Real Estate Capital Markets: Equity

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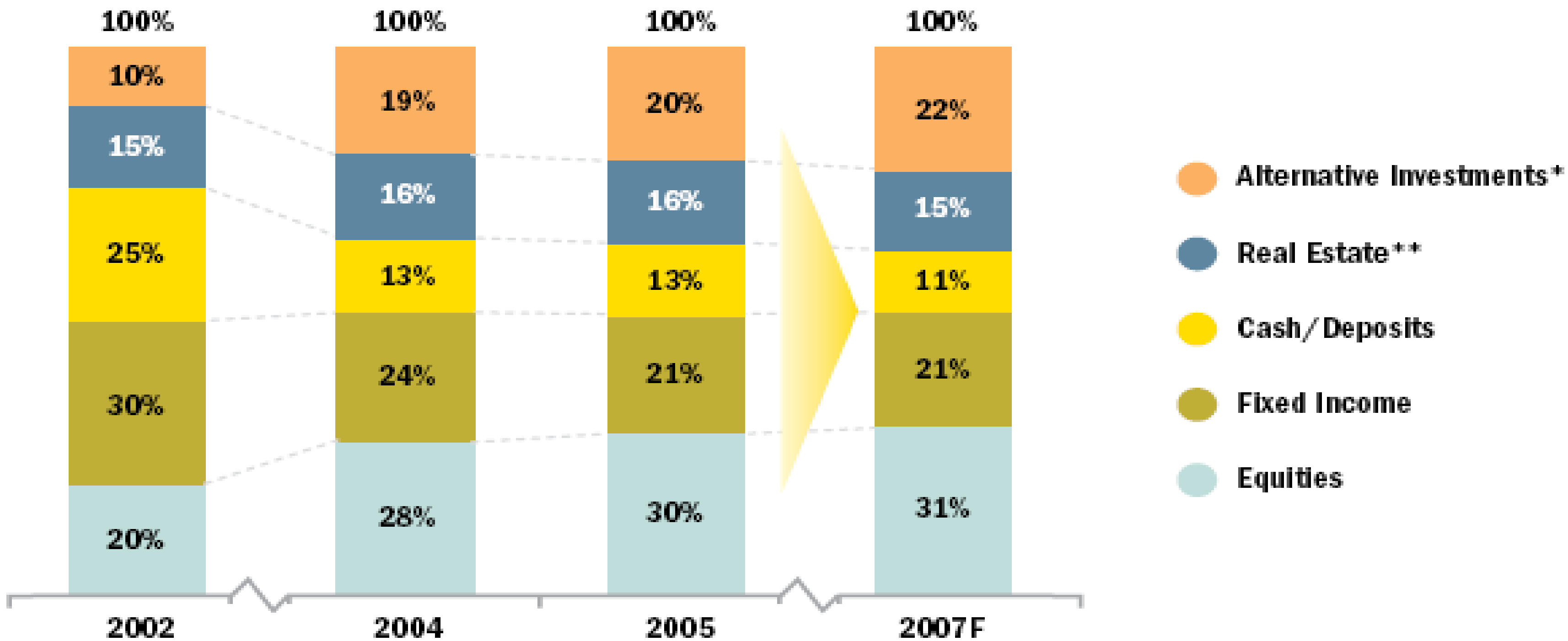
Acknowledgments: I would like to thank Ken Wu, PhD student for research assistance

Why Study Real Estate?

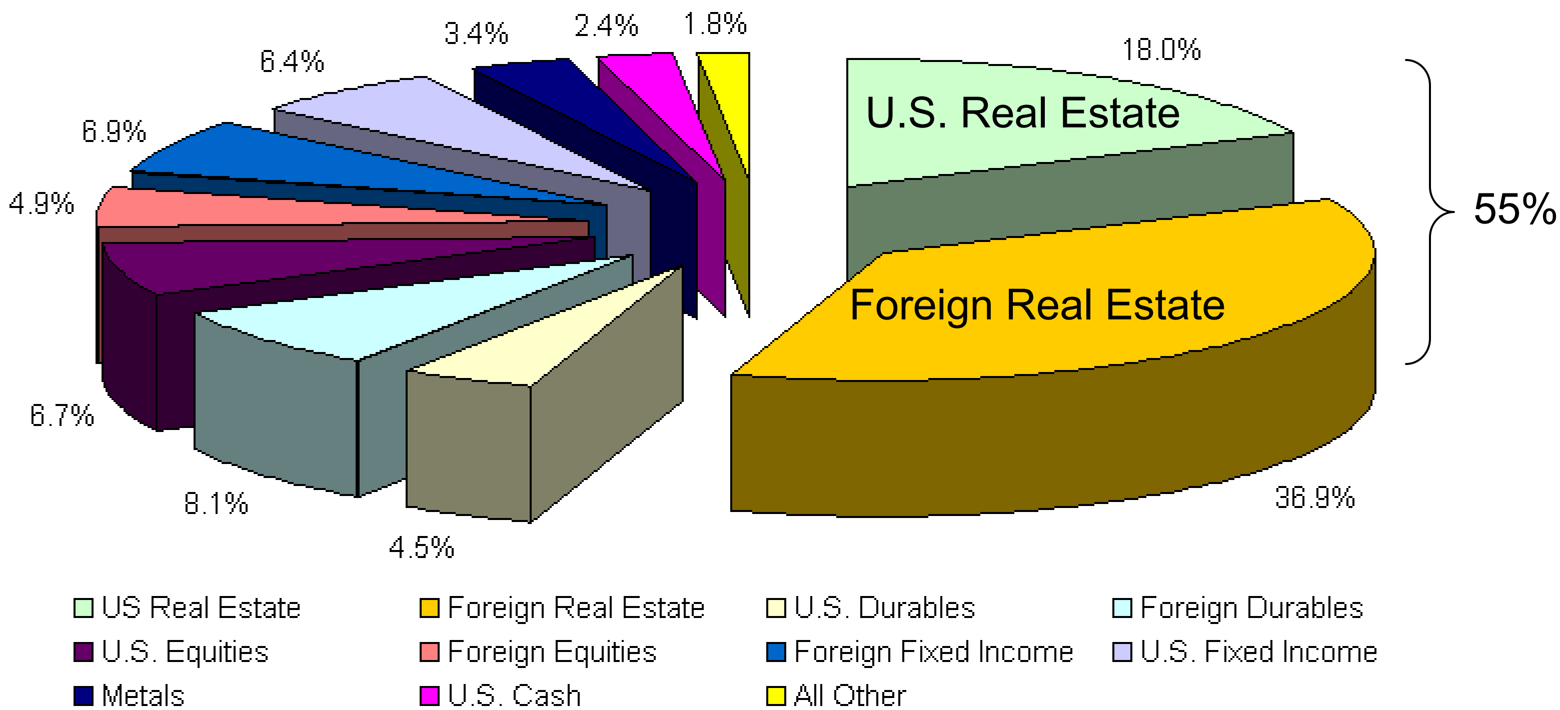
High Net Worth Individuals (HNWI) Assets by Investment Class



** Includes direct real estate investments and REITs
Source: Capgemini/Merrill Lynch Relationship Manager Surveys

Why Study Real Estate?

World Wealth: Market Values and Returns



Source: Ibbotson, et al, *Journal of Portfolio Management*, Fall 1985

Why Study Real Estate?

a. Typically excluded in stock and bond studies

b. Some major crises have involved real estate: LT Capital Management, Olympia & York (Reichmanns), Asian Crisis, Subprime Crisis

b. Controlled corporation in terms of securitized real estate: rules out certain types of corporate behavior given its structural form

c. Market imperfections in terms of direct real estate: asymmetrical information, inefficient markets, illiquidity, no short sales, etc

Accounting: Real Estate versus Stock Market

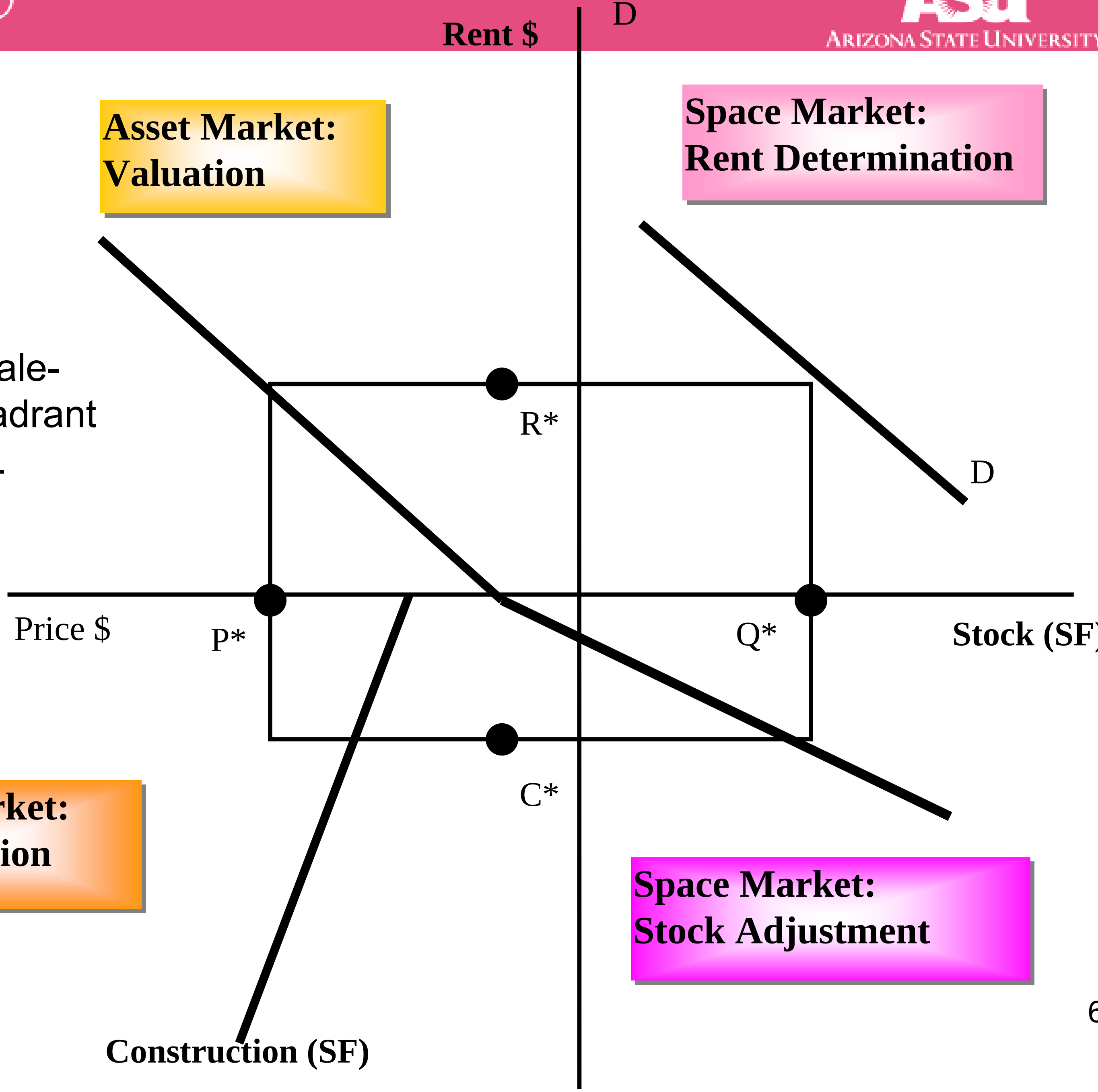
Real Estate Perspective	Stock Market Perspective
Potential Gross Income	Revenues
- Vacancy & Rent Concessions	- Cost of Goods Sold
Effective Gross Income	Gross Profit
- Operating Expenses	- Selling, General & Admin
Net Operating Income (NOI) ↔	EBITDA

$$\text{Cap Rate} = \frac{\text{NOI}}{\text{Price}}$$

$$\text{Price} = \frac{\text{NOI}}{\text{Cap Rate}}$$

$$\text{EBITDA Multiple} = \frac{\text{Enterprise Value}}{\text{EBITDA}}$$

The DiPasquale-Wheaton 4-Quadrant Diagram…



D

Rent $

Asset Market: Valuation

NW quadrant: Rent level (R) determined from the NE quadrant determines price (P) for real estate by means of the capitalization rate, (i).

Space Market: Rent Determination

NE quadrant: In equilibrium, Demand for space (D) = stock of space (S) so rent (R) can be determined

Price $

Stock (SF)

Asset Market: Construction

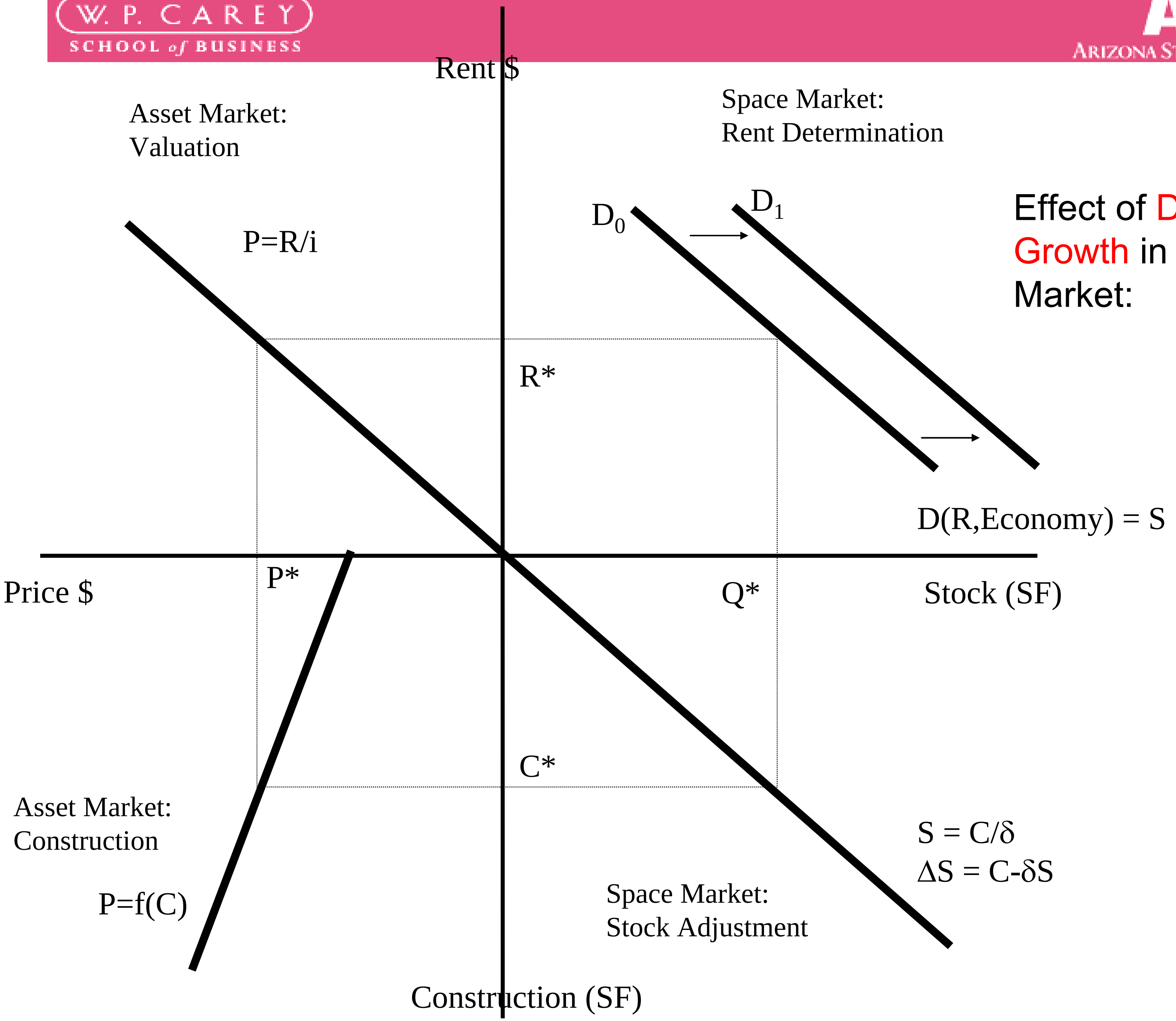
SW quadrant: Replacement cost f(C) of real estate via new construction is assumed to increase with greater building activity (C). Intersects price axis at minimum price (P) required to get some level of new development underway. New construction occurs at that level C, at which price (P) = replacement costs f(C)

