Technology and Apartments

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ZEPHYR AMERICAN
ROLODEX
-FILE

IBM 4381


Program 2
Program 1
Install/Learn/Utilities 2
Install/Learn/Utilities 1

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

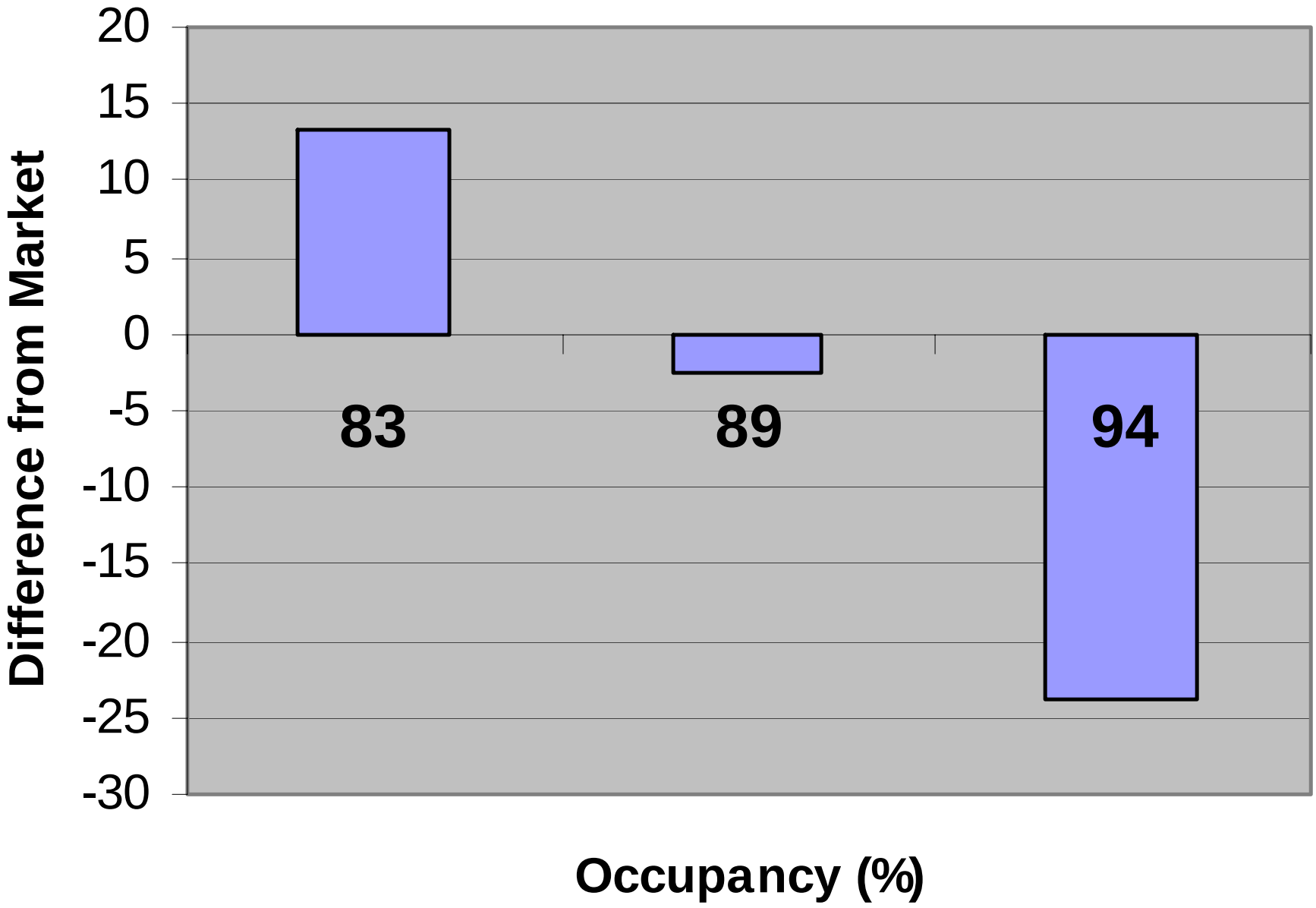
Property Solutions PricingPortal

Spherexx.com RentPush

Property Name	Quantitative Factors									
	Age	Square Footage	Number of Baths	Number of Units	Heat Source: Gas	Heat Source: Electric	Building Height	Covered Parking	Security System	Reduced Security Deposit
Schaumburg Villas: No. 1	20	850	1.00	224	0	0	1	0	1	1
Schaumburg Villas: No. 2	20	1,000	2.00	110	0	0	1	0	1	1
Stonebridge	17	1,200	2.00	370	0	0	3	0	0	0
Tree House	12	1,000	2.00	200	0	0	2	0	0	1
Twelve Oaks	20	1,200	2.00	287	0	0	3	1	0	0

	Quantitative Factors							
	Qualitative Factors					Rent x Occupancy		
	Location/ Viability\ Access	Quality of Management	Amenity Package	Curb Appeal	Construction/ Sound Transmission	Effective Monthly Rental Rate ($)	Estimated Occupancy (%)	Effective Monthly Rent ($)
Schaumburg Villas: No. 1	4	1	1	1	4	658	89.0	586
Schaumburg Villas: No. 2	4	1	1	1	4	686	89.0	611
Stonebridge	8	8	7	9	7	785	90.0	787
Tree House	9	7	9	8	8	793	82.0	650
Twelve Oaks	7	9	7	10	8	912	91.0	830

Pagliari and Webb
On Setting Apartment Rental Rates: A Regression-Based Approach
Journal of Real Estate Research v12, n1 (1996): 37-61


