# Renewal Pricing and Expiration Management in the Apartment Industry

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## Renewal Pricing and Expiration Management in the Apartment Industry

The apartment industry is similar to the traditional industries, like hotel and car-rental, in general business format. However, the apartment industry has the unique revenue-critical aspects of renewals and expiration management. Being alien to the traditional industries, these two aspects have been understudied problems. They have significant impact on revenues in the apartment industry. In this work, we introduce and/or formalize the problems of simultaneous renewal pricing and expiration management. We also present their current industry practices followed by various operational factors that affect these two problems. We conclude with a comparative analysis between expiration management and network revenue management.

**Keywords:** Apartment, Expiration Management, Optimization, Pricing, Renewal, Revenue Management

## INTRODUCTION

Revenue management has evolved into a successful and necessary practice in traditional industries like airline, hotel, car-rental, cruise line, etc. However, in apartment industry, revenue management practice is still in its infancy -- only about 9% of the apartment units in the United States use some form of revenue management (Lefkovits, 2010). The apartment industry is similar to the hotel and car-rental industries in general business format. However, the apartment industry has the unique aspects of renewals and expiration management. These two aspects are revenue management functions in the apartment industry and have significant impact on revenues. Being alien to the traditional industries, the two aspects have been understudied problems. Wang (2008) briefly mentioned expiration management with little detail. In the following sections, we 1. introduce and formalize simultaneous renewal pricing and 2. formalize expiration management; review related practices; present the factors that affect these two problems; compare expiration management and network revenue management; and state the opportunities for future work.

## RENEWALS

The apartment industry has two types of customers:

1. New residents, who sign leases and move in

2. Existing residents, who may renew when their current leases expire, also called renewals

Revenue management in the apartment industry is essentially pricing for these two types of customers. Renewals are key part of apartment operations and account for 50-70% of the business. Thus, the topic of renewals is sensitive among apartment operators. Existing residents usually have an anchoring effect because moving is not convenient. Therefore, a major portion of existing residents likes to renew for the right price as long as the maintenance and service are acceptable. Based on the lease terms and subject to local laws and regulations, an existing resident is required to give a move-out notice 30-60 days before his or her lease expiration. The apartment

management company usually offers a renewal price to the existing resident a few weeks before the notice period. The resident can accept, and sometimes negotiate, the renewal price or turn in the move-out notice. The apartment operator attempts to lease the apartment units with move-out notices to new residents ahead of the move-out. It is not uncommon among existing residents to not commit to renewal or turn in the move-out notice even after the deadline for the move-out notice passes. Some operators even allow the existing residents to cancel the turned-in move-out notices anytime.

Existing residents are low cost to retain but high cost to replace. When an existing resident moves out without renewing, the apartment unit incurs cost to turn and marketing costs to rent, remains vacant until reoccupied, and may even be occupied by a resident paying lower rent. In a bad economy, like the recent years, the primary focus of apartment operators is resident retention because the demand from qualified new residents is low. Also, the reoccupying new residents may have a lower willingness to pay than the existing residents in a bad economy. A large number of move-outs results in lower occupancies over extended time and adds pressure on new resident prices to get the apartment units filled.

**Pricing Practices**

Despite the critical nature of renewals, renewal pricing has unfortunately not received the attention it deserves and has remained an understudied problem. Any focus on renewals has traditionally been limited to offering improved customer service for retaining residents. This neglect is a result of renewal pricing not being common in the traditional industries and lack of scientific advancement in the apartment industry. The key to renewal pricing and maximizing revenues is getting the maximum willingness to pay from every renewing resident. The likelihood that the leases of two existing residents with exactly same type of apartment units expire on the same day is little to none. As a result, fair housing laws that ensure that all new residents get the same price for the same apartment units on the same day are not practically as much binding on the renewal residents. However, some existing residents can be savvy in knowing the promotions offered to the new residents, advertised on the internet for similar apartment units at the same community, what nearby communities have to offer, etc. These savvy

residents are often demanding and highly price-sensitive. Thus, it becomes important to balance between the prices of new residents and renewals. When the price for new residents is significantly higher than that for renewals, the apartment community may not attract enough new residents to replace the leaving residents. When the price for new residents is significantly lower than that for renewals, the apartment community may lose a higher number of existing residents without renewal. Also, lower prices for new residents can lead to customer satisfaction problems with the existing residents.

