sep, 19-Sep, 26-Sep, 17-Oct, 12-Sep, 10-Oct, 6-Oct. An interesting observation from this ranking is the trend that booking closer to the weekend of December 23-24, 2023, appears to be more cost-effective.

To further support these findings, the research took the analysis and calculated the p-value of each date compared to the minimum date, November 21st. This was done to determine if the observed differences in pricing on each date were statistically significant and not just due to random chance. The p-value, in this context, is a measure to determine the strength of the evidence against the null hypothesis, which assumes there is no significant difference between the prices on each date and the minimum price date. Dates with a p-value lower than the significance level of 0.05 indicate a statistically significant difference in pricing compared to the minimum price date.

Among the analyzed dates, four of them - 29-Sep (p-value = 0.036), 17-Oct (p-value = 0.045), 10-Oct (p-value = 0.01), and 6-Oct (p-value = 0.012) - showed significant differences when compared to November 21st. This means that the price deviations on these dates are not just random variations but are statistically significant. This reinforces the insight that these particular dates differed noticeably in pricing compared to the most cost-effective booking date. This analysis provides insight into the application of these hotels' dynamic pricing strategies. Out of the 19 dates analyzed, only four showed statistically significant deviations from the minimum price date. This suggests that dynamic pricing, if used by these hotels, is used to a limited extent. Most dates did not show significant price fluctuations, indicating a potential preference for pricing stability or a less aggressive approach to dynamic pricing.

## Overall Data

Following the analysis of the most cost-effective booking period for Christmas weekend, the same method was applied to the remainder of the selected dates observed. This was performed to determine whether the optimal booking period identified for the Christmas period – approximately one month in advance – holds for the other dates or is unique to the specific dynamic of holiday travels. This extended analysis is limited as the additional dates do not match the depth of the Christmas analysis due to a short observation period and the amount of data collected; however, it will provide more analysis. This section's primary goal is to determine if booking a month ahead is consistently the best choice for travelers looking to maximize savings across different booking scenarios.

Following the same methods from the Christmas analysis—identifying the minimum price, calculating the average deviation of each date's price from the minimum, and then aggregating these deviations for each hotel on each given date before averaging—the dates were ranked from those with deviations closest to zero to those furthest from zero to identify the most cost-effective booking date.

From applying this process to the booking weekend of Dec 15-16, the analysis showed that booking on November 14th was the most cost-effective. This reinforced that booking a month in advance offers the most optimal price for customers looking to save. Similarly, for the booking weekend of November 23-24, the analysis showed that October 24th was the most cost-effective day to book, again supporting the theory of advanced booking benefits a month out.

However, variations from the one-month booking pattern were observed on the other booking dates. Specifically, the most cost-effective booking date for the weekend of November

3-4 was October 24th. This diverges from the hypothesized optimal one-month booking, as it is approximately ten days before the booking date. For the data collection for the weekend of November 3-4, it is essential to highlight that a manual error occurred in the data entry, and data for a whole month in advance of November 3-4 weekend, which would be October 3rd, was not collected. This may have influenced the digression from the expected pattern for this date.

Divergence from the pattern was also seen for the weekend of October 13-14, where the optimal booking date was October 10th, three days before the booking date. For this instance, although one month in advance was not identified as the optimal booking time, it was the second-best choice on September 12th. While this does not confirm that one month in advance is always optimal, it does identify it as a reasonable and safe option for cost savings. The weekend of September 22-23 was excluded from this analysis due to the lack of data extending more than two weeks before the booking date.

### Section 3.3: Stable Pricing

Hotel Name	12-Sep	16-Sep	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct
AC Hotel by Marriot Miami Brickell	309	280	224	224	224	224	224	224	224	224
The Gabriel Miami Downt	314	307	307	307	307	307	307	307	307	307
Hotel AKA Brickell	262	277	278	278	269	377	419	419	299	299
EAST Miami	459	459	399	399	399	399	399	399	399	399
SLS Brickell	244	244	244	305	305	305	297	297	297	297
Hotel Indigo Miami Brickell	208	217	217	217	217	217	255	255	255	255
CitizenM Miami Brickell	264	264	264	229	229	229	244	244	244	244
Hampton Inn & Suites Mi	289	292	293	292	294	297	294	294	295	237
Atwell Suites Miami Brickell	252	225	225	225	225	225	243	243	243	234
Novotel Miami Brickell	259	259	259	259	259	259	259	259	279	237
Hyatt Centric Brickell Miam	319	316	312	308	320	295	298	294	296	326
Four Points by Sheraton	170	170	188	188	197	197	197	197	206	206
Courtyard Miami in Coral Gables	332	223	251	251	251	251	291	291	287	199
THesis Hotel Miami	220	195	288	288	288	288	203	203	203	203
Hyatt Regency Coral Gables	246	246	246	246	246	246	246	246	229	229
Aloft Coral Gables	218	218	218	218	218	218	218	218	218	218
Biltmore Hotel	381	381	381	381	381	381	381	381	413	413
Hotel St. Micheal	203	203	203				196	196	196	196
Hotel Ponce De Leon	129	129	129	129	133	133	133	133	137	138
Hotel Name	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	24-Nov	13-Dec	19-Dec	23-Dec	
AC Hotel by Marriot Miami Bri	224	207	207	220	203	212	229	249	249	
The Gabriel Miami Downt	307	307	307	221	221	188	246	253	209	
Hotel AKA Brickell	274	309	283	309	364	350	320	335	310	
EAST Miami	399	399	399	399	292	349	429	449	399	
SLS Brickell	297	304	304	304	304	304	304	349	269	
Hotel Indigo Miami Brickell	255	255	255	274	246	220	224	279	229	
CitizenM Miami Brickell	229	209	209	224	209	199	194	174	189	
Hampton Inn & Suites Mi	237	237	233	216	203	254	220	225	230	
Atwell Suites Miami Brickell	234	234	234	252	246	281	256	229	239	
Novotel Miami Brickell	251	251	265					189	218	
Hyatt Centric Brickell Miam	336	317	309	305	314	314	348	249	273	
Four Points by Sheraton	206	206	206	188	144	144	189	135	174	
Courtyard Miami in Coral Gables	199	199	199	175	159	254	159	159	199	
THesis Hotel Miami	203	203	203	203	228	228	220	199	199	
Hyatt Regency Coral Gables	229	229	229	229	220	220	239	249	259	
Aloft Coral Gables	218	218	218	218	195	195	165	173	173	
Biltmore Hotel	413	413	413	413	413	498	498	498	459	
Hotel St. Micheal	196	196	196	203	191	191	190	196	169	
Hotel Ponce De Leon	143	143	143	152	132	132	156	129	124	

Figure 9: Highlighted observations of stable pricing for the booking weekend of December 24-25.

Hotel Name	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	24-Nov	13-Dec
AC Hotel by Marriot Miami B	246	246	246	203	203	220	212	212	259
The Gabriel Miami Downto	378	378	378	378	378	286	297	246	239
Hotel AKA Brickell	329	292	329	317	349	258	425	387	385
EAST Miami	429	429	399	399	399	399	351	459	539
SLS Brickell	337	365	331	345	345	330	370	478	359
Hotel Indigo Miami Brickell	227	227	227	227	227	208	220	237	299
CitizenM Miami Brickell	224	224	209	209	219	209	229	199	219
Hampton Inn & Suites Mia	259	218	218	220	203	254	280	280	239
Atwell Suites Miami Brickel	234	225	225	225	225	225	237	255	299
Novotel Miami Brickell	229	212	224	197	208	269	278	446	299
Hyatt Centric Brickell Mian	292	408	415	402	470	308	276	270	234
Four Points by Sheraton	206	214	215	215	215	215	169	169	224
Courtyard Miami in Coral	263	215	215	215	215		186	227	304
THesis Hotel Miami	288	288	288	288	288	305	374	374	279
Hyatt Regency Coral Gable	280	280	280	280	280	280	246	289	259
Aloft Coral Gables	246	239	227	239	229	256	237	246	219
Biltmore Hotel	472	472	472	472	455	407	593	639	579
Hotel St. Micheal	196	196	196	196	196	203	191	191	174
Hotel Ponce De Leon	138	138	138	143	143	152	132	132	

Figure 10: Highlighted observations of stable pricing for the booking weekend of December 15-16.

Hotel Name	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov
AC Hotel by Marriot Miami B	246	246	246	246	246	237	237	203	203	203	209
The Gabriel Miami Downto	290		290	290	290	290	290	290	290	248	249
Hotel AKA Brickell	292	332	379	379	319	274	272	278	319	294	370
EAST Miami	399	399	399	399	349	349	319	319	319	369	407
SLS Brickell	356	356	345	345	345	330	330	330	330	286	269
Hotel Indigo Miami Brickell	220	220	230	230	230	220	220	220	220	202	209
CitizenM Miami Brickell	219	219	249	249	249	239	219	199	199	199	209
Hampton Inn & Suites Mia	272	275	277	277	275	195	195	195	195	237	259
Atwell Suites Miami Brickel	252	261									229
Novotel Miami Brickell	269	256	215	269	269	195	215	206	208	224	229
Hyatt Centric Brickell Mian	213	209	215	215	211	265	268	258	274	286	284
Four Points by Sheraton	152	152	152	152	152	152	152	152	152	150	149
Courtyard Miami in Coral	151	151	151	151	151	111	111	111	111	203	199
THesis Hotel Miami	203	203	178	178	178	178	178	178	178	169	207
Hyatt Regency Coral Gable	212	212	212	212	212	186	186	186	219	229	219
Aloft Coral Gables	151	151	142	142	142	142	132	132	132	116	149
Biltmore Hotel	381	347	335	347	335	347	347	419	419	381	419
Hotel St. Micheal			204	204	212	212	169	169	152	163	135
Hotel Ponce De Leon	133	137	129	129		137	137	137		152	120

Figure 11: Highlighted observations of stable pricing for the booking weekend of November 24-25.