20
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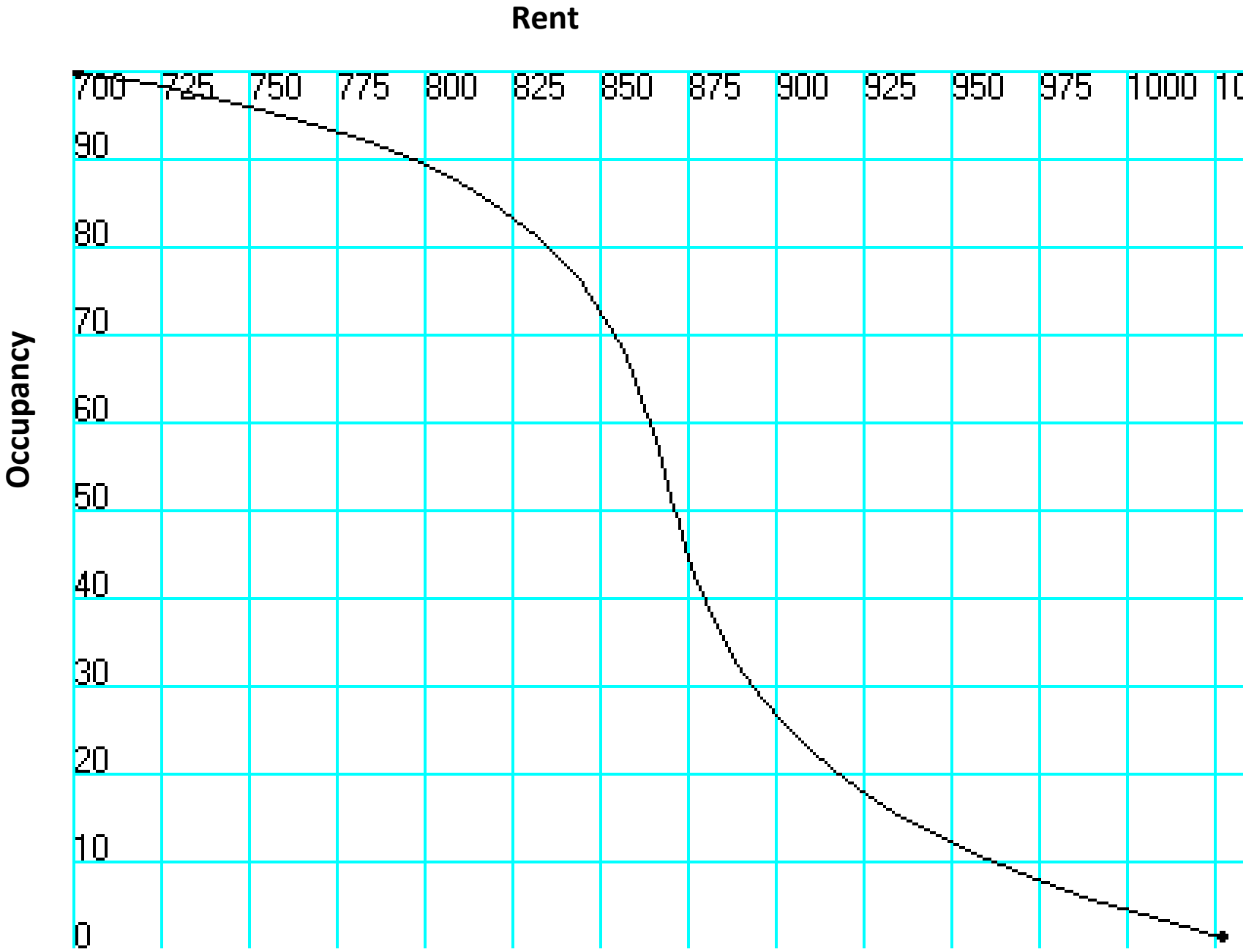
