

CME U.S. Commercial Real Estate Futures & Options

April 2007



Executive Summary

- **Commercial real estate synthetics will allow structured trades and positions between indices and contracts, providing a plethora of alternative risk-return combinations -- currently not available in the global capital markets.**
- **As demand for real estate synthetics rise, the size of the market will be compelling.....driving retail and institutional capital flows to meet portfolio insurance and yield enhancement needs.**

Executive Summary

Goals:

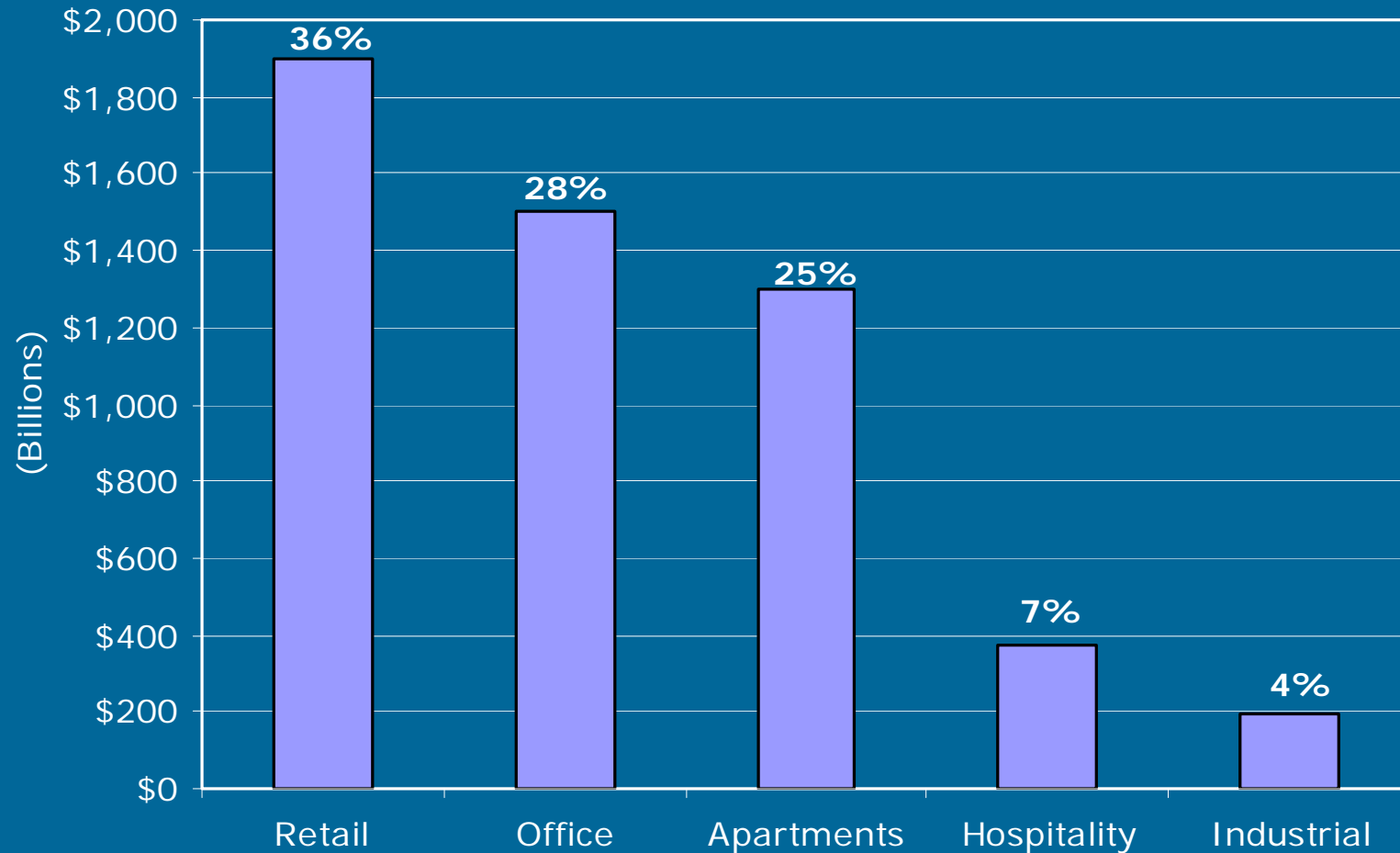
- **Develop Pure-Price Commercial Real Estate Indices based on closed transactions at the National, Regional and Sector Level.**
- **Provide industry with tradable indices used to trade commercial real estate backed derivative products.**
- **Control for data heterogeneity while allowing indices to reflect underlying real estate investment and space market fundamentals.**

Executive Summary

- **Commercial real estate is one of the most significant asset classes worldwide**
 - Global value of commercial real estate is estimated at \$15 trillion
 - Some \$5.3 trillion or ~35.3% of global total is in the United States
 - Despite its significance, the benefits of derivatives (including liquidity and transparency) have generally not been extended into commercial real estate markets
- **CME U.S. Commercial Real Estate Futures & Options promises to plug that void**
 - Chicago Mercantile Exchange (CME) is partnering with Global Real Analytics (GRA) to develop and offer futures and options based on regional and sector based Commercial Real Estate Indexes or GRA CREX™ Indices
 - Targeting Second Quarter 2007 launch

Executive Summary

Value of U.S. Commercial Real Estate



Size of Commercial Real Estate Capital Markets:

Global Direct: \$15 trillion

U.S. Direct: \$5.3 trillion (w/Hotels) - \$100 bill. On side-lines

REITs: \$330 billion (Equity) – 19% per year growth

CMBS: \$170 billion Annual Issuance – 24% per year growth

Bank Loans: \$1.8 trillion Annual Origination (Commercial)

Derivatives: \$5.4 trillion – Commodity – 52% per year growth

RE Derivatives: \$53-to-\$106 billion in 3-to-5 years (projected)

GRA Commercial Real Estate Indices (CREX™)

Ten indices based on property sector and geographic region:

- 1) **National (NCI)**
 - 2) **Office (OCI)**
 - 3) **Warehouse (WCI)**
 - 4) **Apartment (ACI)**
 - 5) **Retail (RCI)**
 - 6) **Northeast (NEI)**
 - 7) **Midwest (MID)**
 - 8) **Mid-Atlantic South (MAS)**
 - 9) **Pacific West (PCW)**
 - 10) **Desert Mountain West (DMW)**
- Composite**
- Four Core Property Sectors**
- Five Geo-graphic Regions**
-
- A diagram showing a list of 10 indices. The first five indices (1-5) are grouped by a bracket on the right and labeled 'Composite Four Core Property Sectors'. The last five indices (6-10) are grouped by a bracket on the right and labeled 'Five Geo-graphic Regions'.

Executive Summary

Futures & option contracts specs ...

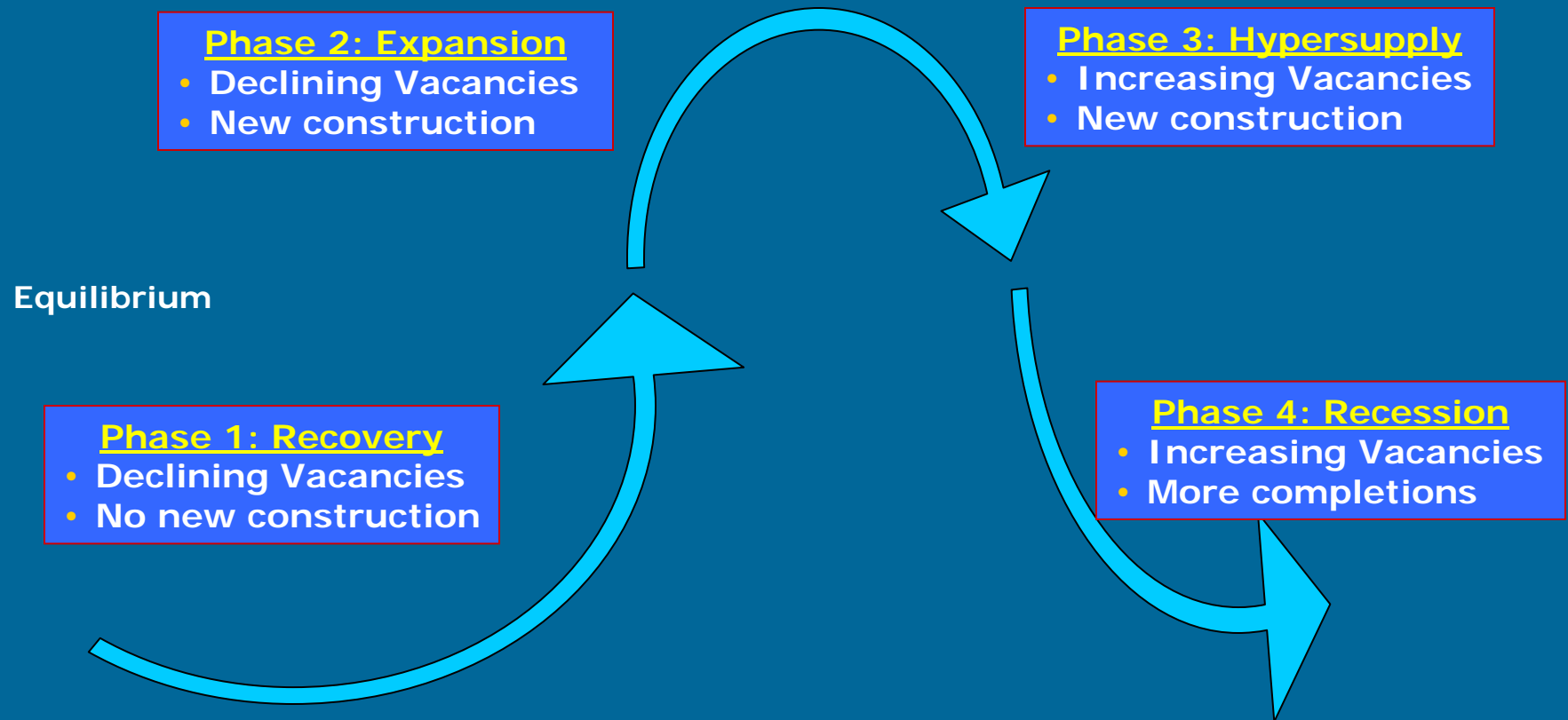
	Futures	Options on Futures
Contract Size	\$250 x Index, <i>e.g.</i> , if GRA CREX™ Index @ 150.00 then contract value equals \$37,500 (= \$250 x 150.00)	One (1) futures contract
Tick Size	0.20 index points (\$50.00)	0.10 index points (\$25.00)
Trading Hours	Offered on CME Globex® Sundays-Thursdays, 5:00 pm-3:00 pm (central) the following day	
Months	First 20 contracts in March quarterly cycle of March, June, September and December	
Final Settlement Date	Trading in expiring contract ceases at the close of trading on the business day prior to the 2nd to last Tuesday of contract month; index data released at 9:15 a.m. (CT) on 2nd to last Tuesday of contract month	
Cash Settlement	Cash settled on Commercial Real Estate Indexes published by Global Real Analytics LLC ("GRA CREX™ Indexes") for ... (1) Composite Index; Property Type Indexes based on (2) Retail; (3) Office; (4) Apartments; and (5) Warehouse properties; Regional indexes in (6) Desert Mountain West; (7) Mid-Atlantic South; (8) Northeast; (9) Midwest; and (10) Pacific West	Exercised into associated futures contract
Strike Prices	NA	1 point intervals above & below market price