Hotel Name	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct
AC Hotel by Marriot Miami B	246	246	246	246	246	246	237	246	246	246	269
The Gabriel Miami Downto	360	360	360		360	360	360	307	307	307	328
Hotel AKA Brickell	341	341	341	395	409	409	319	258	266	319	297
EAST Miami	539	539	539	539	499	479	459	459	459	459	459
SLS Brickell	380	378	390	393	371	394	345	369	321	338	329
Hotel Indigo Miami Brickell	220	220	220	220	230	230	230	248	248	248	269
CitizenM Miami Brickell	249	269	234	234	219	219	229	209	224	237	279
Hampton Inn & Suites Mia	271	271	265	272	255	254	267	225	216	237	225
Atwell Suites Miami Brickel	234	234	234	234	243	243	243	243	243	252	279
Novotel Miami Brickell	309	309	309	294	309	259	259	246	279	289	275
Hyatt Centric Brickell Mian	345	364	356	355	282	291	321	400	428	432	350
Four Points by Sheraton	224	224	224	224	206	206	206	229	209	209	199
Courtyard Miami in Coral	229	229	229	229	183	229	229	215	215	207	211
THesis Hotel Miami	369	369	369	369	369	369	388	388	378	379	409
Hyatt Regency Coral Gable	409	399	399	409	424	424	384	384	384	359	319
Aloft Coral Gables	208	218	199	199	199	199	208	208	208	208	203
Biltmore Hotel	423	423	439	423	529	529	529	529	499	454	499
Hotel St. Micheal					201	212	212	249	239	179	
Hotel Ponce De Leon	124	124									

Figure 12: Highlighted observations of stable pricing for the booking weekend of November 3-4.

Hotel Name	12-Sep	16-Sep	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct
AC Hotel by Marriot Miami	219	203	246	237	237	263	259	184
The Gabriel Miami Downt	281	316	316	316	316		319	300
Hotel AKA Brickell	229	275	269	252	269	371	329	265
EAST Miami	368	399	379	379	399	379	409	241
SLS Brickell	301	373	324	320	357	356	329	329
Hotel Indigo Miami Bricke	220	220	220	220	220	220	249	195
CitizenM Miami Brickell	229	229	229	229	219	229	234	157
Hampton Inn & Suites Mi	235	237	237	247	245	250	287	293
Atwell Suites Miami Brick	229	225	225	225	234	225	274	217
Novotel Miami Brickell	239	209	209	209	209	227	249	219
Hyatt Centric Brickell Miam	371	272	279	278	318	274	229	225
Four Points by Sheraton	179	179	179	179	152	152	184	184
Courtyard Miami in Coral C	151	151	151	151	151	151	151	151
THesis Hotel Miami	239	233	314	305	305	305	299	299
Hyatt Regency Coral Gables	246	246	289	289	279	279	279	279
Aloft Coral Gables	180	180	180	180	180	180	161	161
Biltmore Hotel	367	459	459	449	449	449	429	429
Hotel St. Micheal								
Hotel Ponce De Leon	124	124	124	124	97	97	128	133

Figure 13: Highlighted observations of stable pricing for the booking weekend of October 13-14.

Hotel Name	12-Sep	16-Sep	19-Sep	22-Sep
AC Hotel by Marriot Miami B	199	175	179	179
The Gabriel Miami Downto	157	149	213	189
Hotel AKA Brickell	244	266	269	305
EAST Miami	349	429	459	299
SLS Brickell	179	303	299	249
Hotel Indigo Miami Brickel	180	199	199	199
CitizenM Miami Brickell	179	164	189	189
Hampton Inn & Suites Mi	197	240	259	259
Atwell Suites Miami Bricke	189	229	229	229
Novotel Miami Brickell	239	199	199	178
Hyatt Centric Brickell Miam	167	189	176	209
Four Points by Sheraton	143	143	134	134
Courtyard Miami in Coral C	127	127	159	159
THesis Hotel Miami	169	155	186	299
Hyatt Regency Coral Gable	239	229	219	209
Aloft Coral Gables	142	142	142	149
Biltmore Hotel	319	319	319	319
Hotel St. Micheal	125	135	128	
Hotel Ponce De Leon	106	106	106	83

Figure 14: Highlighted observations of stable pricing for the booking weekend of September 22-23.

## Christmas Data

Upon examining the hotel pricing for the period leading up to the weekend of December 23-24, a notable pattern of stable pricing emerged, hinting at a limited use of dynamic pricing among the surveyed hotels. This section of the analysis aims to pinpoint periods where the hotels room rates remained constant. In Figure 9, each hotel is highlighted in blue from lightest to darkest, with each color depth representing a sequence of at least three dates with unchanged prices. This color coding reveals that, except for Hotel AKA Brickell and Hyatt Centric Brickell, prices at most hotels stayed constant for long periods, suggesting a strategic choice for stability over pricing reactive to demand and market changes.

For example, the AC Hotel by Marriot Miami Brickell maintained a consistent price point of \$244 from September 19 to October 24 and a stable price of \$207 from October 27 to October 31st, showing little variation over these dates. Similarly, The Gabriel Miami Downtown Brickell's rates were set at \$307 from September 19 to October 31, with no adjustments. Another instance of this trend was observed with the Biltmore Hotel, which held its price at \$381 from September 12 to October 10 and then at \$413 for an extended period from October 17 to November 21. It held \$498 from November 24 to December 19. Again, a similar pattern was observed for all other hotels, apart from Hotel AKA Brickell and Hyatt Centric Brickell Miami, which changed their prices minimally on every date checked.

These observations indicate a preference for a more stable or semi-fixed pricing strategy over dynamic pricing, which might be a response to booking trends or an overlooked opportunity to leverage price adjustments during high-demand periods such as Christmas season to maximize revenue. The data suggests important points about pricing methods in the hotel industry, especially regarding how effective fixed pricing is in a suspected competitive and changing

market, especially during busy times like holiday weekends. Moreover, this data indicates that these hotels may not use dynamic pricing strategies to their full extent.

## Overall Data

Following the analysis of stable pricing trends during the Christmas season, this research expanded to the entire dataset, spanning all the dates for which data was collected. This more comprehensive review aimed to determine whether the trend of stable pricing observed during the Christmas period stretched across other dates as well. The findings confirmed that the trend of stable or semi-fixed pricing strategies was not limited to the holiday season but was a consistent approach applied throughout all dates during the five months of data collection.

Although the data collection for periods outside of the Christmas season were less extensive, encompassing less data collection days, a similar pattern of stable pricing emerged. Even in the weekend of September 22-23, 2023, where pricing data was collected on four occasions beginning 20 days prior to the booking date, the trend of stable pricing was observable among five of the hotels. The observed pricing pattern reinforces the tendency among certain hotels to use the same pricing strategy. The consistent application of their strategy shows a deliberate choice to offer price stability.

The pricing approach of AKA Brickell and Hyatt Centric Brickell remains notable for its variability. Similar to the pricing strategy observed for Christmas room rates, these two hotels continued to show fluctuations in their rates during all other monitored dates. Moreover, they did not maintain the same price for three consecutive dates checked for any of the observed booking dates. The distinctive strategy of frequently adjusting prices contrasts with the trend of price stability upheld by the other hotels. It is possible that AKA Brickell and Hyatt Centric Brickell employ dynamic pricing strategies to a fuller extent than the other 17 hotels.