Operators often price renewals intuitively. Examples of commonly used intuitive renewal pricing practices include:

1. Increase the rents of existing residents to market rent – an artificially high rack rate advertised as the “value” of the apartment unit

2. Increase rent up to a maximum of 3% if the existing resident is currently paying rent less than that of new residents for similar apartments

3. Do not increase or decrease the rent if the existing resident is currently paying rent more than that of new residents for similar apartments

4. Increase rent of every existing resident by at least something because “they are not going to move out because of that increase”

5. Decrease the rent of existing residents on a case by case basis if they are not happy with the initially offered renewal price

6. Let the existing resident move-out because we do not want to set a precedent of decreasing rents

This intuitive renewal pricing approach poses several problems. First, it often leads to dilution -- getting less rent than what an existing resident is willing to renew for. In booming economic conditions, and times and markets of high home prices, the new residents tend to have a significantly higher willingness to pay than the existing

residents. A 3% increase in rent may not capture the existing resident's maximum willingness to pay. Second, it may lead to increased turn-costs and vacancy loss due to a higher number of move-outs. In bad economic conditions, times of high unemployment, and low home prices, the existing residents are often paying significantly higher than what new resident prices are willing to pay. Increasing the rents of existing residents by at least something or not decreasing their rents may result in a higher number of move-outs.

While we are not privy to any proprietary models, current revenue management systems available to the apartment industry are known to independently price for new residents and renewals. Rudimentary versions of the optimization models from the traditional industries are first used to price new residents. Then, the renewal prices are derived by applying business rules to the new resident prices. This independent renewal pricing approach equally suffers from the above outlined shortcomings and can drive the overall revenues lower.

**Simultaneous Renewal Pricing and its Factors**

With this background, we introduce the concept of simultaneous renewal pricing – optimizing new resident and renewal prices simultaneously while modeling the competition between new residents and renewals for the common inventory. We now outline various factors, which should be modeled while optimizing renewal prices:

1. Variable Renewal Capacity Allocation: While modeling the competition between individual and group bookings, most optimization models in the traditional industries model capacities by reducing them with the expected group business and solving for individual booking prices. Similarly, one could model the capacities in the apartment industry by reducing them with expected renewals and solve for new resident prices. This modeling approach does not quite help pricing renewals. Optimization models for the apartment industry should consider variable allocation of capacity to renewals while modeling the true competition between new residents and renewals

2. Price-Demand Relationship: On average, not all existing residents renew. There are always existing residents who move out for reasons unrelated to price. At the same time, operators are sensitive to a higher number of move-outs. The existing residents are generally less price-sensitive than the new residents due to their inherent anchoring effect. It may sometimes be more lucrative to replace the existing residents with new residents or vice-versa. So, it is important to model the price-sensitivity of renewal demand for balancing between move-outs and rate-increases

3. Relationship between New Resident and Renewal Prices: Optimization models should factor any intuitive renewal pricing rules and business rules that current systems use after optimization

4. Other factors that improve renewal pricing include length of residency, credit score, income, payment history, and competitive prices. The longer a resident has been leasing the apartment unit, the higher the anchoring effect and willingness to pay. Residents with higher credit score and income tend to exhibit higher willingness to pay. Residents with poor payment history are usually not renewed. Instead, models could compensate for the associated risk and target higher renewal prices. Competitive prices can play a vital role when there is a significant difference that outweighs the inconvenience of or prohibit moving to the competitor

5. Sparsity and uncertainty in the apartment industry data make modeling renewals challenging

**EXPIRATION MANAGEMENT**

Apartment residents often request and have a strict preference to a lease term (number of months). When a new resident signs a lease or an existing resident renews, the expiration time of the new or renewal lease will impact the community's rental revenues in the long run. Leases should ideally expire at a time when the apartment units can be

readily reoccupied. Otherwise, when the signed lease expires and the resident moves out, the apartment unit may remain vacant for a long time before it is reoccupied, thus, incurring, vacancy loss, additional turn and marketing costs, revenue dilution, and even displacing higher-rent paying residents in the long run. Managing the lease expirations forms the core of expiration management.

