



The Bond and Stock Markets

Lecture 16

The Bond and Stock Markets

A bond or a share of stock is an ownership right to a stream of future income

- **A **bond** offers a fixed set of **interest** payments and a fixed **principal** repayment at its **maturity**. The credit worthiness of the borrower is critical.**
- **A **share of stock** is literally a proportional ownership of a corporation. But it **does not guarantee payment** of any **dividend** (the optional, stock equivalent of a regular interest payment) or repayment of the original purchase price, ever. Once a company sells shares to the public, it is never obligated to buy them back; a seller must find his/her own buyer at any time and any market price. A corporation generates income but may opt not to pay any dividends, reinvesting instead in new corporate projects. Therefore, the only return a shareholder may receive is the price received from another buyer.**

The Bond and Stock Markets

A bond or a share of stock is an ownership right to a stream of future income

- **Investors must choose between these two alternative “long term-oriented” investments. Some common terminology can be applied.**
- **The **yield on a bond** is the interest payment relative to the purchase price. This yield is paid in cash regularly (e.g. annually) and the investor must independently reinvest the cash.**
- **The “**yield**” on stock is less well-defined. The corporation’s board of directors has the right to choose any dividend and to change this payment at any time. Like a bond interest payment, a dividend must be reinvested by the investor. Any current income of the corporation that is not paid as a dividend is retained earnings; these retained earnings are reinvested by the firm in new equipment or product development.**

P-E ratios are now driven by the bond market

Given the explosion of interest rates during the 1970s, bonds are no longer viewed as being significantly less risky than stocks:

- Bonds have a *double* inflation risk, while equity investment buys ownership of real assets producing earnings that rise with inflation
- This change of attitude, plus greater arbitrage, has produced a new, consistent pattern: the E-P ratio tends to trade just under two percentage points below the 10-year US Treasury bond yield
- Expected inflation should be added to the “earnings yield” or E-P ratio to get a comparable return relative to the bond yield. This expected inflation is greater than the observed differential of 1.7% on average, thus a small risk premium is still demanded of stock
- A warning: this rule-of-thumb is now widely used, but not widely understood. Permanently lower inflation should narrow the spread between nominal bond yields and earnings-price ratios

“Irrational Exuberance” in U.S. financial markets?

The Context of Fed Chairman Greenspan’s Remarks:

**In December 1996, the U.S. Federal Reserve Board
asked the *Outside Consultants Panel* of experts:**

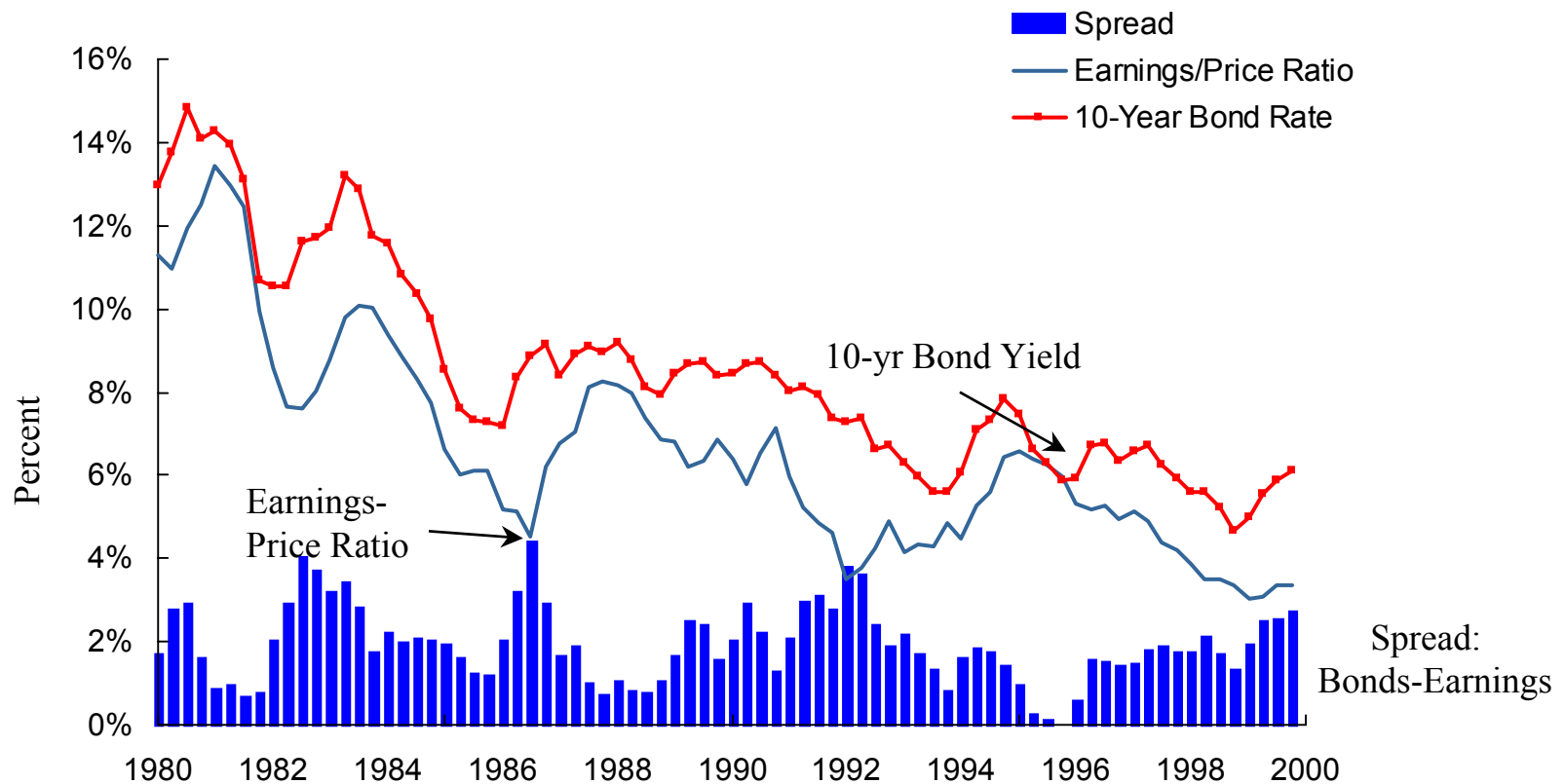
- **“How do you perceive current levels of equity valuation?”**
- **“Are there signs of speculative excess? “**

My Answer Given to the Fed:

- **The stock market is not overvalued today (i.e. December 1996): prices have just caught up with earnings, and low bond yields justify a high price-earnings ratio**
- **In the long-run, fundamentals of supply and demand for national and global savings dominate the markets: eliminating the US government deficits would chop yields by a full percentage point**