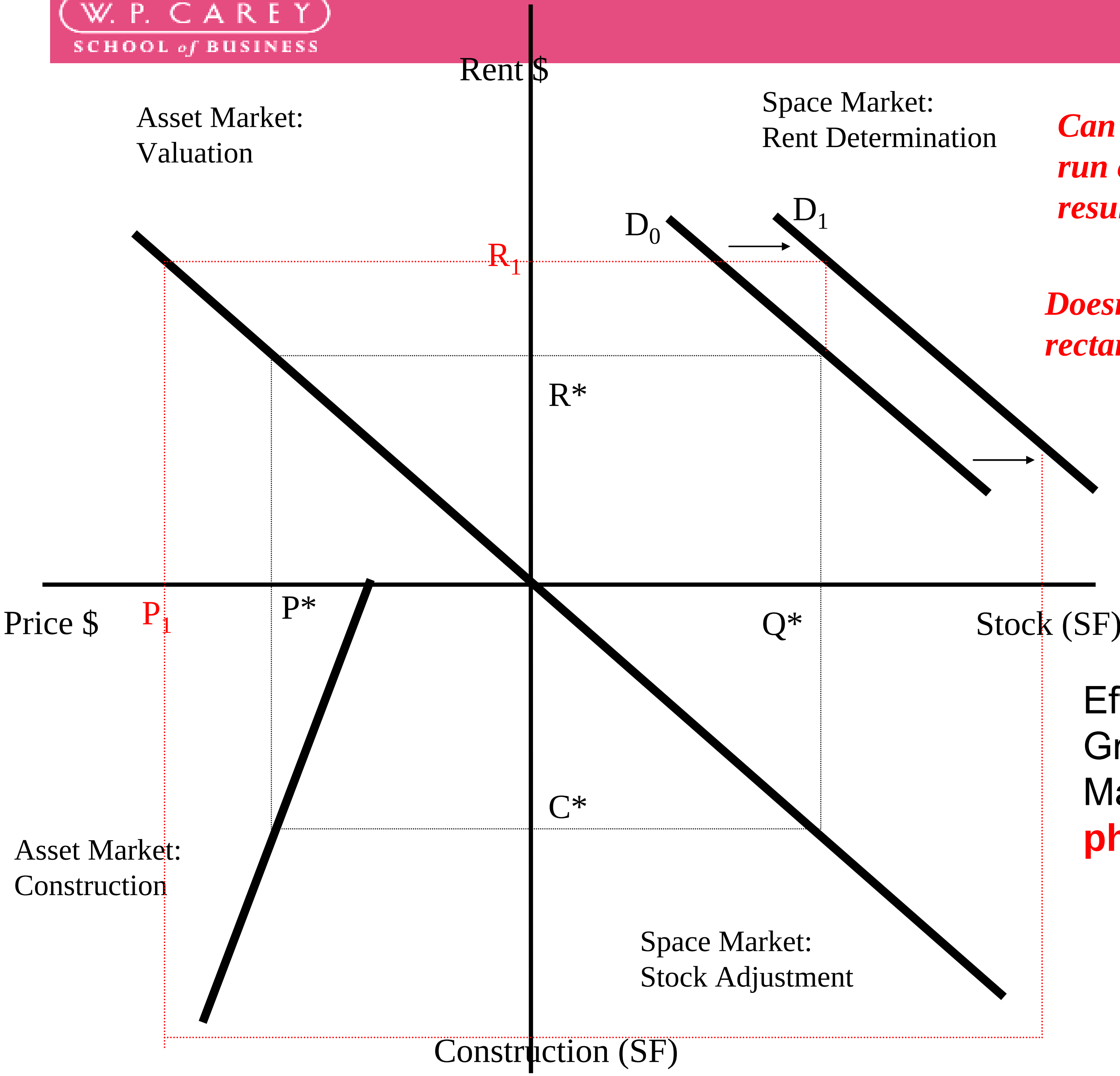
Space Market: Stock Adjustment

SE quadrant: Annual flow of new construction (C) is converted into long run stock of real estate space. The change in stock, ΔS, in a given period is equal to new construction minus losses from the stock measured by the depreciation rate, δ

Level of New Construction (SF)

Effect of Demand Growth in Space Market:

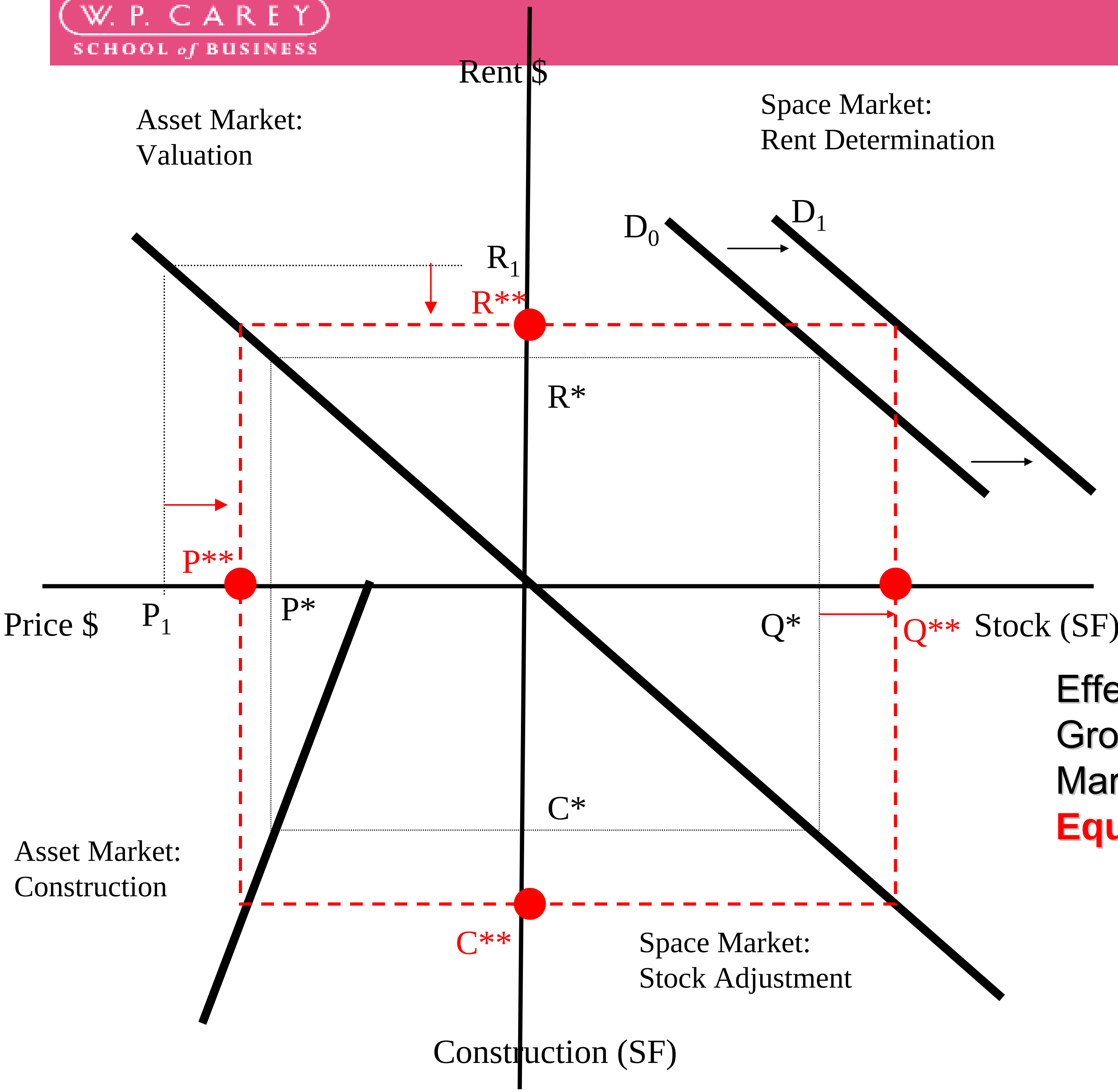




Can this be a long-run equilibrium result?…

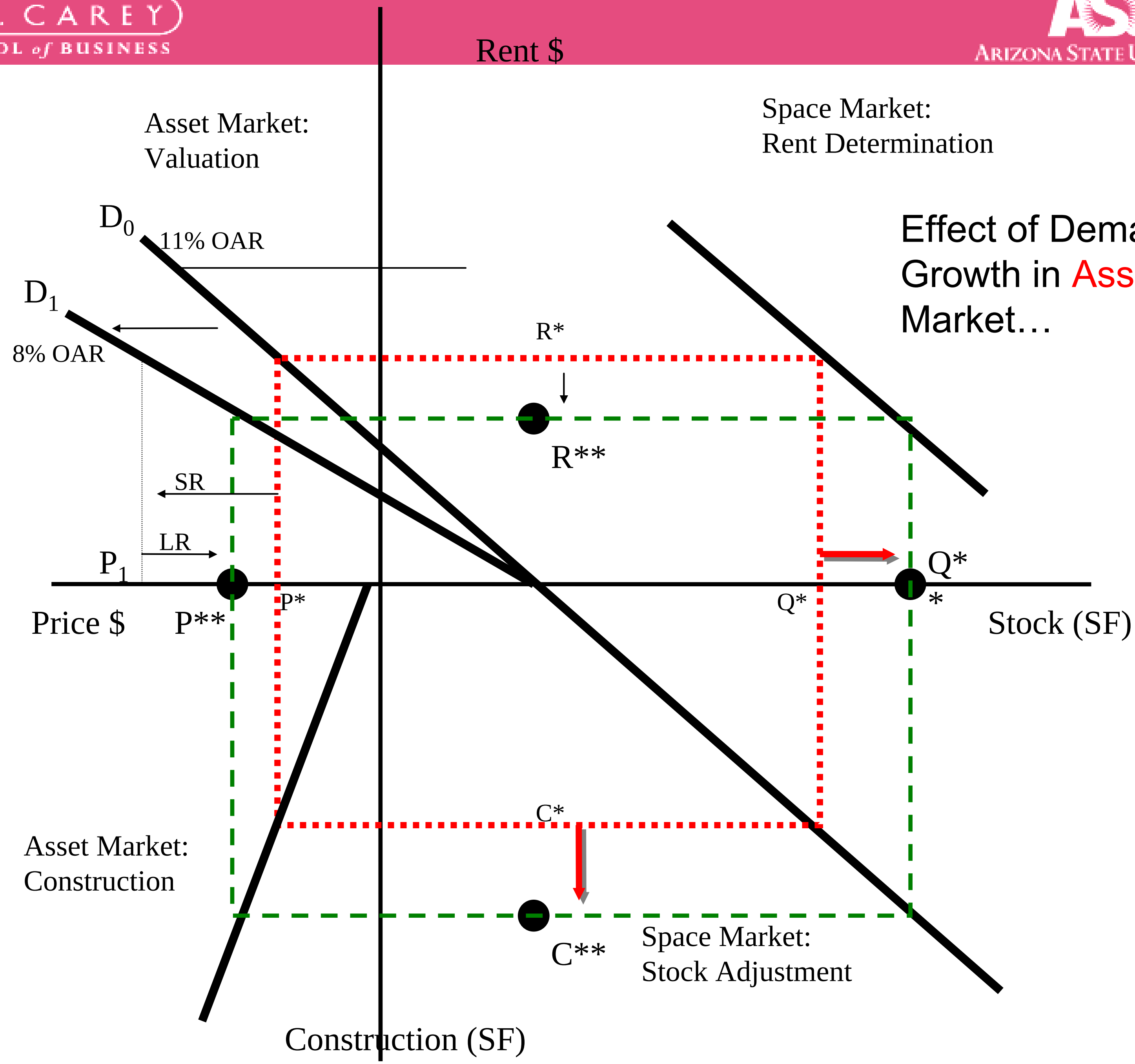
Doesn't form a rectangle.

Effect of Demand Growth in Space Market: **First phase…**



Effect of Demand Growth in Space Market: **LR Equilibrium…**

Effect of Demand Growth in Asset Market…



Does it matter what "real estate" is studied?

Securitized Real Estate (REITs) \ Direct Property Investment	Cold Market	Hot Market
Hot Market	Is Arbitrage Possible?	Markets are in Sync
Cold Market	Markets are in Sync	Is Arbitrage Possible?

Broader issue: What is the relationship between the capital market and the product market (direct property investment)?

Factors in Choosing a Real Estate Vehicle

- Control and Governance: Property decisions and alignment of interests
- Liquidity and Tranferability: Informal vs. central market system
- Management: Self vs. professional management, compensation
- Information: Access, availability, quantity, and quality,

Real Estate Equity Securities: An Overview

Levels of Securitization: Illiquid to Liquid

Characteristic	Direct	CREF	RELP	REIT
Investor Clientele	Wealthy & Institutional Investor	Institutional Investor	Small Investor-Public Wealthy Investor-Priv	Small Investor
Payout	Up to 100% distribution	No mandatory distribution requirement.	High payout ratio likely since partners pay tax regardless of whether income is distributed or not.	Mandatory; 90% of Taxable Income w/ higher distribution possible due to depreciation
Investment Restrictions	No restrictions	None; institutional grade but can develop properties if hold long term.	No restrictions	1) 75% of gross income from real estate 2) sale proceeds≤30% of REIT's income 3) can't operate a bus, develop, or trade pptys 4)5 pptys sold/yr
Asset Quality	All grades of property	Institutional grade properties	Mezzanine properties with some institutional grade and some speculative grade	Mezzanine properties with some institutional grade

Real Estate Equity Securities: An Overview

Levels of Securitization: Illiquid to Liquid

Characteristic	Direct Investment	RELP	CREF	REIT
Leverage	Depends on investor type: Institutional investor (low), REIT (moderate)	Moderate to High; Depends on orientation of partnership	Low; Usually will purchase pptys for all cash unless below market financing is available	Moderate; Depends on declaration of trust/ corporate charter
Size of Investment/ Divisibility	Large (≥ $100,000); Lumpy: All or None	$1,000 - $10,000/unit except in case of MLP	≥ $100,000 unit	Nominal e.g. $25/sh
Short Sales	Not allowed	Not allowed	Not allowed	Are allowed
Secondary Market/ Liquidity of Unit	None; Very Illiquid. Must have reasonable time on the market	Small & Inefficient; Illiquid except for "best" quality RELPs; 35% haircut typical; MLPs trade like REITs	None; Very Illiquid	NYSE, AMEX, OTC; Most liquid
Information	Scarce and imperfect; agent provide only enough information to "do the deal". Cash flows and prices aren't "public".	No rating service exists; information provided by company. No independent information gathering agency	Some rating services exist such as Stanger and Partnership Profiles but information is very expensive to obtain	Several rating services exist; More information on REITs relative to other forms of R.E.

Real Estate Equity Securities: An Overview

Levels of Securitization: Illiquid to Liquid

Characteristic	Direct Investment	RELP	CREF	REIT
Diversification Benefits	High; low correlations with financial assets	High; low correlations with financial assets and REITs. High correlation with CREF	High; low correlations with financial assets and REITs. High correlation with RELPs	Low to moderate; High correlations with financial assets and low correlation with less securitized real estate
Risk and Return	Similar risk-return to stock when transaction prices are used but lower risk if appraisals are used to calculate returns	Lower returns relative to stock	Similar or lower returns to stocks depending on time period but risk is lower even after adjusting for smoothing	Higher risk and returns relative to common stocks. Similar to midcap or small stocks
Investment management	Direct say; Alignment of shareholder and management interest	No say in how portfolio is managed, its composition or diversification strategies	Similar to RELP. Must trust sponsor	Similar to CREF. Must trust REIT advisor or REIT management if self administered.
Hedge against inflation	Perfect hedge against inflation in past but questionable going forward to extent overbuilding occurs	Moderate to high correlation with changes in CPI index (.81)	Hedge against expected inflation but not necessarily unanticipated inflation	Perverse inflation hedge like other common stocks but good predictor of inflation

What Are REITs?

- Operating companies which own and manage commercial real estate
- Chartered as a corporation or business trust
- Elective choice under tax code creates pass-through of income
- Revenue must primarily come from real estate investments
- Required to distribute at least 90 percent of their taxable income
- Taxation of income is passed through to shareholder level

What are the primary types of REITs?