### Section 3.4: Limited Dynamic Pricing

Hotel Name	12-Sep	16-Sep	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct
AC Hotel by Marriot Miami Brickell	309	280	224	224	224	224	224	224	224	224
The Gabriel Miami Downtown	314	307	307	307	307	307	307	307	307	307
Hotel AKA Brickell	262	277	278	278	269	377	419	419	299	299
EAST Miami	459	459	399	399	399	399	399	399	399	399
SLS Brickell	244	244	244	305	305	305	297	297	297	297
Hotel Indigo Miami Brickell	208	217	217	217	217	217	255	255	255	255
CitizenM Miami Brickell	264	264	264	229	229	229	244	244	244	244
Hampton Inn & Suites Miami	289	292	293	292	294	297	294	294	295	237
Atwell Suites Miami Brickell	252	225	225	225	225	225	243	243	243	234
Novotel Miami Brickell	259	259	259	259	259	259	259	259	279	237
Hyatt Centric Brickell Miami	319	316	312	308	320	295	298	294	296	326
Four Points by Sheraton	170	170	188	188	197	197	197	197	206	206
Courtyard Miami in Coral Gables	332	223	251	251	251	251	291	291	287	199
THesis Hotel Miami	220	195	288	288	288	288	203	203	203	203
Hyatt Regency Coral Gables	246	246	246	246	246	246	246	246	229	229
Aloft Coral Gables	218	218	218	218	218	218	218	218	218	218
Biltmore Hotel	381	381	381	381	381	381	381	381	413	413
Hotel St. Micheal	203	203	203			196	196	196	196	196
Hotel Ponce De Leon	129	129	129	129	133	133	133	133	137	138
Hotel Name	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	24-Nov	13-Dec	19-Dec	23-Dec	
AC Hotel by Marriot Miami Brickell	224	207	207	220	203	212	229	249	249	
The Gabriel Miami Downtown	307	307	307	221	221	188	246	253	209	
Hotel AKA Brickell	274	309	283	309	364	350	320	335	310	
EAST Miami	399	399	399	399	292	349	429	449	399	
SLS Brickell	297	304	304	304	304	304	304	349	269	
Hotel Indigo Miami Brickell	255	255	255	274	246	220	224	279	229	
CitizenM Miami Brickell	229	209	209	224	209	199	194	174	189	
Hampton Inn & Suites Miami	237	237	233	216	203	254	220	225	230	
Atwell Suites Miami Brickell	234	234	234	252	246	281	256	229	239	
Novotel Miami Brickell	251	251	265					189	218	
Hyatt Centric Brickell Miami	336	317	309	305	314	314	348	249	273	
Four Points by Sheraton	206	206	206	188	144	144	189	135	174	
Courtyard Miami in Coral Gables	199	199	199	175	159	254	159	159	199	
THesis Hotel Miami	203	203	203	203	228	228	220	199	199	
Hyatt Regency Coral Gables	229	229	229	229	220	220	239	249	259	
Aloft Coral Gables	218	218	218	195	195	165	173	173		
Biltmore Hotel	413	413	413	413	498	498	498	498	459	
Hotel St. Micheal	196	196	196	203	191	191	190	196	169	
Hotel Ponce De Leon	143	143	143	152	132	132	156	129	124	

Figure 15: Highlighted price fluctuations among selected hotels for the booking weekend of December 24-25

Hotel Name	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	24-Nov	13-Dec
AC Hotel by Marriot Miami Brickell	246	246	246	203	203	220	212	212	259
The Gabriel Miami Downtown	378	378	378	378	378	286	297	246	239
Hotel AKA Brickell	329	292	329	317	349	258	425	387	385
EAST Miami	429	429	399	399	399	399	351	459	539
SLS Brickell	337	365	331	345	345	330	370	478	359
Hotel Indigo Miami Brickell	227	227	227	227	227	208	220	237	299
CitizenM Miami Brickell	224	224	209	209	219	209	229	199	219
Hampton Inn & Suites Miami	259	218	218	220	203	254	280	280	239
Atwell Suites Miami Brickell	234	225	225	225	225	225	237	255	299
Novotel Miami Brickell	229	212	224	197	208	269	278	446	299
Hyatt Centric Brickell Miami	292	408	415	402	470	308	276	270	234
Four Points by Sheraton	206	214	215	215	215	215	169	169	224
Courtyard Miami in Coral Gables	263	215	215	215	215		186	227	304
THesis Hotel Miami	288	288	288	288	288	305	374	374	279
Hyatt Regency Coral Gables	280	280	280	280	280	280	246	289	259
Aloft Coral Gables	246	239	227	239	229	256	237	246	219
Biltmore Hotel	472	472	472	472	455	407	593	639	579
Hotel St. Micheal	196	196	196	196	196	203	191	191	174
Hotel Ponce De Leon	138	138	138	143	143	152	132	132	

Figure 16: Highlighted price fluctuations among selected hotels for the booking weekend of December 15-16.

Hotel Name	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov
AC Hotel by Marriot Miami Brickell	246	246	246	246	237	237	203	203	203	209	209
The Gabriel Miami Downtown	290	290	290	290	290	290	290	290	290	248	249
Hotel AKA Brickell	292	332	379	379	319	274	272	278	319	294	370
EAST Miami	399	399	399	399	349	349	319	319	319	369	407
SLS Brickell	356	356	345	345	345	330	330	330	330	286	269
Hotel Indigo Miami Brickell	220	220	230	230	230	220	220	220	220	202	209
CitizenM Miami Brickell	219	219	249	249	249	239	219	199	199	199	209
Hampton Inn & Suites Miami	272	275	277	277	275	195	195	195	195	237	259
Atwell Suites Miami Brickell	252	261									229
Novotel Miami Brickell	269	256	215	269	195	215	206	208	224	229	
Hyatt Centric Brickell Miami	213	209	215	215	211	265	268	258	274	286	284
Four Points by Sheraton	152	152	152	152	152	152	152	152	152	150	149
Courtyard Miami in Coral Gables	151	151	151	151	151	111	111	111	203	199	
THesis Hotel Miami	203	203	178	178	178	178	178	178	178	169	207
Hyatt Regency Coral Gables	212	212	212	212	212	186	186	186	219	229	219
Aloft Coral Gables	151	151	142	142	142	142	132	132	132	116	149
Biltmore Hotel	381	347	335	347	335	347	347	419	419	381	419
Hotel St. Micheal			204	204	212	212	169	169	152	163	135
Hotel Ponce De Leon	133	137	129	129		137	137	137		152	120

Figure 17: Highlighted price fluctuations among selected hotels for the booking weekend of November 24-25.

Hotel Name	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct
AC Hotel by Marriot Miami Brickell	246	246	246	246	246	246	237	246	246	246	269
The Gabriel Miami Downtown	360	360	360	360	360	360	360	307	307	307	328
Hotel AKA Brickell	341	341	341	395	409	409	319	258	266	319	297
EAST Miami	539	539	539	539	499	499	459	459	459	459	459
SLS Brickell	380	378	390	393	371	394	345	369	321	338	329
Hotel Indigo Miami Brickell	220	220	220	220	230	230	230	248	248	248	269
CitizenM Miami Brickell	249	269	234	234	219	219	229	209	224	279	279
Hampton Inn & Suites Miami	271	271	265	272	255	254	267	225	216	237	225
Atwell Suites Miami Brickell	234	234	234	234	243	243	243	243	243	252	279
Novotel Miami Brickell	309	309	309	294	309	259	259	246	279	289	275
Hyatt Centric Brickell Miami	345	364	356	355	282	291	321	400	428	432	350
Four Points by Sheraton	224	224	224	224	206	206	206	229	209	209	199
Courtyard Miami in Coral Gables	229	229	229	229	183	229	229	215	215	207	211
THesis Hotel Miami	369	369	369	369	369	369	388	388	378	379	409
Hyatt Regency Coral Gables	409	399	399	409	424	424	384	384	384	359	319
Aloft Coral Gables	208	218	199	199	199	199	199	208	208	208	203
Biltmore Hotel	423	423	439	423	529	529	529	499	454	454	499
Hotel St. Micheal					201	212	212	249	239	179	

Figure 18: Highlighted price fluctuations among selected hotels for the booking weekend of November 3-4.

Hotel Name	12-Sep	16-Sep	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct
AC Hotel by Marriot Miami Brickell	219	203	246	237	237	263	259	184
The Gabriel Miami Downtown	281	316	316	316	316		319	300
Hotel AKA Brickell	229	275	269	252	269	371	329	265
EAST Miami	368	399	379	379	399	379	409	241
SLS Brickell	301	373	324	320	357	356	329	329
Hotel Indigo Miami Brickell	220	220	220	220	220	220	249	195
CitizenM Miami Brickell	229	229	229	229	219	229	234	157
Hampton Inn & Suites Miami	235	237	237	247	245	250	287	293
Atwell Suites Miami Brickell	229	225	225	225	234	225	274	217
Novotel Miami Brickell	239	209	209	209	209	227	249	219
Hyatt Centric Brickell Miami	371	272	279	278	318	274	229	225
Four Points by Sheraton	179	179	179	179	152	152	184	184
Courtyard Miami in Coral Gables	151	151	151	151	151	151	151	151
THesis Hotel Miami	239	233	314	305	305	305	299	299
Hyatt Regency Coral Gables	246	246	289	289	279	279	279	279
Aloft Coral Gables	180	180	180	180	180	180	161	161
Biltmore Hotel	367	459	459	449	449	449	429	429
Hotel St. Micheal								
Hotel Ponce De Leon	124	124	124	124	97	97	128	133

Figure 19: Highlighted price fluctuations among selected hotels for the booking weekend of October 13-14.

Hotel Name	12-Sep	16-Sep	19-Sep	22-Sep
AC Hotel by Marriot Miami Brickell	199	175	179	179
The Gabriel Miami Downtown	157	149	213	189
Hotel AKA Brickell	244	266	269	305
EAST Miami	349	429	459	299
SLS Brickell	179	303	299	249
Hotel Indigo Miami Brickell	180	199	199	199
CitizenM Miami Brickell	179	164	189	189
Hampton Inn & Suites Miami Biscayne	197	240	259	259
Atwell Suites Miami Brickell	189	229	229	229
Novotel Miami Brickell	239	199	199	178
Hyatt Centric Brickell Miami	167	189	176	209
Four Points by Sheraton	143	143	134	134
Courtyard Miami in Coral Gables	127	127	159	159
THesis Hotel Miami	169	155	186	299
Hyatt Regency Coral Gables	239	229	219	209
Aloft Coral Gables	142	142	142	149
Biltmore Hotel	319	319	319	319
Hotel St. Micheal	125	135	128	
Hotel Ponce De Leon	106	106	106	83

Figure 20: Highlighted price fluctuations among selected hotels for the booking weekend of September 22-23.