S&P 500 Earnings Yields vs Interest Rates

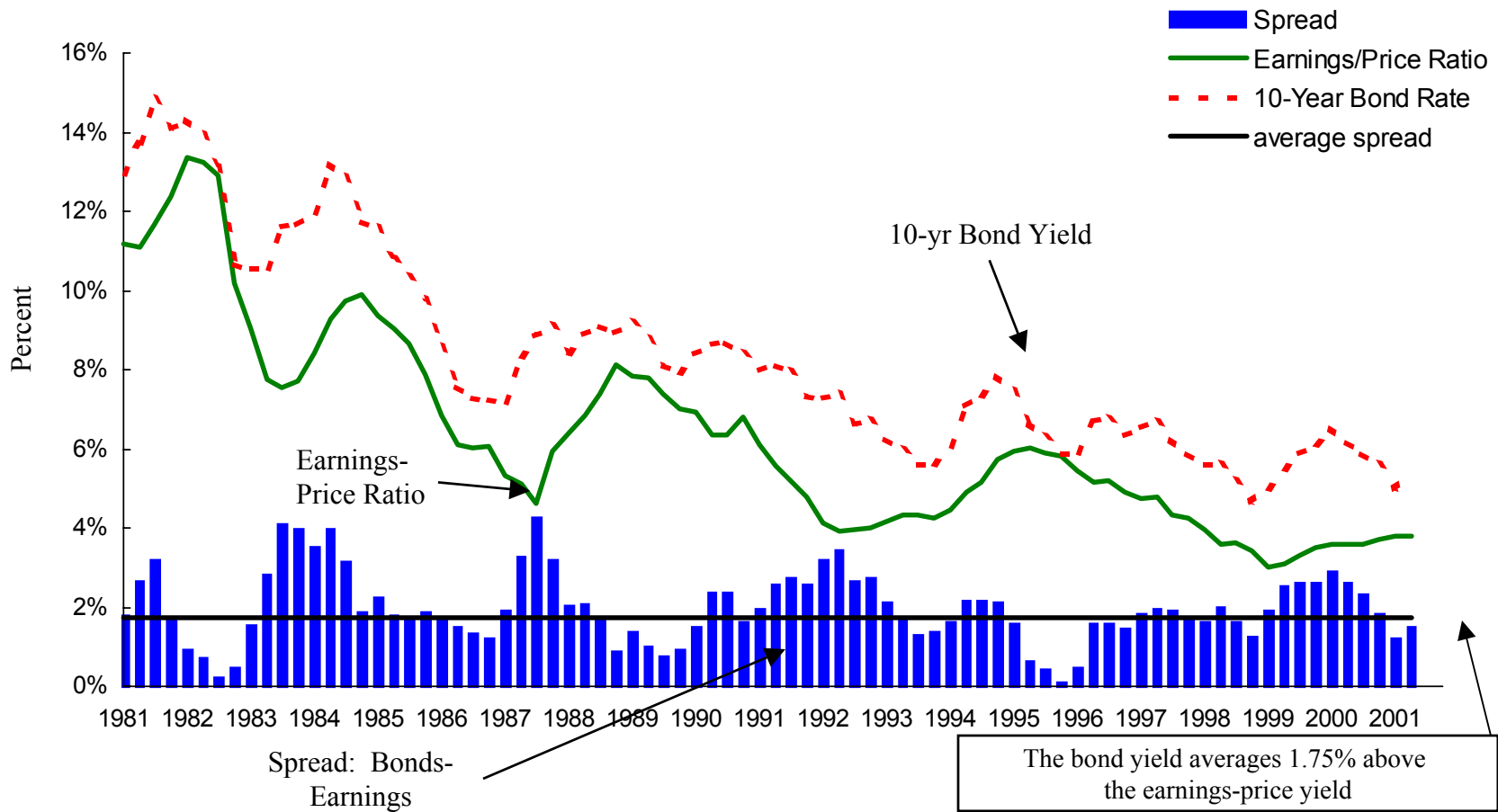
The E/P ratio = the equity yield to be compared to the bond interest rate or yield. Investors have come to recognize that bonds and stocks are both risky investments, and their competing yields should have a normal spread. Therefore the equity bull market of the last two decades has been powerfully driven by declining bond yields.



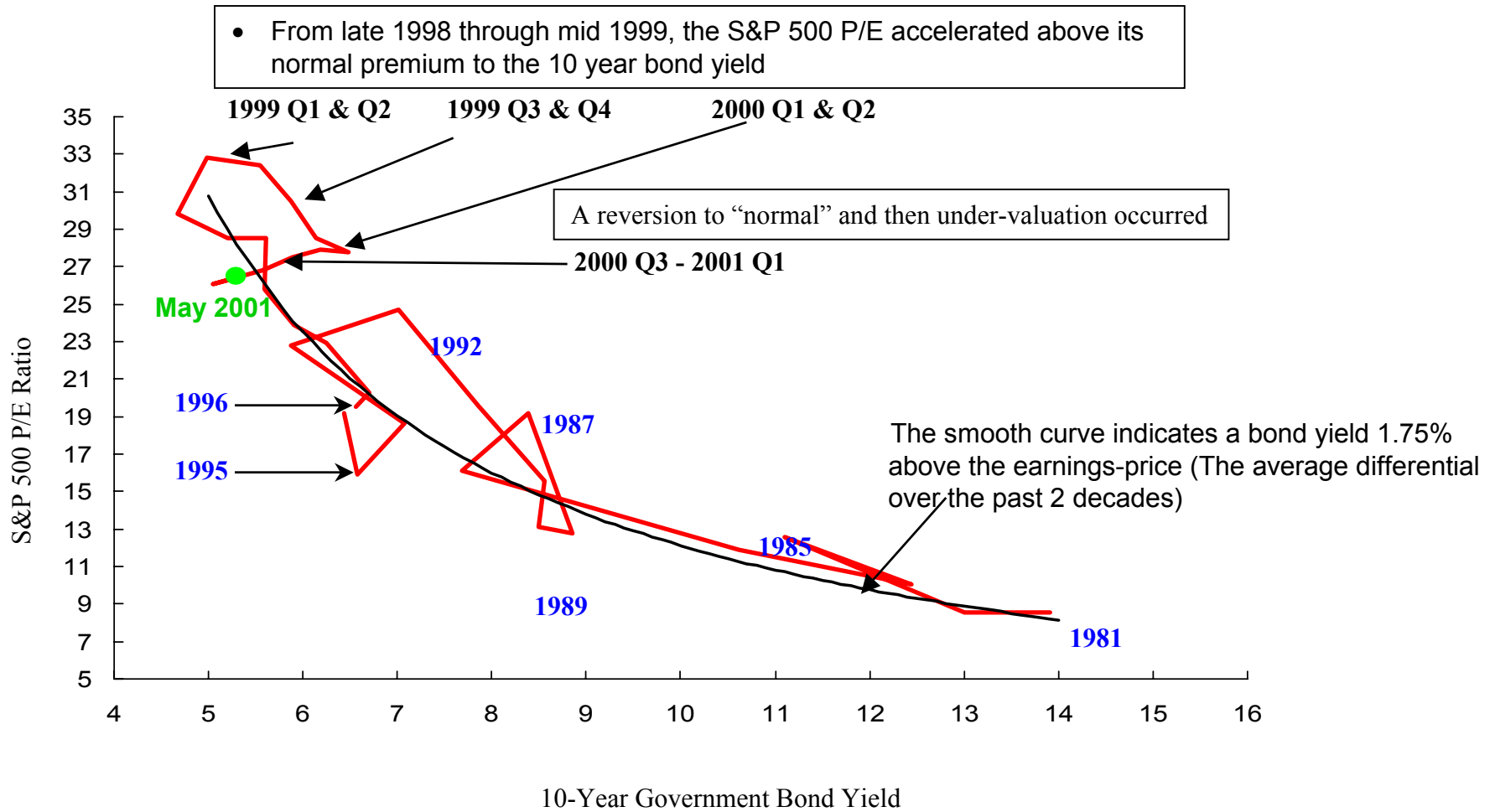
The earnings-price ratio tracks the bond yield
The bond yield averages 1.75% above the earnings-price yield

Earnings Yields Must Compete With Bond Rates

- **Historically, stock prices have reflected bond yield changes**, with stocks decreasing in price as bond yields increase. The yield on stocks (i.e. the E-P ratio) must compete with the bond yield.
- However, in contrast to this normal pattern, as bond yields rose **in 1999 and early 2000 a narrow set of stocks perceived to be “high growth” received increasingly high valuations relative to earnings**. These drove the S&P 500 higher in spite of falling prices for industrials