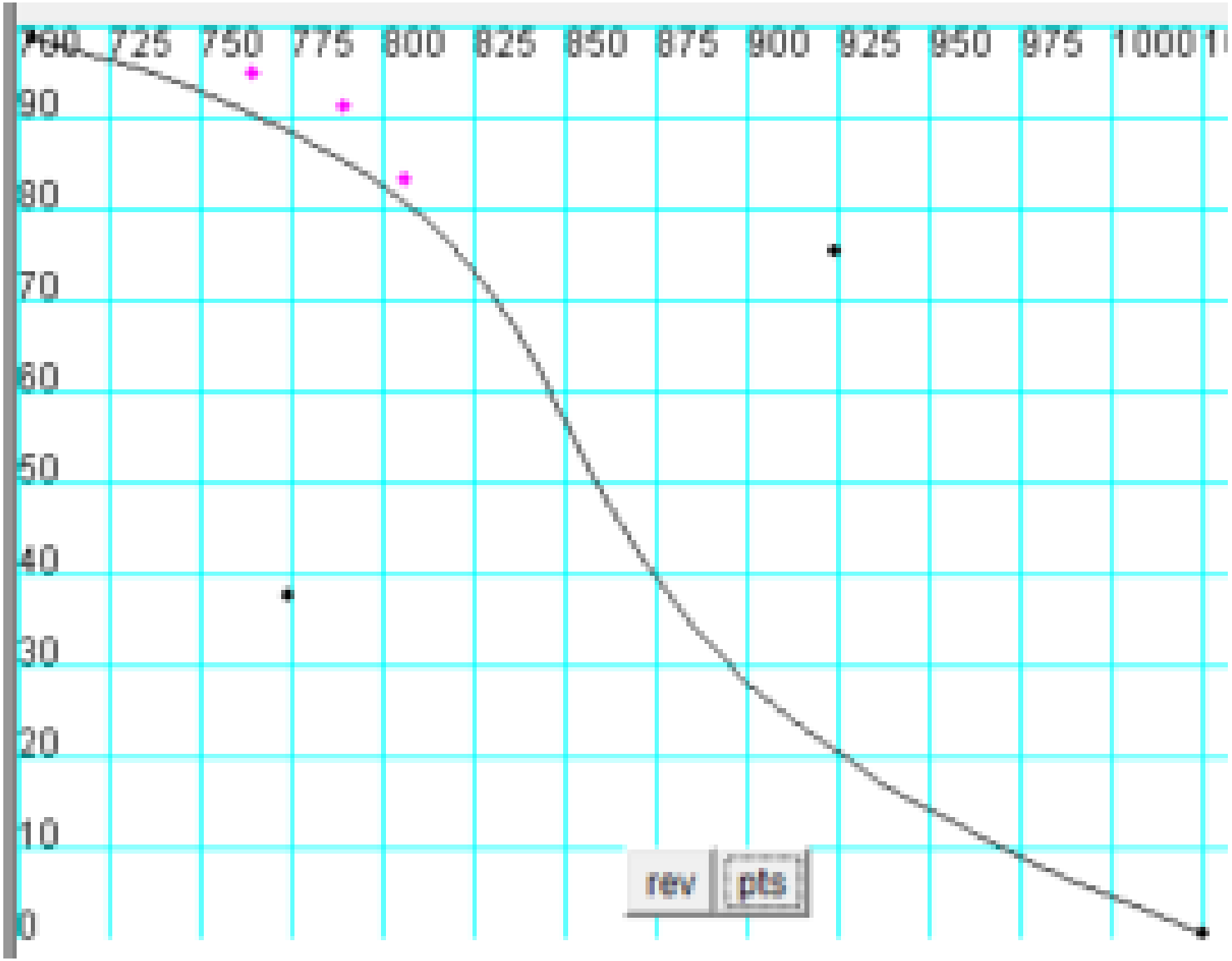
Difference from Market
83
89
94
Occupancy (%)