Outline

- **Commercial Real Estate Market Trends**
- **About the GRA CREX™ Indices**
- **CME U.S. Commercial Real Estate Futures & Options**

Commercial Real Estate Market Trends

Real estate market cycle quadrant theory ...



Source: Glenn Mueller, Dividend Capital

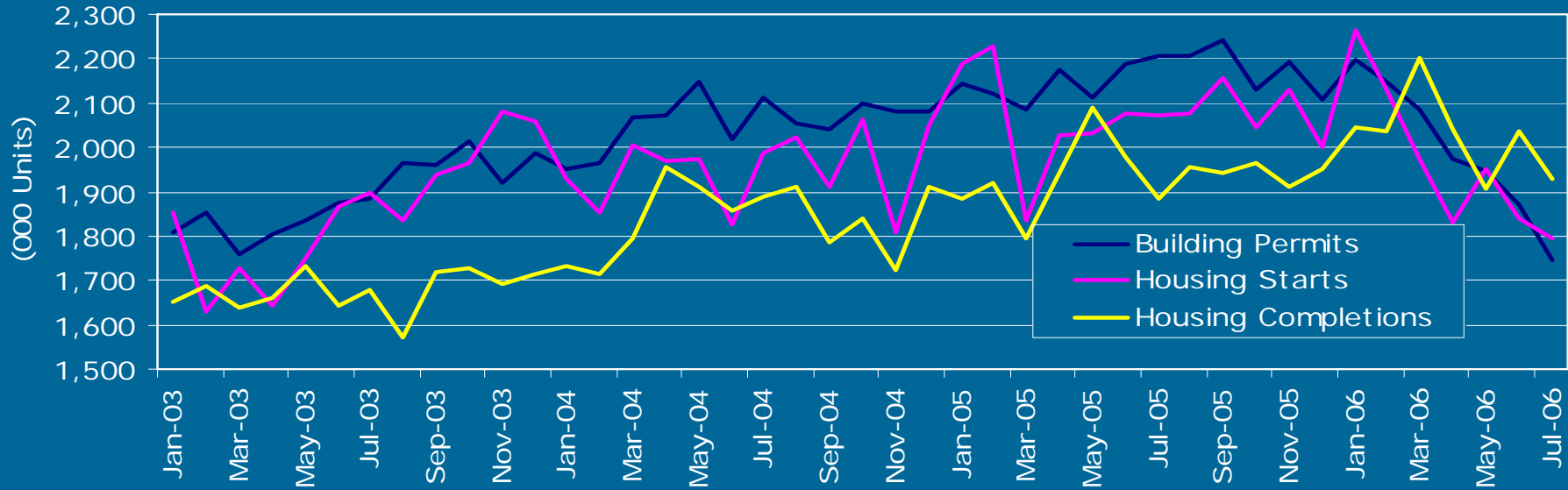
Commercial Real Estate Market Trends

Housing boom has captured much public interest but ...

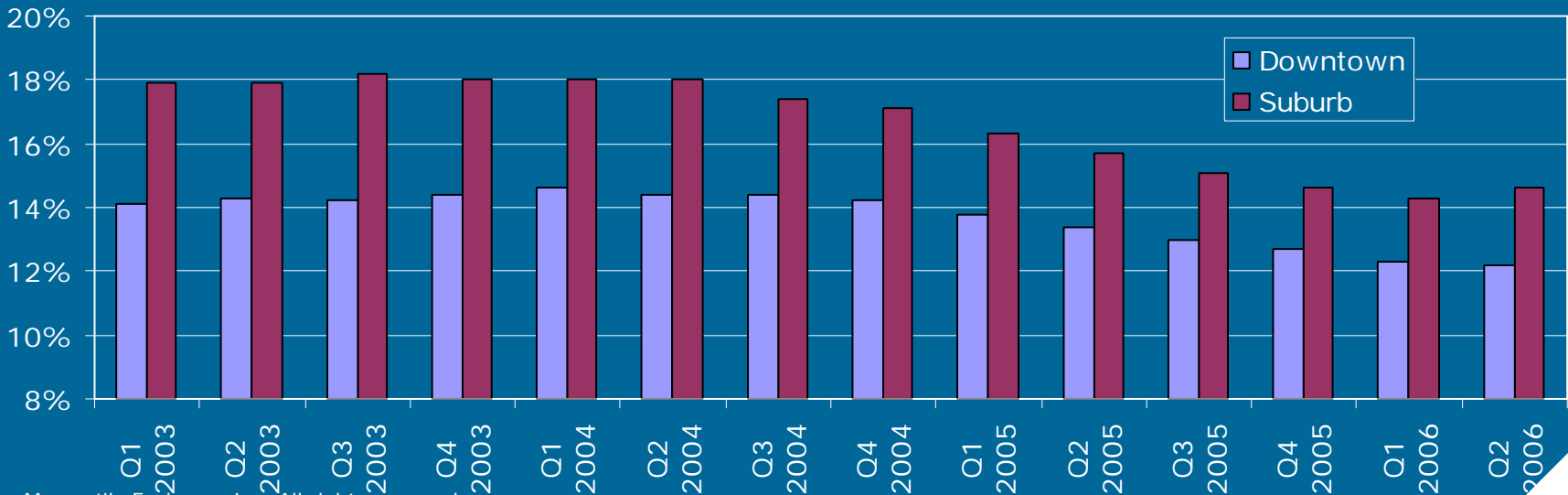
- Commercial real estate performance has likewise been strong
 - Housing appears to be slowing down as evidenced by declining building permits, housing starts and housing completions
 - BUT ... commercial activity as evidenced by office vacancy rates continues to show improvement
 - Oftimes housing strong early and commercial RE strong in latter stages of economic cycle
- Commercial and residential real estate impacted by many common factors but differences are evident
 - Housing tied to income and interest rates ... affordable housing has led to much demand, speculation, rampant building ... but recent advances in rates dampening housing market
 - Housing fueled by private individuals but commercial RE demand much more diverse including foreign investors
 - Housing boom has diverted resources from new commercial construction leading to shortage of new commercial space

Commercial Real Estate Market Trends

Monthly Housing Activity



CB Richard Ellis National Office Vacancy Rates



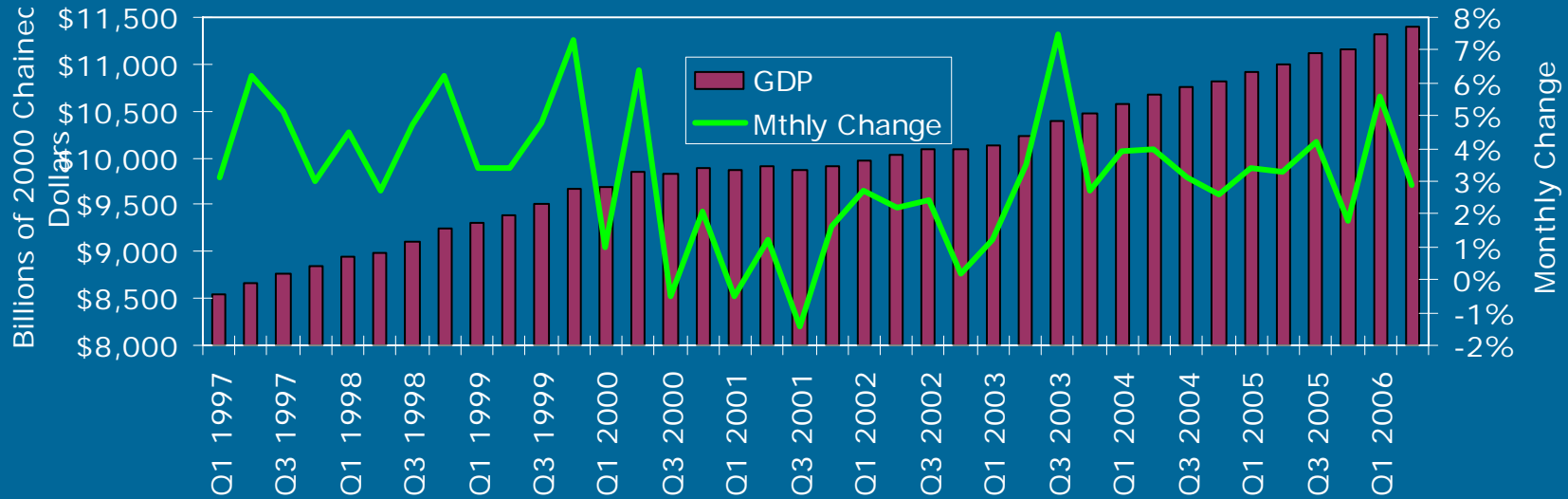
Commercial Real Estate Market Trends

Office sector ...