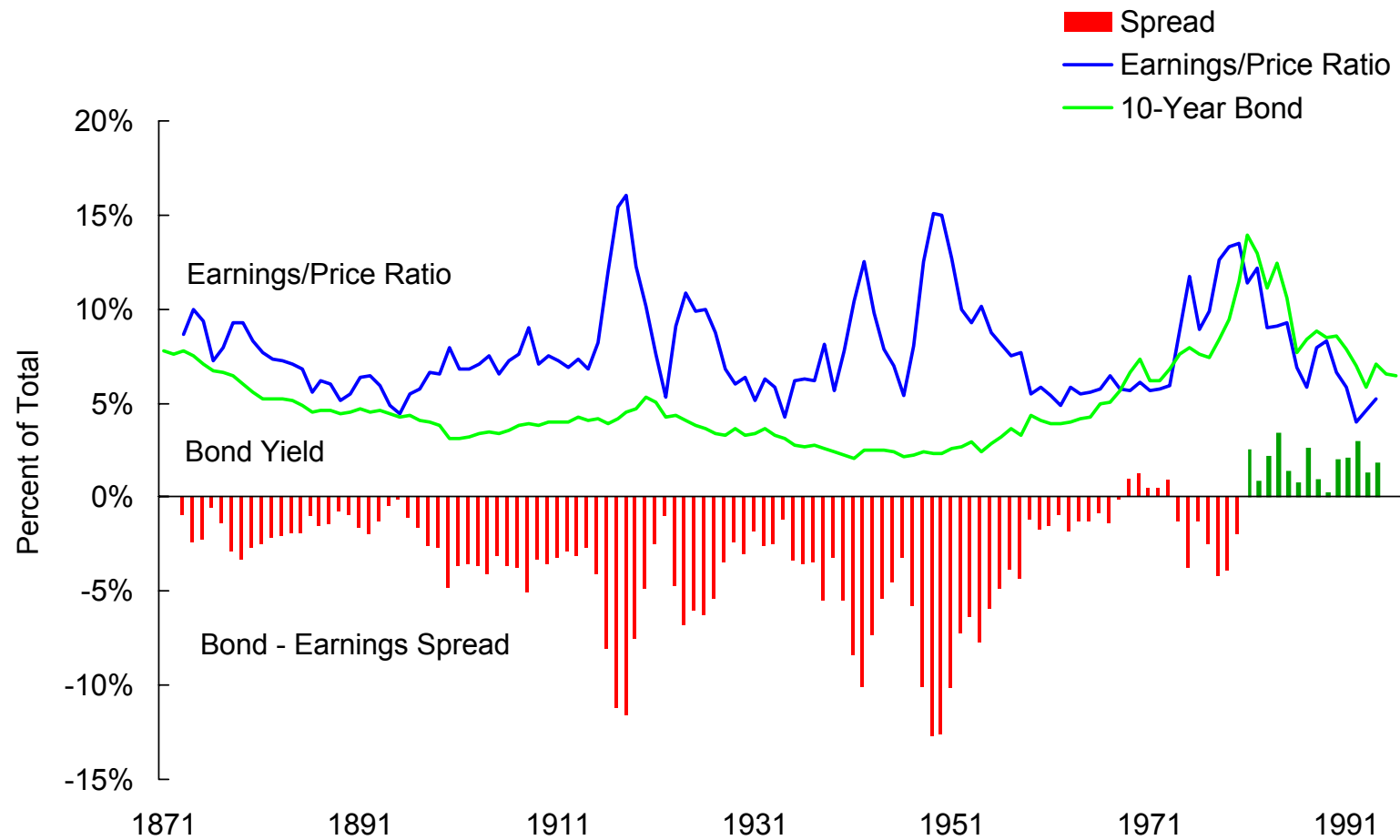


The Historic Trail of the S&P 500 PE and Bond Yields

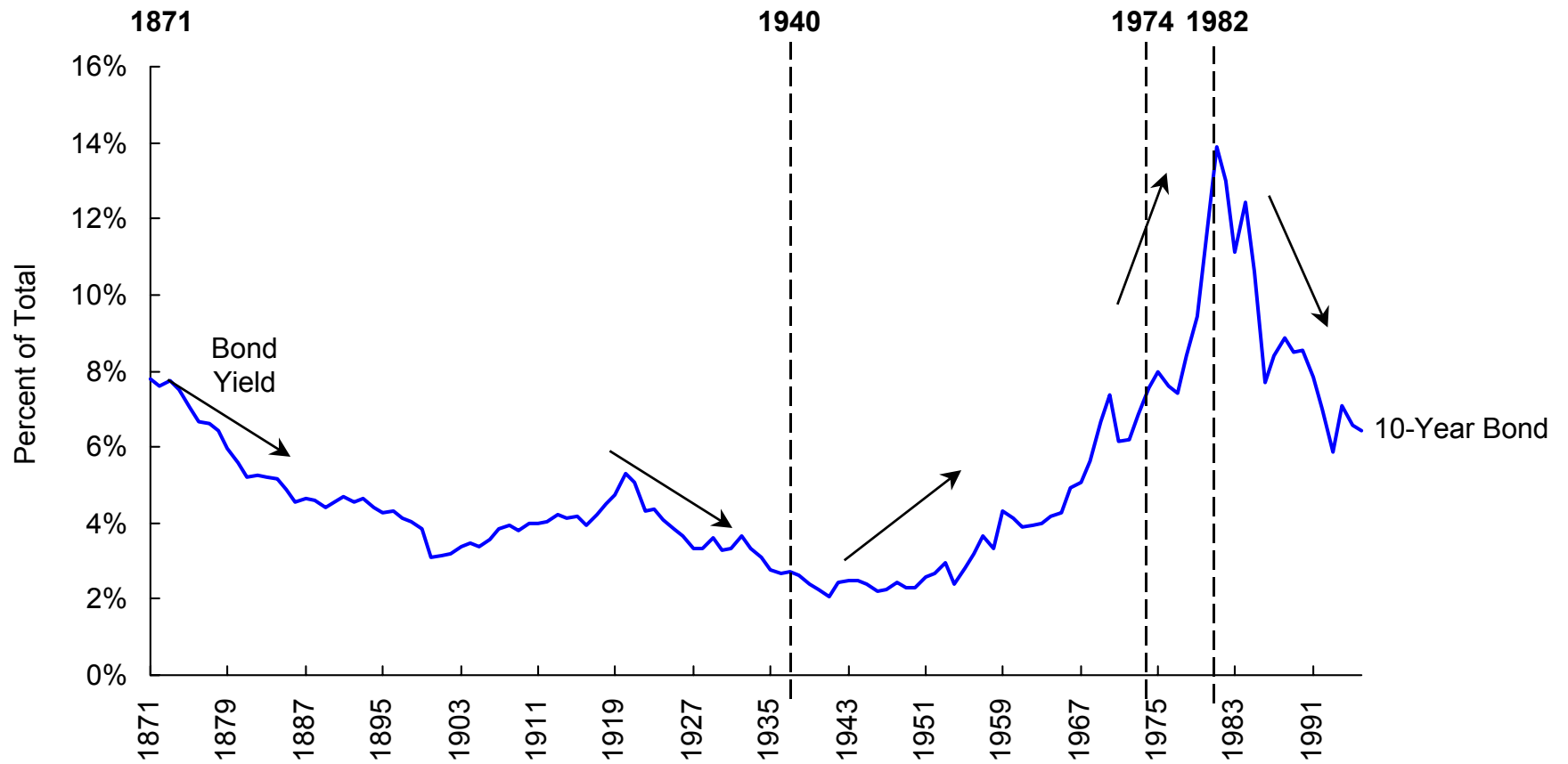


The shift out was extremely abrupt, challenging the idea that higher valuations reflect either sustainable lower risk premia or higher growth expectations.