In practice, operators often accept leases with little attention to their expiration times, just to get the apartment units filled and start generating rental revenues. This shortsighted approach usually results in leases expiring at a future time when the demand from reoccupying residents is insufficient. As a result, the apartment units remain vacant for a long time before they are reoccupied. As an apartment unit remains vacant longer, it may gather dust or even get infected by roaches, thus incurring more costs and time for maintenance. To avoid these maintenance costs, operators routinely offer large free-rent promotions on an aged vacant apartment unit in steps of months to get it rented, thus further eroding the price and rental revenues. When several apartment units simultaneously get vacant at a low-demand time and age, the result could be disastrous to occupancy and revenues. Operators drop prices to get these multiple apartment units reoccupied, entering a spiral-down cycle on overall revenues in the long run. Vacancy loss arises from a mismatch between demand seasonality and current lease expirations, risky renewal behavior, not factoring price-demand relationship, and a high number of month-to-month leases. It is not uncommon for an apartment community to bleed in revenues for months, if not years, due to poor expiration management. We learned from our industry colleagues that poor expiration management can lead to up to 2% loss in revenues, usually first in the form of lower occupancy – similar to 1.5-2% revenue lift from network revenue management in the airline industry (Talluri and van Ryzin, 2005).

**Expiration Management Practices**

In the apartment industry, operators attempt to manage the lease expirations using what is called a lease expiration matrix. A lease expiration matrix shows the relationship between a heuristically desired number of lease expirations and the actual number of lease expirations for a range of future months. Starting with the month after current

month, the matrix is usually maintained for the duration of the longest lease term from the farthest move-in date offered at the apartment community. For example, if the current month is March and an apartment community offers lease terms of 1 to 9 months for move-in dates 3 months out, the apartment community usually maintains the matrix for the next 12 months starting April.

| Expiring Month | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Desired Expirations | 12 | 12 | 12 | 12 | 12 | 12 | 8 | 8 | 8 | 8 | 8 | 8 |
| Actual Expirations | 4 | 9 | 15 | 18 | 1 | 3 | 2 | 0 | 19 | 7 | 4 | 9 |

**Table 1: Example Lease Expiration Matrix at a 120-Unit Apartment Community**

Table 1 shows an example of a lease expiration matrix for the future 12 months at a fictitious 120-unit apartment community. The desired expirations row is heuristically derived. A common way operators derive it is by distributing and aligning the total number of units with seasonality. For example, at a 120-unit apartment community with uniformly high season from April through September and low season for the rest of the year, desired expirations are subjectively estimated as shown in Table 1. While the desired expirations are seldom updated, the actual expirations on the matrix are usually updated weekly or monthly. When a new or existing resident requests a lease term, the operator looks at the latest lease expiration matrix and persuades the resident to sign a lease for a lease term that is close to the requested lease term and ends in a month in which the actual expirations are lower than the desired expirations. Sometimes the operator and the resident may review a few different lease terms before lease execution. The operator then sets up the lease to expire either in the middle of that month, at the end of that month, or at some other time in the month based on the operational practice. Residents are usually not picky about expiring time within the expiring month. There are a few nice aspects of this approach. First, the approach meets the needs of both the residents and operators in terms of the month and time of

the month at which a lease should expire. Second, the approach is simple to use for operators. However, it also comes with a few challenges. First, the approach is based on timing the lease expirations rather than pricing to a requested expiration time. It does not provide prices for the number of lease months desired by a resident or expiration time in the expiring month of the lease desired by an operator. Pricing to a desired lease term provides greater pricing power and maximizes revenues while compensating for the associated risks and cost. Importantly, pricing to a desired lease meets residents' and operators' needs. Second, the maintenance of the lease expiration matrix at a community level neglects the individual patterns at unit type level. Two and three bedroom apartment units tend to lease better during summers when schools are out of sessions. One bedroom apartment units tend to lease throughout the year. These differential behaviors among unit types are lost by maintaining the matrix at community level. Finally, the approach does not consider the effects of renewal behavior of existing residents and vacancy loss resulting from leaving residents, nor does it consider the price-demand relationship of new residents or renewals. The approach also does not account for the turn, maintenance, and marketing costs and it does not factor in what a reoccupying resident would pay. In summary, while the approach is simple, it is not necessarily revenue-maximizing.

Current systems available vary prices based on different lease terms with some consideration of expiration times of the year and turn-costs. At RM Panel (2009), several operators unanimously expressed that the systems perform poorly in expiration management. Operators often find the prices counter-intuitive to demand seasonality and/or current lease expiration profiles at the apartment communities. Operators report that prices are high for lease terms expiring in months with low demand and/or a low number of lease expirations. Further, operators report wide variation in prices across lease terms, which will negatively affect the demand and purchase behavior. Often, operators advertise prices for 12 month lease terms. When a new resident visits an apartment community after seeing an advertised low price for a 12 month lease term, the prospect may not be happy to learn that the price was valid only for a 12 month lease term and a shorter lease term would cost significantly more, especially when the difference amounts to $100s in monthly rent. Also, the prices are not based on varying

expiration time of the month to meet operational needs. A further issue is that renewal pricing and expiration management are closely tied together but the expiration management offered by the available systems does not take renewals into account.

