Technology and Apartments

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IBM 4381
Latest Uses of Technology, Big Data

Revenue Management
• Algorithms to set optimal rent
• Uses own historical data, data from market and competitors

Resident Screening
• Uses “big data” to find predictors of bad tenant behavior
  • Late payment
  • Skipping
  • Poor care of unit
  • Disturbances
Companies Offering Revenue Management for Apartments

Rainmaker LRO

RealPage YieldStar

Yardi RENTmaximizer

Property Solutions PricingPortal

Spherexx.com RentPush
Pagliari and Webb
On Setting Apartment Rental Rates: A Regression-Based Approach
Elasticity Estimation

Early discussion, Weimer & Hoyt, Principles of Urban Real Estate, 1933

Hicks 1935, “I cannot but feel skeptical about this.” (application of monopoly theory to “practical economic problems.”)

- Too difficult to estimate demand curves

General Motors, 1938 conference on demand estimation
“no exact answer to the question has been obtained.”

Deliberate to avoid regulation?

Early estimates for apartments, Hanushek & Quigley, 1980

Wide range of estimates

Often fixed parameter in apartment RM systems

Might vary during recession
Perishability

If a seat on a flight isn’t filled, it is lost forever
  • Same for hotel rooms, rental cars, apartments

Greatly complicates pricing
  • Marginal value of inventory changes over time
  • Modification of capacity occurs over different timescale than pricing dynamics
  • True “revenue management” optimizes pricing given constraints
Airlines

“Where did RM come from? In short, the airlines. There are few business practices whose origins are so intimately connected to a single industry.”

Talluri & Van Ryzin, Theory and Practice of Revenue Management, 2004
Select your roundtrip flight to West Palm Beach Wed, May 13 - Thu, May 14

Prices are roundtrip per person, includes all taxes and fees.

Filter your results by

Stops
☐ 1 Stop (1400) $344

Airlines included
☐ Delta (779) $458
☐ US Airways (707) $348
☐ American Airlines (627) $355

Show more

Departing time - Los Angeles
☐ Early Morning (12:00a - 4:59a)
☐ Morning (5:00a - 11:59a)
☐ Afternoon (12:00p - 5:59p)
☐ Evening (6:00p - 11:59p)

Show arrival time for West Palm Beach

Departing time - West Palm Beach
☐ Morning (5:00a - 11:59a)
☐ Afternoon (12:00p - 5:59p)
☐ Evening (6:00p - 11:59p)

Show arrival time for Los Angeles

Save up to $133 when you book your Flight and Hotel together
Shop Flight + Hotel

Sort by: Duration (Shortest)

3:00p - 12:40a +1
Delta
6h 40m LAX - PBI
1 stop
39m in ATL

4 left at $575.20 roundtrip
Select

6:15a - 10:43a
United
7h 28m PBI - LAX
1 stop
56m in IAH

6:06p - 11:35p
Delta
7h 29m PBI - LAX
1 stop
42m in ATL

3:00p - 12:40a +1
Delta
6h 40m LAX - PBI
1 stop
39m in ATL

4 left at $769.20 roundtrip
Select

12:50p - 10:32p
United
6h 42m LAX - PBI
1 stop
1h in IAH

2 left at $478.20 roundtrip
Select

6:15a - 10:43a
United
7h 28m PBI - LAX
1 stop
56m in IAH
Airline Revenue Management

Optimization began with overbooking

- Mathematics, Edgeworth, 1888
- Arrow, Harris, Marschak, 1951
- Airlines, Littlewood, 1972
- CAB acknowledged 1961, tolerated until 1972
  - Julian Simon’s idea of volunteer auction adopted 1977

AA started Super Saver fares, 1977

- UA, others sued, CAB (Alfred Kahn) let stand
- Deregulation, 1978

People Express, 1981

- $60 million profit 1984
  - Year before DINAMO (Dynamic Inventory Allocation and Maintenance Optimizer)
    - Dynamic programming
- $160 million loss 1986
  - Year after DINAMO

RM now boosts revenue by 4-5% (roughly all industry profit)
At equilibrium, charging optimal rent of $800

Unexpected move-outs in 20 apartments
  • At current price will take 6 months to rent
  • Cutting rent by $100 will rent units in 3 months

Results:
  • 12 month revenue at current rents: 20 x (3 x 800 + 6 x 800) = $144,000
  • 12 month revenue with cut: 20 x (1.5 x 700 + 9 x 700) = $147,000
  • 2% revenue increase
  • After 12 months, raise rent to $800 plus

2% revenue increase could be 4% increase in NOI & property value
Apartment Example

Complications/constraints:

- Availability forecast from lease expirations
- Seasonal, stochastic demand
  - Estimate price elasticity
  - Estimate demand using time series analysis
- Requests for blocks of apartments from corporate clients
- Different unit types, with some cross-product elasticity
- Surveys of competitor rents, occupancy
- Traffic statistics

Maximize revenue given constraints

- Stochastic linear/non-linear programming problem
Indicators of Short-Term Demand

Availability
• Time on market
• Renewal percentage
• Seasonality
• Expiration schedule

Traffic
• # of guest cards
• Closing ratio
• Acceptance ratio

Competitors
• Rents
• Occupancy

Long-term demand sets basic rent level
Short-term indicators say raise or lower rent
Moving dates are random, but correlated
- More move-outs and move-ins during summer
- Student housing, all move at same time
  - Cruise ship leaving once per year

Incentivize tenants to move in and out at convenient time
- Result is pricing matrix
- Month-to-month
- renewals

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Figure 1: Yardi RENTmaximizer Pricing Matrix Example
Yield Management in Practice

Frequent changes

• Some systems emphasize trends, changes to minimize volatility
  • Cost is lack of true model of demand, true optimization
  • Some systems more volatile (30% of changes > 5%)
    • Optimize more frequently

Illogical decisions

• Pricing one-bedrooms higher than two-bedrooms

Complex options for prospects

Managers often override software

• Yardi uses “business rules” so manager preferences are built in
• Example: “If there is an increase recommendation, and the Leased % is between 95 and 101, Then Multiply by 1.50 * $10 = $15.00 or if my availability is 12% or greater then Multiply by 0.50 * $10 = $5.00”
• Too many, program is useless
• Too few means managers not paying attention
Yield Management in Practice

Providers claim yield management improves sales force understanding of pricing

Latest improvement is mobile RevMan

- YieldStar
- LRO
- Traveling managers can make, implement decisions

YieldStar uses MPF data

Might cause PR problems

- Passengers dislike RM
- Renewals feel betrayed
- Affordable housing (NMHC note on rents)
Daily Trends are clearly indicated along with incremental pricing.
Performance Claims

YieldStar: “proven to deliver a sustained revenue premium of two to five percent over properties not using the system.

LRO: “So far, we beat national rent averages every month from January through June, with year to date results as high as 7.2%.”

Yardi: “Average return of 2 to 5% above market”

Controversy:
• Controlled studies show no improvement for some packages?
• Implement in Houston after Katrina?
Renting apartment is a long-term commitment with externalities

- 12 month leases
- Eviction process takes time (differs by state)
- Non-paying tenant occupies unit that paying tenant can’t

Externalities

- Noise
- Crime
- Trash
- Pests
Resident Screening

Typical process:
• Report from credit screening agency
• Call past landlords
• Verify employment
• Compare to rules to accept/deny

Growing use of specialized tenant scoring companies
• Some provided by property management software
  • Yardi, RealPage, etc.
  • RealPage, federal suit filed this month for providing expunged arrest data
• Screening specialists, such as CoreLogic’s SafeRent
  • Frank Nothaft, Chief Economist
  • All factors reduced to 200-800 scale score
  • Data from Expirion, Equifax, TransUnion, and Teletrack
    • Plus default, income, rent data from users
Resident Screening

Rule based or score based

• Score gives single number
  • Based on logistic regression of factors on late payments, evictions
    • Fraud detection uses neural network, antibody models
  • Landlord sets threshold
    • Can vary with market conditions

• Rules written by landlord
  • Data from provider or gathered by landlord
  • SafeRent scores credit, landlord has own rules for background, references
Resident Screening and Fair Housing

Apartments are not allowed to discriminate based on:

• Race, color, national origin
• Religion
• Sex
  • Sexual orientation in some jurisdictions
• Disability
  • “hearing, mobility and visual impairments, chronic alcoholism, chronic mental illness, AIDS, AIDS Related Complex and mental retardation”
  • Expanded to include need for companion animals, hoarders
• Presence of children
  • Sometimes “familial status”
Resident Screening and Fair Housing

Texas Department of Housing and Community Affairs v. The Inclusive Communities Project, Inc.

• Supreme Court might decide whether FHA allows disparate impact claims
• FHA means owners want distance from screening decisions
  • Third party firms
  • But disparate impact might affect ability to use background, other information
Resident Screening and Fair Credit Reporting Act

Requires data providers to take reasonable steps to achieve “maximum possible accuracy.”

Negative information cannot be retained for excessive period

Landlords must inform tenants if credit information is used for adverse decision
Automated Screening in Practice

Adjustments are made depending on occupancy
  • Managers often forget to reset when occupancy improves

Overrides occur when managers disagree with decision
  • Mitigating factors
    • Trust funds
    • Experience with employers, schools
    • References
    • Cosigners
    • Past residents
    • “Creeps”
  • Danger of FHA vulnerability