Colwell, Vacancy Management
Journal of Property Management May/June 1991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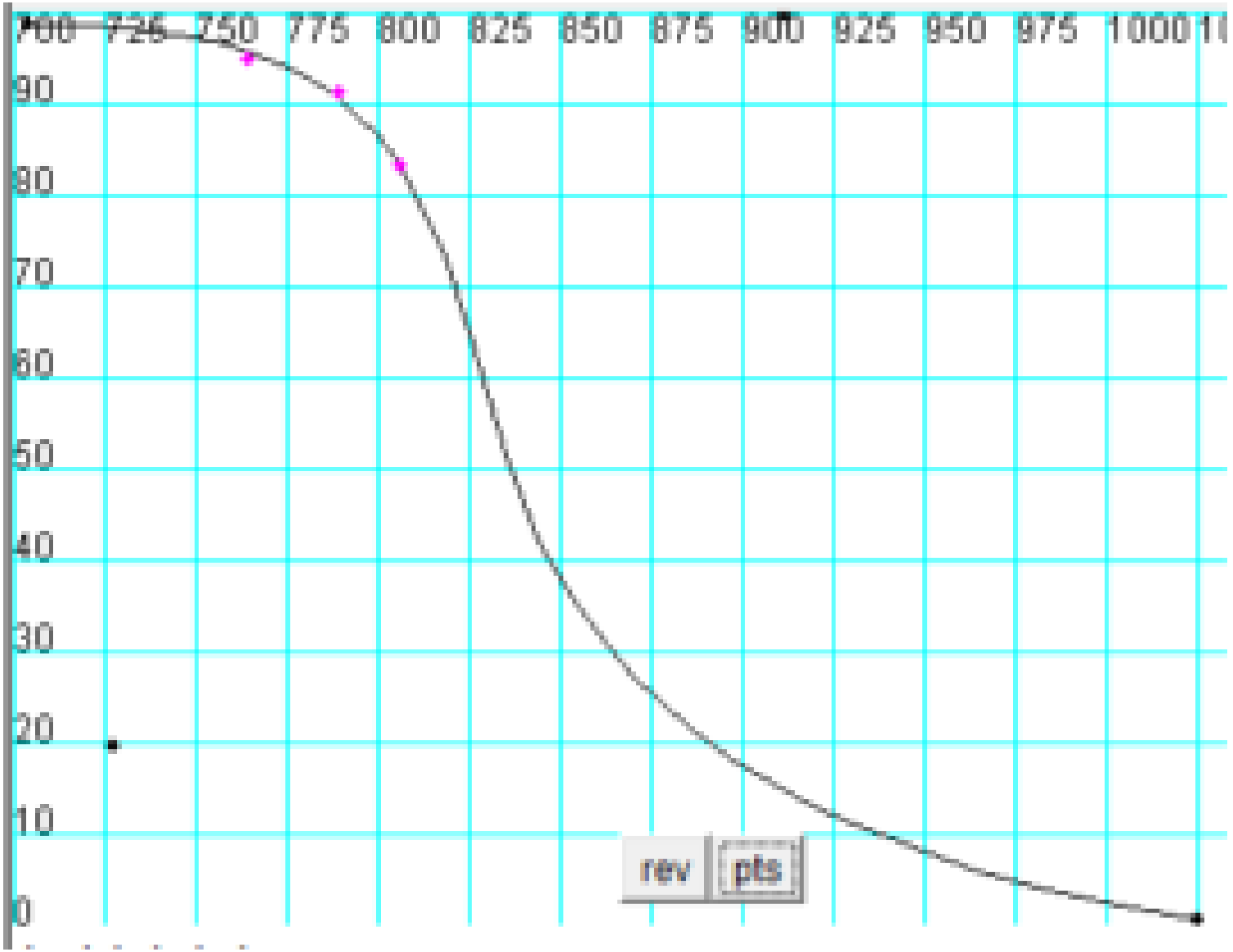