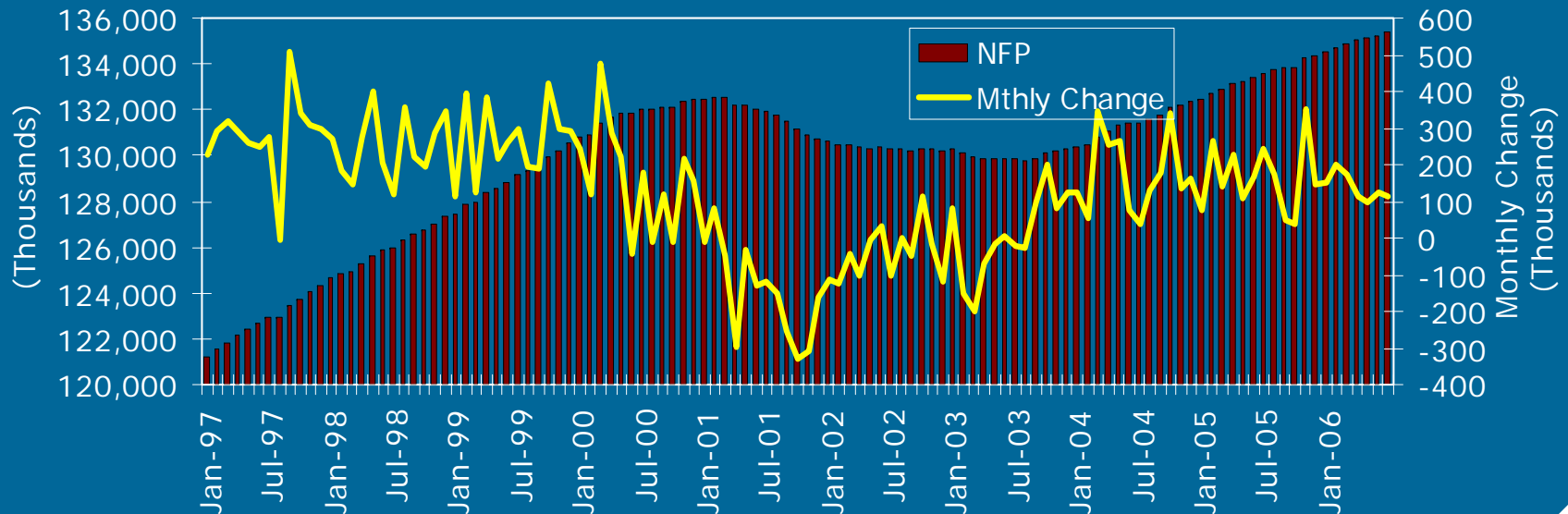
- **Outlook driven by broad economic indicators, e.g., GDP, NFPs**
 - **Gross Domestic Product (GDP) at +2.9% in Q2 2006 down from +5.6% in Q1 2006 ... anticipate 3.0%-4.0% growth in 2006**
 - **Outlook incorporates moderating consumer spending and confidence in light of Fed monetary policy that has pushed Fed Funds to 5.25%**
 - **Non-farm payroll (NFP) growth moderating with advances <200,000 jobs over past year ... service sector jobs still growing despite manufacturing and construction slowdown**
- **Downtown and suburb office absorption strong although new office construction starting to rebound**
 - **Some 16.9 million square feet absorbed in Q2 2006**
 - **Downtown vacancy rates near 12.2%; suburban vacancies at 14.6%**
- **Downtown and suburban values and rentals strong**
 - **Central business district values +9.7% with rents +5.2%**
 - **Suburban values +6.9% with rents +4.7%**

Commercial Real Estate Market Trends

Real Gross Domestic Product (GDP)

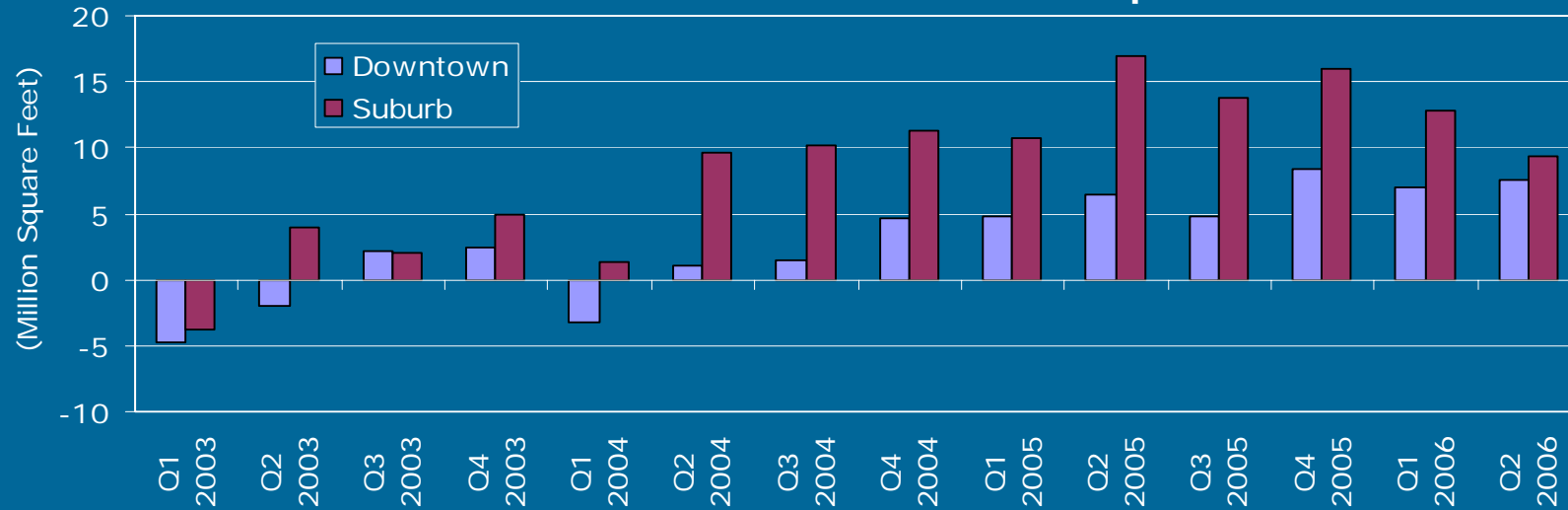


Non-Farm Payrolls

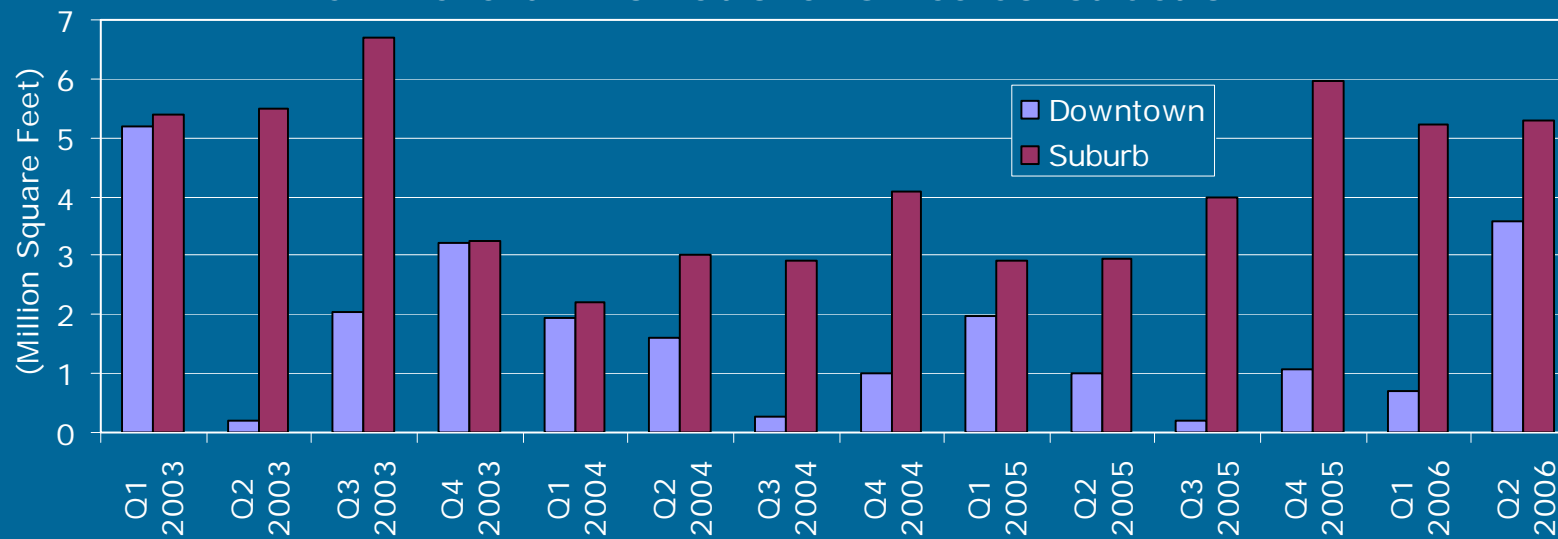


Commercial Real Estate Market Trends

CB Richard Ellis National Office Absorption



CB Richard Ellis National Office Construction



Commercial Real Estate Market Trends

Central Business District Class A Office ...