Competing investment yields over the past 125 years reveal a “sea-change” in 1980-81



The Risk of Owning Bonds: An Increasingly Different View After 1940

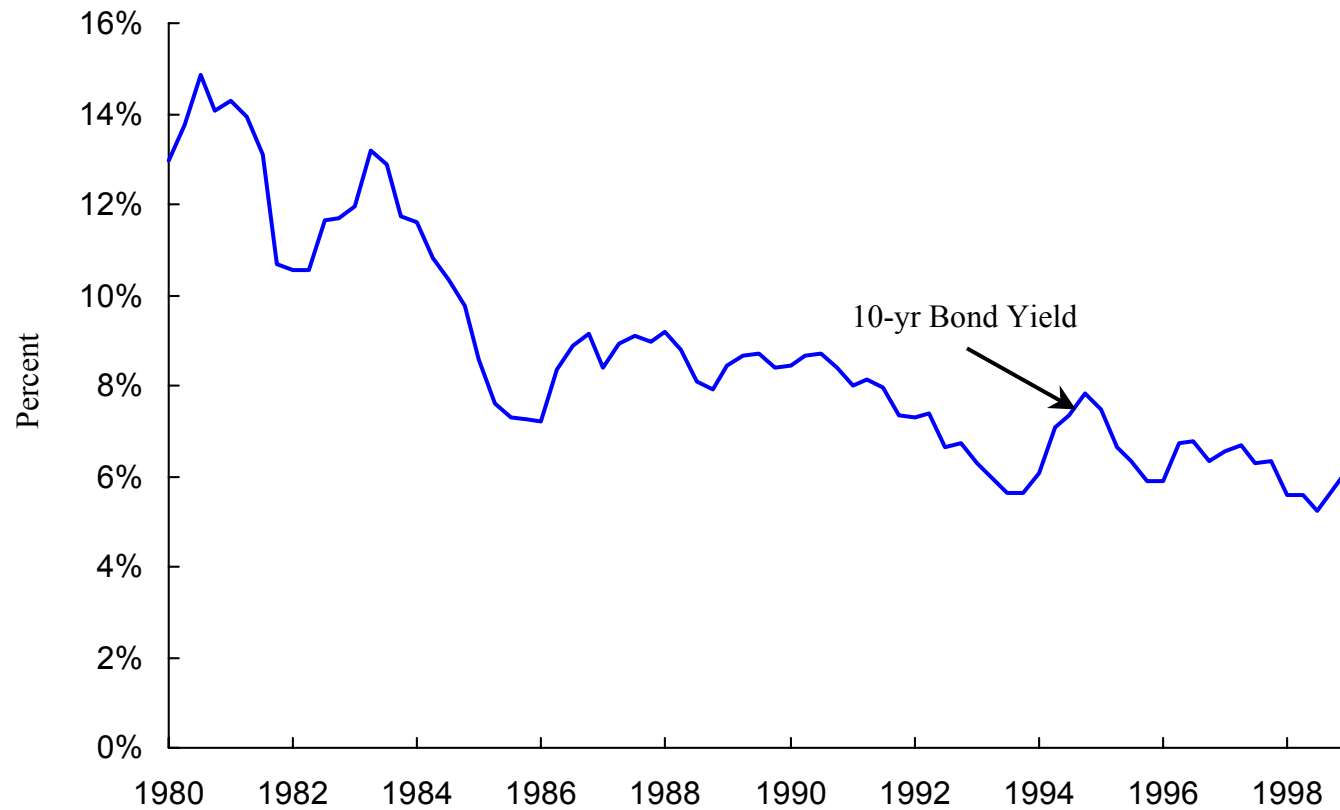


Competing Investment Yields

	<u>1872-1940</u>	<u>1941-1974</u>	<u>1975-1981</u>	<u>1982-1996</u>
<u>Investment in Bonds</u>				
10-Year Bond Yield	4.3%	3.9%	9.5%	8.7%
Annual Gain (loss)	2.0%	-3.0%	-8.0%	6.1%
Total Return	6.3%	0.9%	1.5%	14.8%
<u>Investment in Stocks</u>				
Dividend Yield	3.9%	4.2%	4.8%	3.5%
Annual Gain (loss)	3.3%	7.2%	6.4%	11.5%
Total Return	7.3%	11.4%	11.2%	15.1%

10-year Bond Yield: 1980-2000

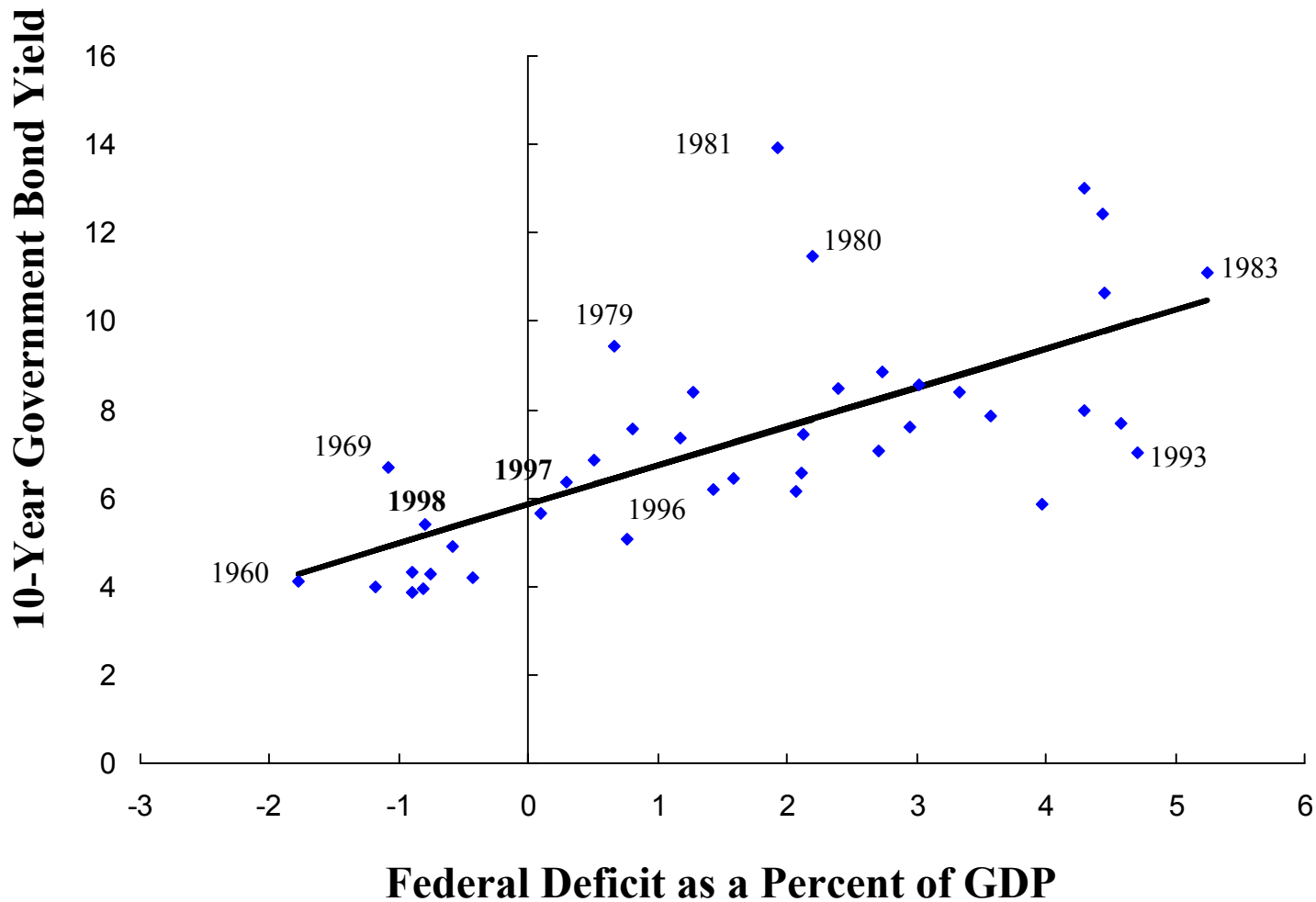
**Bond yields have trended down as inflation
and the federal budget deficit have declined**