**Expiration Management and its Factors**

With price as the mostly available control, we define expiration management as optimally pricing a lease for a given expiration time. This definition gives us an improved flexibility to meet the needs of operators, in addition to the residents. Apartment residents often request and have a strict preference to a lease term (number of months). When a new resident signs a lease or an existing resident renews, the resident usually has a lease term, say 12 months, in mind. Optimally pricing for the requested 12 month lease term while factoring in all risks and costs, rather than persuading the resident to sign for a different lease term, is appropriate in meeting the resident's needs. Similarly, several operators desire to expire their leases either in the middle of a month, at the end of a month, or staggered throughout the month for their operational convenience. Demand for the apartment units is usually higher during the first and last weeks in any month. If a lease expires in the beginning of a month and the apartment unit gets cleaned up and becomes ready by the second week of the month, there may not be enough demand for the apartment unit to get reoccupied until the last week of the month, thus incurring 2-3 weeks of vacancy loss. Again, optimally pricing for lease expirations at the desired time of the month while factoring all these costs, rather than persuading the operator to expire the leases at a different time of the expiring month, is appropriate in meeting the operator's needs. The key is factoring in the costs of expiration decisions. Our definition attempts to capture both resident and operator needs by pricing to requested expiration time. Specifically, expiration management is a revenue management function to optimally price leases based on a requested expiration time while maximizing rental revenues over the lease term and minimizing the costs of vacancy loss and marketing, turning, and maintaining the apartment unit. Thus, expiration management determines optimal prices for:

1. A lease term (number of months) requested by a resident

2. An expiration time (middle or end of the month or staggered throughout the month) desired by an operator

Expiration management is affected by:

1. The relationship between demand for the apartment units from reoccupying residents and availability at the requested expiration time. The demand depends on seasonality while the availability depends on renewal behavior of the existing residents

2. Price-sensitivity of new residents and renewals at both move-in and expiration time

3. The revenue loss from the vacancy until the apartment unit is reoccupied after the resident moves out

4. The costs to turn, maintain, and market an apartment unit before it is reoccupied

**Expiration Management vs. Traditional Network Revenue Management**

While it may not be prominent, the concept of expiration management manifests itself in other industries in some form or other. In general, the driving force behind expiration management is any situation in which multiple products compete for multiple resources and the control variables are the resource prices/costs – network revenue management.

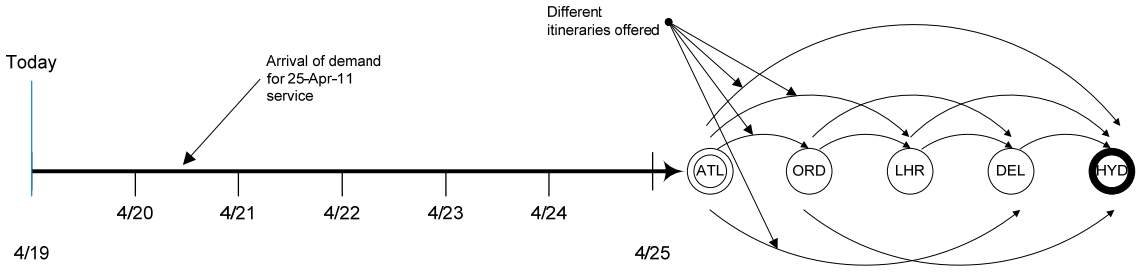


**Figure 1: Airline Revenue Management**

There are two types of industries with the concept similar to expiration management. One type is the airline-like industries. In the airline industry (Figure 1), an airline may sell $\binom{5}{2}$ different one-way itineraries (products) on the route Atlanta (ATL) - Chicago (ORD) - London (LHR) - New Delhi (DEL) - Hyderabad (HYD). Each one of the itineraries has a revenue value and competes for a seat on one or more legs (resources). The overall revenues across the route depend on optimally pricing all itineraries to charge as high prices as possible and have seats readily reoccupied when a passenger alights along the route. Another type is the hotel-like industry.

