Introduction to Real Estate Economics and Cycle Analysis

Presented to
Asset Management Group

Presented by
Lawrence A. Souza, CRE
Director of Research
Thursday, September 26, 2002
OUTLINE

• Introduction

• Real Estate Portfolio Theory

• Supply and Demand Analysis

• Real Estate Cycle Theory

• Current Economic Indicators
INTRODUCTION
Real Estate in a Social, Cultural and Economic Context

Interdisciplinary/Cross-Sectional Approach to Real Estate Market Analysis:

- Biological/Physiological/Psychological
- Philosophical Systems
- Legal Systems
- Political Systems
- Economic Systems
- Financial Systems
PORTFOLIO THEORY
Institutional Real Estate
Capital Allocation Line
Movements Along the Efficient Frontier

E (r)

σ*

CAL

LEVERAGE

LENDING

Market Basket

Direct Real Estate Development

Lower Risk/Return Real Estate Investments

Capital Allocation Line (CAL)

100% High Risk/Return Portfolio

Higher Return/Risk Real Estate Investments

100% Low Return/Risk Portfolio

Apartment Loan Origination

E (r)*
Applications In Portfolio Theory

<table>
<thead>
<tr>
<th>Metro</th>
<th>Average Annual Return</th>
<th>Standard Deviation</th>
<th>Risk-Adjusted Rate of Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange County</td>
<td>13.4%</td>
<td>7.6%</td>
<td>1.7</td>
</tr>
<tr>
<td>SF Bay Area</td>
<td>15.5%</td>
<td>8.8%</td>
<td>1.7</td>
</tr>
<tr>
<td>Seattle</td>
<td>14.3%</td>
<td>9.3%</td>
<td>1.5</td>
</tr>
<tr>
<td>San Diego</td>
<td>13.7%</td>
<td>9.4%</td>
<td>1.4</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>14.4%</td>
<td>9.9%</td>
<td>1.4</td>
</tr>
<tr>
<td>Sacramento</td>
<td>13.8%</td>
<td>11.0%</td>
<td>1.3</td>
</tr>
<tr>
<td>Denver</td>
<td>12.0%</td>
<td>11.2%</td>
<td>1.3</td>
</tr>
<tr>
<td>Portland</td>
<td>12.5%</td>
<td>11.0%</td>
<td>1.3</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>13.0%</td>
<td>11.0%</td>
<td>1.2</td>
</tr>
<tr>
<td>Phoenix</td>
<td>14.1%</td>
<td>11.4%</td>
<td>1.2</td>
</tr>
<tr>
<td>Tucson</td>
<td>14.1%</td>
<td>11.4%</td>
<td>1.2</td>
</tr>
<tr>
<td>Riverside</td>
<td>11.6%</td>
<td>11.9%</td>
<td>1.0</td>
</tr>
<tr>
<td>Las Vegas</td>
<td>5.1%</td>
<td>6.6%</td>
<td>0.8</td>
</tr>
<tr>
<td>Albuquerque</td>
<td>2.4%</td>
<td>4.4%</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Risk-Adjusted Rates of Return are calculated by dividing the Total Average Annual Rate of Return by the Standard Deviation (Risk) for each metro area.

The Risk-Adjusted Rate of Return measures the amount of return for each unit of risk. For example Orange County provides 1.7 units of return for each unit of risk.

Total Returns are calculated by the year-over-year change in sales price per square foot on a quarterly basis (Capital Appreciation) plus the annualized cap rate (Income Return) per quarter.

Sources: National Real Estate Index (NREI) and BRE Properties Research Department

Balanced Conditions for Long Periods:

- LA/Orange County/Riverside
- San Diego
- Bay Area
- Seattle

- Low Vacancy Rates
- High Effective Rents
- Prices Above Replacement
- Job Growth
- In-Migration
- Housing Demand
- Positive Net Absorption

Modest Conditions of Over/Under Supply:

- Sacramento
- Salt Lake City
- Portland
- Denver
SUPPLY AND DEMAND ANALYSIS
Real Estate Supply and Demand Analysis

Long-Run Market Equilibrium

Rent Growth %

Supply (Space Available)

No Incentive to Build New Product

Demand (Absorption)

* Rent

* Rent Growth

Rents-Prices Equal Cost of Construction

Market Equilibrium

Existing Inventory

* Existing Inventory

Inflation Rent Growth (3.5%)

Structural Vacancy Rate (5%)