Equity REITs

- Directly own, invest in or acquire, manage, or develop real property
- Derive revenue primarily from rental and lease payments
- Benefits from appreciation of its underlying real properties

Mortgage REITs

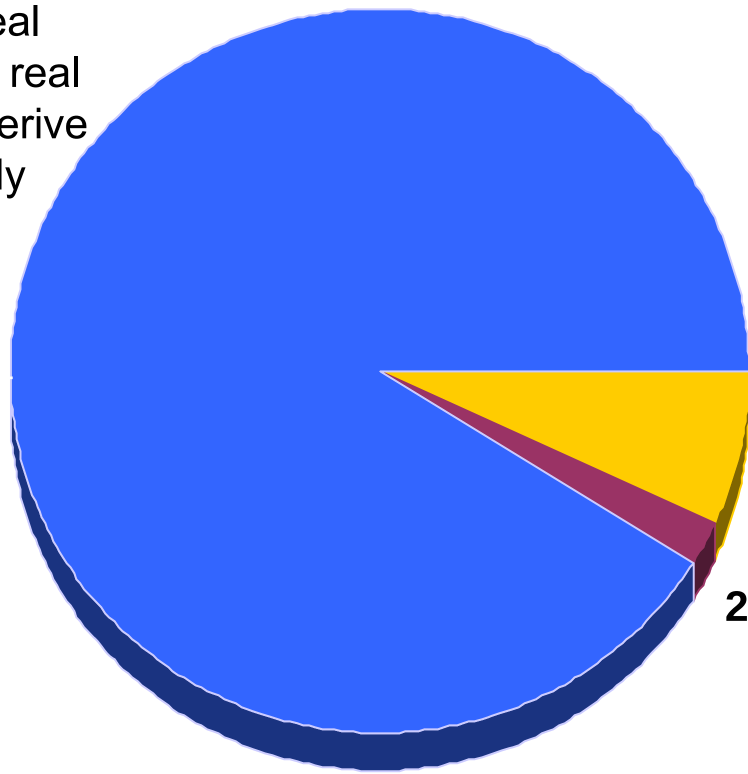
- Invests in mortgages, CMBS, CMOs and loans on real property assets
- Generates revenue from the interest earned on such financial instruments

Hybrid REITs: combination of equity and mortgage interests in properties

Types of REITs Today

91% EQUITY REITs
Provide equity capital for commercial real estate by owning real estate assets. Derive revenues primarily from rents.

7% MORTGAGE REITs
Provide debt capital for housing and commercial real estate by investing in mortgages and mortgage-backed securities. Derive revenues primarily from interest payments.



2% HYBRID REITs
Combine the investment strategies of both equity and mortgage REITs

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REITs in the S&P Indexes: Big, Medium, & Small

REIT	Ticker	Entrance Date	REIT	Ticker	Entrance Date
S&P 500 Index			**S&P 600 Small Cap Index**		
AIMCO	AIV	3/13/2003	Acadia Realty Trust	AKR	5/25/2005
Archstone-Smith	ASN	12/17/2004	Colonial Properties Trust	CLP	10/1/2001
Boston Properties	BXP	3/31/2006	EastGroup Properties	EGP	5/27/2005
Equity Office Properties Trust	EOP	10/1/2001	Entertainment Properties Trust	EPR	6/3/2004
Equity Residential	EQR	11/1/2001	Essex Property Trust	ESS	4/24/2002
Kimco Realty Corporation	KIM	4/3/2006	Inland Real Estate Corporation	IRC	10/2/2006
Plum Creek Timber	PCL	1/16/2002	Kilroy Realty Corporation	KRC	10/1/2001
ProLogis	PLD	7/16/2003	Lexington Corporate Properties Trust	LXP	9/4/2003
Public Storage	PSA	8/18/2005	LTC Properties	LTC	2/14/2006
Simon Property Group	SPG	6/25/2002	Mid-America Apartment Communities	MAA	8/22/2006
Vornado Realty Trust	VNO	8/11/2005	New Century Financial Corporation	NEW	*
S&P 400 Mid Cap Index			Parkway Properties	PKY	10/29/2004
AMB Property Corporation	AMB	1/27/2003	PS Business Parks	PSB	7/27/2006
Developers Diversified Realty Corp.	DDR	9/30/2004	Senior Housing Propeties Trust	SNH	8/22/2006
Highwoods Properties	HIW	10/7/2003	Sovran Self Storage	SSS	7/8/2004
Hospitality Properties Trust	HPT	10/1/2001			
Liberty Property Trust	LRY	12/11/2002			
The Macerich Company	MAC	7/1/2005			
Mack-Cali Realty Corporation	CLI	3/19/2003			
New Plan	NXL	10/1/2001			
Rayonier	RYN	*			
Regency Centers	REG	4/25/2005			
United Dominion Realty Trust	UDR	1/27/2003			
Weingarten Realty Investors	WRI	11/10/2004			
* Prior to REIT Status					

(as of October 2, 2006)

Low Securitization Levels Highlight Growth Potential

- Despite this rapid growth, less than 8% of all commercial real estate is held in securitized form

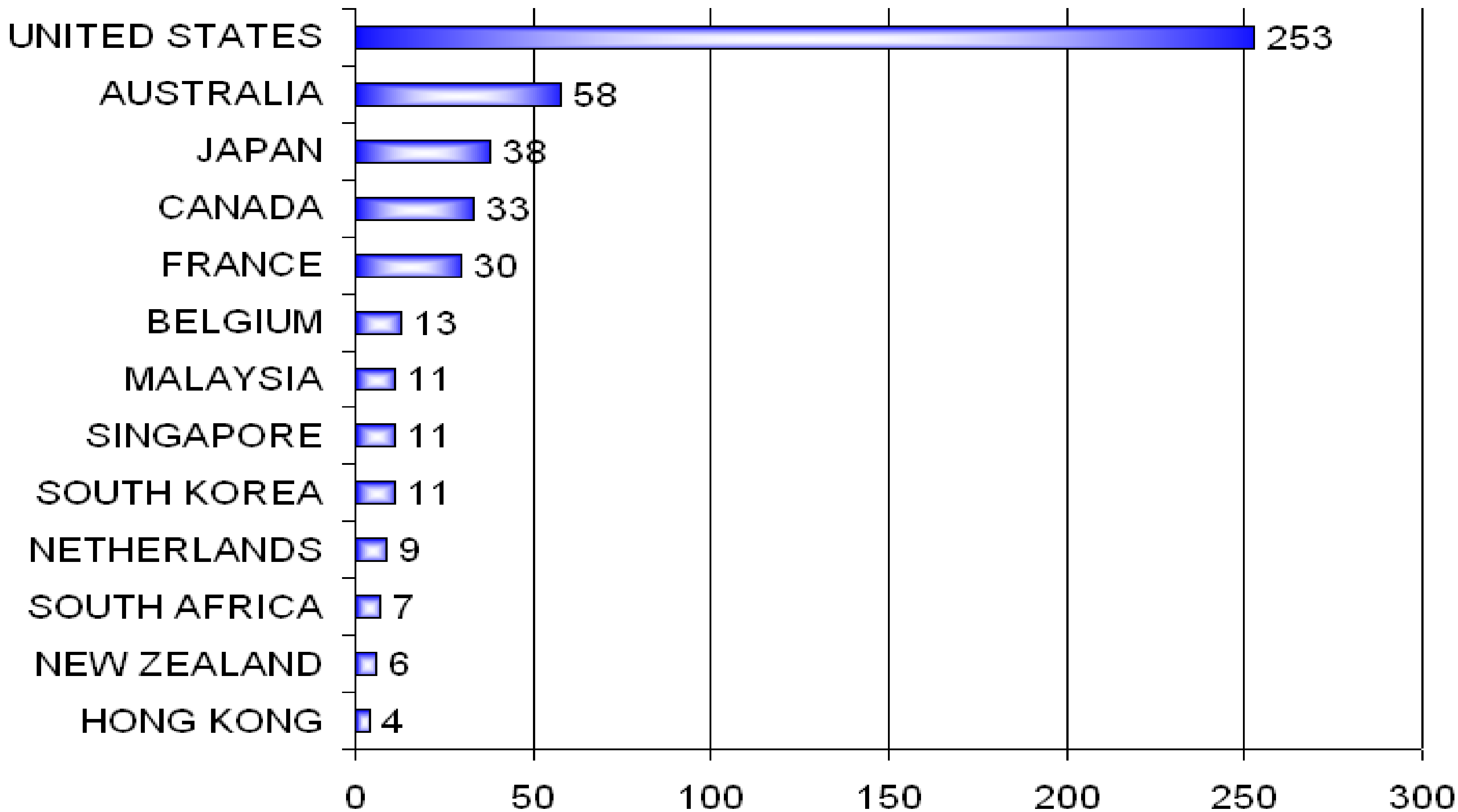
- Securitization levels vary widely by country and region, ranging from zero in some emerging markets to over 45% in mature economies such as Australia

Public Listed Real Estate An Important Component of Investment Market[2]

Rank	Country	Total Real Estate ($Bn)	Public Listed Real Estate ($Bn)	% Securitized[1]	Public RE as % of All Stocks
1	United States	4,944.5	257.4	9.5%	1.7%
2	Japan	1,934.7	55.2	5.2%	1.5%
3	Germany	1,084.9	4.3	0.7%	0.4%
4	United Kingdom	807.7	53.0	10.9%	1.9%
5	France	793.9	21.9	4.6%	1.4%
6	Italy	663.4	3.0	0.8%	0.4%
7	Canada	390.1	14.0	6.5%	1.3%
8	Spain	378.6	6.7	2.9%	1.1%
9	China	240.5	NA	NA	0.0%
10	South Korea	233.5	NA	NA	0.0%
11	Netherlands	230.9	16.3	11.8%	2.5%
12	Australia	227.5	62.3	45.6%	7.3%
13	Mexico	189.2	0.1	0.1%	0.0%
14	Switzerland	144.0	4.7	5.4%	0.6%
15	Belgium	136.2	4.7	5.8%	1.3%
	WORLD	**14,113.2**	**613.3**	**7.6%**	**1.7%**

As of June 2005

Total REITs by Country



Source: Ernst & Young, Global REIT Report 2006

The U.S. REIT Industry in 2006

- Over $475 billion of commercial real estate owned
  - 15-20 percent of investment-grade commercial real estate
  - More than 24,000 properties nationwide
  - All major property sectors
  - All major geographic regions
- $424 billion equity market capitalization
- 188 publicly traded REITs in NAREIT index
- 161 companies trade on the NYSE

The REIT Industry in 2006

Data provided by Institutional Shareholder Services (ISS) show that real estate had one of the best average corporate governance rankings of any U.S. Industry as of April 20, 2006, as measured by ISS' Corporate Governance Quotient (CGQ) database

Industry Group	Average Index CGQ
Utilities	69.0
Real Estate	**61.0**
Pharmaceuticals & Biotechnology	54.0
Banks	53.0
Materials	52.9
Average	**50.5**

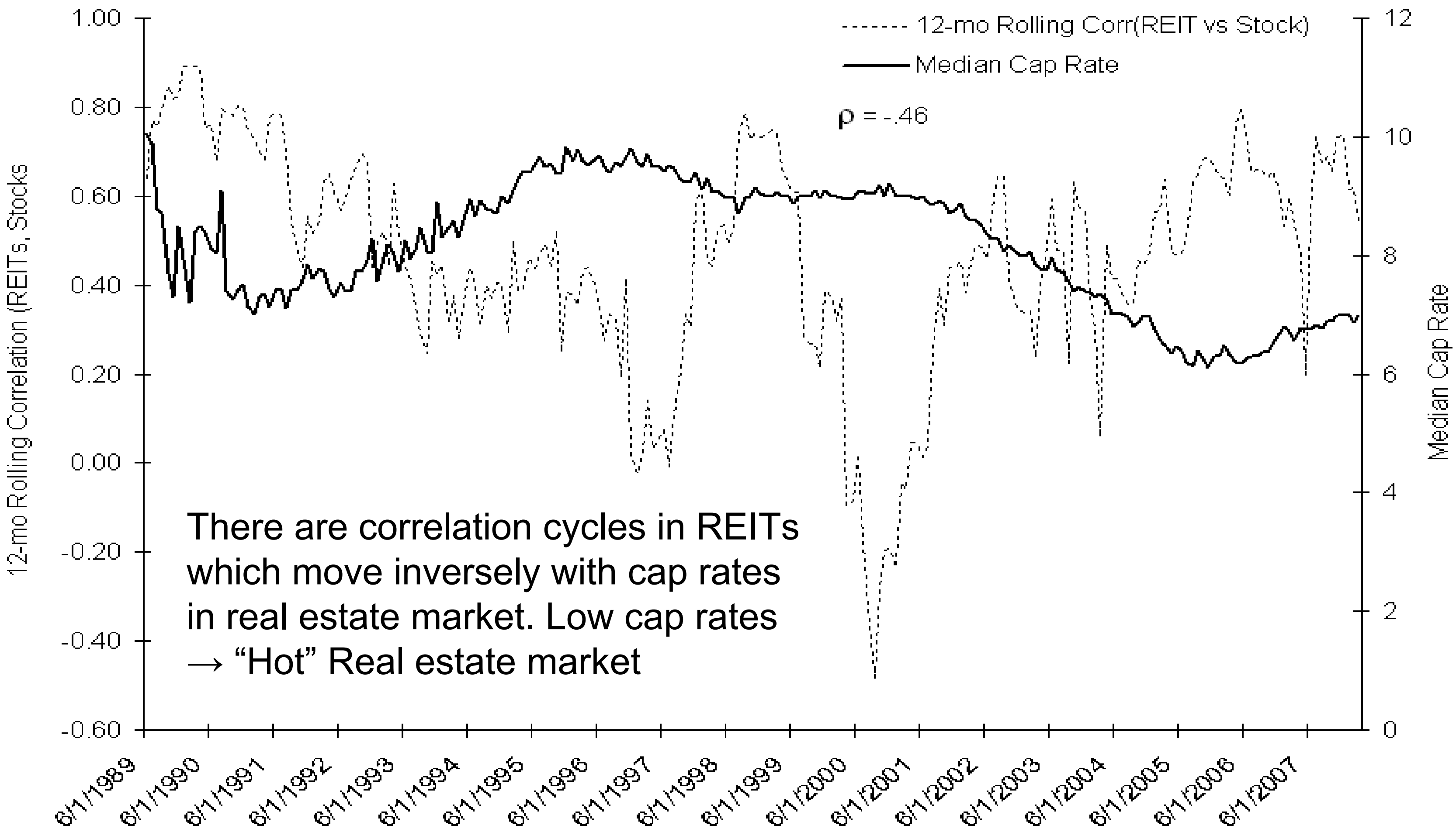
How to Qualify as a REIT

To qualify as a REIT, an entity must meet a number of organizational, operational, distribution, and compliance requirements such as:

- Ownership tests: 5-50 and 100
- Income tests: 75% and 95%
- Asset tests: 75%, 10%, 5%, and 20%
- Dividend Distribution and Compliance: 90% and Form 1120-REIT

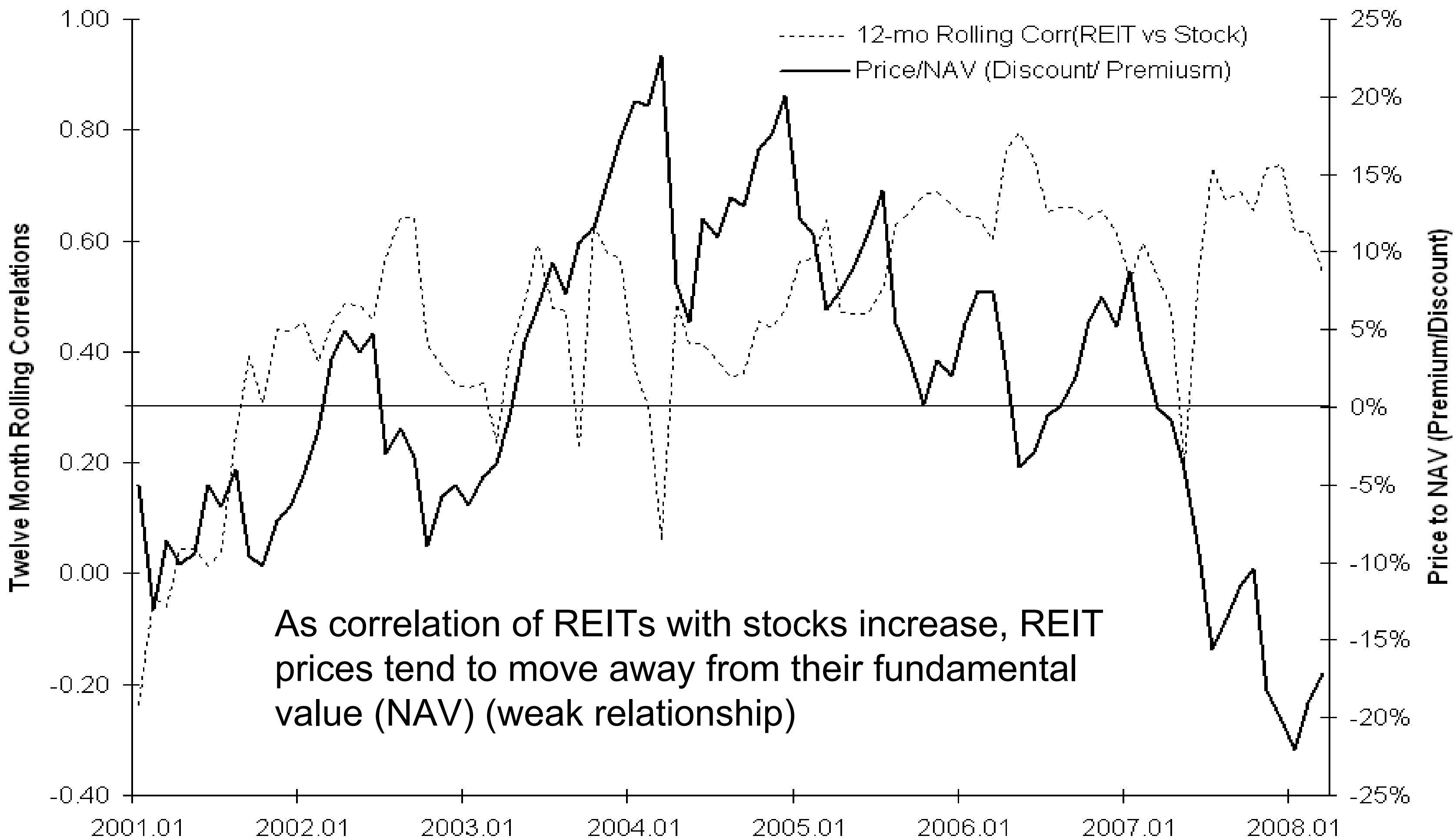
If the **REIT** satisfies these requirements, it can deduct any dividends paid from its taxable income (**Point**: pays no federal tax).