## Christmas Data

In this analysis, an examination of the hotel's pricing strategies for Christmas weekend, December 23-24, was performed by tracking changes in room rates over each period data. The results were color-coded: grey indicates periods where prices remained unchanged from one check to the next, purple indicates a decrease in prices, and orange shows an increase in price. From the color coding, it can be seen that a large portion of the rates remained grey, suggesting price stability, as mentioned in the previous section. Moreover, the hotels avoided making any adjustments to the room rates in response to short-term market demand or supply fluctuations.

The purple highlights appear less frequently than the grey. However, during specific periods, the hotels decreased their price. Typically, this strategy is used to increase demand significantly if the initial pricing strategies overestimate the market's willingness to pay or if occupancy rates closer to the booking date require price adjustments. On the other hand, the orange highlights periods when the hotels increased their room rates; this change may be in response to anticipation of increased demand or if room supply decreases as the booking date approaches. This strategy employed by the hotels is dynamic, as it allows the hotels to change their prices based on the differing maximum willingness of guests to pay.

While the strategy remains fluid, it can be argued that the hotels are using limited dynamic pricing strategies. This means that they are holding a baseline of stable pricing with strategic adjustments made less frequently and with more consideration for market demands. This contrasts with a fully dynamic pricing model where it would be expected to see highlighted color distributed throughout the entire five months of data collection, showing frequent increases and decreases in pricing across nearly all dates and hotels. Moreover, prices would consistently shift in real-time in response to even small market signals, which could include competitor pricing changes, variations in demands, and other market conditions.

## Overall Data

The analysis of hotel pricing across the various non-Christmas dates, despite having shorter data collection periods, also reveals the use of limited dynamic pricing. Additionally, the grey highlights in Figure 20 reveal shorter periods of price stability. The long stretches of price stability when looking at the Christmas booking period compared to the shorter period of price stability when looking at the other dates may be attributed to hotels waiting until right before the booking date to change room rates. This means they wait for closer-to-date demand signals before adjusting their pricing strategy to be dynamic.

This pattern may show a more cautious approach to dynamic pricing as hotels maintain price consistency long enough to secure early bookings and set a dependable rate as a foundation. Then, as the booking date approaches, they change their strategy to become dynamic to accommodate late trends in guest bookings and respond to real-time market conditions. Moreover, this analysis confirms the takeaways from the Christmas data. It shows the adaptive nature of these hotels' pricing strategies, which could be said to align with expectations about the

fluidity of the hotel market and maintain a balance between optimizing revenue and increasing customer trust.

### Section 3.5: Levene's Test

Next in this statistical analysis, Levene's test was used to further evaluate whether pricing strategies were consistent among various hotels. This analysis checks for uniformity in the variability of pricing. The intent of this investigation was to reveal whether pricing patterns across a selection of hotels remained steady or varied significantly. Levene's test is a statistical tool which provides a foundational approach for ensuring that the variability in hotel pricing is comparable across different samples.

Levene's Test's strength is its ability to compare variances among several groups, determining if there are significant differences. This test is preferred over alternatives like Bartlett's test due to its resilience in handling data that do not follow a normal distribution, making it a more reliable choice in diverse data scenarios like this one. The Levene's test is defined by the hypothesis:

Null Hypothesis (H<sub>0</sub>): The variances across all groups are equal.

Alternative Hypothesis (H<sub>a</sub>): At least one pair of groups with different variances exists.

The test statistic W is calculated using the group means of the absolute deviations from the group mean (or median/trimmed mean), factoring in the sizes of each subgroup and the overall mean of these deviations ([27] U.S. Department of Commerce, (n.d.)).

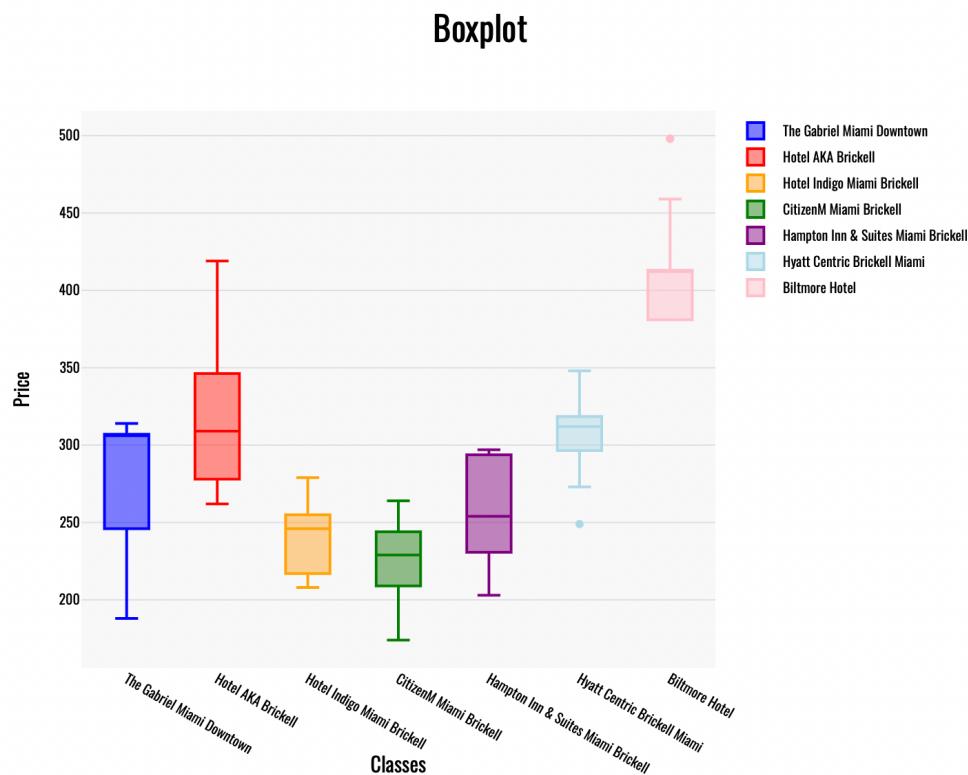
Source	DF	Sum of Square	Mean Square	F Statistic	P-value
Groups (between groups)	18	36489.1477	2027.1749	3.992	1.679e-7
Error (within groups)	334	169609.0234	507.8114		
Total	352	206098.1711	585.5062		

Figure 21: Levine's Test for all 19 hotels during the Christmas period, showing the source, degrees of freedom, sum of square, mean square, f statistic, and p-value.

After performing Levene's test on the 19 hotels to check if their pricing variances are equal, the findings were significant. Notably, in Figure 21, the test showed an F-statistic of 3.992, a measure of the variance ratio between and within groups; the p-value was very low at 1.679e-7, much less than the usual significance threshold of 0.05. This provides a basis to confidently reject the null hypothesis that all hotels have equal price variances. This also indicates a significant difference in price variability among some hotels.

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
<b>Groups</b> (between groups)	6	6513.1038	1085.5173	1.713	0.1232
<b>Error</b> (within groups)	125	79209.6452	633.6772		
<b>Total</b>	131	85722.749	654.3721		

Figure 22: Levene's Test for subset 1 of hotels, showing the source, degrees of freedom, sum of square, mean square, f statistic, and p-value.



*Figure 23: Boxplot for subset 1 of hotels to visualize similar variability.*

To identify patterns of price variance among a selected subset of hotels, a follow-up Levene's test was performed as shown in Figure 22, focusing on the hotels that appeared to exhibit similar variability in their pricing, as suggested by their boxplots in Figure 23. This more targeted analysis included seven hotels - The Gabriel Miami Downtown, Hotel AKA Brickell, Hotel Indigo Miami Brickell, CitizenM Miami Brickell, Hampton Inn & Suites Miami Brickell, Hyatt Centric Brickell Miami, and Biltmore Hotel - and the Levene's test produced an F-statistic of 1.713 with a corresponding p-value of 0.1232. Unlike the results from the full dataset, this p-value is greater than the significance level of 0.05, which indicates that there is no statistical evidence to suggest a difference in the variances of prices among the selected hotels. This result aligns with the visual interpretation of the boxplots, where these hotels appeared to have a similar spread and range of prices. Therefore, it seems reasonable to cluster these hotels into a category of 'similar price variance,' which may reflect a comparable market position or pricing strategy among them.