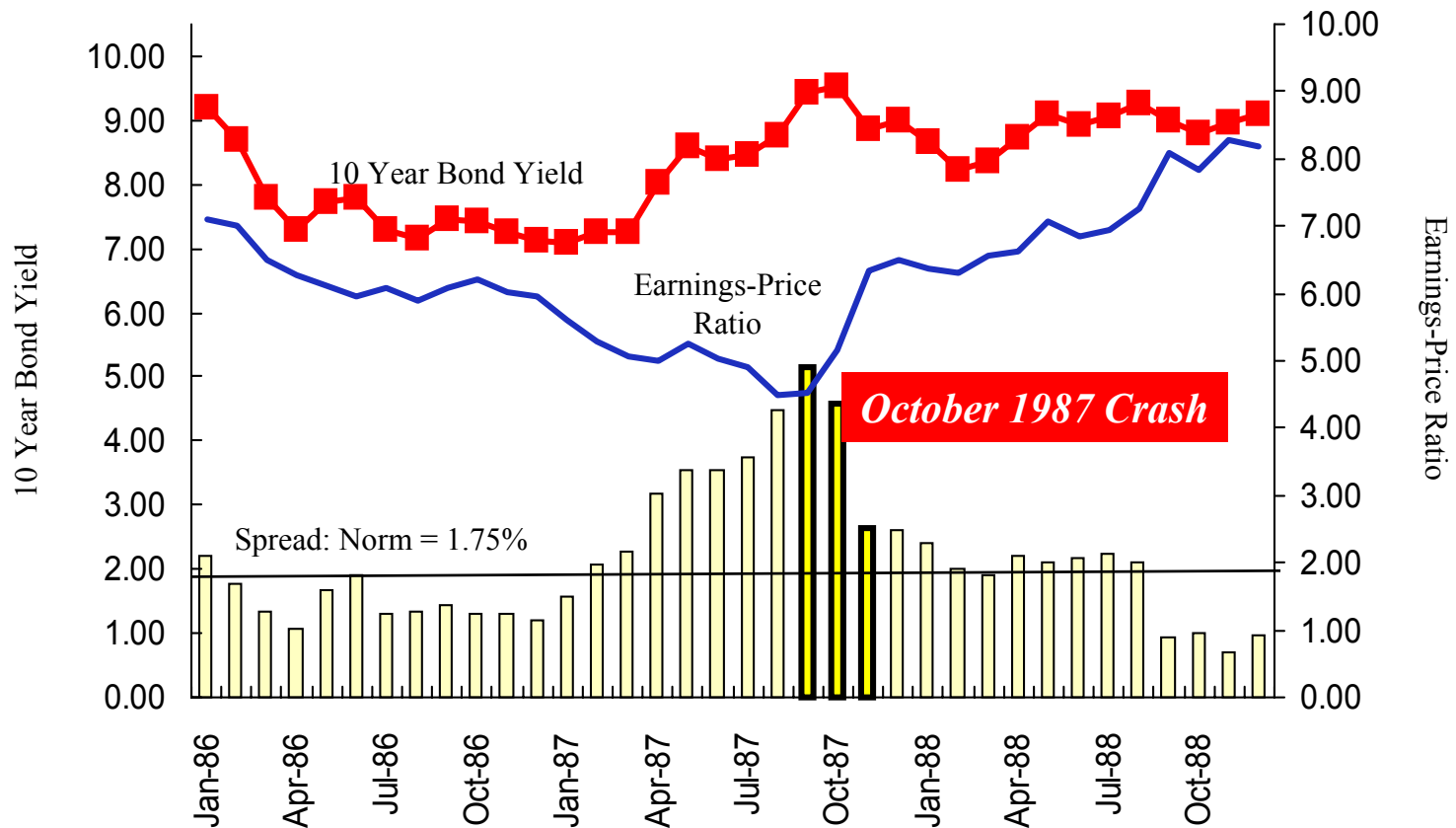
What Drives Bond Yields?

In the Longer-Term, Lower Federal Deficits Bring Lower Bond Yields

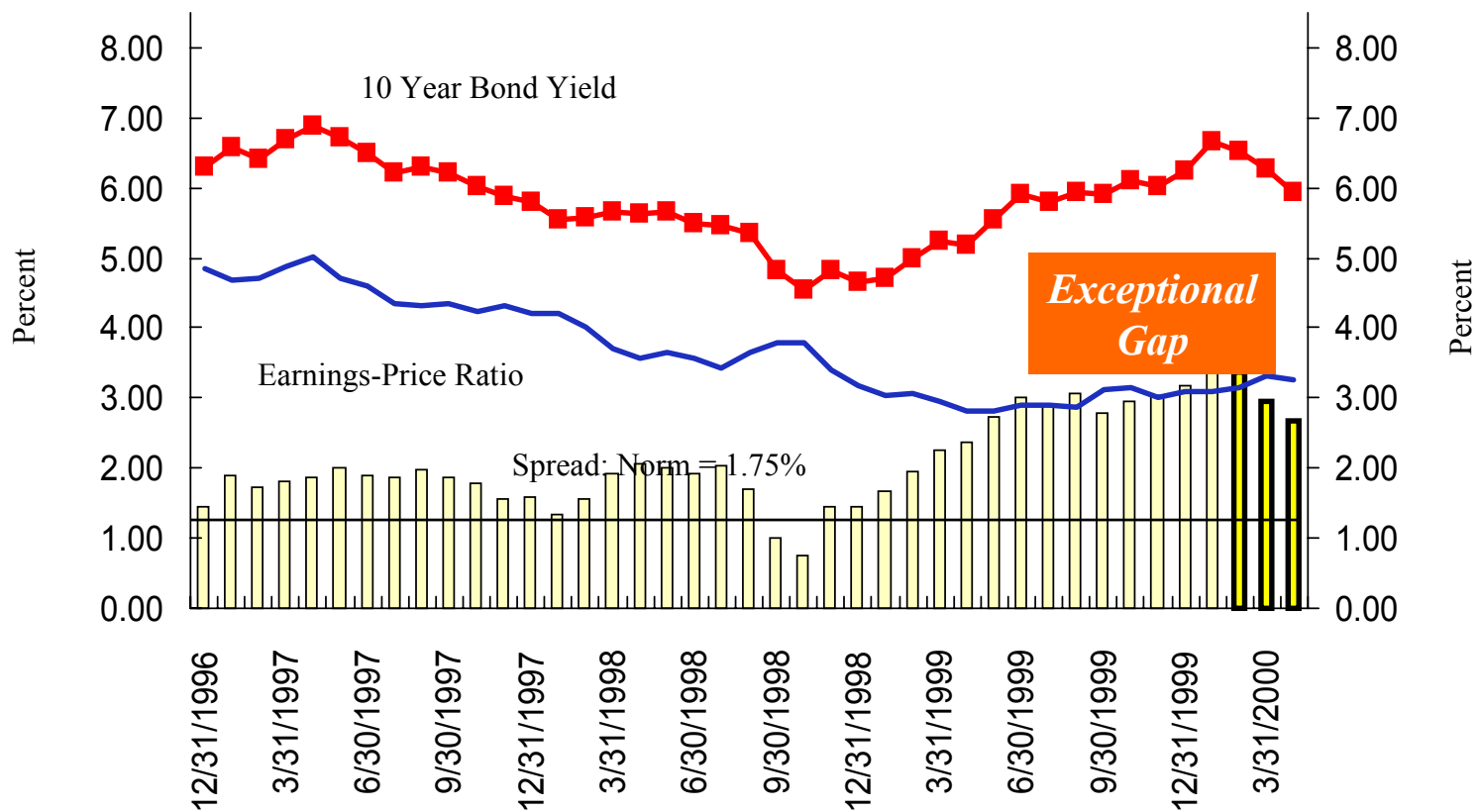
The line is the 1959-96 fitted relationship between yields and deficits



Before and after the crash of 1987:
the 10-year Bond Yield and the Earnings-Price Ratio



The Manic Market of 1999-2000:
 Share Prices Rose Exceptionally from late 1998 through June 1999
 and Held on to These Gains,
 Driving the Earnings Price Ratio Down Even as Bond Yields Were Rising