Hybrid Nature of REITs: Part Stock, Part Real Estate

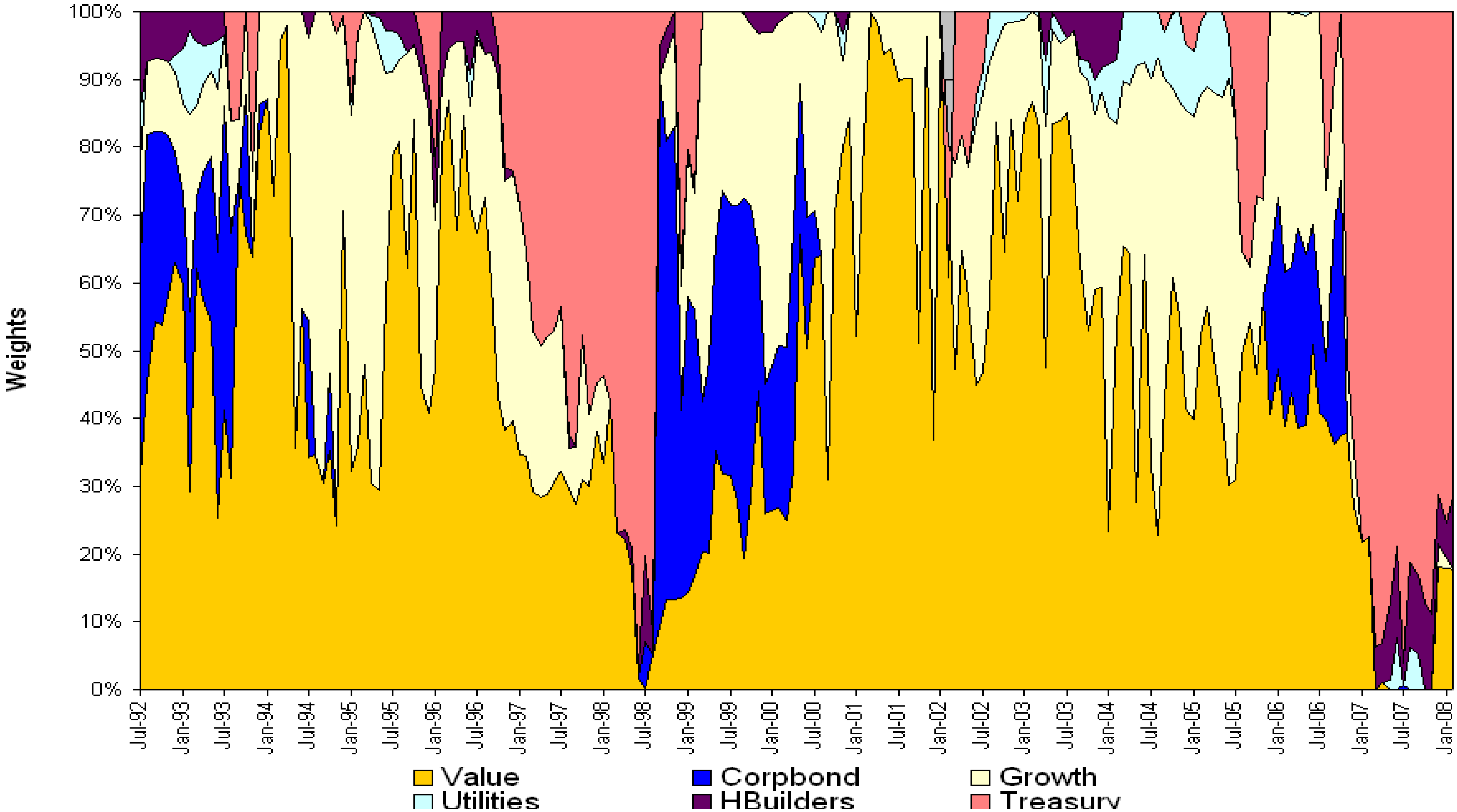


Source: NAREIT, CoStar

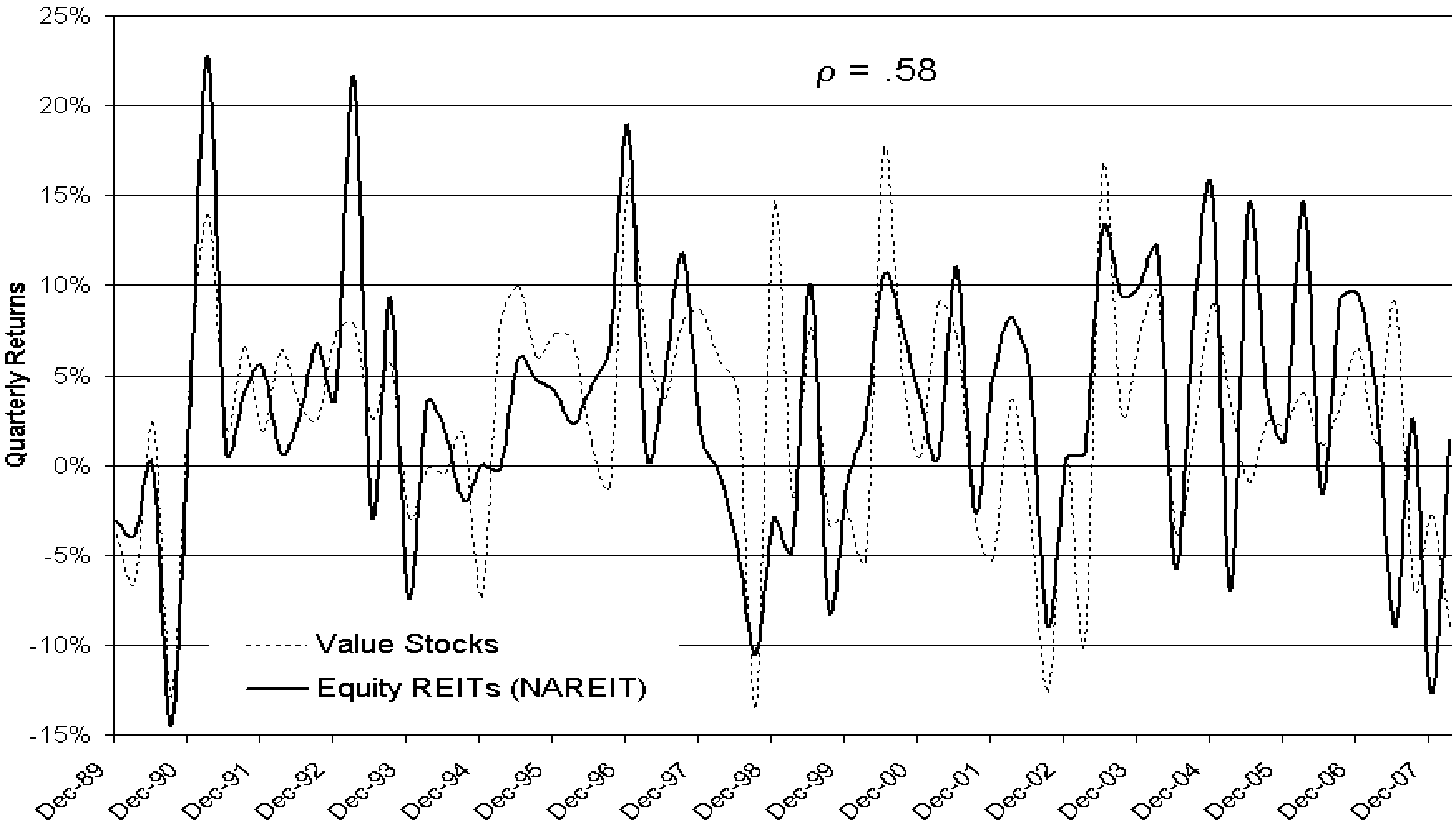
Another Perspective of REITs as a Hybrid Asset



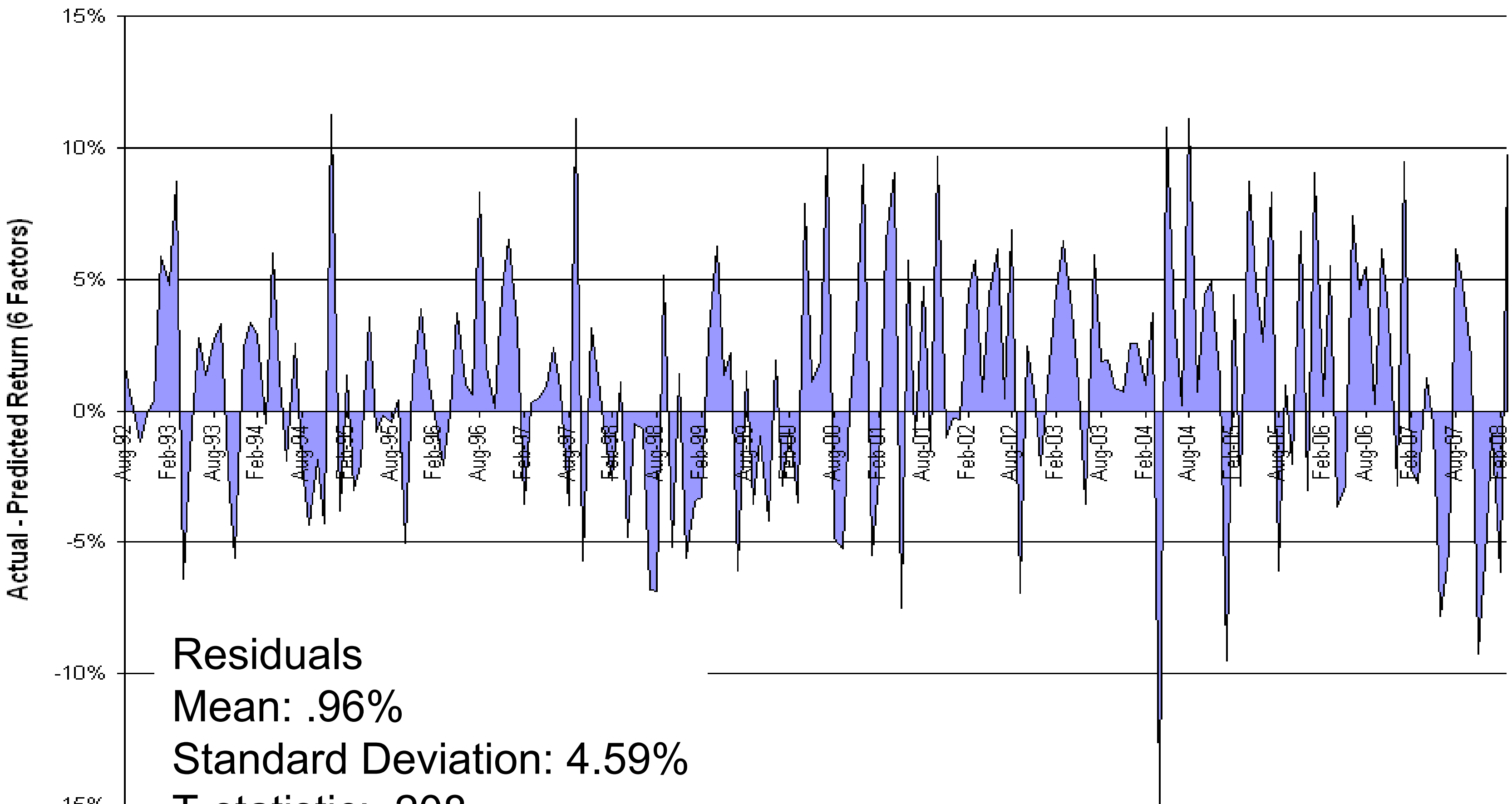
REIT Attribution Analysis: Income Producing Assets



Co-Movement of Equity REITs and Value Stocks



Does Investing in REITs “add” Value?



Residuals
Mean: .96%
Standard Deviation: 4.59%
T-statistic: .208

Moral of REIT Attribution Analysis

- REITs are primarily income plays
- REIT returns appear to exceed a portfolio of other income related assets in most time periods
- Even if we could replicate REITs using other income producing assets, there are transaction costs associated with monthly rebalancing

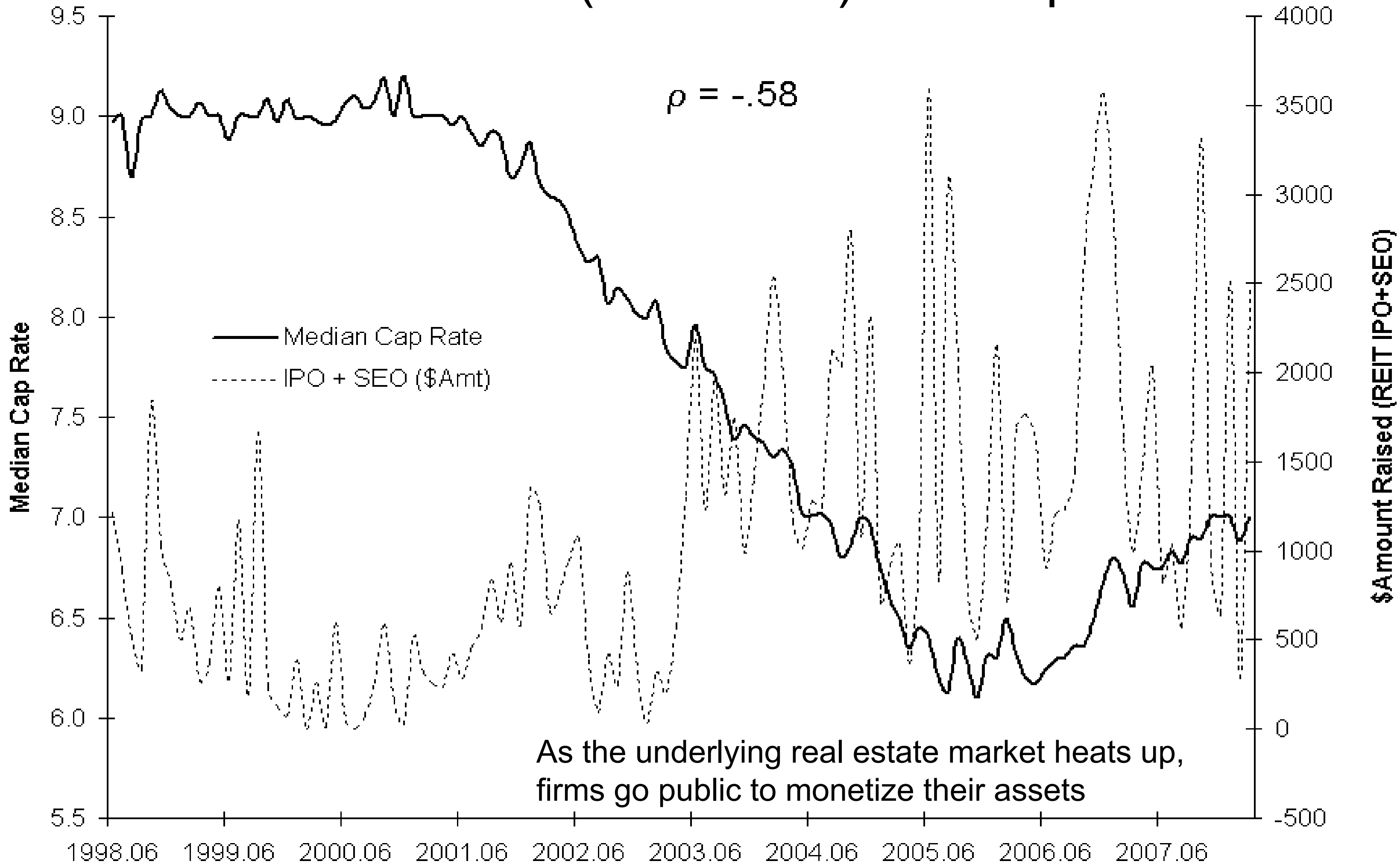
The Role of Corporate Governance in REIT IPOs

Differences in the governance structure of a firm at the time of its IPO influence:

- its initial market valuation,
- its initial level of institutional ownership, and
- its long-term operating performance.