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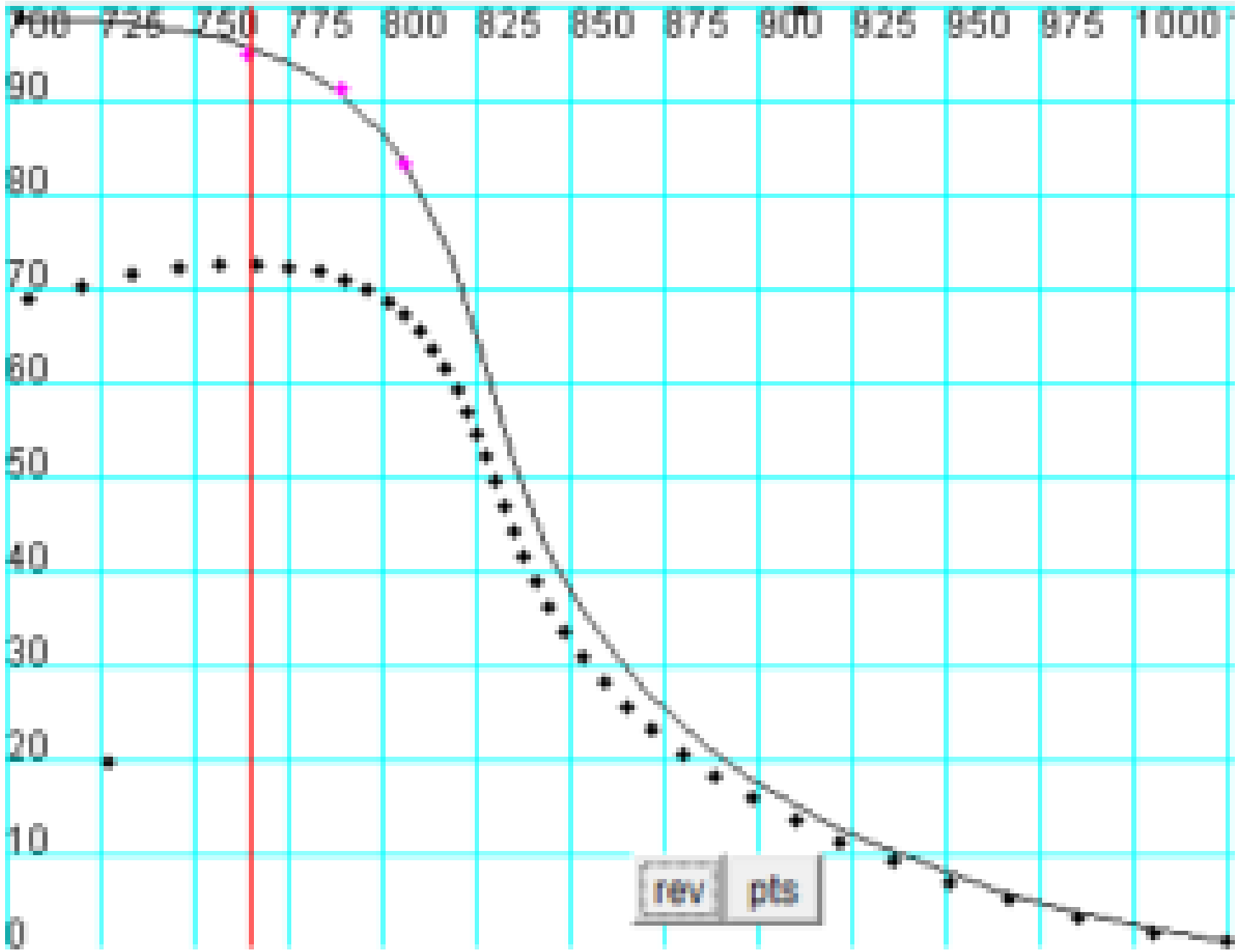
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rev
pts