Average Value per Square Foot				
Rank	Location	2Q 2006	2Q 2005	Change
1	West Palm Beach	\$265.32	\$211.5	+25.4%
2	Phoenix	\$189.10	\$155.78	+21.4%
3	Denver	\$224.40	\$186.81	+20.1%
4	Ft. Lauderdale	\$177.51	\$148.55	+19.5%
5	Orlando	\$199.13	\$166.65	+19.5%
	<i>National Average</i>	<i>\$277.51</i>	<i>\$252.96</i>	<i>+9.7%</i>
Average Rent per Square Foot				
1	New York	\$61.66	\$55.31	+11.5%
2	San Francisco	\$34.56	\$31.08	+11.2%
3	Orange County	\$29.03	\$26.29	+10.4%
4	Honolulu	\$28.03	\$25.52	+9.8%
5	Downtown Manhattan	\$41.02	\$37.39	+9.7%
	<i>National Average</i>	<i>\$29.70</i>	<i>\$28.24</i>	<i>+5.2%</i>

Source: GRA National Real Estate Index

Commercial Real Estate Market Trends

Suburban Class A Office ...

Average Value per Square Foot				
Rank	Location	2Q 2006	2Q 2004	Change
1	Nassau-Suffolk	\$234.07	\$185.64	+26.1%
2	Jacksonville	\$149.24	\$119.78	+24.6%
3	West Palm Beach	\$269.14	\$217.26	+23.9%
4	Charlotte	\$167.24	\$139.11	+20.2%
5	Stamford	\$300.69	\$252.36	+19.2%
	<i>National Average</i>	<i>\$210.35</i>	<i>\$196.82</i>	<i>+6.9%</i>
Average Rent per Square Foot				
1	Tampa/St. Petersburg	\$20.90	\$19.02	+9.9%
2	Miami	\$26.74	\$24.61	+8.7%
3	Ft. Lauderdale	\$22.63	\$20.92	+8.2%
4	San Diego	\$33.23	\$30.75	+8.1%
5	Orange County	\$25.83	\$23.94	+7.9%
	<i>National Average</i>	<i>\$23.53</i>	<i>\$22.48</i>	<i>+4.7%</i>

Source: GRA National Real Estate Index

Commercial Real Estate Market Trends

Industrial and warehouse/distribution sector ...

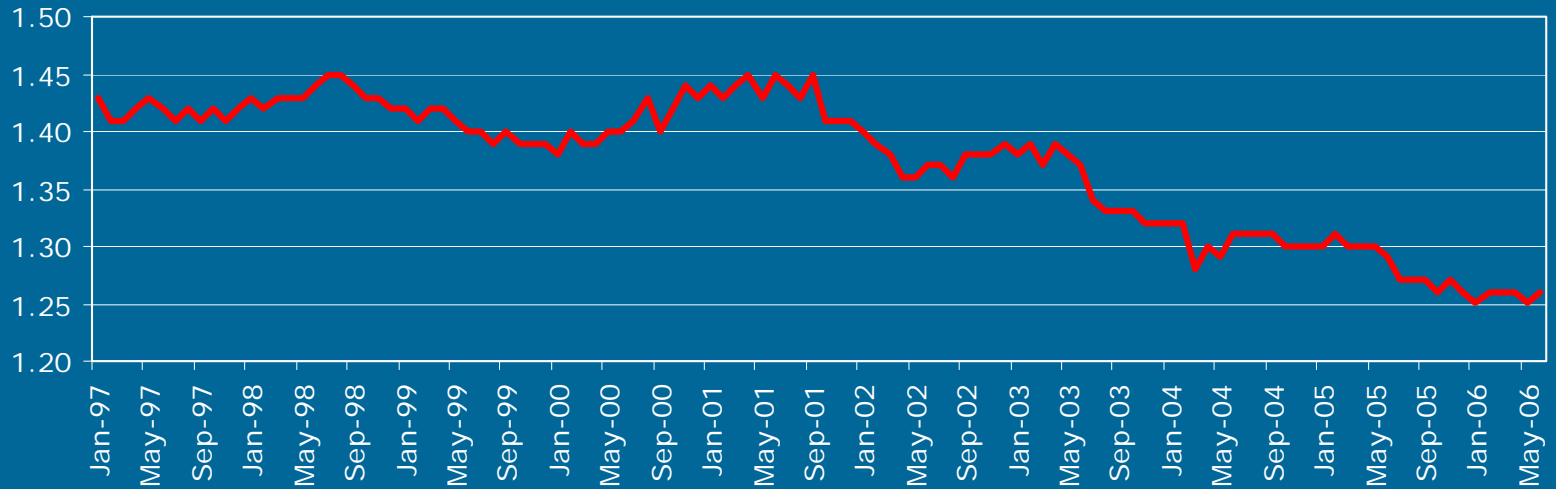
- **Insight provided by capacity utilization, inventories**
 - Factory orders, production, business investment riding wave of strong consumer spending
 - Capacity utilization advances from 74% in 2001 to 82.4% in July 2006
 - Inventory to sales ratio at 1.26 months with YOY inventory gains (+6%) weaker than sales (+9%)
- **Industrial availability rates declining**
 - Availability on declined to 9.6% in Q2 2006
 - New construction surging in prior 4 calendar quarters
- **Values and rentals strong**
 - Industrial property (warehouse & distribution) values +9.2% with rents +5.2%

Commercial Real Estate Market Trends

Capacity Utilization

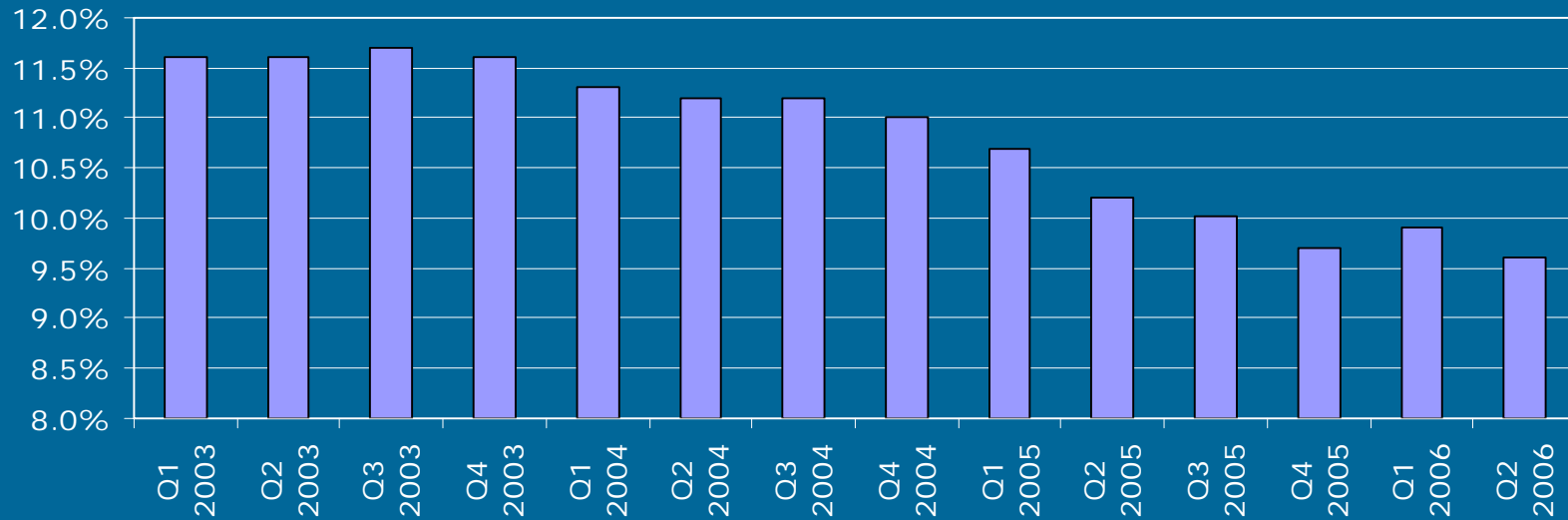


Inventories to Sales Ratio

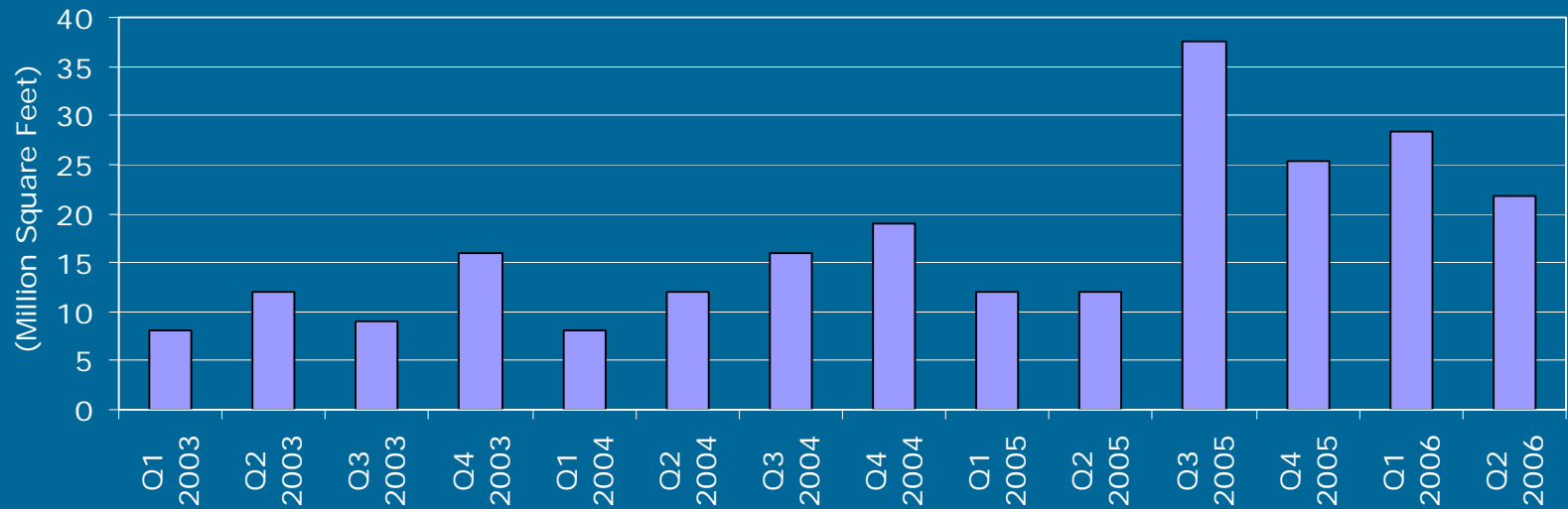


Commercial Real Estate Market Trends

CB Richard Ellis National Industrial Availability Rates



CB Richard Ellis Natl Industrial Construction



Commercial Real Estate Market Trends

Industrial (Warehouse/Distribution) ...