Implication: at the time of the IPO, any negative valuation effects are borne by the firm and its insiders through a reduction in the offering's proceeds

Amount Raised (IPO+SEO) and Cap Rate



Sources: CoStar, NAREIT

Valuation Metric (Q)

Tobin's *Q* at the time of the IPO

$$Q_{IPO} = \frac{\text{Offer price} * \text{Shares outstanding} + \text{Total assets} - \text{Book equity}}{\text{Total assets}}$$

Two primary interpretations of *Q* exist in the corporate finance literature:

- measure of valuation (or performance), and as
- a proxy for growth opportunities.

Given the homogeneous nature of growth opportunities for REITs at a given point in time, we **assume Q is a valuation metric**.

Equity REIT IPO Valuation as a Function of Governance

Dep variable:	Q_{IPO}		Q_{IPO}		Q_{IPO}		Q_{DAY1}		Q_{DAY1}		Q_{DAY1}	
	(1)		(2)		(3)		(4)		(5)		(6)	
InsiderOwn	1.314	**			1.937	***	1.616	**			2.362	***
InsiderOwn^2	-1.800	*			-2.782	***	-2.403	**			-3.550	***
ExcessComp	-0.019	*			-0.013		-0.007				0.000	
	(-1.71)				(-1.12)		(-0.58)				(-0.02)	
VarPay	0.235	**			0.185	*	0.319	**			0.261	**
	(2.01)				(1.67)		(2.48)				(2.23)	
PctOutDir			0.153		0.115				0.037		0.075	
BoardSize			0.022		0.015				0.017		0.014	
Maryland			-0.154	***	-0.189	***			-0.216	***	-0.257	***
SelfAdmin	0.217	***	0.167	**	0.212	**	0.239	***	0.222	**	0.255	***
UPREIT	0.144	***	0.179	***	0.155	***	0.136	**	0.170	***	0.155	***
MktLev	-0.242	*	-0.097		-0.280	**	-0.243		-0.109		-0.281	**
MktCap	-0.00001		-0.00003		-0.00003		0.00004		0.00004		0.00001	
Constant	1.112	***	0.955	***	0.905	***	1.053	***	1.023	***	0.872	***
N	105		104		102		105		104		102	
Adj R^2	0.32		0.32		0.41		0.30		0.32		0.43	

One, two, and three asterisks denote significance at the 0.10, 0.05, and 0.01 levels, respectively

Long-run Operating Performance (3 Years) as a Function of Governance Variables

Dep variable:	Adjusted Return on BkEqty		Adjusted Return on Assets	
	(1)		(2)	
InsiderOwn	0.091	**	0.013	*
InsiderOwn^2	-0.188	**	-0.024	**
ExcessComp	0.0008		0.0003	*
VarPay	0.009	**	0.003	***
PctOutDir	0.006		0.003	
BoardSize	0.005	**	0.000	
Maryland	-0.010	**	-0.001	*
SelfAdmin	0.002		0.000	
UPREIT	0.006	**	0.001	*
MktLev	0.052	**	-0.011	***
MktCap	0.0000004		-0.0000013	*
Constant	-0.046	**	-0.006	**
N	1,196		1,213	
Adj R^2	0.08		0.09	

Both performance measures shown are adjusted by subtracting the median statistic for all seasoned REITs for that calendar quarter.

IPOs with less shareholder-friendly governance structures suffer from worse long-term (adjusted) operating performance

Impact of Corporate Governance

- REITs with stronger governance structures have higher average Tobin's Q
- REITs with stronger governance structures also outperform their peers in terms of abnormal *operating* performance (post IPO)

  Higher initial values and better post-IPO operating performance are associated with

  - lower management fees or compensation,
  - more variable or incentive-based compensation, and
  - greater insider ownership (up to a point)

  Negative valuation and operating performance for Maryland incorporation

Insider Trading as a Signal of Private Information

- Some REITs choose to reappraise themselves
- Appraisals contain information which is first revealed to insiders and later reported to the public
- Period during which only insiders are privy to appraised values

Insider Trading as a Signal of Private Information

- Appraisals are done at the discretion of REIT management vs. analysts NAV estimates which are made at the analysts' discretion
- Firms that view themselves as undervalued are more likely to choose to have themselves reappraised than overvalued firms
- Real estate appraisers are picked and remunerated by the REIT that they are revaluing (potential for bias)
- Real estate appraisers have a significant advantage since the firm supplies them with proprietary information on the properties being revalued + but they also bring with them proprietary information that other firms that they have valued have provided them in estimating the value of the properties

Timeline for the appraisal process

Advisor to the trust recommends to Board that REIT be reappraised

Board votes on recommendation for appraisal audit and starts in-house appraisal

An outside, independent MAI appraiser is hired to verify accuracy of in-house estimate

<u>Median: 3 months</u>

In-house and MAI appraisal of REIT is done. Board members can ask for in-house appraisals but can't access outside appraisal

Board members of firm receive both in-house and MAI value estimate. If the in-house estimate is within 10% of appraiser's estimate, appraiser issues a letter certifying the REIT values. Otherwise management must change their estimate of portfolio value

<u>Median: 68 trading days</u>

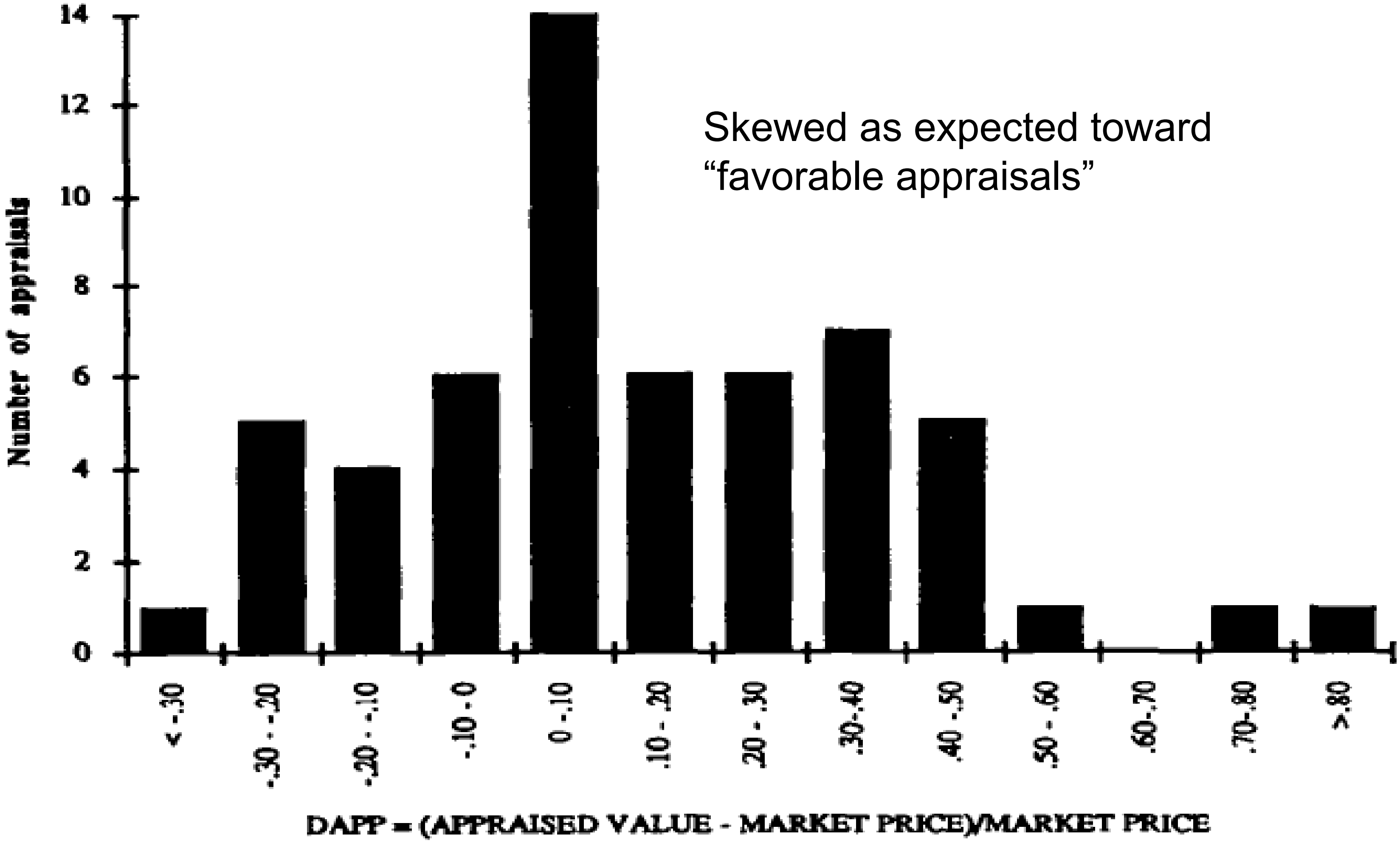
Insiders have appraised values but general public doesn't

Earnings report containing REIT reappraisal is released to public

<u>Median: 38 trading days</u>

Audit Realty collects and releases appraised values

Difference between appraised value and market price



Skewed as expected toward "favorable appraisals"

Abnormal returns after real estate appraisals cumulated abnormal returns (1982-1989)

	Positive appraisals			Negative appraisals		
Time period (Period returns	Mean (%)	SE(%)	T-stat	Mean (%)	SE(%)	T-stat
Appraisal month	0.7961	1.393	0.57	-1.3333	0.587	-2.36 *
End of appraisal month to 11 days before earnings report	1.5645	1.607	0.97	-2.8455	2.776	-1.03
10 days before earnings report to 10 days after	2.4855	1.19	2.09 **	-0.0814	1.146	-0.07
11 days after earnings report to 11 days before audit report	1.4139	1.345	1.05	-1.6247	2.419	-0.67
10 days before audit report to 10 days after report	1.9486	1.218	1.60	0.3034	1.293	0.23
Return breakdown						
Before earnings report	2.7619	3.283	0.84	-4.7199	2.251	-2.10 **
After earnings report	5.4467	2.433	2.24 **	-0.8616	2.588	-0.33
Sample-bias adj CAR						
Appraisal month	1.1019	0.702	1.57	-2.7625	0.771	-3.58 **
Earnings report (-10 to +10)	1.2507	0.715	1.75	-0.0516	0.718	-0.07
Secondary report (-10 to +10)	1.0624	0.984	1.08	-0.8544	0.712	-1.20

No impact if corrected for sample bias

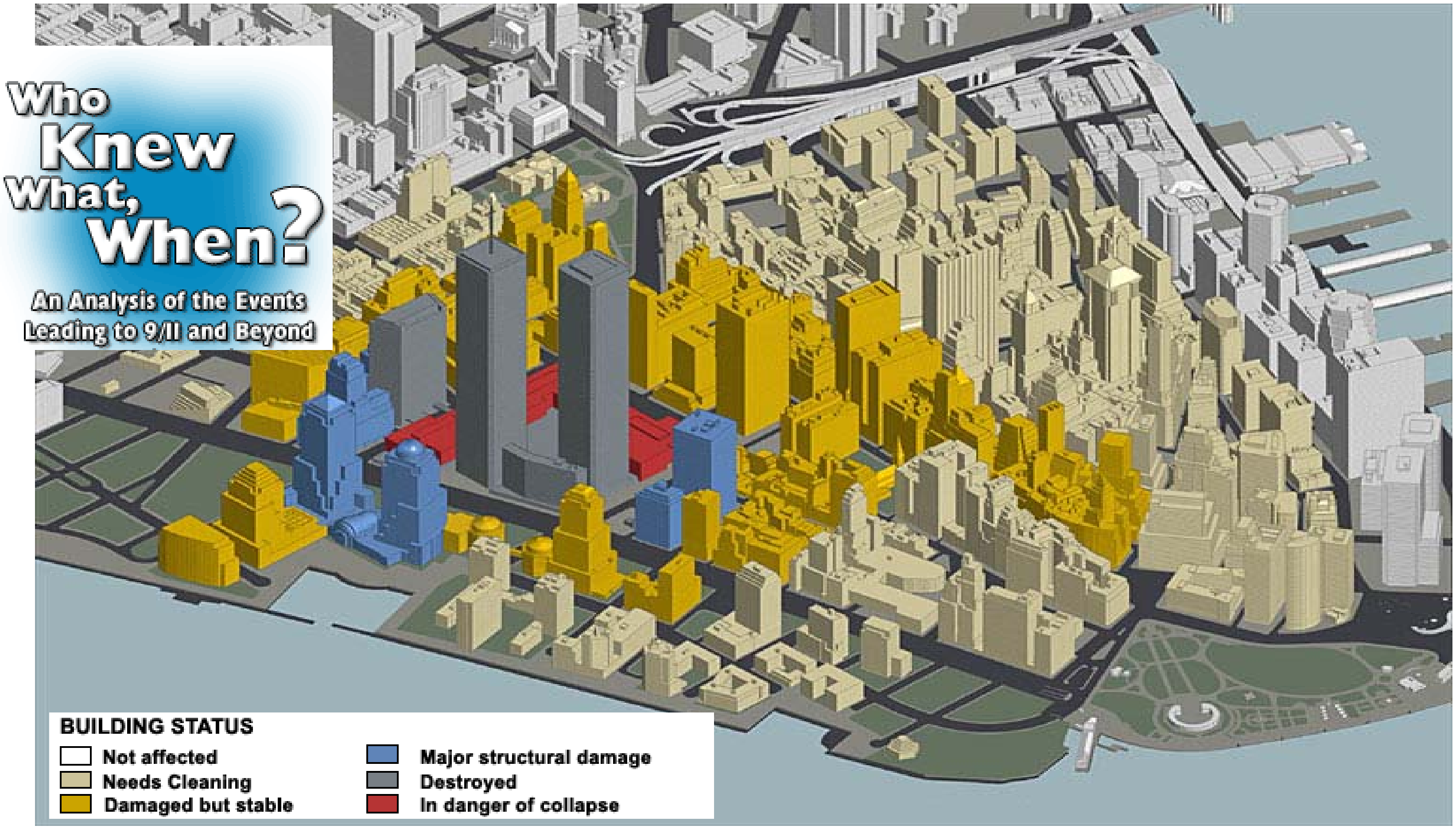
Do appraisals matter?

Differences in price behavior do exist in response to favorable and unfavorable appraisals.

- Unfavorable appraisals are followed by significant negative abnormal returns in the appraisal month

- The most significant abnormal returns with favorable reports seem to be earned in the period surrounding the earnings announcement and in the following period. When the correction for sample bias is made, the cumulated returns are not significantly different from zero

Updating Expectations: An Analysis of Post-9/11 Returns

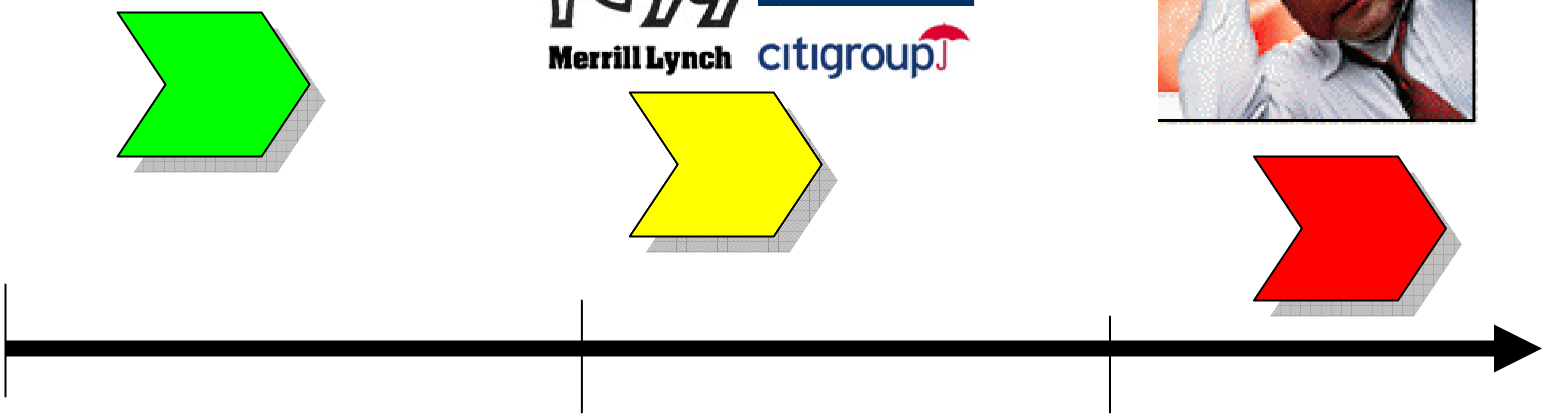


Focus: How Expectations are Revised after 9/11

Analysts

Goldman Sachs
Morgan Stanley
JPMorganChase
Merrill Lynch
citigroup

Investors



Hypothesis: Insiders react faster than analysts who in turn act more quickly than the general class of investors.