Elasticity Estimation

Early discussion, Weimer & Hoyt, Principles of Urban Real Estate, 193

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.

You can turn on your search notes in your Scratchpad.

Filter your results by

Sort by: Duration (Shortest)

Stops From:
- 1 Stop (1400) $344

Airlines included From:
- 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

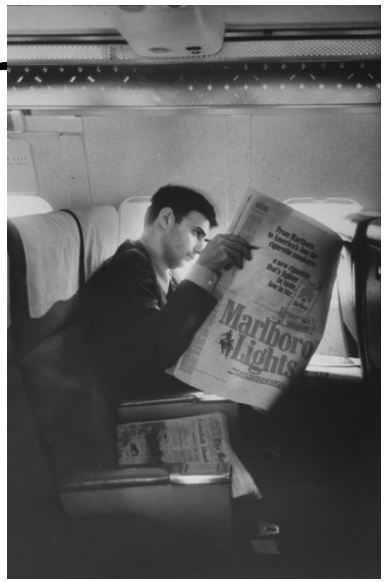
Departing time - West Palm Beach
- Morning (5:00a - 11:59a)
- Afternoon (12:00p - 5:59p)
- Evening (6:00p - 11:59p)

Show arrival time for Los Angeles

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

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 Show Flight Details	**7h 28m** PBI - LAX	1 stop 56m in IAH		
3:00p - 12:40a +1 Delta	**6h 40m** LAX - PBI	1 stop 39m in ATL	4 left at $769.20 roundtrip	Select
7:06p - 11:35p Delta Show Flight Details	**7h 29m** PBI - LAX	1 stop 42m in ATL		
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 Managemer



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)