# Units

* Existing Inventory

Cost of Construction

Existing Inventory

Inflation Rent Growth (3.5%)
Real Estate Supply and Demand Analysis

Short-Run Supply Conditions with Employment Demand Shock

- **Rent Growth %**
- **Supply (Fixed)**
- **New Demand**
- **New Market Equilibrium Price**
- **Frictional Vacancy Rate (2% - 3%)**
- **Rents-Prices Above Replacement Costs**
- **Incentive to Build New Product**

* Existing Inventory

- *Rent Growth (3.5%)*
- *Rent Growth (8.5%)*

Rent Spikes

# Units
Real Estate Supply and Demand Analysis

Long-Run Supply Response

Rent Growth %

Short-Run Supply (Fixed)

Old Market Equilibrium Price

No Incentive to Build New Product

Rent Growth Declines

Long-Run Supply (Flex)

Structural Vacancy Rate (5%)

Rents-Prices At Replacement Costs

New Demand

* Old Level Inventory

* New Level Inventory

# Units

Rent Growth (3.5%)

Rent Growth (8.5%)
Real Estate Supply and Demand Analysis

Long-Run Supply Response in Supply Constrained Markets

- Rent Growth %
  - Rent Growth (8.5%)
  - Rent Growth (5.5%)
  - Rent Growth (3.5%)

Moderate Rent Growth Declines

SR Supply (Fixed)

LR Supply (Mod-Flex)

Old Market Equilibrium Price

Rents-Prices Above Replacement Costs

Incentive to Build New Product- Rehab

Structural Vacancy Rate (3% - 4%)

Demand

* Old Level Inventory

* New Level Inventory

# Units
Real Estate Supply and Demand Analysis

Long-Run Supply Response in Supply Unconstrained Markets

Rent Growth %

SR Supply (Fixed)
Old Market Equilibrium Price
Rent Declines

LR Supply (Flex)
Vacancy Rate (5%)

Rent Growth (8.5%)
Rent Growth (3.5%)
Rent Growth (-3.5%)

* Old Level Inventory

* New Level Inventory

# Units

No Incentive to Build New Product

Rent Declines

Over Supply

Demand

Rents-Prices Well Below Replacement Costs

* Old Level Inventory

* New Level Inventory

# Units
Rent Growth %

Short-Run Supply Conditions with Negative Employment Demand Shock

Rent Declines

Existing Inventory

Old Market Equilibrium Price

Structural Vacancy Rate (5%)

Vacancy Rate (8%)

Rents-Prices Well Below Replacement Costs

Old Demand

New Demand

# Units

No Incentive to Build New Product

Rent Growth (-3.5%)

Rent Growth (3.5%)
Real Estate Supply and Demand Analysis

Long-Run Supply Response with Negative Employment Demand Shock

- Rent Growth %
  - Short-Run Supply (Fixed)
    - Old Market Equilibrium Price
  - LR Supply (Flex)
    - Structural Vacancy Rate (5%)
    - Vacancy Rate (8%)
    - Vacancy Rate (10%)

- Negative Rent Spikes
- *Existing Inventory
- *New Level Inventory
- No Incentive to Build New Product
- Rents-Prices Well Below Replacement Costs
- Old Demand
- New Demand
- # Units

* Rent Growth
  - (3.5%)
  - (-3.5%)
  - (-8.0%)
REAL ESTATE CYCLE THEORY
Real Estate Cycle Theory

Market Cycle Quadrants

Phase 1 - Recovery

- Declining Vacancy
- No New Construction

Phase 2 - Expansion

- Declining Vacancy
- New Construction

Phase 3 - Hypersupply

- Increasing Vacancy
- More Construction

Phase 4 - Recession

- Declining Vacancy
- New Construction

Equilibrium
Real Estate Cycle Theory

**Equilibrium**
- New demand confirmed
  - Excess space absorbed (Parallel Expectations)

**Supply/Demand Inflection Point**
- Supply growth higher than demand growth
  - Pushing vacancies up

**Market Cycle Characteristics**
- New demand not confirmed in marketplace (Mixed Expectations)
- Space difficult to find
  - Rents rise rapidly toward new construction levels