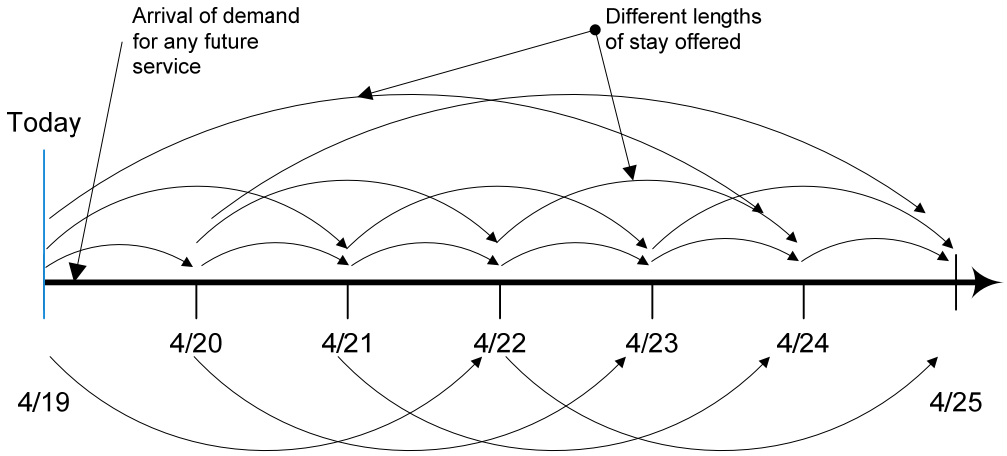


**Figure 2: Hotel Revenue Management**

In the hotel industry (Figure 2), a hotel may sell $\binom{7}{2}$ different check-in date and length-of-stay combinations (products) between 4/19 and 4/25. Each one of the check-in date and length-of-stay combinations has a revenue value and competes for a room on one or more nights (resources). The overall revenues between 4/19 and 4/25 depend on optimally pricing all check-in date and length-of-stay combinations to charge as high prices as possible and have rooms readily reoccupied when a guest checks out on any day. In both airline and hotel industries, the multiple products offered overlap in legs and nights, respectively. The overlap of legs in the airline industry is finite because the legs are finite. In other words, an itinerary that flies beyond Hyderabad consuming a leg on the ATL-ORD-LHR-DEL-HYD route is never sold. On the other hand, the overlap of

nights in the hotel industry is infinite. The hotel may sell stays with check-in dates overlapping with each other throughout an infinite time horizon. This key distinction in any hotel-like industry makes revenue management more challenging. Examples of other industries that share airline-like behavior include railways, buses, etc. Examples of other industries that share hotel-like behavior include car rental, apartment, self-storage, etc.

The apartment industry appears similar to the hotel industry in the general format of business. The apartment communities have unit types with limited capacity of apartment units. Demand for the apartment units is seasonal, price-sensitive, and predictable. The demand arrives much ahead of the move-in date over the booking period. An apartment community offers multiple lease terms, which also overlap. All these similarities help jump-start the revenue management optimization models for the apartment industry. However, the apartment industry has some unique characteristics (Sivalenka 2010 and Wang 2008). The low transaction volume provides demand only at certain levels of disaggregation with statistical confidence. The level of disaggregation may not be fine enough to pinpoint the timing of overlap. For example, we would need to forecast demand by community, unit type, application date, move-in date, move-out date, and price to pinpoint overlapping products. This level of disaggregation is impossible to forecast in the apartment industry. Also, the longer inventory commitment requires forecasting 18 to 24 months out. Forecasting accuracy significantly diminishes that far out. Longer inventory commitment magnifies the focus on expiration management. For example, a typical apartment community offers lease terms 1 through 18 months. The multiple lease terms overlap in months rather than days. So the change in value of each resource for a unit change in demand could be significantly higher. This larger threshold in the sensitivity of resource value demands improved accuracy in optimization. The notion of network optimization in the traditional industries optimizes the mix of products sold with a smaller number of legs (airline) or lengths of stay (hotel). Such network optimization models stress little on limiting the number of passengers alighting at a particular city or checking out on a particular date. As a result, the optimal prices generated by solving traditional models are not good enough to encourage or discourage residents for signing leases that expire at the right time. Operators often end

up using the matrix in Table 1 to control the lease expirations outside the optimal solutions generated by the traditional models. Thus, traditional models do not capture proper management of lease expirations. Further, stricter focus on expiration management requires solving models with integer variables (unlike popular traditional models) to ensure discrete allocation of leases and expirations at any given time.

## CONCLUSIONS AND FUTURE WORK

Renewal pricing and expiration management are unique and revenue-critical functions in the apartment industry. Optimization models from the traditional industries do not sufficiently model these unique problems in the apartment industry context. One of the key challenges to modeling and solving for these problems is the sparsity and uncertainty in the apartment industry data. In future work, we will present optimization models, heuristic algorithms, and a case study for these problems.

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