Average Value per Square Foot				
Rank	Location	2Q 2006	2Q 2005	Change
1	Philadelphia	\$57.56	\$46.66	+23.4%
2	Jacksonville	\$49.33	\$40.54	+21.7%
3	Kansas City	\$44.94	\$37.05	+21.3%
4	Portland	\$63.10	\$54.47	+15.8%
5	Cincinnati	\$40.80	\$35.36	+15.4%
	<i>National Average</i>	<i>\$58.65</i>	<i>\$53.20</i>	<i>+10.2%</i>
Average Rent per Square Foot				
1	Las Vegas	\$5.91	\$5.29	+11.7%
2	Ft. Lauderdale	\$8.04	\$7.20	+11.7%
3	Los Angeles	\$7.92	\$7.14	+10.9%
4	Sacramento	\$5.22	\$4.77	+9.4%
5	Cleveland	\$4.47	\$4.09	+9.3%
	<i>National Average</i>	<i>\$5.79</i>	<i>\$5.49</i>	<i>+5.2%</i>

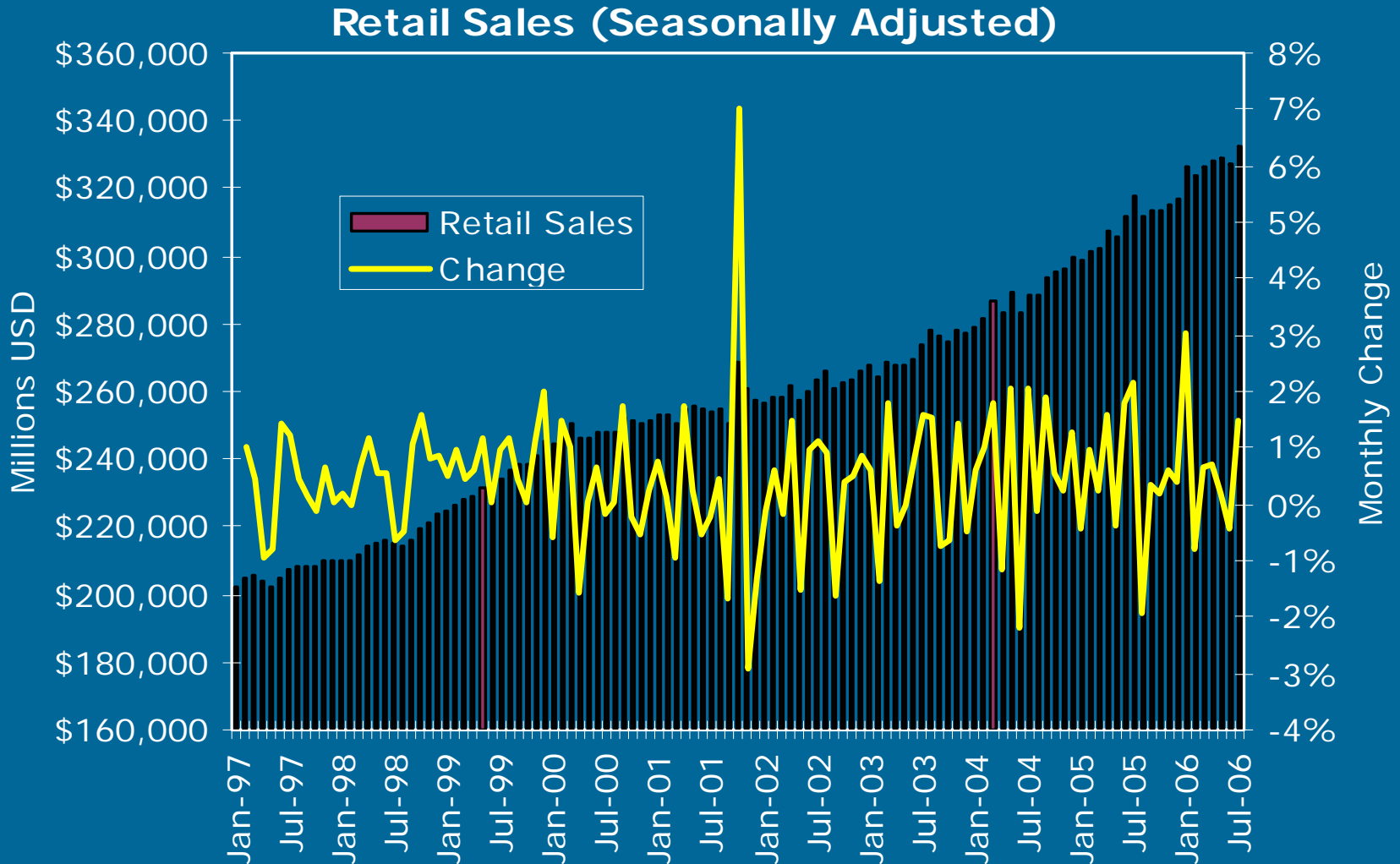
Source: GRA National Real Estate Index

Commercial Real Estate Market Trends

Retail sector ...

- **Retail sales most widely followed indicator of consumer spending**
 - Low interest rates, housing boom and deep vehicle discounting driving consumer sector through late 2005
 - But retail sector showing signs of slowing down or inconsistency as a result of constrictive monetary policy and rising fuel costs
 - Retail sales were weak in 4th quarter 2005 followed by strong 1st quarter 2006 and weak 2nd quarter 2006
- **Still ... retail property values and rentals strong**
 - Values have risen +11.4% over past year while rents have advanced +5.4%

Commercial Real Estate Market Trends



Commercial Real Estate Market Trends

Retail (Grocery Anchored) ...

Average Value per Square Foot				
Rank	Location	2Q 2006	2Q 2004	Change
1	San Francisco	\$270.92	\$219.80	+23.3%
2	Honolulu	\$291.88	\$237.83	+22.7%
3	San Diego	\$239.19	\$197.61	+21.0%
4	Oakland	\$207.96	\$177.45	+17.2%
5	Houston	\$174.86	\$149.23	+17.2%
	National Average	\$178.34	\$160.11	+11.4%
Average Rent per Square Foot				
1	Honolulu	\$31.14	\$27.63	+12.7%
2	Miami	\$20.35	\$18.36	+10.8%
3	Washington, DC	\$24.69	\$22.54	+9.5%
4	Riverside-San Bernardino	\$20.09	\$18.46	+8.8%
5	San Diego	\$25.24	\$23.29	+8.4%
	National Average	\$19.74	\$18.73	+5.4%

Source: GRA National Real Estate Index

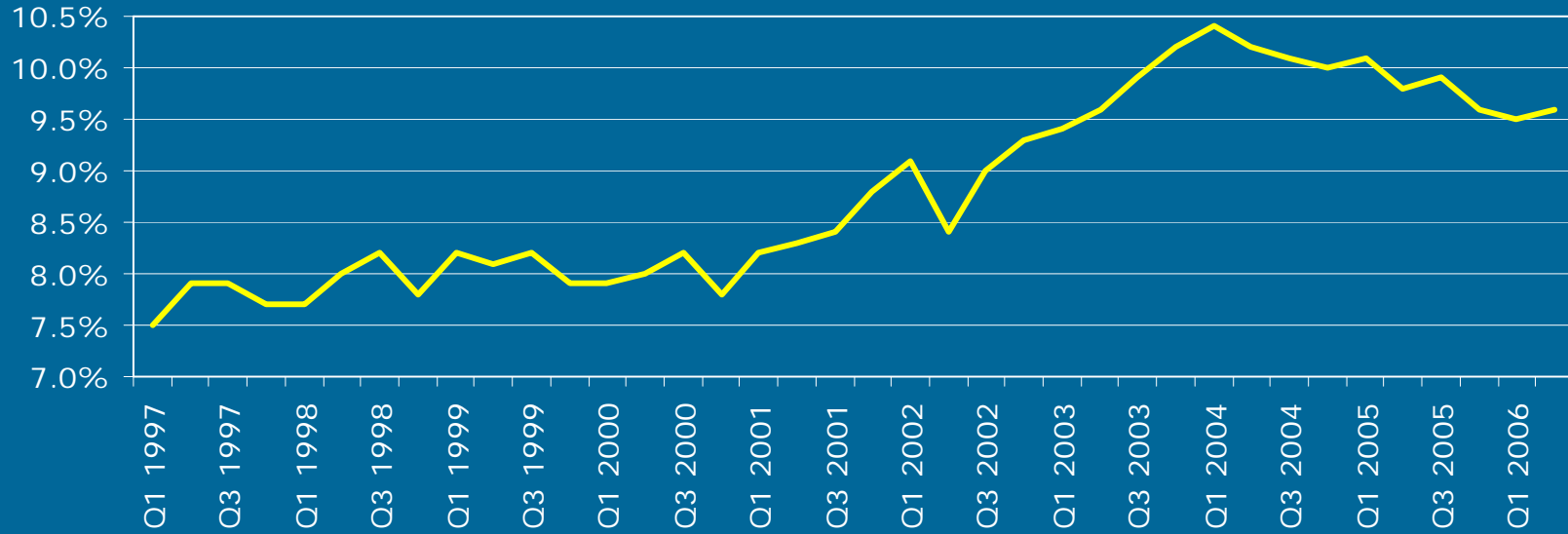
Commercial Real Estate Market Trends

Apartment sector ...