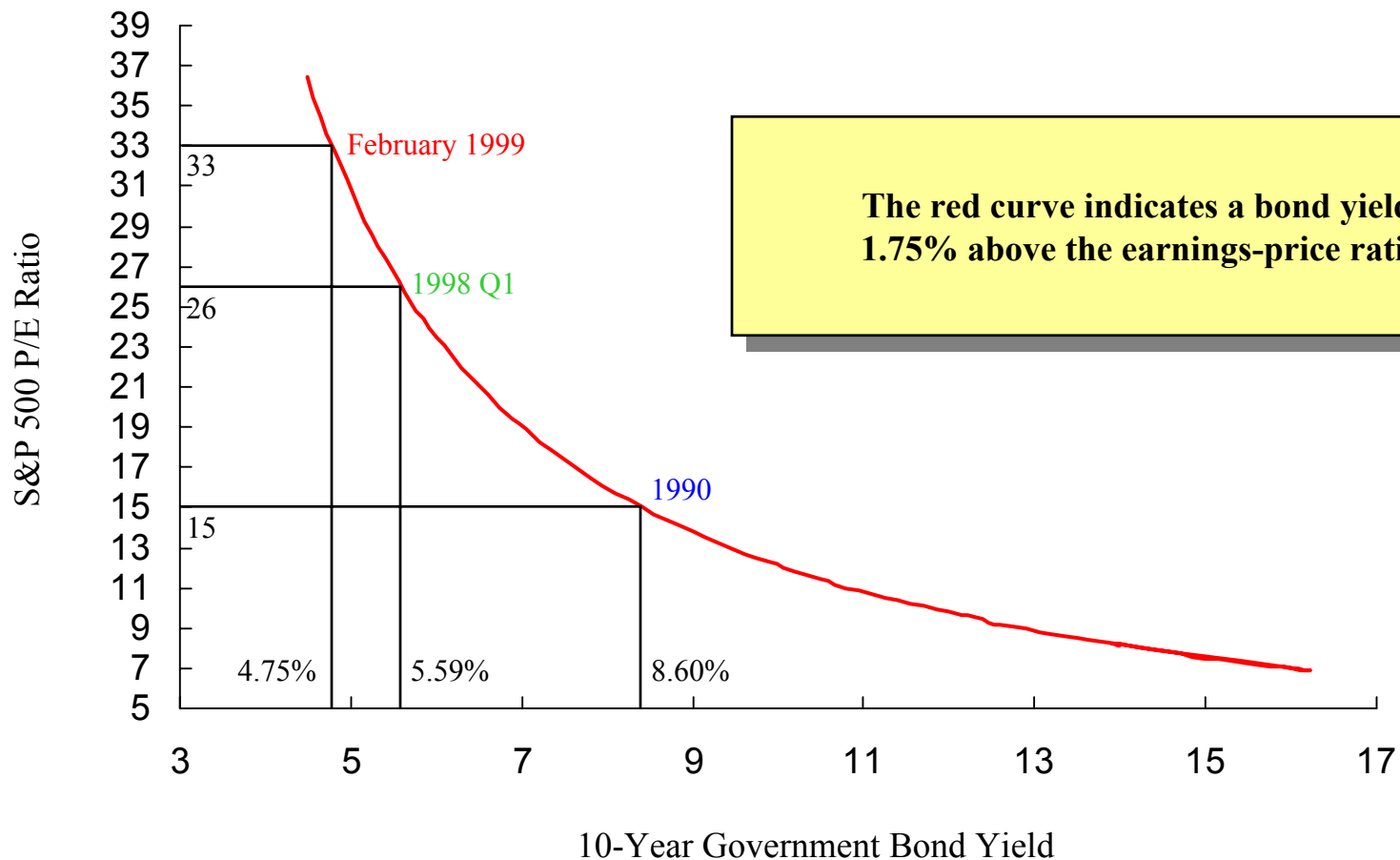


Riding the 1990s Rising Tide

Brinner

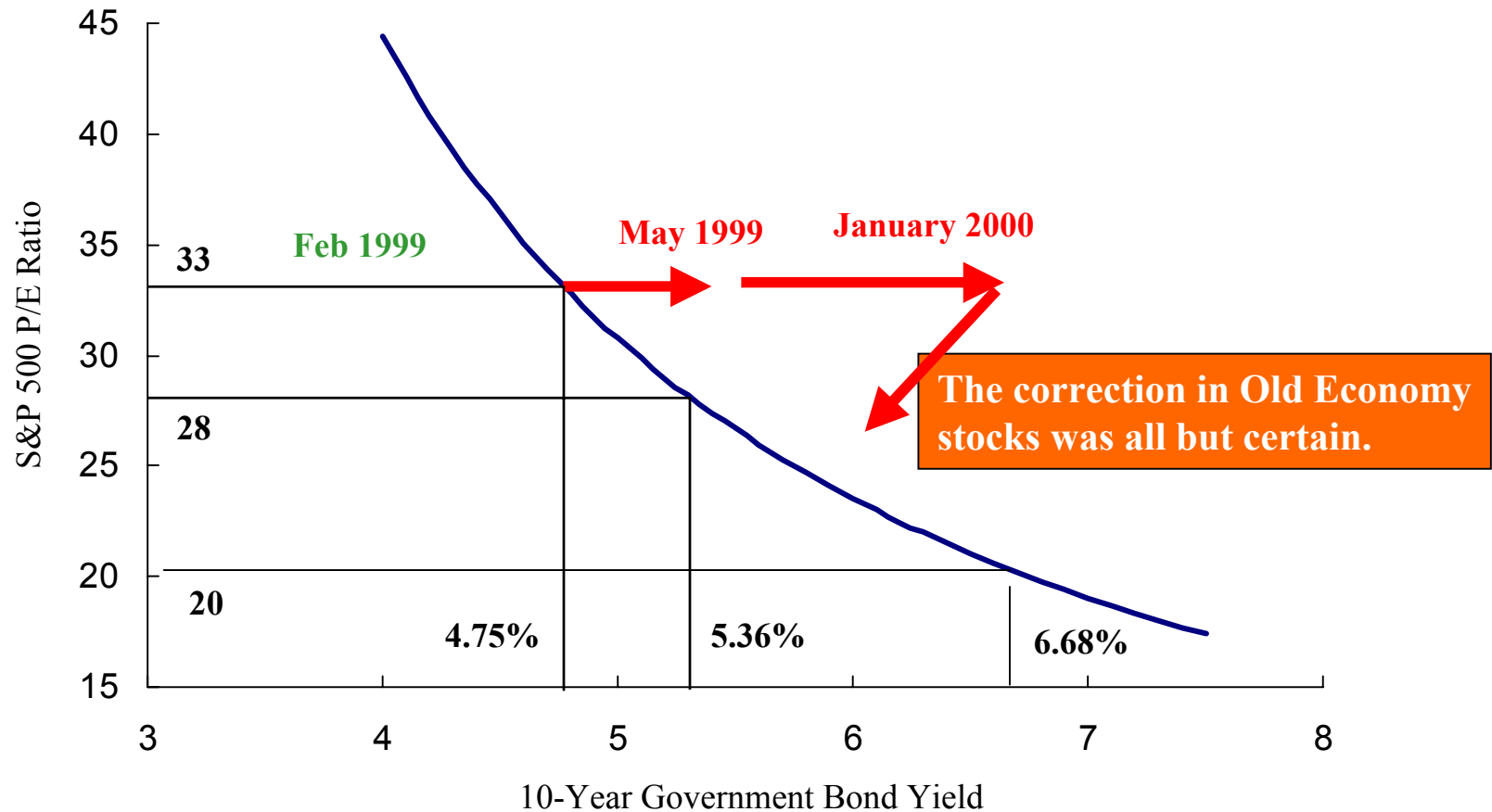
Each Lower Bond Yield Translated Into a Higher “Normal” Price-earnings Multiple

- The 1990 8.60 % Bond Yield Justified P/E Ratio of 15 = $(1/(8.60\% - 1.75\%))$
- The 1998 Q1 5.59% Bond Yield Justified P/E Ratio of 26 = $(1/(5.59\% - 1.75\%))$
- The February 1999 4.75% Bond Yield Justified P/E Ratio of 33 = $(1/(4.75\% - 1.75\%))$



Then, with an Overheating Economy, Interest Rates Began to Rise But Share Prices Didn't React

- The **May 1999 5.36% Bond Yield** Justified a P/E Ratio of only **28**.
- The **January 6.68% Bond Yield** Justified a P/E Ratio of only **20**.
- If S&P 500 earnings are **\$50 per share**, the S&P index should only be **1000**. Instead, it has been trading near **1400-1500**.