Distinguishing Features of Study

- **Ambiguous ST and LT impact** of 9/11 on NYC office market
  - Supply reduction effect **(+)**: reduce supply → drive ***up*** value of remaining NYC office properties
  - Recessionary shock effect **(-)**: teetering economy prior to 9/11 → plunge NYC into deep recession → drive ***down*** property values

Damage to NYC Office Real Estate: Downtown

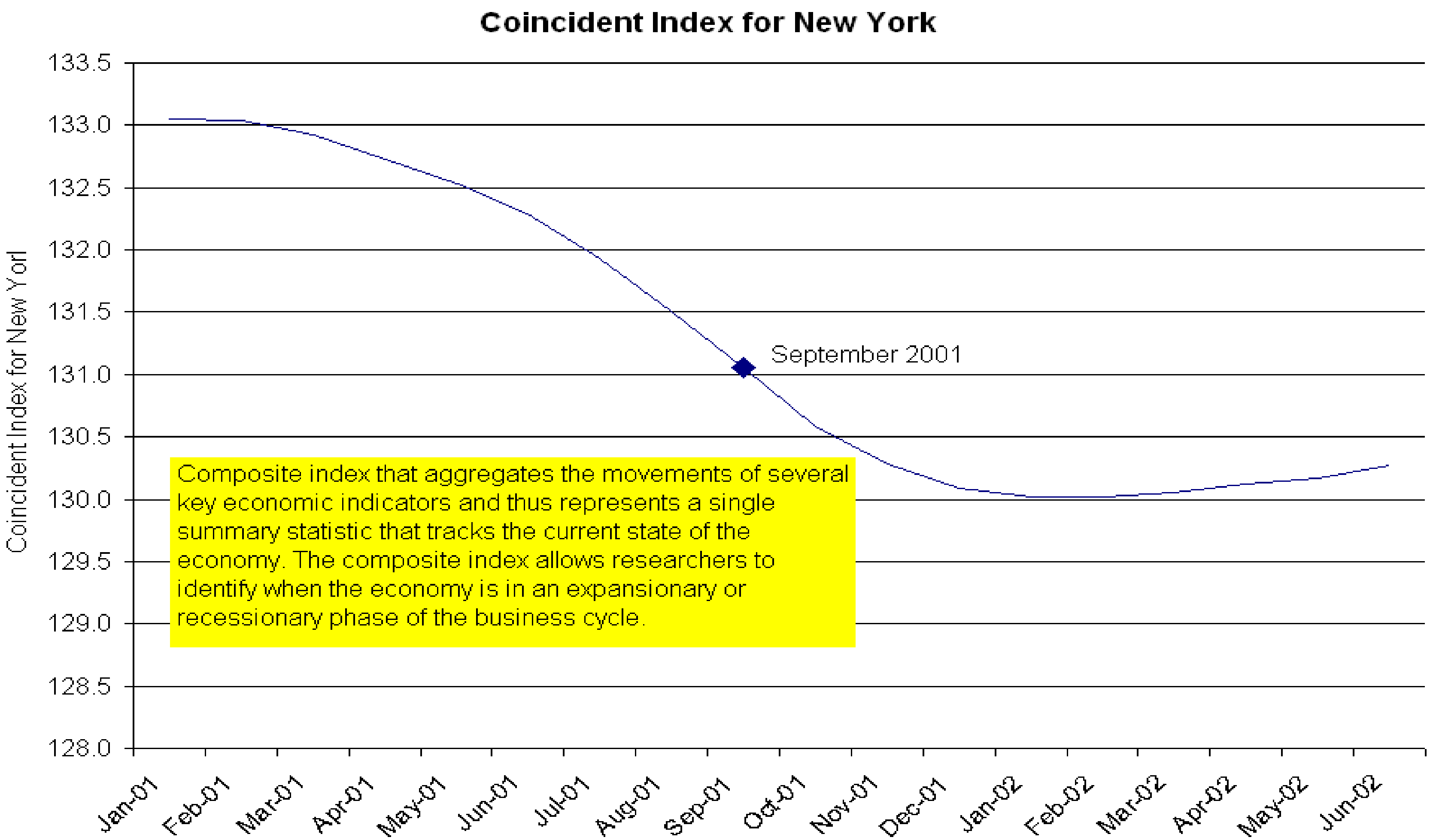
The numbers on square feet

• Destroyed:	13.4 million
• Damaged and remained close:	12.1 million
• Damaged but could reopen:	5.6 million
	31.1 million

NYC is the largest office market in U.S. with 9% of the total office space

At time of attack, NYC office vacancy = 3%.

NY Economy Prior to 9/11



Other Distinguishing Features of Study

- Experiment is **free from ST "behavioral" effects**: longest ever period of market closure (Tuesday, 9/11 to Monday, 9/17)

- Allows a comparison of **real asset market vs. financial market** performance of office **REITs with vs. without** some **NYC exposure**

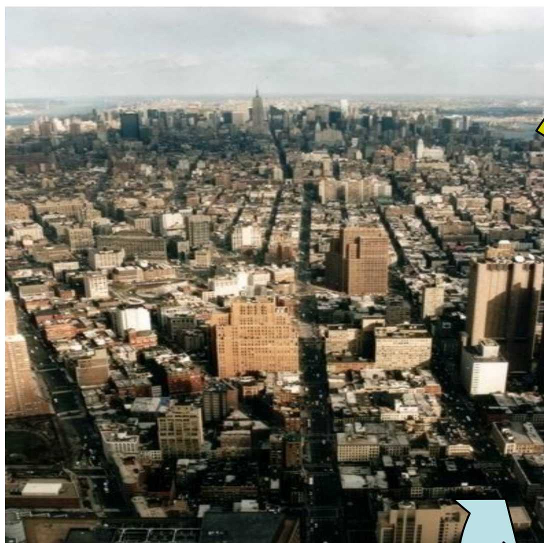


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Table 1: Sample REITs

I. Office REITs with some NY Metro Exposure

Name of REIT	Ticker	PctNYMetro
SL Green Realty Corp.	SLG	100.0%
Reckson Associates Realty Corporation	RA	93.5%
Mack-Cali Realty Corporation	CLI	61.7%
Vornado Realty Trust	VNO	43.3%
Forest City Enterprises, Inc.	FCEA	38.5%
Brookfield Properties Corporation	BPO	36.6%
HRPT Properties Trust	HRP	32.3%
Boston Properties, Inc.	BXP	18.4%
TrizecHahn Corporation	TZH	17.2%
Lexington Corporate Properties Trust	LXP	8.5%
Equity Office Properties Trust	EOP	5.1%
Glenborough Realty Trust Incorporated	GLB	4.6%
Corporate Office Properties Trust	OFC	3.2%
Brandywine Realty Trust	BDN	1.7%

II. Office REITs with no NY Metro Exposure

Name of REIT	Ticker	PctNYMetro
Alexandria Real Estate Equities, Inc.	ARE	0.0%
AmeriVest Properties Inc.	AMV	0.0%
Arden Realty Inc.	ARI	0.0%
Bedford Property Investors, Inc.	BED	0.0%
CarrAmerica Realty Corporation	CRE	0.0%
Crescent Real Estate Equities Company	CEI	0.0%
Duke Realty Corporation	DRE	0.0%
Great Lakes REIT	GL	0.0%
Highwoods Properties, Inc.	HIW	0.0%
Kilroy Realty Corporation	KRC	0.0%
Koger Equity, Inc.	KE	0.0%
Mission West Properties, Inc.	MSW	0.0%
Parkway Properties, Inc.	PKY	0.0%
Prentiss Properties Trust	PP	0.0%
Prime Group Realty Trust	PGE	0.0%

Close of the market on Monday September 10 to the open and close on Monday, September 17

Office REITS: NYC vs No NYC Exposure

	Close to Open	Close to Close
I. Average Price Change		
Average Price Change of Office REITs with Some NY Metro Exposure	1.998%	0.39%
Average Price Change of Office REITs with No NY Metro Exposure	-2.075%	-3.366%
t Stat	2.647*	3.337*
P(T<=t) one-tail	0.007	0.001
t Critical one-tail	1.708	1.708
P(T<=t) two-tail	0.014	0.003
t Critical two-tail	2.060	2.060

NYC Office REITS vs DJIA 30 Stocks

	Close to Open	Close to Close
I. Average Price Change		
Average Price Change of Office REITs with Some NY Metro Exposure	1.998%	0.39%
Average Price Change of 30 Stocks in Dow Jones Industrial Average	-6.798%	-8.119%
t Stat	4.095*	3.667*
P(T<=t) one-tail	0.000	0.000
t Critical one-tail	1.684	1.684
P(T<=t) two-tail	0.000	0.000
t Critical two-tail	2.021	2.021

Price Change for Office REITs vs. NYC Office Space

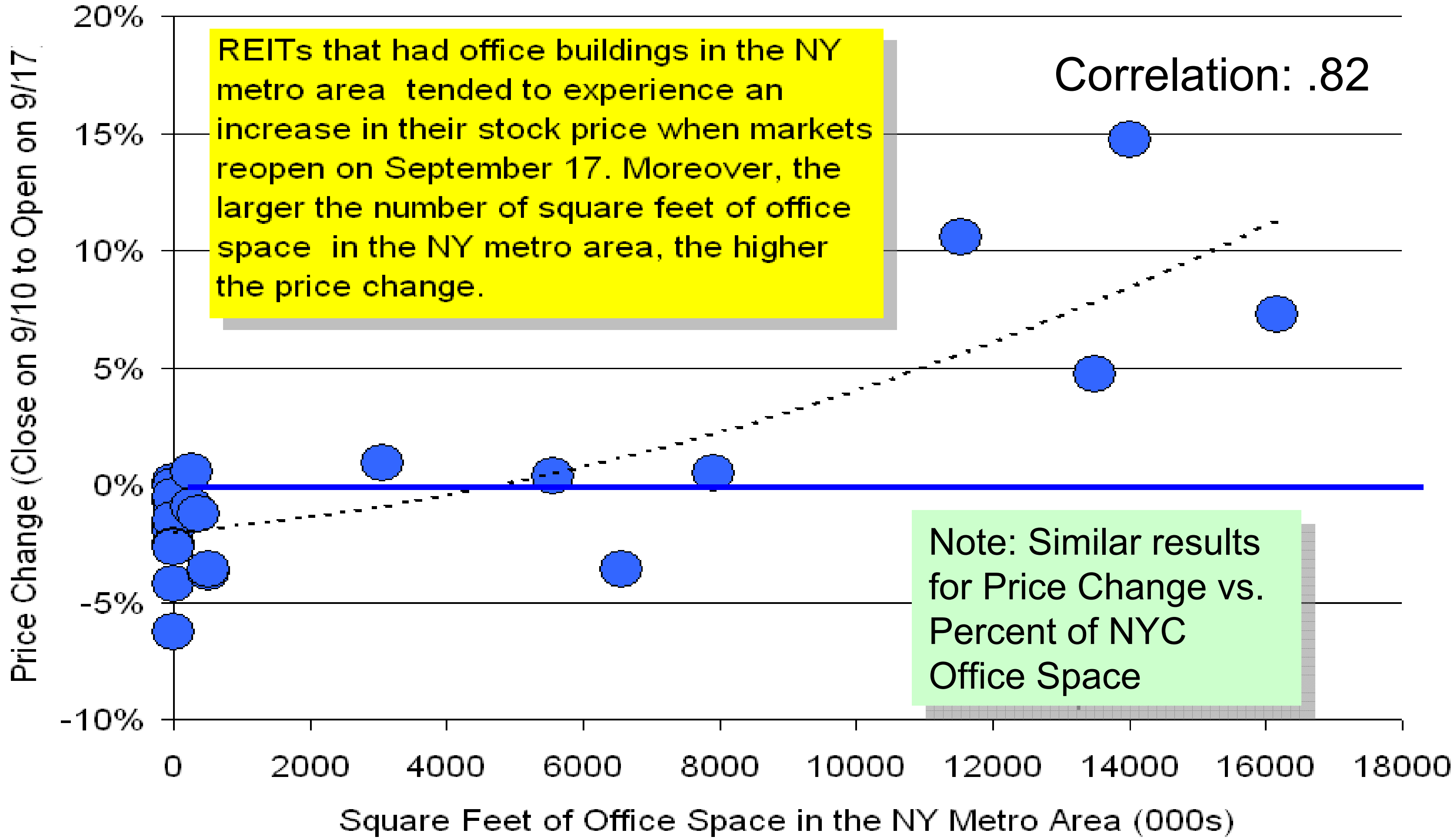


Table 4: Market Reaction Tests (***Stock market behavior***)

	Cross-sectional Average			
	Actual Return on 9/17 (Avg)	Predicted Return on 9/17 (CAPM)	Difference (Actual - Predicted)	Pct of REITs with sqft in NYMetro
All Office REITs	-0.017	-0.034	0.017	44%
(***9/10 Close to 9/17 Close***) Office REITs with positive (+) return on 9/17	0.03	-0.034	0.064	71%
(***9/10 Close to 9/17 Close***) Office REITs with negative (-) return on 9/17	-0.033	-0.033	0	35%
(***9/10 Close to 9/17 Close***) REITs with some NYMetro exposure	0.004	-0.037	0.041	100%
(***9/10 Close to 9/17 Close***) REITs with No NYMetro exposure	-0.034	-0.031	-0.003 ≈0	0%
(***9/10 Close to 9/17 Open***) Office REITs with positive (+) return on 9/17	0.047	-0.037	0.084	88%
(***9/10 Close to 9/17 Open***) Office REITs with negative (-) return on 9/17	-0.023	-0.032	0.009 ≈0	26%

Positive relative performance in ***financial markets*** over period of market closure

Behavior in Stock Market: Summary

Stock market behavior is consistent with ***Supply Reduction hypothesis***

REIT equity markets anticipated that:

- the supply reduction effect would dominate the recessionary shock effect
- Prices of REITs with NY exposure would move significantly higher than REITs without NY exposure

Table 5a: Real asset behavior: Returns using NAV and cap rates

	Cross-sectional Average	Cross-sectional Avg	Cross-sectional Avg	
	NAVs: National R.E. Index (Actual Transaction Prices)	NAVs: ACLI (Actual Cap Rates)	NAVs: Korpacz(PWC) (Expected Cap Rates)	
	Actual Return - Predicted Return	Actual Return - Predicted Return	Actual Return - Predicted Return	Pct of REITs with sqft in NYMetro
All Office REITs	-0.048**	-0.013	-.034*	44%
(***9/10 Close to 9/17 Close***) Office REITs with positive (+) return on 9/17	-0.024	0.014	-0.026	71%
(***9/10 Close to 9/17 Close***) Office REITs with negative (-) return on 9/17	-.057**	-0.022	-0.037	35%
(***9/10 Close to 9/17 Close***) REITs with some NYMetro exposure	-.033**	0.004	-.030**	100%
(***9/10 Close to 9/17 Close***) REITs with No NYMetro exposure	-.060*	-0.026	-0.038	0%
(***9/10 Close to 9/17 Open***) Office REITs with positive (+) return on 9/17	-.029*	0.009	-.036**	88%
(***9/10 Close to 9/17 Open***) Office REITs with negative (-) return on 9/17	-.056**	-0.022	-0.034	26%

Real abnormal return ≤ 0 in ***real asset market*** vs. positive relative performance in ***financial markets*** over period of market closure (see prior slide)

Behavior in Real Asset Market: Summary

Real asset market behavior is consistent with ***Recessionary Shock hypothesis***