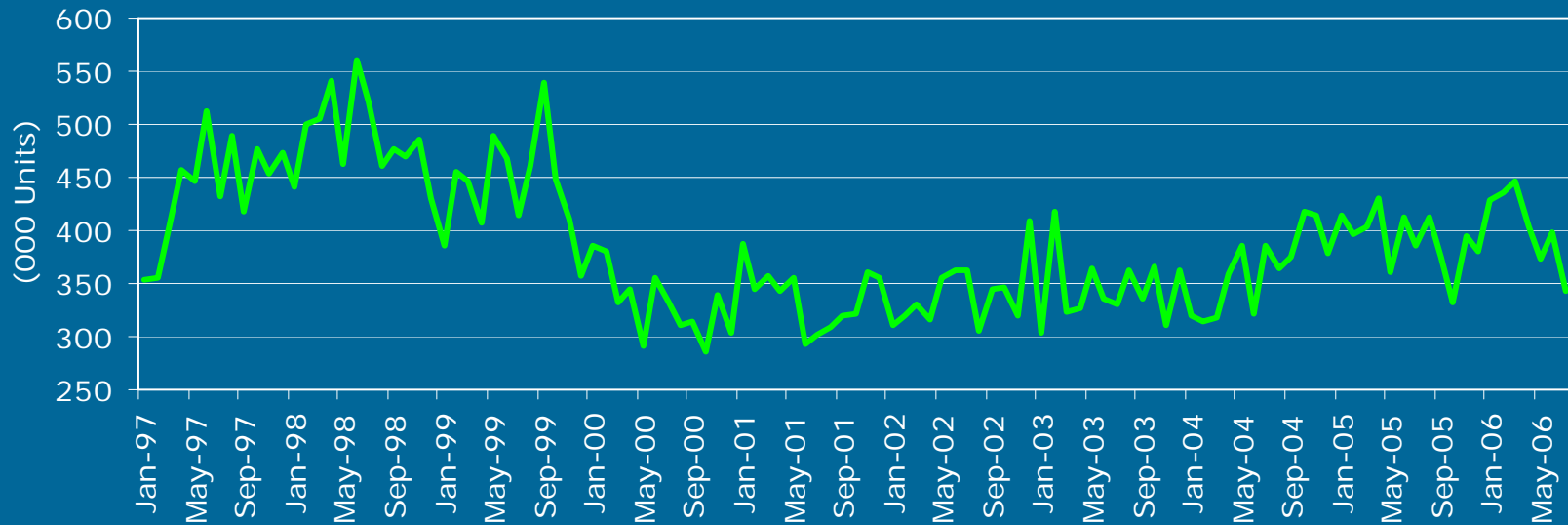
- **Vacancy rates on downtrend with slow building permit growth**
 - Rental vacancies reported at 9.6% in Q2 2006 ... down from Q2 2004 high of 10.4% but generally higher than prevailing rates in early 2000s
 - Building permits for buildings with 5+ units slow by starting to advance with 397K permits in June 2006
- **Property values and rental rates strong**
 - Class A apartment values reported +12.1% with rents +6.0% over past year
 - Class B apartment values reported +12.7% with rents +5.3% over past year

Commercial Real Estate Market Trends

Rental Vacancy Rate



Building Permits (5+ Units)



Commercial Real Estate Market Trends

Class A Apartments (Garden Style Luxury) ...

Average Value per Square Foot				
Rank	Location	2Q 2006	2Q 2004	Change
1	Tampa/St. Petersburg	\$125.11	\$92.62	+35.1%
2	Orlando	\$125.81	\$101.33	+24.2%
3	Washington, DC	\$226.52	\$182.69	+24.0%
4	Las Vegas	\$117.40	\$95.26	+23.2%
5	Ft. Lauderdale	\$147.57	\$119.78	+23.2%
	<i>National Average</i>	<i>\$144.72</i>	<i>\$129.14</i>	<i>+12.1%</i>
Average Rent per Square Foot				
1	Seattle	\$13.85	\$12.59	+10.0%
2	Phoenix	\$11.26	\$10.25	+9.9%
3	Orange County	\$21.71	\$19.82	+9.5%
4	Tampa/St. Petersburg	\$11.45	\$10.47	+9.4%
5	Ft. Lauderdale	\$13.73	\$12.57	+9.2%
	<i>National Average</i>	<i>\$15.83</i>	<i>\$14.94</i>	<i>+6.0%</i>

Source: GRA National Real Estate Index

Commercial Real Estate Market Trends

Class B Apartments (Garden Style) ...

Average Value per Square Foot				
Rank	Location	2Q 2006	2Q 2004	Change
1	West Palm Beach	\$102.23	\$83.49	+22.4%
2	Miami	\$99.79	\$81.56	+22.4%
3	Ft. Lauderdale	\$89.04	\$73.13	+21.8%
4	Washington, DC	\$150.82	\$124.14	+21.5%
5	Orlando	\$80.74	\$66.62	+21.2%
	<i>National Average</i>	<i>\$95.81</i>	<i>\$85.04</i>	<i>+12.7%</i>
Average Rent per Square Foot				
1	West Palm Beach	\$11.28	\$10.24	+10.2%
2	Phoenix	\$9.18	\$8.41	+9.2%
3	San Jose	\$17.51	\$16.09	+8.8%
4	San Francisco	\$19.91	\$18.33	+8.6%
5	Orange County	\$17.94	\$16.53	+8.5%
	<i>National Average</i>	<i>\$11.94</i>	<i>\$11.34</i>	<i>+5.3%</i>

Source: GRA National Real Estate Index

About the GRA CREX™ Indices

Tradable and non-tradable indices ...

- **Global Real Analytics (GRA) ...**
 - Has published the National Real Estate Index (NREI) since 1985
 - Represents a family of proprietary indices representing commercial property values, rental rates, cap rates in 60 local markets
 - Indexes published quarterly
- **GRA Commercial Real Estate Indices (CREX™) ...**
 - Represent “tradable” indices depicting trends in commercial real estate values
 - Published monthly and designed to serve as subject for exchange traded and OTC derivative products

About the GRA CREX™ Indices

- **Ten (10) indices will initially be published that cut across market by property type and geography**
 - **Five (5) regional indices including ... (1) Northeast, (2) Midwest, (3) Mid-Atlantic South, (4) Pacific West, and (5) Desert Mountain West ... representing major counties in major metropolitan areas**
 - **Four (4) property type indices ... (1) Office, (2) Warehouse, (3) Apartment, and (4) Retail**
 - Warehouse properties represent a subset of industrial properties
 - Scarce data precludes publication of Hospitality Index at this time
 - **ALSO ... Composite Index of 4 property types in 5 regions**

1 Composite Index (covering 4 Property Types in 5 Regions)	5 Regional Indexes (covering 4 Property Types)	4 Property Type Indexes (covering 5 Regions)
National (NCI)	Northeast (NEI)	Office (OCI)
	Midwest (MWI)	Warehouse (WCI)
	Mid-Atlantic-South (MAS)	Apartment (ACI)
	Pacific West (PCW)	Retail (RCI)
	Desert Mountain West (DMW)	

About the GRA CREX™ Indices

Broad-Based Target Markets

- **Commercial stock and market activity**
- **Population size/growth trends**
- **Demographic composition/trends**
- **Regional/inter-regional economic-geographic correlations**

About the GRA CREX™ Indices

Five regional indexes ...



About the GRA CREX™ Indices

Sub-Markets (Metro/Metro Groups)


- **NEI: New York-Boston**
- **NEI: Washington D.C.-Baltimore-Richmond-Philadelphia**
- **MID: Chicago**
- **MID: Cincinnati-Cleveland-Columbus-Detroit-Kansas City**
- **MAS: Atlanta-Charlotte-Raleigh-Durham-Memphis-Nashville**
- **MAS: Miami-Ft. Lauderdale-Jacksonville-Orlando-Tampa-St. Petersburg**
- **DMW: Phoenix-Tucson-Las Vegas-Denver**
- **PCW: Los Angeles-Inland Empire-San Diego**
- **PCW: San Francisco-Oakland-San Jose-Sacramento**
- **PCW: Seattle-Portland**

About the GRA CREX™ Indices

Metro-Group Property Sector Matrix

Due to stratified weighting by property type at the metro-group level, no need for metro group combinations.

Metro Group - Property Sector Matrix

	Northeast		Mid-Atlantic South		Mid-West		Pacific West			Desert	National	Regional Indices
National	NE-Bos	NE-Other	MAS-Atl	MAS-FI	MW-Chic	MW-Oth	PW-PNW	PW-NorCal	PW-SoCal	DesMtn	National	
Apartment												Apartment
Office												Office
Retail												Retail
Warehouse												Warehouse
												National

Sector Indices

Note: There are 40 metro-group-sector combinations (10 metro groups x 4 sectors).

About the GRA CREX™ Indices

Index Calculation: National & Regional Geographic Composite Indices

Goal: Aggregate statistically significant sample sizes per period, while keeping the index current.