The Bond and Stock Markets

Two Alternative \$10,000 Investments					
		Bond with coupon rate:	5.00%		
	<u>time</u>	<u>cash flows to investor</u>			
		begin/end	annual	annual sum	PV @ bond rate
Original Investment	0	-\$10,000		-\$10,000	-\$10,000
	1		\$ 500	\$500	\$476
	2		\$ 500	\$500	\$454
	3		\$ 500	\$500	\$432
	4		\$ 500	\$500	\$411
	5		\$ 500	\$500	\$392
	6		\$ 500	\$500	\$373
	7		\$ 500	\$500	\$355
	8		\$ 500	\$500	\$338
	9		\$ 500	\$500	\$322
Assumed Sale	10	\$10,000	\$ 500	\$10,500	\$6,446
Total		\$0	\$5,000	\$5,000	\$0

The Bond and Stock Markets

Or, \$10,000 Invested in a Corporation for 10 years

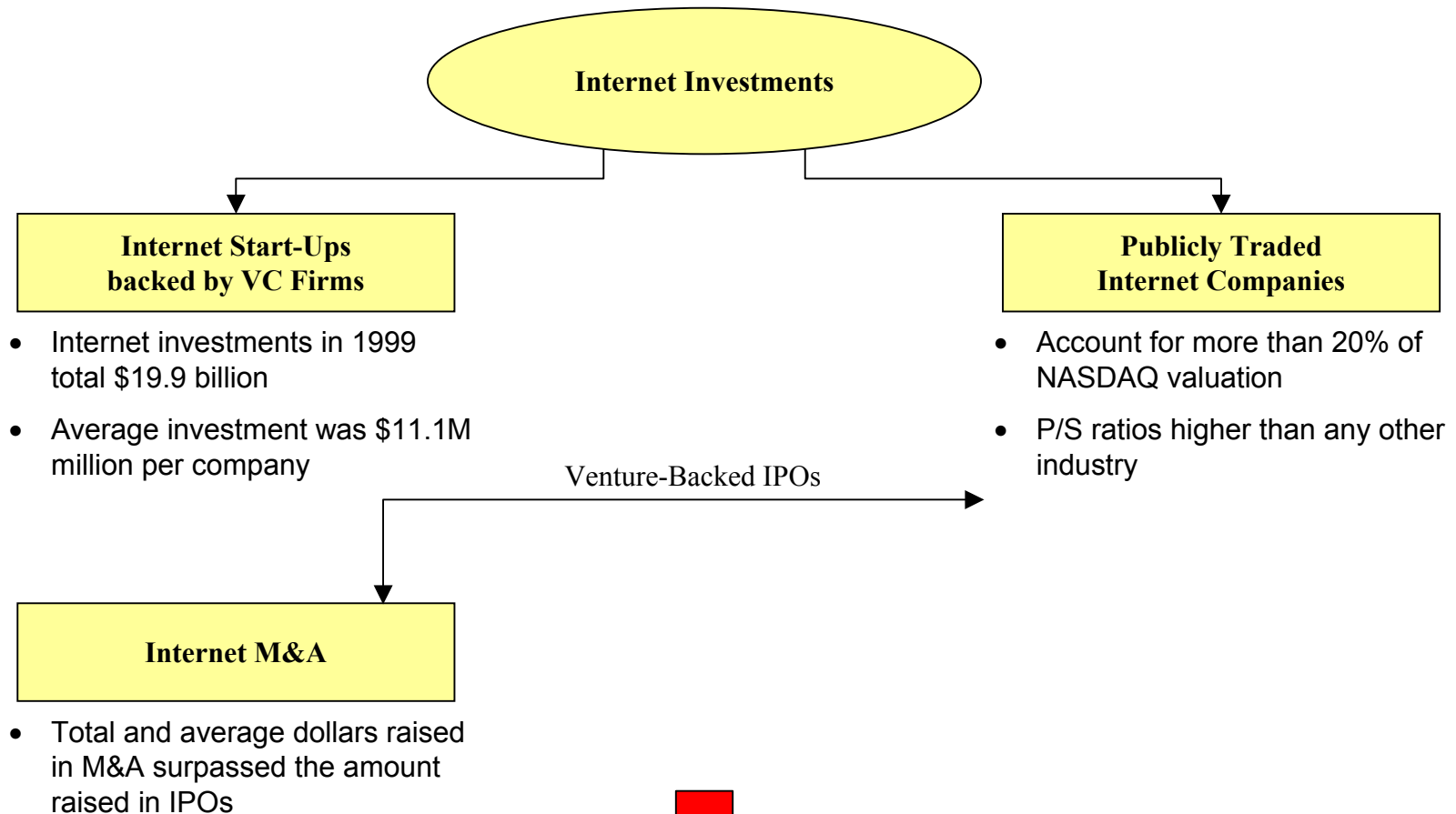
Corporation's opportunities:		assume:	real yield on assets:			inflation:	2.00%			
<u>time</u>	<u>cash flows to investor</u>	4.15%	Net Income at real yield on prior assets	Dividend @50%	Retained Earnings	Inflation of Value of Corporate Capital	Ending (Illiquid) Corporate Capital	Fund of Prior Dividends, plus interest	Current Cash to investor	PV @ bond yield
0		-\$10,000	\$0	\$0	\$0	\$0	\$10,000	\$0	\$0	-\$10,000
1	\$ 9,766		\$415	\$208	\$208	\$200	\$10,408	\$0	\$208	\$196
2	\$ 10,164		\$432	\$216	\$216	\$208	\$10,832	\$220	\$216	\$192
3	\$ 10,578		\$450	\$225	\$225	\$217	\$11,273	\$462	\$238	\$200
4	\$ 11,009		\$468	\$234	\$234	\$225	\$11,732	\$728	\$262	\$207
5	\$ 11,458		\$487	\$243	\$243	\$235	\$12,211	\$1,020	\$287	\$215
6	\$ 11,925		\$507	\$253	\$253	\$244	\$12,708	\$1,339	\$315	\$222
7	\$ 12,411		\$527	\$264	\$264	\$254	\$13,226	\$1,688	\$344	\$229
8	\$ 12,916		\$549	\$274	\$274	\$265	\$13,765	\$2,069	\$376	\$236
9	\$ 13,443		\$571	\$286	\$286	\$275	\$14,326	\$2,484	\$410	\$243
10	\$ 13,991	\$13,991	\$595	\$297	\$297	\$287	\$14,910	\$2,936	\$14,437	\$8,062
		\$3,991	=capital gain							\$0

Formula:
Price = Earnings ("net Income") divided by the bond yield minus 1.75%

Internet Valuation

Brinner
MIT
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New Economy Stocks Follow Strange Rules