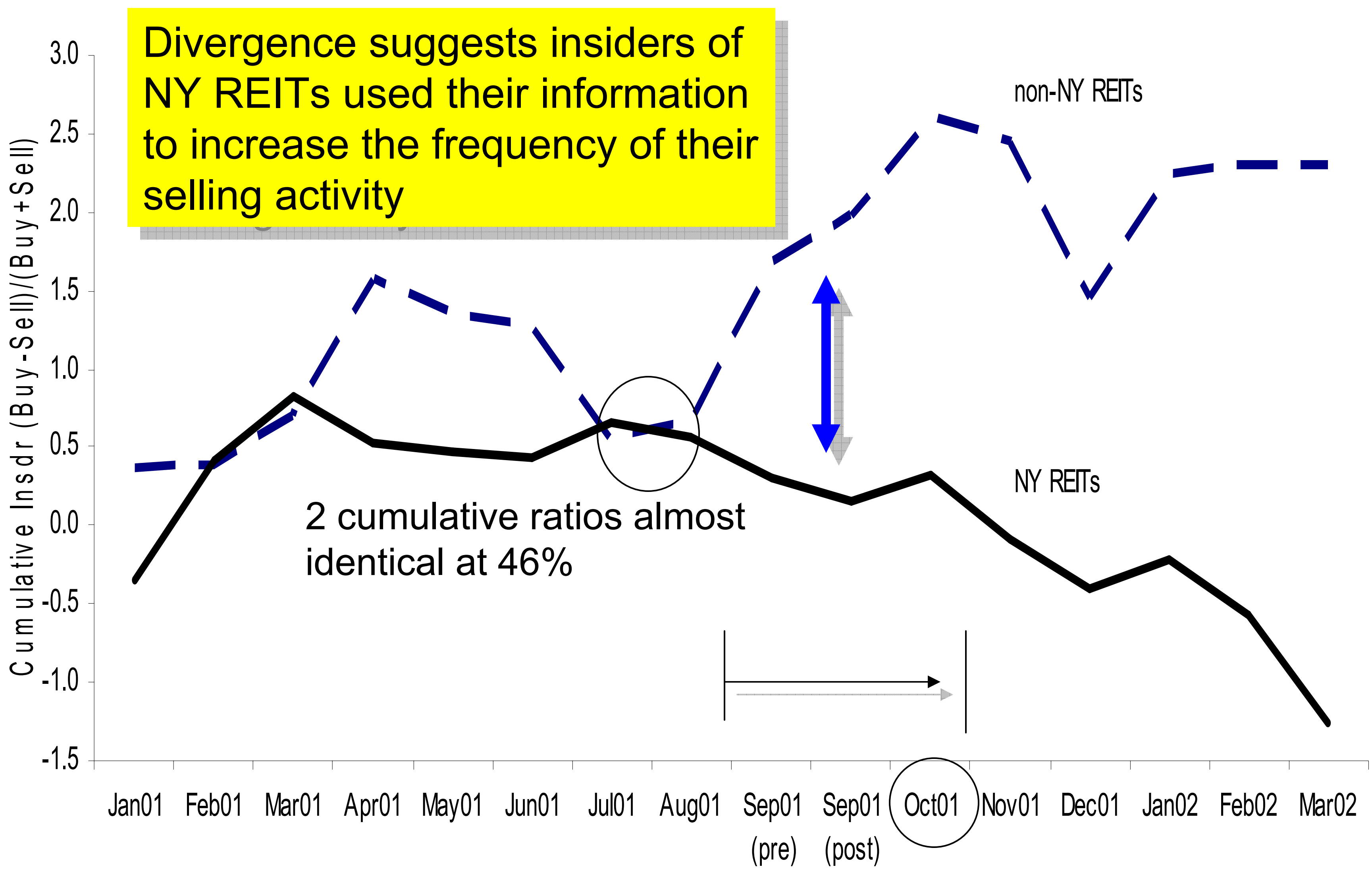
- NY properties significantly underperformed or had similar performance to similar office properties in the U.S. over 3 month horizon following the attack

Analyzing Adjustments to Real Market Conditions

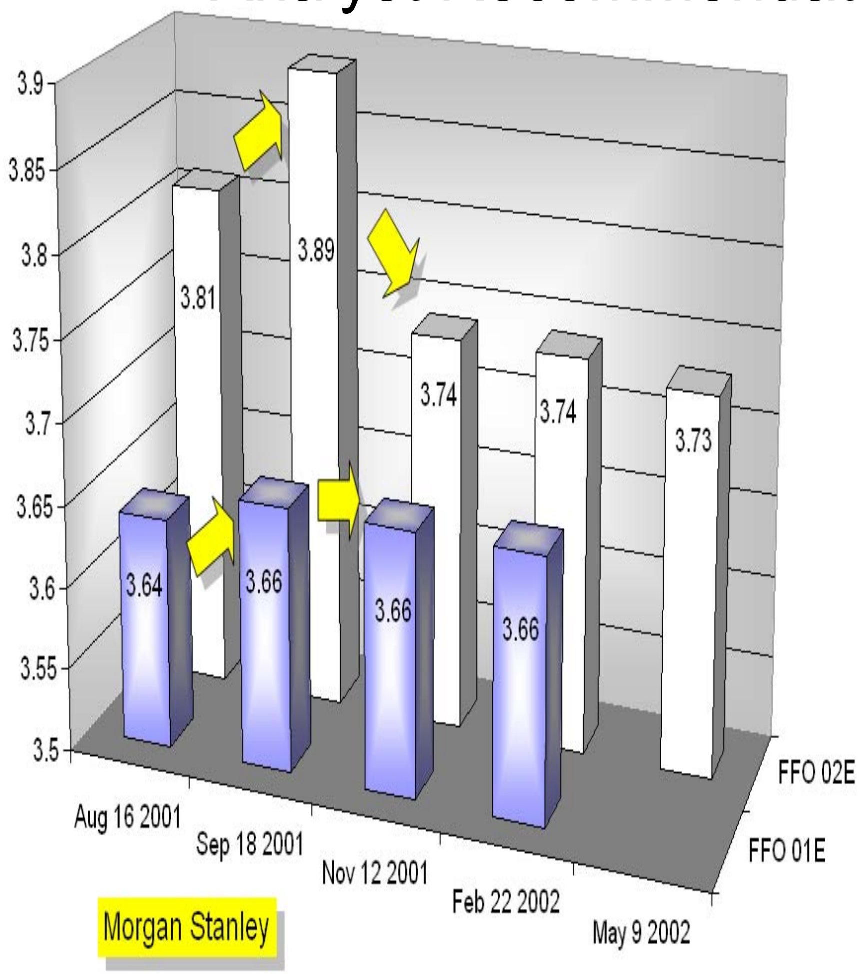
Question: How quickly did each group of market participants – insiders, analysts, REIT equity investors – adjust to real market conditions?

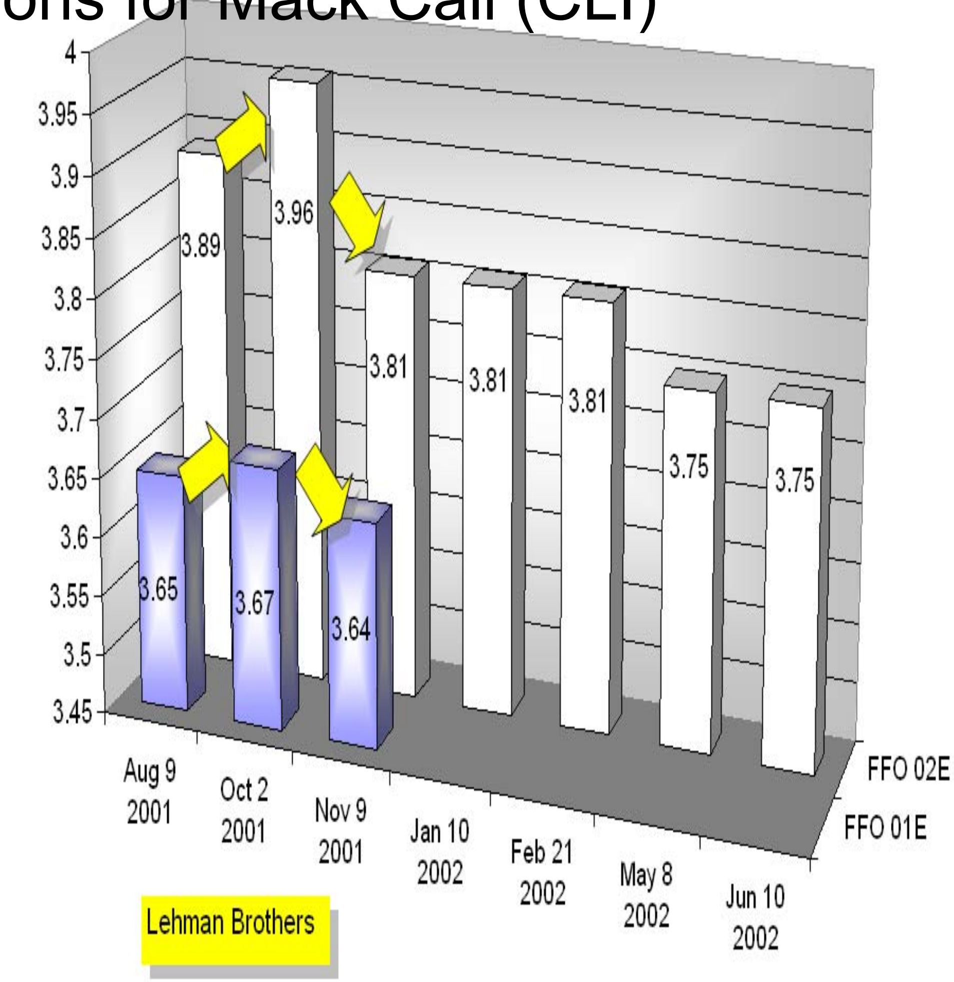
- **Insider Beliefs**: relative levels of selling and buying of NY REITs
- **Analysts' Beliefs**: Analyst recommendations on NY REITs
- **Aggregate Market's Belief**: Measure stock price performance relative to a REIT index benchmark

Insider Trading: NY REITs versus Non-NY REITs



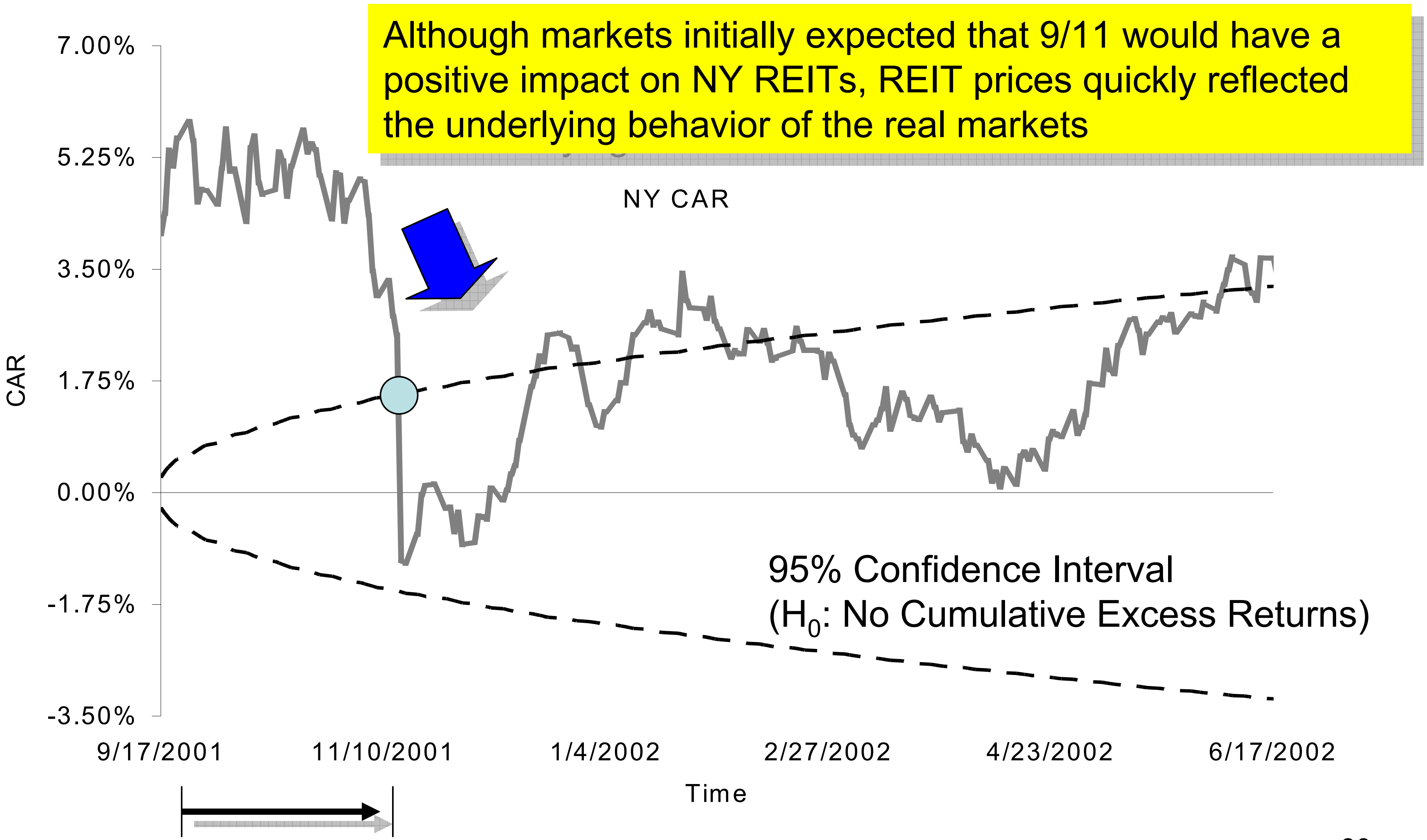
Analyst Recommendations for Mack Cali (CLI)





Analysts revised expectations in early November

Cumulative abnormal returns for NY REITs



Summary and Conclusions

- Evidence of a dichotomy between financial and real markets' assessment of 9/11 impact on NY REIT valuations
- Consistent with notions of market efficiency:
  - Insiders were the first to lower their expectations consistently with the real market
  - Analysts were almost as quick to adjust their recommendations
  - Lastly, REIT stock prices adjusted to reflect underlying real market behavior; abnormal REIT returns disappear by end of 11/2001

Real Estate Limited Partnerships

- Mechanism for individual investors to pool their resources to participate in real estate
- Represents direct investment in businesses and are not publicly traded
- Not rated by a rating agency nor followed by Wall Street analysts.
- General partner (GP) organizes and assumes responsibility for running the partnership.
- Most public partnerships require a minimum investment of $1,000 to $5,000 and they are actively marketed to “small” investors.
- Typically, partnership is structured as a blind pool wherein the general partner (the sponsor) has not bought any assets until the offering is completely sold

Real Estate Limited Partnerships

- RELPs are particularly susceptible to the agent (GP/sponsor) choosing suboptimal actions from the principal's (limited partners) perspective.
- Market participants in the initial offerings are almost always small individual investors, while institutions dominate the secondary market.
- Secondary market trading in these RELPs is done at substantial discounts (an average of 45%) to appraised value.

Limited Partnerships and Reputation Formation

Focus: Optimal quality decision of a producer in a multi-period setting with reputation effects.

Question: Do producers in RELP market invest in reputation building by initially selling high quality goods and then lowering quality?

Motivation: Many interesting financial problems involve asymmetries of information

Ackerlof's "lemons" paradigm: seller has superior information about the quality → goods sold are of lower than average quality → market failure

What if it's a repeat game? tension between incentives to exploit informational asymmetries vs value of establishing a quality reputation

What We Test

Test 1: test whether producers choose to initially build a reputation for quality and then produce lower quality goods in subsequent periods.

> Implication: should observe a decreasing trend in the returns on the sequence of offerings of a given sponsor.

Test 2: test for mixing strategies, where the producer alternatively selects quality from either a high or a low quality regime.

> Implication: should be able to identify two statistically different distributions of the producer's observed quality.

RELP Market: An Ideal Setting

- Almost all empirical studies on the links between reputation and quality are based on inferences gained from experimental settings

- RELPs are more amenable to testing the theoretical predictions of quality/ reputation models

  – RELPs in our study are "blind pools so sponsor has flexibility in setting quality level of partnership.