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
<b>Groups</b> (between groups)	10	5725.457	572.5457	1.3965	0.1844
<b>Error</b> (within groups)	191	78307.6938	409.9879		
<b>Total</b>	201	84033.1508	418.0754		

*Figure 24: Levene's Test for subset 2 of hotels, showing the source, degrees of freedom, sum of square, mean square, f statistic, and p-value.*

## Boxplot

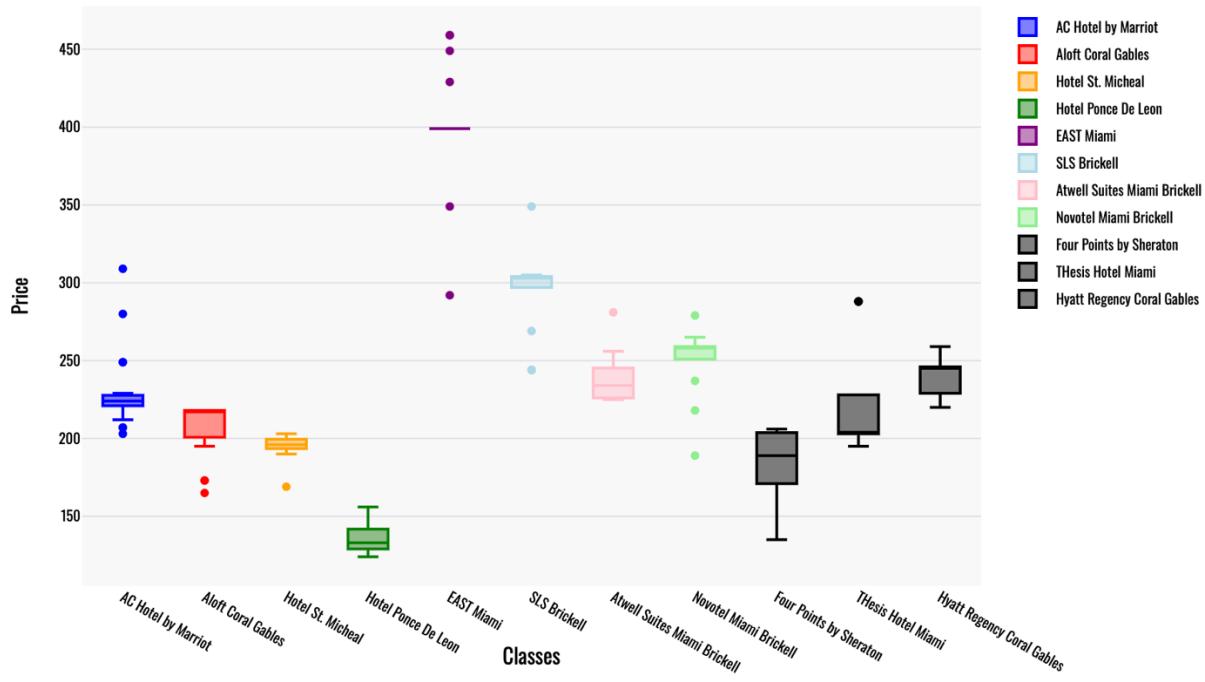


Figure 25: Boxplot of subset 2 of hotels visualizing similarity of variability.

Additionally, the investigation was extended to another set of 11 hotels - AC Hotel by Marriott, Aloft Coral Gables, Hotel St. Michel, Hotel Ponce De Leon, EAST Miami, SLS Brickell, Atwell Suites Miami Brickell, Novotel Miami Brickell, Four Points by Sheraton, THesis Hotel Miami, and Hyatt Regency Coral Gables - to evaluate their price variance. Upon reviewing their boxplots in Figure 25, these hotels were selected with the expectation that they might display a similar spread in their pricing structures. After running Levene's test, the results showed an F-statistic of 1.3965 and a p-value of 0.1844. This p-value is significantly above the 0.05 threshold, which suggests that the null hypothesis of equal variances cannot be rejected for this specific group of hotels. In other words, the variances in hotel prices for this selection are not significantly different. This reinforces the visual conclusion derived from the boxplots and shows that these 11 hotels can be grouped as they have comparable pricing.

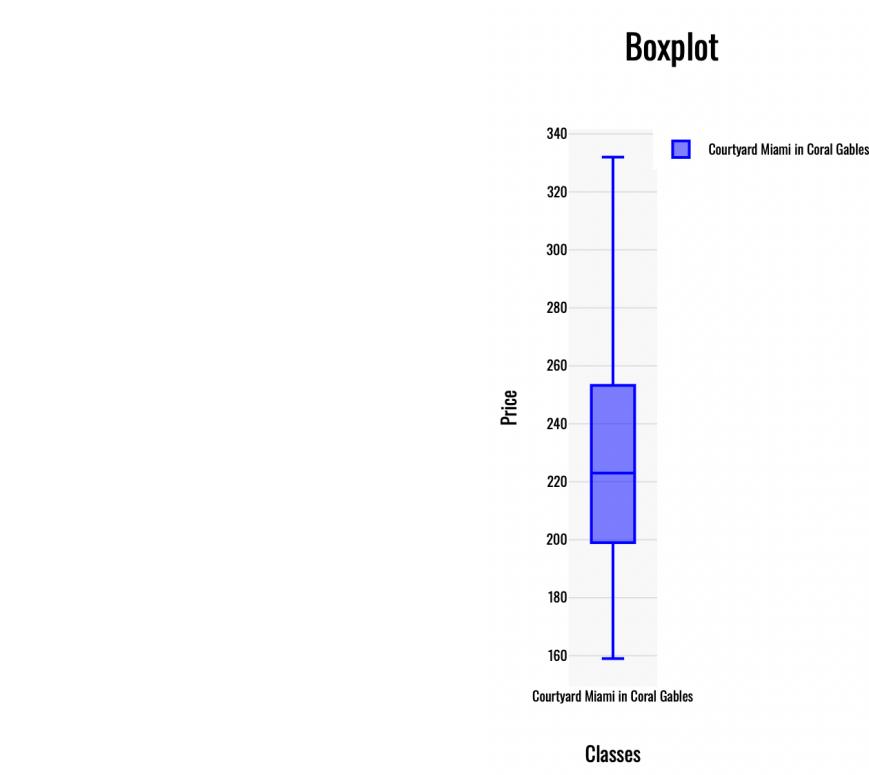


Figure 26: Boxplot for Courtyard Miami to visualize variability.

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
<b>Groups</b> (between groups)	11	21205.2756	1927.7523	4.4569	0.000004915
<b>Error</b> (within groups)	209	90399.3782	432.5329		
<b>Total</b>	220	111604.6538	507.2939		

Figure 27: Levene's Test with Courtyard Miami included in subset 1, showing the source, degrees of freedom, sum of square, mean square, f statistic, and p-value.

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
<b>Groups</b> (between groups)	7	11305.7556	1615.1079	2.5297	0.01752
<b>Error</b> (within groups)	143	91301.3296	638.4708		
<b>Total</b>	150	102607.0852	684.0472		

Figure 28: Levene's Test with Courtyard Miami included in subset 2, showing the source, degrees of freedom, sum of square, mean square, f statistic, and p-value.

Furthermore, from conducting Levene's test to analyze the variance in pricing among the selected groups of hotels, a deviation from the inclusion of Courtyard Miami in Coral Gables arose. Initially, its box plot, shown in Figure 16, seemed to suggest that it would be a match for

the first group of hotels. However, the test results indicated otherwise, showing a p-value of 0.01752, beneath the conventional significance level of 0.05. This finding led to rejecting the null hypothesis of equal variances, pointing to Courtyard Miami as an outlier in this set of hotels due to its distinctive price variance. The Courtyard Miami was then included in the second set of hotels for comparison. Courtyard Miami did not assimilate well into this second cluster and had a huge effect on the statistical results. Levene's test for this group showed a p-value of 0.000004915. This p-value was compelling evidence against the null hypothesis. This exceptionally low p-value strongly suggests Courtyard Miami's pricing variance significantly differs from the second groups.

This analysis led to the Courtyard Miami in Coral Gables as an outlier concerning pricing variance when assessed with either of the selected hotel sets. Its inclusion disrupts the variance homogeneity within both groups, highlighting its unique market position. Overall, The Courtyard Miami does not share the price variance characteristics of either group, marking it as a distinctive outlier with a possible different strategic approach in pricing analysis.

## Chapter 4: Conclusions

### Section 4.1: Overview

The primary objective of this thesis was to uncover if hotels in Miami's Brickell and Coral Gables neighborhoods employed dynamic pricing strategies. Nineteen hotels in the selected neighborhoods were examined. Chapter One served as the backbone of the thesis, attempting to provide insights into how hotels set pricing strategies and the primary participants of dynamic pricing. By reviewing literature and using qualitative and quantitative techniques to provide background on all 19 hotels, the framework to uncover the use of dynamic pricing was set.

Chapter Two built upon the foundation and detailed the specific methodologies used to gather and analyze data on pricing trends and the dynamics within Miami's hotel market. This entailed tracking room rates for specific dates twice a week leading up to the day of booking from three OTAs: Expedia.com, Hotels.com, and Booking.com. The selection of the 19 hotels ensured a representative sample, including two distinct areas and unbiased selection. The study also encompassed peak tourist seasons, such as holidays like Christmas, that could influence hotel pricing.

Next, Chapter Three, the core of the analysis, presented the collected data and the statistical analysis performed to understand dynamic pricing within Miami's Brickell and Coral Gables neighborhoods. This chapter broke down the pricing trends observed across the 19 hotels and highlighted how rates fluctuated in response to demand. Chapter Three was supported by visualizations that show the pricing patterns and allowed for examining how prices were adjusted over the observation period. The evidence section sought to discover differences across OTAs, find the optimal time for booking, and uncover dynamic pricing utilization.