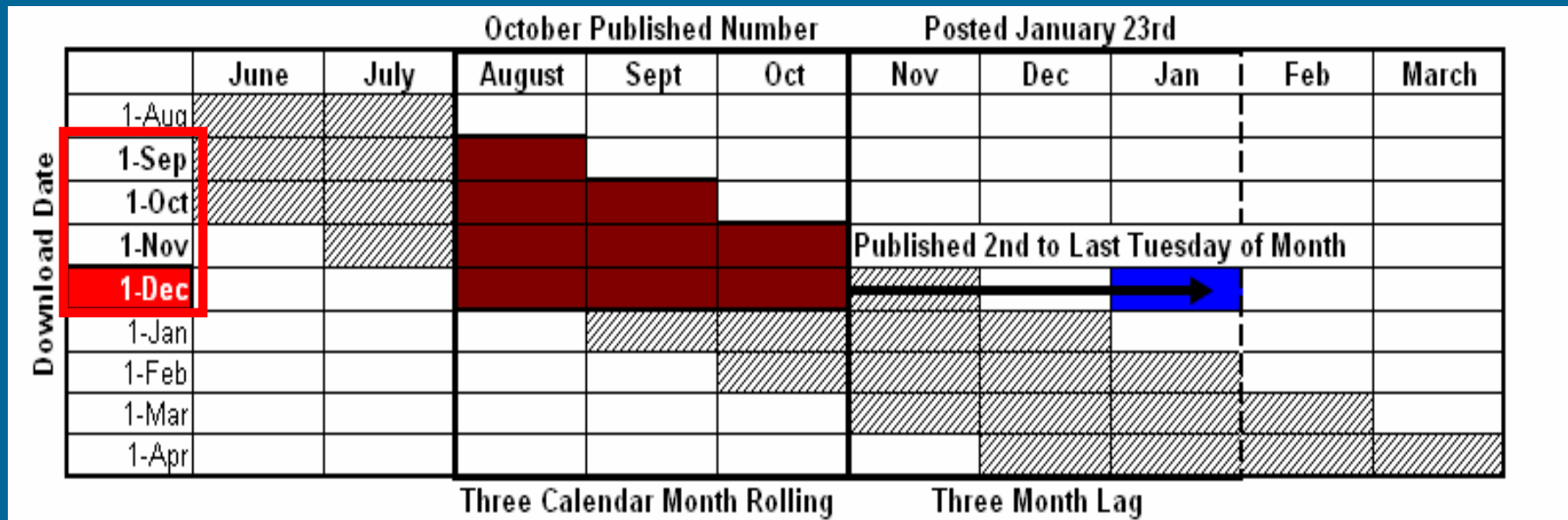
Monthly reported index numbers based on:

- **3-month rolling mean *transaction price per square foot***
(Base Period December 2001 = 100)

- **Calculated using:**
 - ◆ *Broad-based target market* **geographic definitions**
 - ◆ *Refined* **property type sector definitions**
 - ◆ *Core* **property sale transactions**

About the GRA CREX™ Indices

Data Collection Process



Published number: *"four-month data collection period," "three month rolling" with a "three month lag."*

About the GRA CREX™ Indices

- Data collected from redundant sources and filtered for errors
- Raw transaction data translated into market prices/foot
- Data reported at 9:15 am (CT) on 2nd to last Tuesday of each month covering rolling 3-month window closing ~10 weeks prior

Release	Majority of Sale Closing Prices
2 nd to last Tuesday of ... January	August, September, October
February	September, October, November
March	October, November, December
April	November, December, January
May	December, January, February
June	January, February, March
July	February, March, April
August	March, April, May
September	April, May, June
October	May, June, July
November	June, July, August
December	July, August, September

Property Sector Classifications

- Coding System in Existence for 20 years
- Over 200 property type sector classifications
- *Refined* coding utilized to determine **CREX™**, excludes specialized property types that lie outside *core* property sector definitions
- **Office, Warehouse and Apartment transactions in buildings over 20,000 square feet; Retail over 10,000 square feet.**

Transaction Data

- Over 200,000 historical transactions in system
- 4,000 to 5,000 transactions processed per month
 - ◆ Average closed transactions per 3-month period:
 - 700 per sector
 - 500 per region
- Transaction Volume: Roughly 48% National
 - ◆ \$170 billion per year
 - ◆ 1.2 billion square feet per year

About the GRA CREX™ Indices

Transaction Data

Sales Volume Distribution (Average 36 Months):

Geographic Percent

- Pacific West (32%)
- Northeast (30%)
- Mid-Atlantic South (18%)
- Desert-Mountain West (11%)
- Midwest (9%)

Sector Percent

- Office (45%)
- Apartments (31%)
- Retail (15%)
- Warehouse (9%)

Note: All transactions Geocoded down to the zip code level and up to the county, metro, metro group, region and national level.

About the GRA CREX™ Indices

Insufficient Data: additional research conducted to verify Internet search, mapping, location analysis, phone calls to brokers, appraisers, title companies, etc.

Reasonability Tests and Price Checks: to determine if transaction price per square foot reasonable based on coding system - by property type and geographic location.

Transaction Price Not Reasonable: further research conducted for verification. If transaction data can not be verified, it is eliminated from the system.

Log Transformation/Filters

Goal: Metro-property type-sector level elimination (filtering) of transaction data (price outliers) above and below two standard deviations from mean. Focus on core transactions.

Log Transformations

- Log sales prices per square foot
- Normalize data
- Elimination of prices above below 2Stdev from mean (filter)
- Transform back to original state
- Add to metro-group property type sector for mean price calculation

Index Calculation: National & Regional Geographic Composite Indices

Approach:

- Market capitalization (“cap weighted”) price index.
- Cap weighted index calculations using divisors.
- Gives each geographic market and property sector a weight based on size and value of existing commercial real estate stock (or total inventory).
- National composite, sector and regional indices constructed track period-to-period movements in the total aggregate value of commercial real estate.

About the GRA CREX™ Indices

National and Regional Geographic Composite Indices:

- Market Capitalization (“cap weighted”) Price Index Methodology

$$Index_{\sum US t+1} = \left\{ \frac{\sum (P_{SMt+1} * S_{SMt})}{\sum (P'_{SMt} S_{SMt})} \right\} * 100$$

Where:

$Index_{\sum US t+1}$ is the national composite index.

P_{SMt+1} average price per square foot sector-metro-group.

P'_{SMt} average price per square foot sector-metro-group base period (Dec. 01).

S_{SMt} constant weighting factor square feet stock-inventory sector-metro-group reference year (2005).

$\sum(P_{SMt+1} * S_{SMt})$ sum all property sector-metro-group weighted market caps current period.

$\sum(P'_{SMt} * S_{SMt})$ is the *Divisor*.

About the GRA CREX™ Indices

National Property Sector Indices (Warehouse):

- Market Cap Weighted Price Index Methodology

$$Index_{\sum USW t+1} = \left\{ \frac{\sum (p_{WMt+1} * sf_{WMt})}{\sum (p'_{WMt} * sf_{WMt})} \right\} * 100$$

Where:

$Index_{\sum USW t+1}$ national composite index warehouse current period.

p_{WMt+1} average price per square foot each warehouse sector-metro-group.

p'_{WMt} average price per square foot warehouse sector-metro-group base period (Dec'01).

sf_{WMt} constant weighting factor stock-inventory warehouse sector-metro-group reference year (2005).

$\sum (p_{WMt+1} * sf_{WMt})$ sum of the warehouse sector-metro-group weighted market caps current period.

$\sum (p'_{WMt} * sf_{WMt})$ is the *Divisor*.

Quality-Adjusted Stratified Weights (QASW):

- Property Type Weighting Methodology

$$QASW_p = (\sum PT-SQF_{t=10}) / (\sum \sum PS-SQF_{t=10})$$

Where $QASW_p$ is derived by:

- 1) Sum of transactions volume in square feet over a 10 year period by property type within the sector at metro-group level ($PT-SQF_{t=10}$).
- 2) Divided by the sum of all transactions volume in square feet for the sector at the metro-group level ($\sum \sum PS-SQF_{t=10}$).

About the GRA CREX™ Indices

Property Class Stratified Weights

Average Property Type Weights: National Geography

Office

- CBD (38%)
- Suburban (62%)

Warehouse

- Warehouse (86%)
- Self-Storage (4%)
- Industrial (10%)

Apartments

- Garden (79%)
- Mid-Rise/High-Rise/Super Luxury (11%)

Apartments – Cont.

- Small Apartments (6%)
- Urban/Walkup (4%)

Retail

- Groc/Drug Anchored Ctrs (31%)
- Regional Malls (22%)
- Unanchored Strip Ctrs (11%)
- Power Centers (15%)
- Big-Boxes (11%)
- Other (10%)

About the GRA CREX™ Indices

Quality-Adjusted Weighted Average Price Per Square Foot:

$$QAP_t = \sum (PT_{t=n} * QASW_t)$$

Where QAP_t is derived by:

- 1) Property type average price per square foot at the metro-group level in the current period ($PT_{t=n}$).
- 2) Multiplied by the base period quality-adjusted (property type) stratified weight ($QASW_t$).

Note: QAP is the sector-metro-group weighted average price per square foot that is then applied to property sector stock weights (square feet) to derive aggregate values for index construction.

About the GRA CREX™ Indices

Setting Minimum Transaction Counts

Goal: Eliminate noise in data due to sample size error, at metro-group property type level. Maintain responsiveness to changes in market.