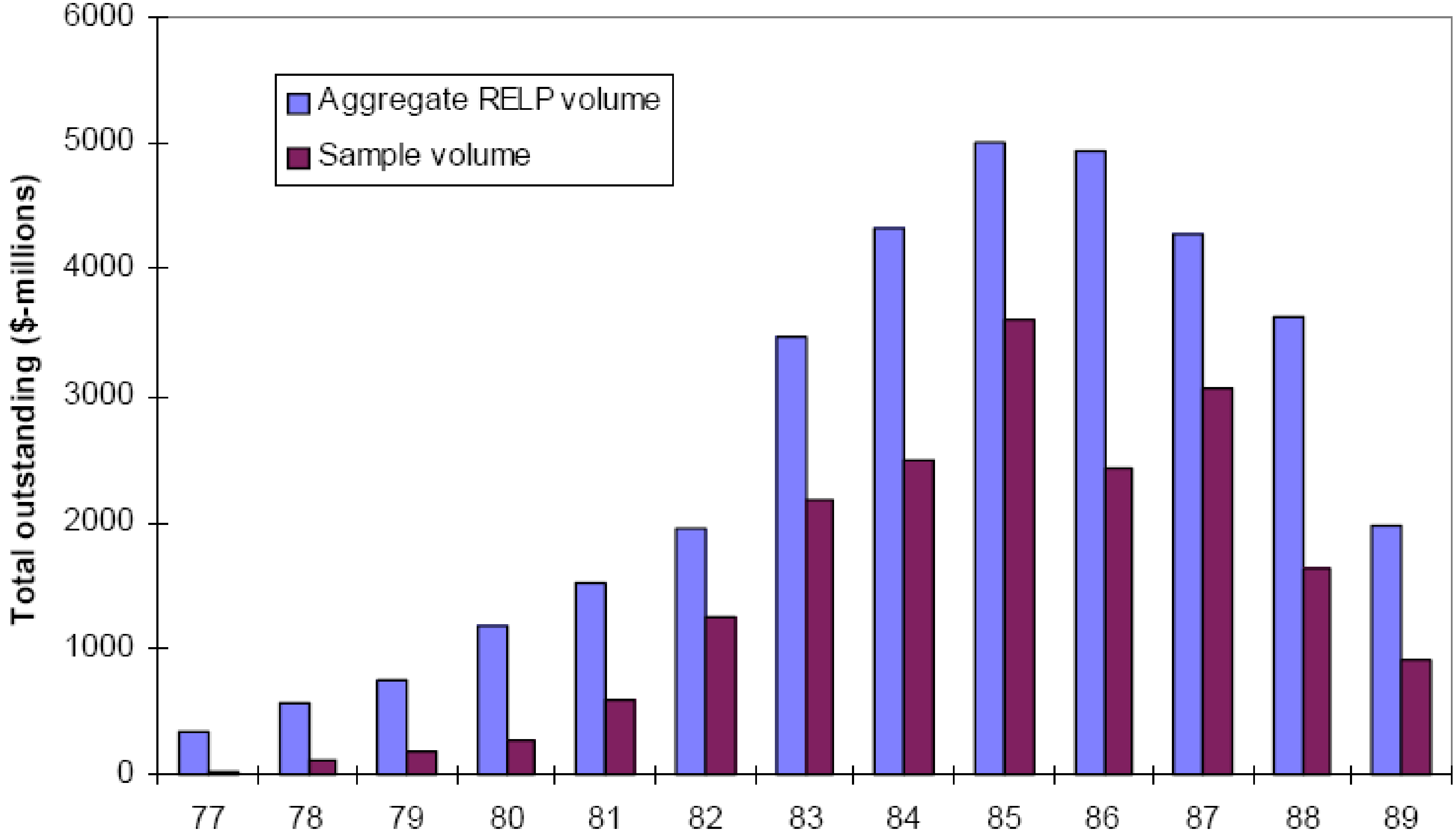
  – over time, as cash flows from the properties are realized, the quality of the sponsor (and RELP) is gradually revealed, albeit with some noise.

What We Discover

- Average quality decreases with each successive partnership issued by a given sponsor (consistent with theoretical predictions of reputation building)

- Some producers engage in mixing strategies, producing high quality in some periods and low quality in others.

Total Real Estate Limited Partnership (RELP) Volume



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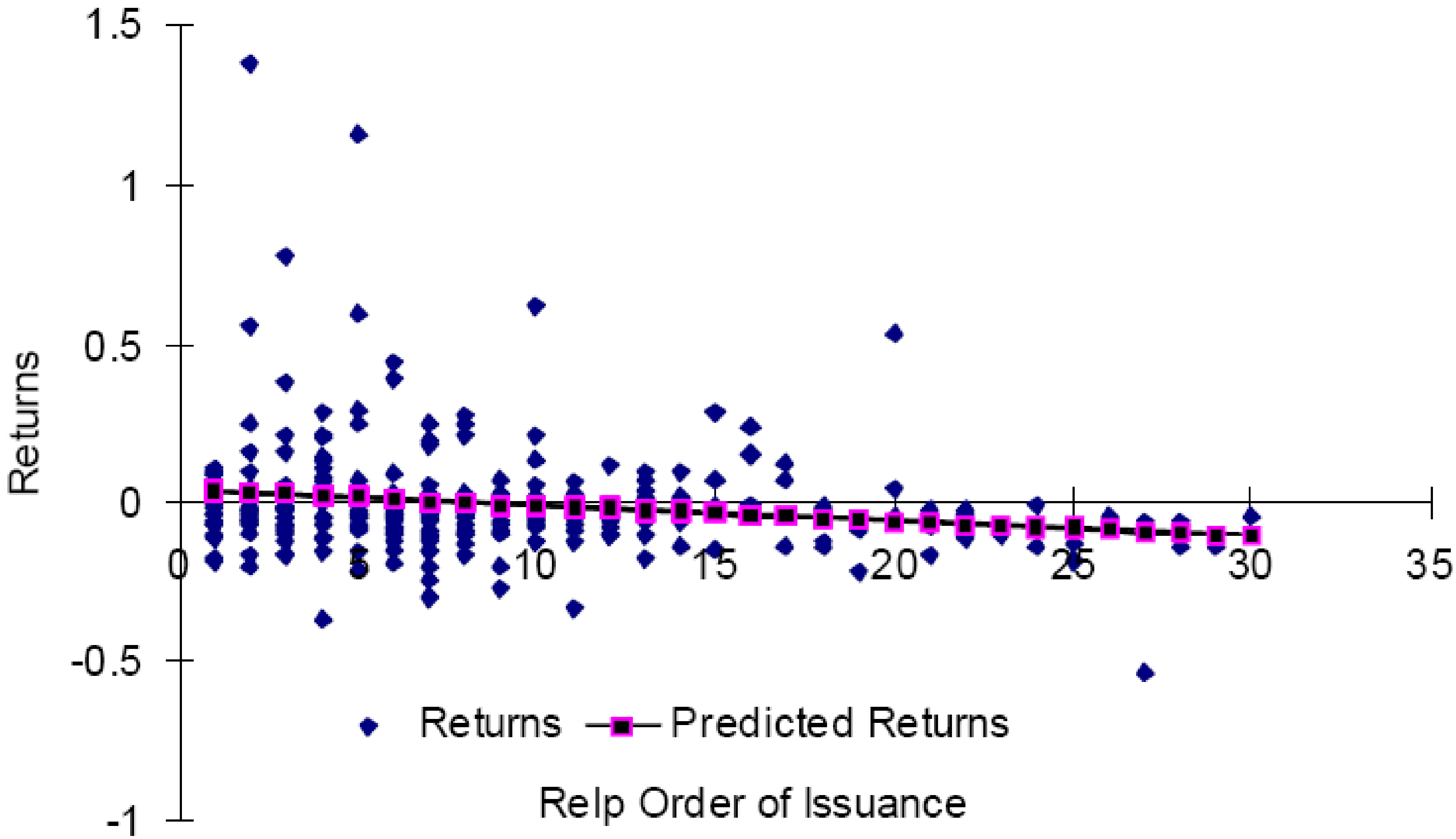
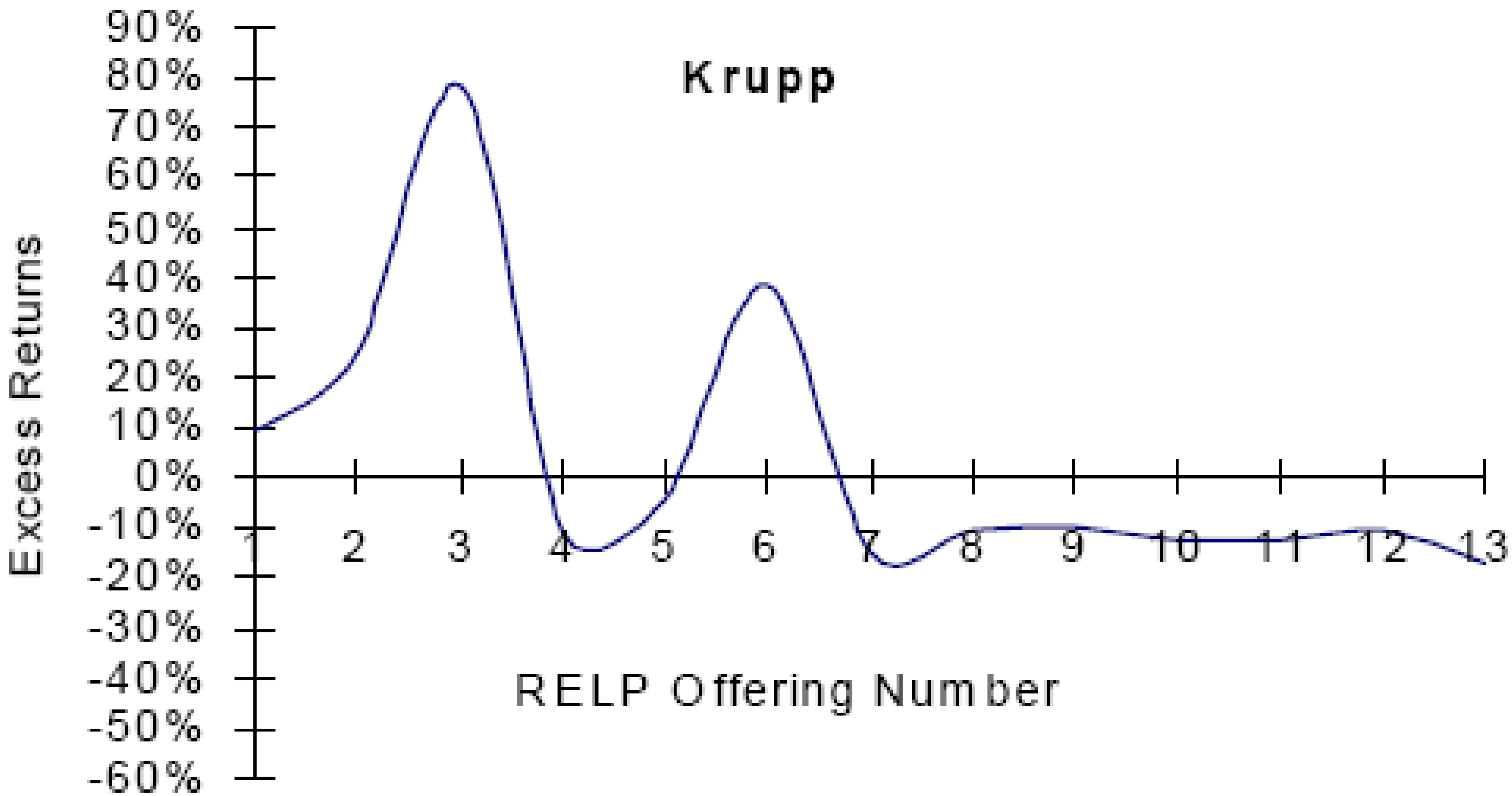
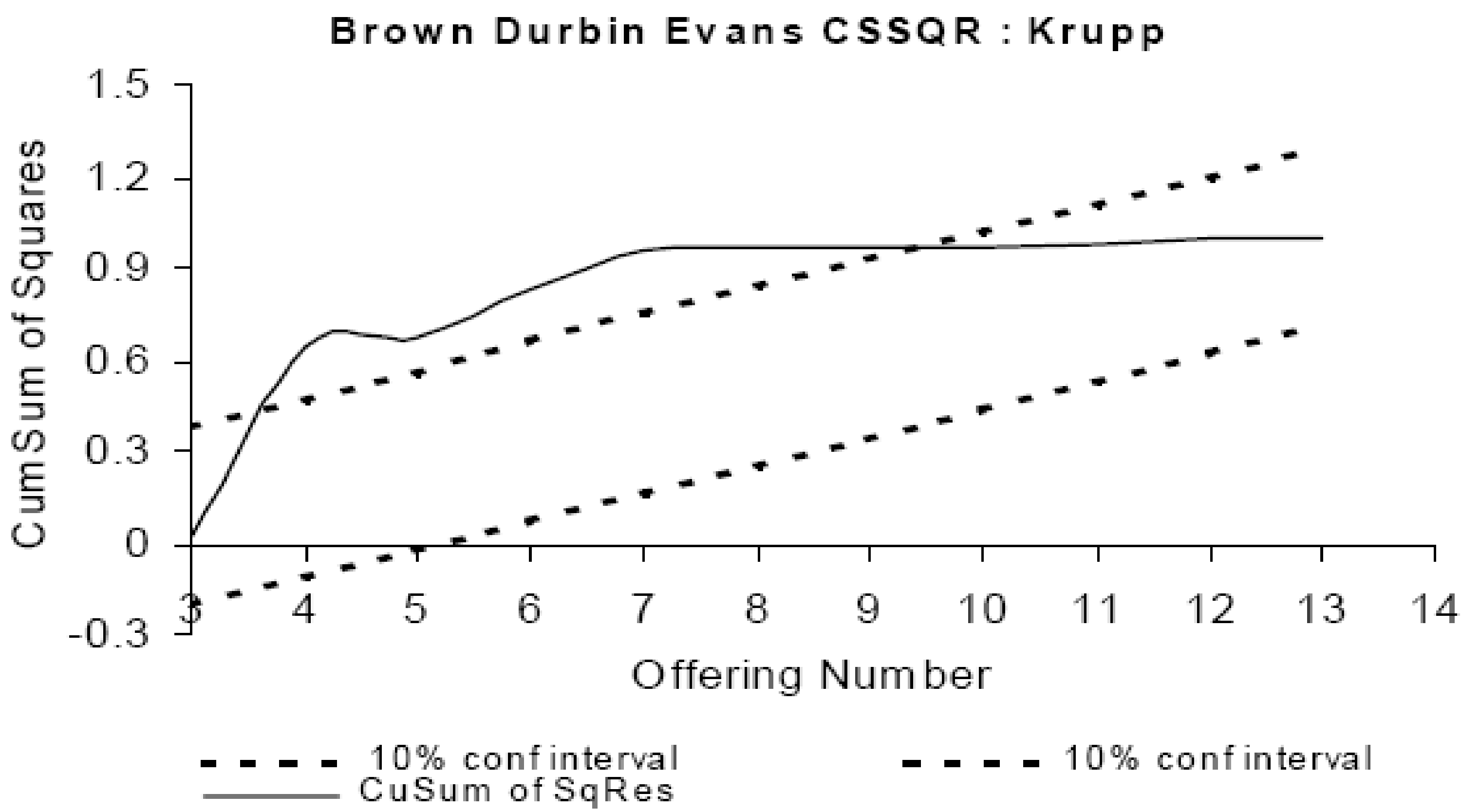
Returns of Various Sponsors Sorted by Order of RELP Issuance



Example: Excess Returns on RELPs by Sponsor



Brown-Durbin-Evans CuSumSq Residuals



BDE proposed a test of nonstationarity that can be used to determine if a given switch point is significant.

Tests for Mixed Strategy Using Normal Mixtures

To estimate the mixture of normals, the following moment generating function (mgf) is minimized using weighted nonlinear least squares with j = 15 to ensure that the corresponding normal equations are of full rank:

$$\sum_{i=1}^{n} \frac{e^{\theta_j y_i}}{n} = \lambda e^{\theta_j \mu_1 + \theta_j^2 \sigma_1^2 / 2} + (1-\lambda) e^{\theta_j \mu_2 + \theta_j^2 \sigma_2^2 / 2} \qquad j = 1, 2, \ldots, 15$$

Here y_i represents the abnormal return (in percentage) for the i[th] RELP offering of a sponsor. Parameter restrictions are tested using a Wald test with the level of significance reported in the last column of the following table. The null hypothesis is that $\mu_1 = \mu_2$ and $\sigma_1 = \sigma_2$, i.e., that observations are drawn from a single normal distribution. Here * indicates significant at the .10 level, ** indicates significant at the .05 level.

Tests for Mixed Strategy Using Normal Mixtures

RELP Sponsor	λ	μ_1	μ_2	σ_1	σ_2	σ_{Resid}	Max θ_j	Min θ_j	Wald Test
Aggregate	.43**	4.7**	−3.6**	2.9	2.0	.0001	.09	−.23	.000**
Angeles	.91**	−5.4**	28.7**	4.5**	2.0	.0008	.19	−.13	.000**
Insured	.01	13.0	−1.5	7.2	5.4**	.0036	.17	−.15	.009**
JMB	.02	18.9**	−4.1**	33.0**	19.8**	.0053	.07	−.08	.000**
Krupp	.30**	44.9**	−11.5**	17.6**	3.2**	.0026	.03	−.25	.000**
Prudential	.88**	−4.1**	21.6**	3.5	3.2	.0027	.21	−.07	.000**
Shurgard	.52	−2.4	6.3	3	3.3	.0014	.15	−.17	.465