## Section 4.2: Microeconomics

As this thesis concludes its exploration of dynamic pricing strategies across the 19 selected hotels in the target neighborhoods, it is important to reflect on the fundamental microeconomic theories that underlie these more modern revenue management practices. At the core of dynamic pricing is the background of supply and demand. Supply and demand inform the strategic adjustments in hotel room rates in response to changes in market conditions.

The University of Chicago defines the Law of Demand as 'In almost all cases, the quantity demanded rises when the price falls (holding all else equal),' detailing the inverse relationship between price and demand. They also define the Law of Supply as 'In almost all cases, the quantity supplied rises when the price rises (holding all else equal),' detailing the relationship between price and the amount producers are willing and able to sell.

In the hospitality industry, these two economic principles can be seen when setting room rates and deciding pricing strategies. The number of hotel rooms represents supply, which is relatively inelastic in the short run as hotels cannot increase the number of available rooms to respond to shifts in demand. Therefore, hotels need to rely on strategies like dynamic pricing to leverage higher prices during periods of higher demand.

Conversely, demand is elastic in the hotel industry because it responds to things like competition, seasons, and events. In this case, the elasticity of demand is consumers' responsiveness to changes in room prices. During major holidays or special events, consumers might need to be more responsive to price increases, which results in inelastic demand. However, when demand is low during off-seasons, consumers become more aware of prices, in which; demand can be significantly increased by lowering room rates.

Dynamic pricing considers where demand and supply meet to adjust prices to anticipate shifts in demand elasticity and attempt to sell each room for the highest price. Hotels must be

flexible with their room rates to respond to the balance of supply and demand and changes they foresee in the future. This allows them to optimize both occupancy and revenue.

### **Section 4.3: Study's Limitations**

A major limitation of this study was the smaller sample size. Searching and recording hotel prices from various websites every week was time-consuming. Given the comprehensive nature of the data collection effort, the research was limited to encompassing only nineteen hotels. Although these hotels were chosen to represent a cross-section of the hotel industry in Coral Gables and Brickell, Miami, they represent a small portion of that area's hotel market. As a result, the findings might not fully represent the dynamic pricing practices of all hotels in Miami.

The length of the study was a limitation. The thesis project lasted for two semesters, and only one was used for collecting and analyzing data, which meant the data was gathered in just five months. This short time frame made it hard to track long-term pricing trends and seasonal changes, which are crucial for fully understanding how dynamic pricing works. If the data had been collected over a more extended period, the analysis could have been more comprehensive, covering more variations due to different seasons and market changes.

Due to the limited time and manual data collection, the study mainly examines what was observed in the collected data. These observations are useful for examining the idea of dynamic pricing in the chosen hotels, but they can't fully confirm or deny whether dynamic pricing is used in the wider Miami hotel market. The conclusions are based on the study's specific data and time frame, which might not cover all the details and complexities of how hotels use dynamic pricing strategies.

Therefore, while the study provides valuable insights and adds to the knowledge of pricing strategies in a particular context, its findings should be approached carefully. They offer a glimpse into the dynamic pricing situation in a restricted area over a set period and are not a definitive statement on the overall dynamic pricing practices in the broader Miami hotel industry. Furthermore, another notable limitation is the omission of data for a few select dates within the study period. Despite the planned approach to data collection, human error and unforeseen events results in short gaps in the dataset. These missed collections, though few, could potentially affect the completeness of the pricing trend analysis, particularly in understanding the whole picture of dynamic pricing and response to changing market conditions.

Additionally, an oversight was found in the final week of review for this thesis regarding the selection of data sources. It was brought to our attention that Hotels.com is owned by Expedia Group Inc., a piece of information that was not found during the initial planning and collection of data. This could have implications for the data collected, as Hotels.com and Expedia.com may not provide as varied a set of pricing as desired, due to the same ownership. In hindsight, diversifying the third data set to be direct bookings from the hotel's webpages may have offered a broader perspective, but would have taken more time for the manual data collection. Despite this, Kerry Medina and Alex Hadwicks research showed that Booking.com, Hotels.com, and Expedia.com remain the top three OTAs used by consumers, which details the relevance of including these platforms in the study.

#### **Section 4.4: Future Directions**

Due to the limited sample size and time constraints of this project, there are many possible future directions this research could lead to. Future studies could first aim to include a more extensive and more diverse set of hotels. This could encompass the remainder of the hotels

in Brickell and Coral Gables or, on a larger scale, perform the same analysis in a similar city to see if conclusive findings are observed. This expansion would allow for a more comprehensive analysis of dynamic pricing strategies and could uncover regional-specific trends.

Another direction the research could take is to incorporate direct booking data into the study. By comparing prices from OTAs with prices from hotels' direct websites, the extent of price parity and different strategies hotels employ to encourage direct bookings could be uncovered. Additionally, collecting data over a long period could provide far more insights into how dynamic pricing works over more extended periods. This could uncover whether dynamic pricing even factors into hotel room rates a year or two before the booking date. Additionally, it would allow for observing long-term seasonal trends and comparison of two Christmas booking seasons.

Furthermore, analyzing the relationship between dynamic pricing and occupancy rates could reveal insights into the effectiveness and impact of these pricing models on hotel performance. This would require data from multiple hotels on their occupancy rates and anticipated occupancy levels. This study could include studying hotels' algorithms to forecast occupancy and adjust prices. If data on occupancy rates was obtained, future research could also investigate competitive dynamics and occupancy rates, seeing how competition influences occupancy and pricing and attempting to uncover whether hotels in more competitive markets are more aggressive with dynamic pricing.

#### **Section 4.5: Closing Thoughts**

The statistical tools and analysis techniques used to reveal insights on the hotel pricing strategies of Miami's Brickell and Coral Gables neighborhoods show that dynamic pricing is not used aggressively by the selected hotels in these areas. The common notion that dynamic pricing

is a widespread strategy within the hotel industry, particularly in tourist-driven economies like Miami's, is not proven within the five months of data collection. This observation challenges the hypothesis that hotel revenue management teams typically employ dynamic pricing to increase revenue. The findings suggest a more selective approach to adjusting prices on demand and supply dynamics. The absence of significant fluctuation in pricing suggests that these hotels lean more towards pricing stability than frequent changes that characterize dynamic pricing models.

Analysis of room rates across online travel agents supports the rejection of aggressive dynamic pricing being widely employed by the studied hotels. Despite the competitive nature of these platforms and the potential for price variation to attract bookings, the research showed that hotel managers are setting rates the same across all analyzed sites, and minimal differences can be attributed to human collection errors. The uniformity in pricing across Expedia.com, Hotels.com, and Booking.com may mean that the hotels are making a strategic decision to maintain rate parity and simplify the booking process for consumers. Having rates set the same across all websites means customers do not need to compare online travel agents to find the best price. It could also be inferred that hotels are attempting to draw customers toward booking directly rather than through an online travel agent to secure a competitive price. The consistency observed across all 19 hotels and 3 online travel agencies may indicate an industry-wide trend; however, more research would be needed to make this inference.

Additionally, the hotels' room rates showed a tendency to maintain consistent pricing from week to week, with only occasional variations observed until right before the booking date. This indicates a pattern of pricing stability rather than dynamic pricing, which means the hotels adopt a more long-term view of pricing. Moreover, dynamic pricing relies on real-time data and insights to capitalize on short-term market fluctuations, and the fact that hotels keep the same

prices over multiple weeks implies that short-term market fluctuations are not being utilized or considered. This approach may examine logistical challenges with frequent price changes or may be due to an attempt to improve customer loyalty. For example, a customer may favor a hotel more if the price does not drastically drop a week after they have already paid for their room. The stability, even during holiday seasons, indicates these selected hotels possibly prioritize maximizing guest perception over increased revenue from dynamic pricing.

During the Christmas holiday season, it can be observed that many hotels appeared to significantly delay changes in their rates until the booking date became closer. This approach to pricing for the Christmas season among the hotels was a notable trend, as all 19 hotels with the exception of Hotel AKA Brickell and Hyatt Centric Brickell adopted this approach. Moreover, contrary to expectations, these hotels do not set prices well in advance for major holidays such as Christmas. It appears that they prefer to maintain stable prices and not focus on setting rates until the Holiday approaches. This implies that Christmas is not at the forefront of hotel pricing strategies, and there are zero or limited algorithms in play to set prices. These hotels' strategies could be due to several factors. They may be using dynamic pricing that is based on historical booking patterns showing most guests make their holiday reservations closer to the date; however, through this research, this statement cannot be confirmed or denied.

From the analysis of the 19 hotels, the results could have a few different implications as to why they are not fully utilizing dynamic pricing or why only observing price changes would make it appear so. One explanation could be that the hotels are using dynamic pricing at a smaller level than expected, as they could be focused on customer relations. Moreover, drastic price fluctuations might deter customers as it could be seen as unfair. Another explanation could be that the supply and demand of hotel rooms in Brickell and Coral Gables may not need to

make price adjustments, as the heavy influx of tourism is achieving occupancy rate needs with a stable pricing model. It may also be plausible that these hotels are using dynamic pricing, but in a way that cannot be seen by merely observing pricing trends. Furthermore, deeper insights into the hotel's direct booking, selective adjustment of prices, customer segments, and specific room types could reveal that dynamic pricing is being utilized to fulfill a need other than optimizing revenue. Overall, by examining the shift in prices, it can be concluded that aggressive dynamic pricing does not appear to be utilized.