Apartment Example

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

ndicators 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

Lease Expiration Management

Moving dates are random, but correlated

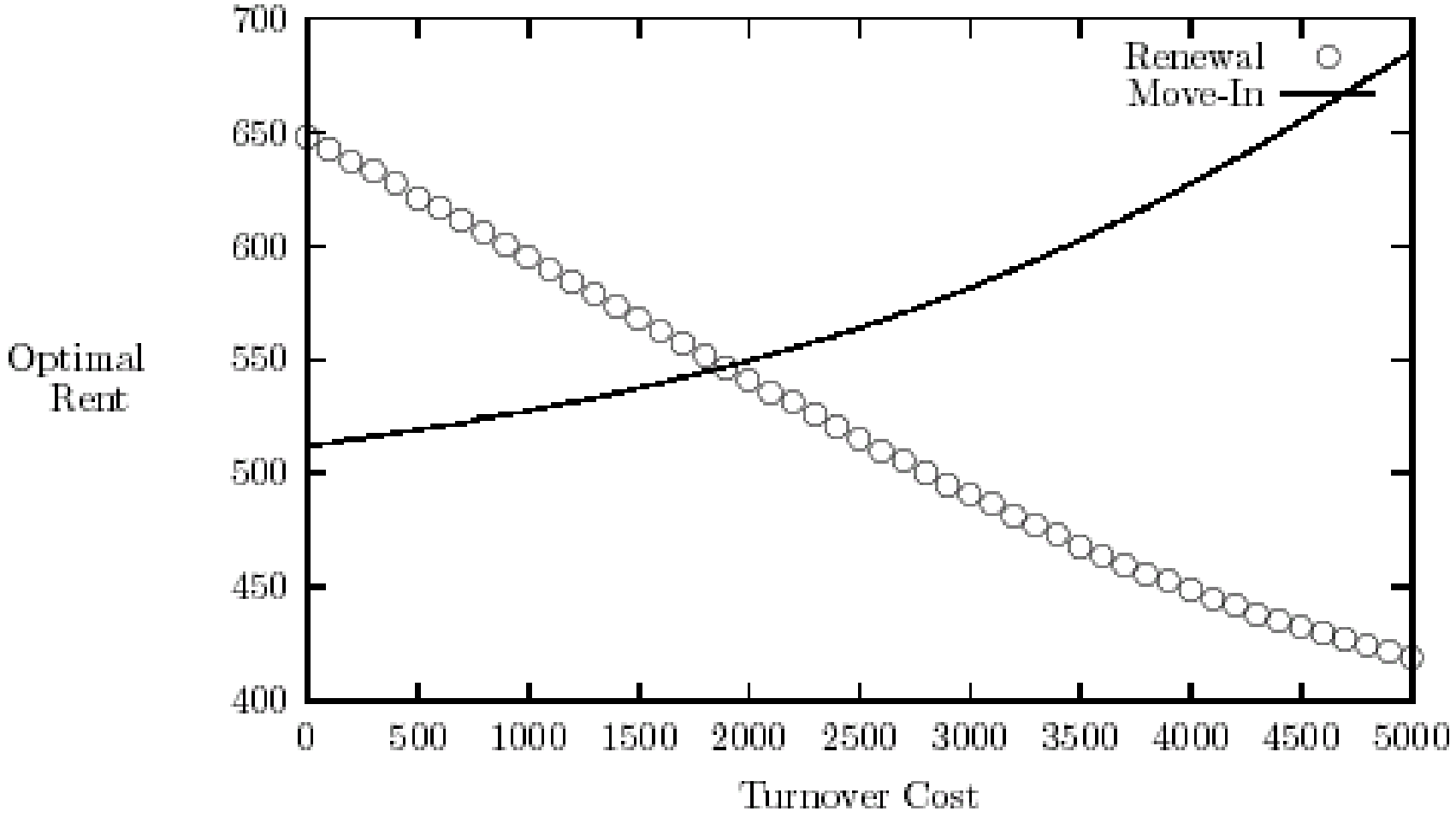
- More move-outs and move-ins during summer
- Student housing, all move at same time
  - Cruise ship leaving once per year

Incentivize tenants to move in and out at convenient time

- Result is pricing matrix
- Month-to-month
- renewals

Term	Move in				
	Today	+1 Week	+2 Weeks	+3 Weeks	+4 W
2	$ 1,105	$ 1,126	$ 1,147	$ 1,168	$
3	$ 1,094	$ 1,115	$ 1,136	$ 1,157	$
4	$ 1,083	$ 1,104	$ 1,125	$ 1,145	$
5	$ 1,072	$ 1,093	$ 1,113	$ 1,134	$
6	$ 1,062	$ 1,082	$ 1,102	$ 1,123	$
7	$ 1,051	$ 1,071	$ 1,091	$ 1,112	$
8	$ 1,041	$ 1,061	$ 1,081	$ 1,101	$
9	$ 1,030	$ 1,050	$ 1,070	$ 1,090	$
10	$ 1,020	$ 1,040	$ 1,059	$ 1,079	$
11	$ 1,010	$ 1,029	$ 1,049	$ 1,068	$
12	$ 1,000	$ 1,019	$ 1,038	$ 1,058	$
13	$ 990	$ 1,009	$ 1,028	$ 1,047	$
14	$ 980	$ 999	$ 1,018	$ 1,037	$
15	$ 970	$ 989	$ 1,008	$ 1,026	$

Figure 1: Yardi RENTmaximizer Pricing Matrix Example


Optimal
Rent
700
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550
500
450
400
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Turnover Cost
Renewal
Move-In

Yield Management in Practice

Frequent changes

- Some systems emphasizes 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)