**Demand growth continues**
- New construction begins (Parallel Expectations)

Legg Mason Real Estate Research
Real Estate Cycle Theory

Market Cycle Capital Flow Impact

Capital Flows to Existing Properties

Cost Feasible Rents Reached

Property Market Cycle

Total Capital Flow Cycle

Equilibrium

Capital Flows to New Construction
Applications Real Estate Cycle Theory

Supply/Demand
Inflection Point

Equilibrium

II
III
I
IV

Riverside
San Diego
Orange Co
Los Angeles
Sacramento
USA
Portland
Salt Lake City
San Francisco, Seattle
Phoenix, Denver

Source: M/PF Research Inc., Real Facts, Inc, REIS Reports, Inc. and BRE Properties Research Department.
Applications Real Estate Cycle Theory

Los Angeles

Occupancy Rate

Rent Growth

Structural Occ. Rate (95.7%)


-4% -2% 0% 2% 4% 6% 8% 10% 12% 14%

Source: M/PF Research Inc., Real Facts, Inc., REIS Reports, Inc. and BRE Properties Research Department.
San Francisco

Occupancy Rate

Rent Growth

Structural Occ. Rate (95.0%)

Source: M/PF Research Inc., Real Facts, Inc, REIS Reports, Inc. and BRE Properties Research Department.
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# Apartment Occupancy Rate Cycles

<table>
<thead>
<tr>
<th>Metro Area</th>
<th>Peak-to-Peak</th>
<th>Peak-to-Trough</th>
<th>Trough-to-Trough</th>
<th>Trough-to-Peak</th>
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<tbody>
<tr>
<td></td>
<td>17 years</td>
<td>8 years</td>
<td>15 years</td>
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<td>15 years</td>
<td>6 years</td>
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<td>12 years</td>
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<td>7 years</td>
<td>12 years</td>
<td>7 years</td>
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**NOTE:** Dates are approximate and do not represent the exact beginning or ending of cycles.
## Applications Real Estate Cycle Theory

### Supply-Unconstrained Markets

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<td></td>
<td>14 years</td>
<td>6 years</td>
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<td>8 years</td>
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<td>9 years</td>
<td>6 years</td>
<td>10 years</td>
<td>5 years</td>
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<tr>
<td></td>
<td>13 years</td>
<td>6 years</td>
<td>12 years</td>
<td>7 years</td>
</tr>
<tr>
<td><strong>Average Duration in Years</strong></td>
<td><strong>1994 to 2005</strong></td>
<td><strong>1994 to 2001</strong></td>
<td><strong>1990 to 2001</strong></td>
<td><strong>2001 to 2005</strong></td>
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<tr>
<td></td>
<td><strong>11 years</strong></td>
<td><strong>7 years</strong></td>
<td><strong>11 years</strong></td>
<td><strong>4 years</strong></td>
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**Sources:** MP/F Research, RealFacts, RealSource, REIS Reports, Marcus & Millichap, Clayton-fillmore, ULI, and BRE Properties.

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A Peak represents top of an occupancy cycle and a Trough represents the bottom of an occupancy cycle.
CURRENT ECONOMIC INDICATORS
Manufacturing Continues To Recover

ISM Mfg: PMI Composite Index
SA, 50+ = Econ Expand

Source: Institute for Supply Management / Haver Analytics
The Markets Appear To Have “Disconnected” From The Economy

Source:  Wall Street Journal, Federal Reserve Board /Haver Analytics
Housing Has Remained A Bright Spot

New Plus Existing Home Sales
(Millions)
The Consumer Has Remained Relatively Active

![Personal Consumption Expenditures: Durable Goods](image)

Source: Bureau of Economic Analysis / Haver Analytics
As Income Growth Has Outpaced Inflation

Personal Income Less Inflation (CPI)

YOY % Change
Consumer Confidence Has Slipped Recently

Conference Board: Consumer Confidence

SA, 1985=100

Source: The Conference Board / Haver Analytics
Investor Fear Remains Very High

Investor Anxiety Index

Overall, Conditions Are Not That Dire

The Misery Index

Unemployment Plus Inflation
Inflation Expectations Are Increasing
Inflation Expectations Are On The Rise

10-Year Treasury Bond Yield at Constant Maturity
% p.a.

ECRI Future Inflation Gauge
1992=100

Sources: Federal Reserve Board, Economic Cycle Research Institute /Haver Analytics
Eurodollar Futures Indicate The Fed Will Tighten Through 2003
CONCLUSIONS

- Real Estate Portfolio Theory
- Supply and Demand Analysis
- Real Estate Cycle Theory
- Current Economic Indicators