In conclusion, this thesis sought to discover the intricacies of pricing strategies in Miami's Brickell and Coral Gables neighborhoods. The findings showed that dynamic pricing is not being used aggressively or to a statistically significant extent within the 19 selected hotels. This finding challenges the idea that aggressive use of dynamic pricing strategies are widespread throughout the hospitality industry. Additionally, it suggests that hotels may prioritize other factors, such as customer relationships, over the more immediate gains that dynamic pricing offers. The limitations and future directions, outlined in Sections 4.3 and 4.4, invite future research that could expand upon this thesis and delve into other aspects, such as occupancy rates and direct booking data, to further explore the pricing tactics employed by hotels.

## Works Cited

- [1] *About: Miami Florida hotel st. michel.* . (n.d.). Retrieved from Hotel St. Michel.: <https://www.hotelstmichel.com/about-us>
- [2] Altin, M. S. (2017). Where you do it" matters: The impact of hotels' revenue-management implementation strategies on performance. *International Journal of Hospitality Management*, 67, 46-52.
- [3] Boahen, O. Q. (2013). Assessing the Benefits of Yield Management in the Hospitality Industry in Kumasi Metropolis of Ghana. *International Journal of Business and Social Research (IJBSR)*, 3(9).
- [4] Den Boer, A. V. (2015). Dynamic pricing and learning: historical origins, current research, and new directions. *Surveys in operations research and management science*, 20(1), 1-18.
- [5] Donaghy, K. M. (1995). Yield management: an overview. *International journal of hospitality management*, 14(2), 139-150.
- [6] *Dynamic pricing models: Types, algorithms, and best practices*. (2024, February 21). Retrieved from Aporia.: [https://www.aporia.com/blog/learn/machine-learning-for-business/dynamic-pricing-models-types-algorithms-and-best-practices/#:~:text=Reinforcement%20Learning%20\(RL\),relationship%20between%20price%20and%20demand](https://www.aporia.com/blog/learn/machine-learning-for-business/dynamic-pricing-models-types-algorithms-and-best-practices/#:~:text=Reinforcement%20Learning%20(RL),relationship%20between%20price%20and%20demand).
- [7] *East, Miami serves as Anchor Hotel for brickell city centre – ...* . (n.d.). Retrieved from EastHotels: [https://www.easthotels.com/en/miami-/media/swirehotels/easthotels/east\\_miami/files/pdf/EASTMiamiOpeningRelease\\_June-2016.ashx](https://www.easthotels.com/en/miami-/media/swirehotels/easthotels/east_miami/files/pdf/EASTMiamiOpeningRelease_June-2016.ashx)
- [8] George, P. S. (2020). *Miami's Brickell Avenue Neighborhood*. Arcadia Publishing.
- [9] Heo, C. Y. (2015). Do luxury room amenities affect guests' willingness to pay? *International Journal of Hospitality Management*, 46, 161-168.
- [10] *Hotel deals coral gables: Miami florida hotel deals.* . (2024, February 29). Retrieved from Biltmore.: [https://biltmorehotel.com/offer/stay-more-save-more/?gad\\_source=1&gclid=Cj0KCQjwqpSwBhClARIsADlZ\\_TmyS-ft5a8Ba0CQiKoiPDLyOP5W01oF-ztCxvlNVMokpxjBa3RsIzEaAs4gEALw\\_wcB&gclsrc=aw.ds](https://biltmorehotel.com/offer/stay-more-save-more/?gad_source=1&gclid=Cj0KCQjwqpSwBhClARIsADlZ_TmyS-ft5a8Ba0CQiKoiPDLyOP5W01oF-ztCxvlNVMokpxjBa3RsIzEaAs4gEALw_wcB&gclsrc=aw.ds)
- [11] Hung, W. T. (2010). Pricing determinants in the hotel industry: Quantile regression analysis. *International Journal of Hospitality Management*, 29(3), 378-384.
- [12] Jang, Y. C. (2019). Last-minute hotel-booking behavior: The impact of time on decision-making. *Journal of Hospitality and Tourism Management*, 38, 49-57.

- [13] Kim, W. G. (2017). The influence of recent hotel amenities and green practices on guests' price premium and revisit intention. *Tourism economics*, 23(3), 577-593.
- [14] Kosar, L. (2014). Lifestyle hotels: New paradigm of modern hotel industry. *Turističko poslovanje*, (14), 39-50.
- [15] Medina, K. &. (2019). *THE STATE OF HOSPITALITY DISTRIBUTION: DIRECT BOOKINGS*. EyeorTravel Ltd.
- [16] Mohl, R. A. (1982). Changing economic patterns in the Miami metropolitan area, 1940-1980. *Tequesta*, 1, 63-73.
- [17] *Pet-friendly boutique hotels in Miami: Hotel Indigo Miami Brickell*. (n.d.). Retrieved from IHG: <https://www.ihg.com/hotelindigo/hotels/us/en/miami/miani/hoteldetail>
- [18] Priester, A. T. (2020). "A special price just for you: Effects of personalized dynamic pricing on consumer fairness perceptions. *Journal of Revenue and Pricing Management* 19, 99-112.
- [19] Raza, M. R. (2021). Sentiment analysis using deep learning in cloud. *9th International Symposium on Digital Forensics and Security (ISDFS)*, 1-5.
- [20] Sebree, M. A. (1991). The development and preservation of Coral Gables, Florida, an early twentieth-century thematic suburb. *University of Georgia*.
- [21] Sparks, B. A. (2011). The impact of online reviews on hotel booking intentions and perception of trust. *Tourism management*, 32(6), 1310-1323.
- [22] Talón-Ballester, P. N.-G.-S. (2022). The wheel of dynamic pricing: Towards open pricing and one to one pricing in hotel revenue management. *International journal of hospitality management*, 102, 103-184.
- [23] *The Art of Design: Hotel Indigo infuses spaces with unexpected ...*. (n.d.). Retrieved from IHG: <https://www.ihgplc.com/en/news-and-media/news-releases/2021/the-art-of-design-hotel-indigo-infuses-spaces-unexpected-design-details-inspired-by-neighborhoods>
- [24] *The economic impact of Hotel Development*. (2015, December 10). Retrieved from Pinnacle Advisory Group: <https://pinnacle-advisory.com/press-room/the-economic-impact-of-hotel-development/>
- [25] *The economic impact of Hotel Development*. (2020, August 10). Retrieved from Acquisition International | The voice of modern business - est. 2010.: <https://www.acquisition-international.com/the-economic-impact-of-hotel-development/>
- [26] Toh, R. S. (2011). Selling rooms: Hotels vs. third-party websites. *Cornell Hospitality Quarterly*, 52(2), 181-189.

- [27] U.S. Department of Commerce, N. I. ((n.d.)). *1.3.5.10. Levene Test for Equality of Variances*. Retrieved from Engineering Statistics Handbook:  
<https://www.itl.nist.gov/div898/handbook/eda/section3/eda35a.htm>
- [28] Viglia, G. M. (2016). The exploration of hotel reference prices under dynamic pricing scenarios and different forms of competition. *International Journal of Hospitality Management*, 52, 46-55.
- [29] Wheeler, D. F. (2006). Understanding the value of Boutique Hotels. *Diss. Massachusetts Institute of Technology*.

## Appendices

### Booking Weekend Table: September 22-23, 2023

Hotel Name	Column1	12-Sep	16-Sep	19-Sep	22-Sep
AC Hotel by Marriot Miami Brickell		199	175	179	179
The Gabriel Miami Downtown		157	149	213	189
Hotel AKA Brickell		244	266	269	305
EAST Miami		349	429	459	299
SLS Brickell		179	303	299	249
Hotel Indigo Miami Brickell		180	199	199	199
CitizenM Miami Brickell		179	164	189	189
Hampton Inn & Suites Miami B		197	240	259	259
Atwell Suites Miami Brickell		189	229	229	229
Novotel Miami Brickell		239	199	199	178
Hyatt Centric Brickell Miami		167	189	176	209
Four Points by Sheraton		143	143	134	134
Courtyard Miami in Coral Gab		127	127	159	159
THesis Hotel Miami		169	155	186	299
Hyatt Regency Coral Gables		239	229	219	209
Aloft Coral Gables		142	142	142	149
Biltmore Hotel		319	319	319	319
Hotel St. Micheal		125	135	128	
Hotel Ponce De Leon		106	106	106	83