Management Worksheet

y Id: 105-167	Total Units: 300	Total SQFT: 272,468
y Code: 1040	Property Name: The Bentley	Property Address: 7846 W Mansi Parkway Lakewood, CO 80235
Effective: 4/15/2013	Trend Comparison Period: 14 days	

Daily Trends are clearly indicated along with incremental pricing

erty Analysis

ng	Avg Avail	Avg Expiring 30	Avg Expiring 60	Avg Expiring 90	A E 1					% ed	Avg % Avail
2013 thru Mar 31 2013	27.29	9.29	11.93	21.36						97.43	9.10
2013 thru Apr 14 2013	27.93	11.00	22.93	25.86						96.62	9.31
/ Change	0.64	1.71	11.00	4.50				17	-16.52	0.64	-0.81	0.21

d Analysis

ype	Avg Supply Current	Previous		New Leases Current	Previous			nt	Previous	Rent Ratio Current	Previous	
	4.0714	5	↑	1	0	↑	9.00	5.00	↑	916.00	894.00	0.9934	1.0145	↑
	5.6429	4.9286	↓	0	2	↓	5.00	0.00	↑	854.00	847.00	0.9602	1.0189	↑
	3.6429	4.0714	↑	1	0	↑	0.00	0.00	→	051.00	949.00	0.9629	1.0938	↑
	4.4286	4.8571	↑	2	3	↓	14.00	5.00	↑	202.00	1119.00	0.9908	1.0652	↑
	5	3.6429	↓	0	0	↓	0.00	0.00	↓	151.00	1086.00	0.934	1.0092	↑
	5.1429	4.7857	↓	2	1	↑	7.00	8.00	↓	499.00	1540.00	0.9046	0.8799	↓

Type Analysis

	Baths	Sqft	Unit Type Group	Unit Type	Total Units	Avail Units	% Avail	Previous Avg Reference Rent	New Avg Reference Rent	Avg Cha					Traffic Trend	Comp Trend	Overall Trend	Recommendation
1	1.00	740	1x1l	1x1_740	32	1	3.13	889.72	893.72						↑	↑	↑	Raise Aggressive
1	1.00	740	1x1l	1x1_740r	16	3	18.75	966.13	970.13						↑	↑	↑	Raise Aggressive
1	1.00	660	1x1S	1x1_660	50	2	4.00	803.10	803.10	0.00	100.00	100.00	↓	↓	↑	↑	→	Hold Price
1	1.00	660	1x1S	1x1_660r	10	1	10.00	868.00	868.00	0.00	70.00	100.00	↓	↓	↑	↑	→	Hold Price
2	1.00	884	2x1	2x1_884	35	1	2.86	995.29	1000.29	5.00	100.00	100.00	↑	↑	→	↑	↑	Raise Price
2	1.00	884	2x1	2x1_884r	13	2	15.38	1074.23	1079.23	5.00	100.00	100.00	↑	↑	→	↑	↑	Raise Price
2	2.00	1088	2x2l	22_1088r	14	2	14.29	1245.36	1252.36	7.00	85.71	92.86	↑	↓	↑	↑	↑	Raise Price
2	2.00	1088	2x2l	2x2_1088	34	0	0.00	1167.65	1174.65	7.00	97.06	100.00	↑	↓	↑	↑	↑	Raise Price
2	2.00	987	2x2s	2x2_987	46	3	6.52	1047.50	1047.50	0.00	100.00	100.00	↓	↓	↓	↑	↓	Lower Price
2	2.00	987	2x2s	2x2_987r	14	2	14.29	1121.79	1121.79	0.00	92.86	92.86	↓	↓	↓	↑	↓	Lower Price
3	2.00	1206	3x2	32_1206r	12	3	25.00	1405.83	1405.83	0.00	66.67	75.00	↓	↑	↓	↓	↓	Lower Price
3	2.00	1206	3x2	3x2_1206	24	2	8.33	1331.88	1331.88	0.00	100.00	100.00	↓	↑	↓	↓	↓	Lower Price

maximizer

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?

Resident Screening

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