Statistical Precision Formula for Minimum Transaction Counts

$$n = \left(\frac{t \cdot s}{r \cdot p} \right)^2$$

Where:

n = Minimum Sample Size (Transaction Counts) Required at Property Type Level

p = Mean Sales Price Per Square Foot (3-Month Moving Average)

r = Acceptable Price Distance between Sample-True Mean Price (15%)

t = Student t – Statistical confidence level (e.g. for ~95%, confidence, $t = 1.83$)

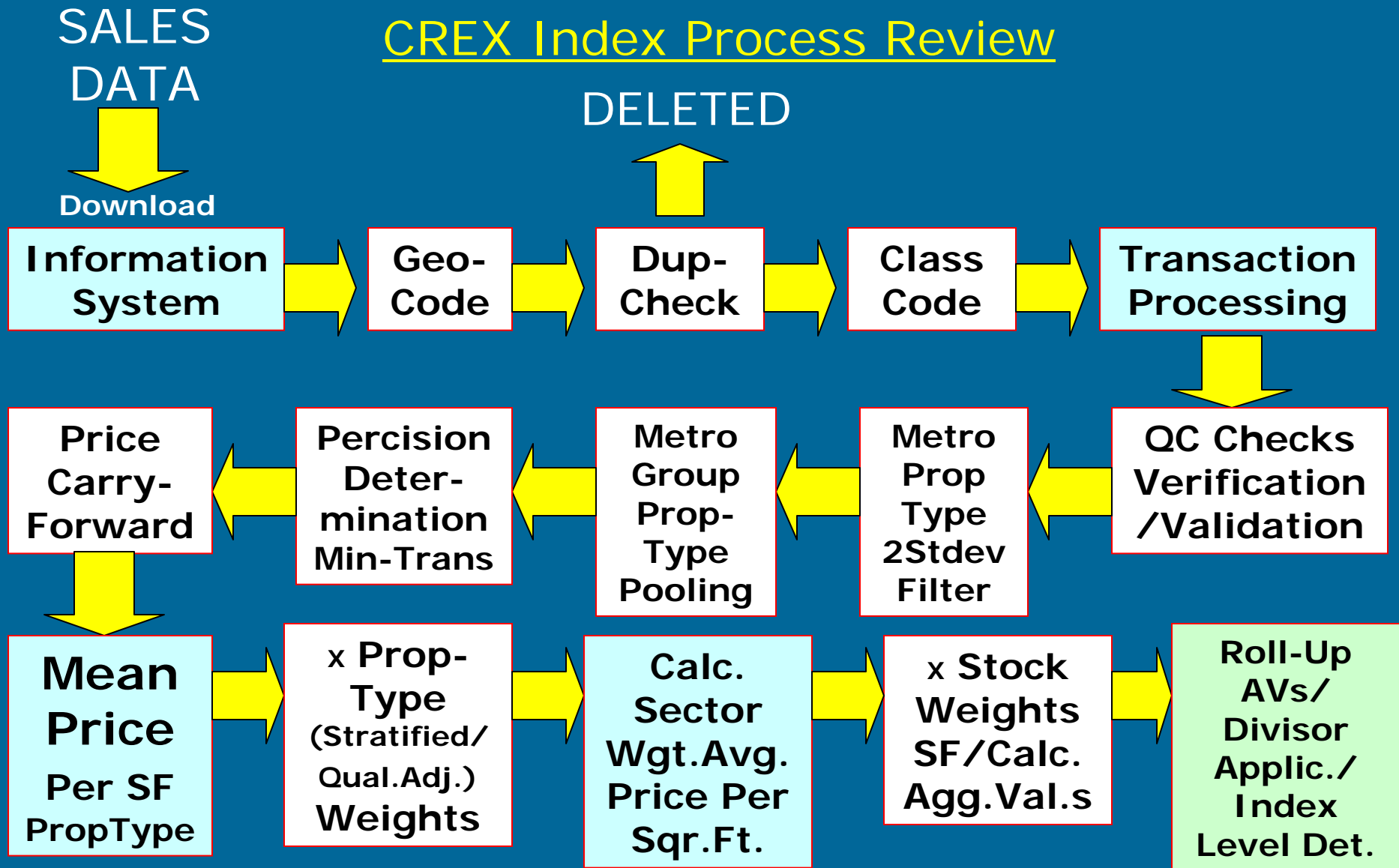
s = Mean Sales Price Per Square Foot Standard Deviation (3-Month Rolling)

Price Carry-Over Procedure

- **If Actual to Calculated Minimum Transaction Counts Net Positive, no action.**
- **If Net Negative:**
 - 1) Take mean price from prior period,
 - 2) Carry forward to current period,
 - 3) Replicate until minimum transaction count met,
 - 4) Calculate mean price per square foot for current period.

About the GRA CREX™ Indices

CREX Index Process Review



GRA Commercial Real Estate Indices (CREX™)

Ten indices based on property sector and geographic region:

- 1) **National (NCI)**
 - 2) **Office (OCI)**
 - 3) **Warehouse (WCI)**
 - 4) **Apartment (ACI)**
 - 5) **Retail (RCI)**
 - 6) **Northeast (NEI)**
 - 7) **Midwest (MID)**
 - 8) **Mid-Atlantic South (MAS)**
 - 9) **Pacific West (PCW)**
 - 10) **Desert Mountain West (DMW)**
- Composite**
- Four Core Property Sectors**
- Five Geo-graphic Regions**
-
- The diagram uses white curly braces to group the indices. A large brace on the right groups indices 1 through 5 under the heading 'Composite'. A smaller brace on the right groups indices 2 through 5 under the heading 'Four Core Property Sectors'. Another brace on the right groups indices 6 through 10 under the heading 'Five Geo-graphic Regions'.

CME U.S. Commercial Real Estate Futures & Options

Development of real estate markets ...

Advantages	Disadvantages	
<ul style="list-style-type: none"> • Liquidity • Capital efficiencies and financial surety • Possible 60/40 tax treatment • No mgt burden • Diversification 	<ul style="list-style-type: none"> • Ramp up learning curve • Limited number of markets available • No control of physical property 	<p><u>Derivatives</u> Exchange-traded futures & options, OTC swaps</p>
<ul style="list-style-type: none"> • Liquidity • No mgt burden • Diversification • Limited liability 	<ul style="list-style-type: none"> • Lack of control • Asset management fees • No tax shelter • Possible correlation with stocks 	<p><u>Publicly Traded Securities</u> REITs, REOCs</p>
<ul style="list-style-type: none"> • No mgt burden • Possible diversification • Leverage • Limited liability 	<ul style="list-style-type: none"> • No control • Extremely illiquid • High mgt fees • Possible misalignment of owner/manager interests 	<p><u>Privately Placed Securities</u> Private REITs, RELPs, CREFs</p>
<ul style="list-style-type: none"> • Control/pride of ownership • Possible return on human capital • May borrow vs. asset • Diversification • Tax shelter possibility 	<ul style="list-style-type: none"> • Mgt burden • Unlimited liability • Large capital investment not conducive to diversification • Illiquidity 	<p><u>Direct Investment</u> Sole Owner, GP, JV</p>

CME U.S. Commercial Real Estate Futures & Options

CME CREX™ Futures & Option specifications ...

- Contract based on a value of \$250 (contract multiplier) times the value of the index

$$\begin{aligned}\text{Contract Value} &= \text{Contract Multiplier} \times \text{Index Value} \\ &= \$250 \times 150.00 \\ &= \underline{\$37,500}\end{aligned}$$

- Minimum fluctuation or “tick” is 0.20 index points or \$50 (= \$250 x 0.20 index points) for futures; 0.10 index points or \$25 for options
- Traded for cash settlement in February quarterly cycle of February, May, August & November

CME U.S. Commercial Real Estate Futures & Options

Futures & option contracts specs ...

	Futures	Options on Futures
Contract Size	\$250 x Index, <i>e.g.</i> , if GRA CREX™ Index @ 150.00 then contract value equals \$37,500 (= \$250 x 150.00)	One (1) futures contract
Tick Size	0.20 index points (\$50.00)	0.10 index points (\$25.00)
Trading Hours	Offered on CME Globex® Sundays-Thursdays, 5:00 pm-3:00 pm (central) the following day	
Months	First 20 contracts in March quarterly cycle of March, June, September and December	
Final Settlement Date	Trading in expiring contract ceases at the close of trading on the business day prior to the 2nd to last Tuesday of contract month; index data released at 9:15 a.m. (CT) on 2nd to last Tuesday of contract month	
Cash Settlement	Cash settled on Commercial Real Estate Indexes published by Global Real Analytics LLC ("GRA CREX™ Indexes") for ... (1) Composite Index; Property Type Indexes based on (2) Retail; (3) Office; (4) Apartments; and (5) Warehouse properties; Regional indexes in (6) Desert Mountain West; (7) Mid-Atlantic South; (8) Northeast; (9) Midwest; and (10) Pacific West	Exercised into associated futures contract
Strike Prices	NA	1 point intervals above & below market price

CME U.S. Commercial Real Estate Futures & Options

Anatomy of a futures trade ...

- You can buy or sell futures with equal facility
- Buyers and sellers required to post an initial performance bond (“margin”) intended to cover 1 day’s price move with 95-99% confidence
- Futures are then “marked-to-market” (MTM) daily ... you collect any profits and pay any losses daily and in cash
- On Final Settlement Date, you are MTM to the spot value of the index and the position is stricken from the books

Buy 25 contracts	@	150.00 index pts
Sell 25 contracts	@	156.60 index pts
Profit/contract	=	<u>6.60 index pts</u>
		x 25 contracts
		<u>x \$250</u>
Profit/loss	=	+\$41,250

Sell 40 contracts	@	156.60 index pts
Buy 40 contracts	@	153.40 index pts
Profit/contract	=	<u>3.20 index pts</u>
		x 40 contracts
		<u>x \$250</u>
Profit/loss	=	+\$32,000

CME U.S. Commercial Real Estate Futures & Options

- **Benefits of CME futures & options ...**
 - Liquidity and price transparency
- **Potential users include ...**
 - Pension & hedge funds may gain exposure to commercial RE investments as diversification tool
 - Insurance companies, commercial banks can hedge downside risk on commercial RE loans
 - Foreign investors may access U.S. commercial RE market on low cost basis
 - Real estate portfolio managers benefit through low cost allocation to real estate by property type and geographic location, portfolio hedge in down markets, and portfolio yield enhancement thru property type & geographic location selection
 - Real estate developers can hedge development risks
 - Accredited investors can create personal portfolio insurance, achieve property type and geographic diversification

CME U.S. Commercial Real Estate Futures & Options

April 2007