### Booking Weekend Table: October 13-14, 2023

Hotel Name	Column1	12-Sep	16-Sep	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct
AC Hotel by Marriot Miami B1		219	203	246	237	237	263	259	184
The Gabriel Miami Downtown		281	316	316	316	316		319	300
Hotel AKA Brickell		229	275	269	252	269	371	329	265
EAST Miami		368	399	379	379	399	379	409	241
SLS Brickell		301	373	324	320	357	356	329	329
Hotel Indigo Miami Brickell		220	220	220	220	220	220	249	195
CitizenM Miami Brickell		229	229	229	229	219	229	234	157
Hampton Inn & Suites Miami I		235	237	237	247	245	250	287	293
Atwell Suites Miami Brickell		229	225	225	225	234	225	274	217
Novotel Miami Brickell		239	209	209	209	209	227	249	219
Hyatt Centric Brickell Miami		371	272	279	278	318	274	229	225
Four Points by Sheraton		179	179	179	179	152	152	184	184
Courtyard Miami in Coral Gab		151	151	151	151	151	151	151	151
THesis Hotel Miami		239	233	314	305	305	305	299	299
Hyatt Regency Coral Gables		246	246	289	289	279	279	279	279
Aloft Coral Gables		180	180	180	180	180	180	161	161
Biltmore Hotel		367	459	459	449	449	449	429	429
Hotel St. Micheal									
Hotel Ponce De Leon		124	124	124	124	97	97	128	133

Booking Weekend Table: November 3-4, 2023

### Booking Weekend Table: November 24-25, 2023

Hotel Name	Column1	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	21-Nov
AC Hotel by Marriot Miami Brickell	246	246	246	246	246	246	237	237	203	203	203	209	209
The Gabriel Miami Downtown	290		290	290	290	290	290	290	290	290	248	248	249
Hotel AKA Brickell	292	332	379	379	319	274	272	278	319	319	294	294	370
EAST Miami	399	399	399	399	349	349	319	319	319	319	369	369	407
SLS Brickell	356	356	345	345	345	330	330	330	330	330	286	286	269
Hotel Indigo Miami Brickell	220	220	230	230	230	220	220	220	220	220	202	202	209
CitizenM Miami Brickell	219	219	249	249	249	239	239	219	199	199	199	199	209
Hampton Inn & Suites Miami Atwell Suites Miami Brickell	272	275	277	277	275	195	195	195	195	195	237	237	259
Novotel Miami Brickell	269	256	215	269	269	195	215	206	206	208	224	224	229
Hyatt Centric Brickell Miami Four Points by Sheraton	213	209	215	215	211	265	268	258	274	286	284	284	284
Courtyard Miami in Coral Gables	151	151	151	151	151	152	152	152	152	152	150	150	149
THesis Hotel Miami	203	203	178	178	178	178	178	178	178	178	203	203	199
Hyatt Regency Coral Gables	212	212	212	212	212	186	186	186	186	186	169	169	207
Aloft Coral Gables	151	151	142	142	142	142	142	132	132	132	116	116	149
Biltmore Hotel	381	347	335	347	335	347	347	419	419	419	381	381	419
Hotel St. Micheal			204	204	212	212	169	169	169	169	163	163	135
Hotel Ponce De Leon	133	137	129	129	137	137	137	137	137	137	152	152	120

## Booking Weekend Table: December 15-16, 2023

Hotel Name	Column 1	17-Oct	20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	24-Nov	13-Dec
AC Hotel by Marriot Miami Brickell	246	246	246	246	203	220	212	212	212	259
The Gabriel Miami Downtown	378	378	378	378	378	286	297	246	246	239
Hotel AKA Brickell	329	292	329	317	349	258	425	387	387	385
EAST Miami	429	429	399	399	399	399	351	459	459	539
SLS Brickell	337	365	331	345	345	330	370	478	478	359
Hotel Indigo Miami Brickell	227	227	227	227	227	208	220	237	237	299
CitizenM Miami Brickell	224	224	209	209	219	209	229	199	199	219
Hampton Inn & Suites Miami	259	218	218	220	203	254	280	280	280	239
Atwell Suites Miami Brickell	234	225	225	225	225	225	237	255	255	299
Novotel Miami Brickell	229	212	224	197	208	269	278	446	446	299
Hyatt Centric Brickell Miami	292	408	415	402	470	308	276	270	270	234
Four Points by Sheraton	206	214	215	215	215	215	169	169	169	224
Courtyard Miami in Coral Gables	263	215	215	215	215	186	227	227	227	304
THesis Hotel Miami	288	288	288	288	288	305	374	374	374	279
Hyatt Regency Coral Gables	280	280	280	280	280	280	246	289	289	259
Aloft Coral Gables	246	239	227	239	229	256	237	246	246	219
Biltmore Hotel	472	472	472	472	455	407	593	639	639	579
Hotel St. Micheal	196	196	196	196	196	203	191	191	191	174
Hotel Ponce De Leon	138	138	138	143	143	152	132	132	132	132

## Booking Weekend Table: December 24-25, 2023

Hotel Name	Column 1	12-Sep	16-Sep	19-Sep	22-Sep	26-Sep	29-Sep	6-Oct	10-Oct	17-Oct
		209	280	224	224	224	224	224	224	224
AC Hotel by Marriot Miami Brickell		309	280	224	224	224	224	224	224	224
The Gabriel Miami Downtow		314	307	307	307	307		307	307	307
Hotel AKA Brickell		262	277	278	278	269	377	419	419	299
EAST Miami		459	459	399	399	399	399	399	399	399
SLS Brickell		244	244	244	305	305	305	297	297	297
Hotel Indigo Miami Brickell		208	217	217	217	217	217	255	255	255
CitizenM Miami Brickell		264	264	264	229	229	229	244	244	244
Hampton Inn & Suites Miami		289	292	293	292	294	297	294	294	295
Atwell Suites Miami Brickell		252	225	225	225	225	225	243	243	243
Novotel Miami Brickell		259	259	259	259	259	259	259	259	279
Hyatt Centric Brickell Miami		319	316	312	308	320	295	298	294	296
Four Points by Sheraton		170	170	188	188	197	197	197	197	206
Courtyard Miami in Coral Gat		332	223	251	251	251	251	291	291	287
THesis Hotel Miami		220	195	288	288	288	288	203	203	203
Hyatt Regency Coral Gables		246	246	246	246	246	246	246	246	229
Aloft Coral Gables		218	218	218	218	218	218	218	218	218
Biltmore Hotel		381	381	381	381	381	381	381	381	413
Hotel St. Micheal		203	203	203				196	196	196
Hotel Ponce De Leon		129	129	129	129	133	133	133	133	137
20-Oct	24-Oct	27-Oct	31-Oct	14-Nov	21-Nov	24-Nov	13-Dec	19-Dec	23-Dec	
224	224	207	207	220	203	212	229	249	249	
307	307	307	307	221	221	188	246	253	209	
299	274	309	283	309	364	350	320	335	310	
399	399	399	399	399	292	349	429	449	399	
297	297	304	304	304	304	304	304	349	269	
255	255	255	255	274	246	220	224	279	229	
244	229	209	209	224	209	199	194	174	189	
237	237	237	233	216	203	254	220	225	230	
234	234	234	234	252	246	281	256	229	239	
237	251	251	265					189	218	
326	336	317	309	305	314	314	348	249	273	
206	206	206	206	188	144	144	189	135	174	
199	199	199	199	175	159	254	159	159	199	
203	203	203	203	203	228	228	220	199	199	
229	229	229	229	229	220	220	239	249	259	
218	218	218	218	218	195	195	165	173	173	
413	413	413	413	413	413	498	498	498	459	
196	196	196	196	203	191	191	190	196	169	
138	143	143	143	152	132	132	156	129	124	

## Hotels Address and Neighborhood Classification Table

Hotel Name	Address	Neighborhood
AC Hotel by Marriott Miami Brickell	115 SW 8th St, Miami, FL 33130	Brickell
Aloft Coral Gables	2524 S Le Jeune Rd, Coral Gables, FL 33134	Coral Gables
Atwell Suites Miami Brickell	145 SW 11th St Building 2, Miami, FL 33130	Brickell
Biltmore Hotel	1200 Anastasia Ave, Coral Gables, FL 33144	Coral Gables
CitizenM Miami Brickell	11 SE 10th St, Miami, FL 33130	Brickell
Courtyard Miami in Coral Gables	2051 S Le Jeune Rd, Coral Gables, FL 33134	Coral Gables
EAST Miami	788 Brickell Plaza, Miami, FL 33131	Brickell
Four Points by Sheraton	3861 SW 40th St, Coral Gables, FL 33146	Coral Gables
Hampton Inn & Suites Miami Brickell	50 SW 12th St, Miami, FL 33130	Brickell
Hotel AKA Brickell	1395 Brickell Ave, Miami, FL 33131	Brickell
Hotel Indigo Miami Brickell	145 SW 11th St Building 1, Miami, FL 33130	Brickell
Hotel Ponce De Leon	1721 Ponce de Leon, Coral Gables, FL 33134	Coral Gables
Hotel St. Michel	162 Alcazar Ave, Coral Gables, FL 33134	Coral Gables
Hyatt Centric Brickell Miami	1102 Brickell Bay Dr, Miami, FL 33131	Brickell
Hyatt Regency Coral Gables	50 Alhambra Plaza, Coral Gables, FL 33134	Coral Gables
Novotel Miami Brickell	1500 SW 1st Ave, Miami, FL 33129	Brickell
SLS Brickell	1300 S Miami Ave, Miami, FL 33130	Brickell
The Gabriel Miami Downtown	1100 Biscayne Blvd, Miami, FL 33132	Brickell
THesis Hotel Miami	1350 S Dixie Hwy, Coral Gables, FL 33146	Coral Gables