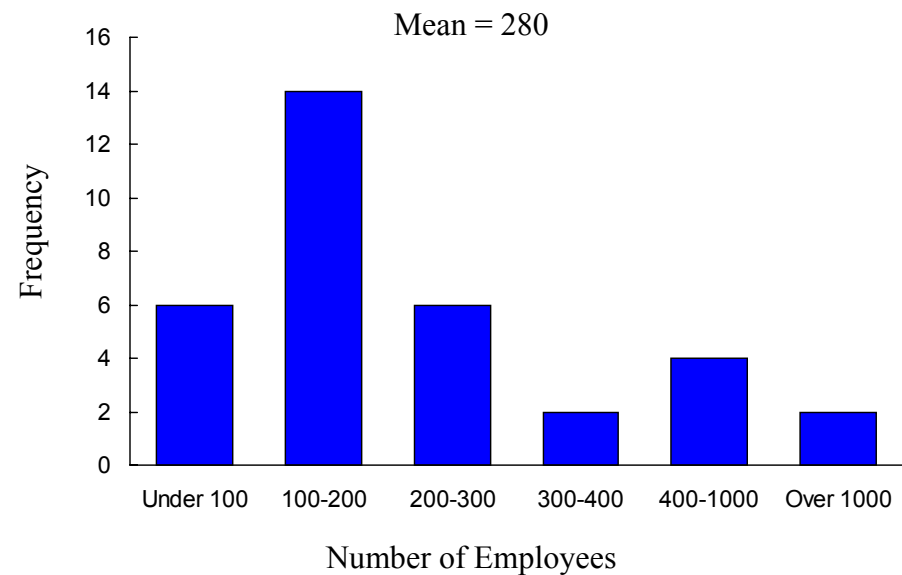
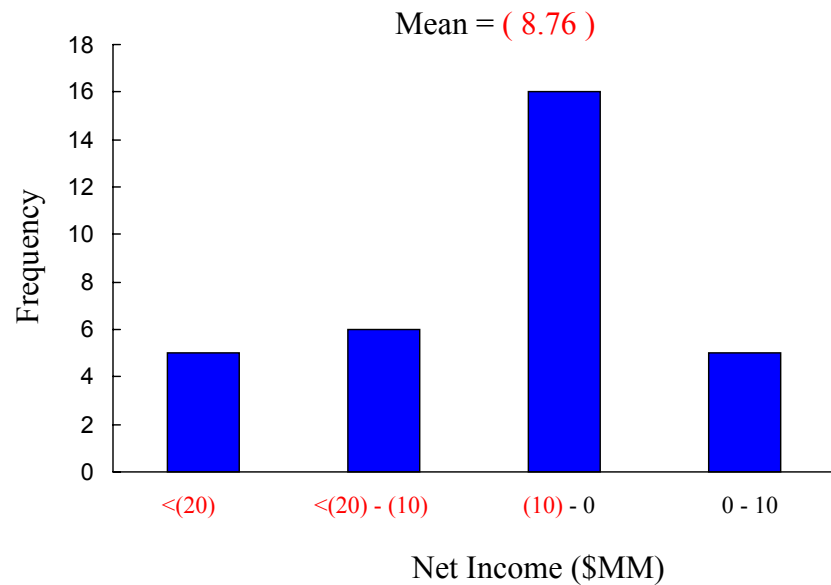
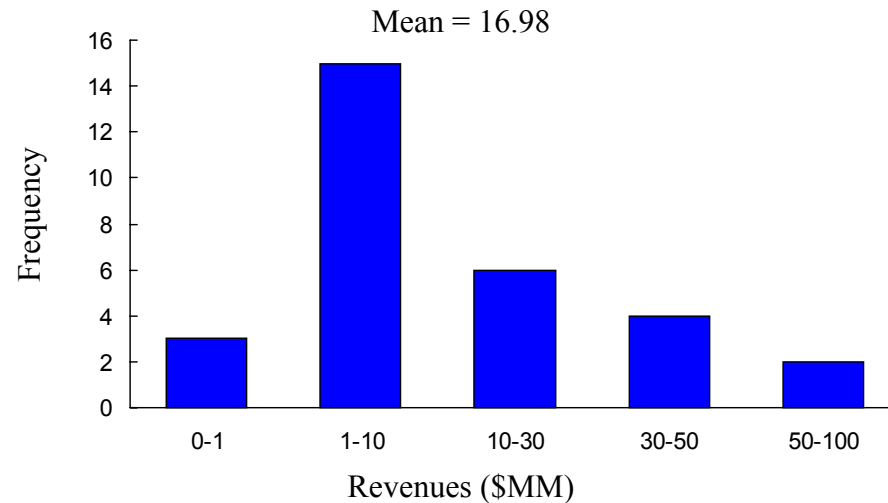


Yet, only a few Internet firms generate positive cash flows

Does the market reward, and eventually require, earnings?

Profile of 30 Recently IPO-ed

Internet Companies



* Note: Red lettering indicates negative values
Source: www.stockpoint.com

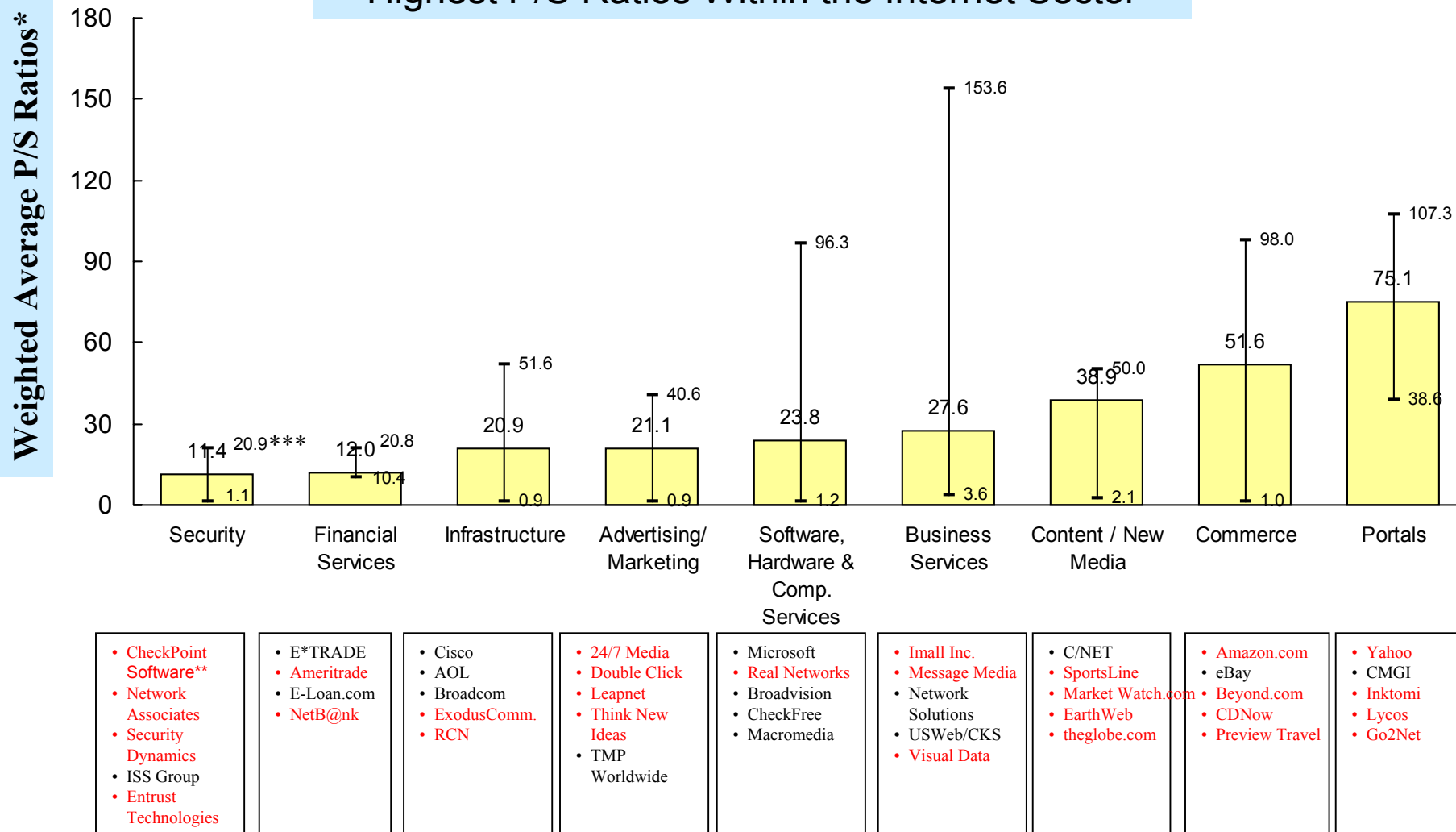
Internet vs. Dow Financial Performance

- Do the differentials in sales growth and profitability create systematic differences in valuation?

	Number of Firms	Median Values by Sector				Market Capitalization / Revenue Multiple		
		Market Cap (Millions)	Revenue (Millions)	EBITDA Margin	Sales Growth	Median	Minimum	Maximum
Infrastructure	16	\$ 1,769	\$ 109	-30%	97	15	3	117
Software & Hardware	22	\$ 224	\$ 33	-17%	37	7	1	127
Commerce	8	\$ 389	\$ 80	-47%	151	6	1	25
Security	10	\$ 195	\$ 52	-3%	14	4	1	22
Advert	4	\$ 453	\$ 47	-11%	51	10	1	32
Business	5	\$ 548	\$ 3	-3%	202	127	7	192
Content	5	\$ 166	\$ 41	-55%	86	14	2	47
Portals	2	\$ 24,296	\$ 284	11%	149	68	36	101
Entire Internet Group	72	\$ 413	\$ 54	-18%	67	8.1	1.1	192.3
Dow Jones Group	30	\$ 82,181	\$ 26,397	22%	6	2.3	0.3	23.4

Price/Sales Ratios by Internet Sub-Group

- Content, Commerce & Portals Have the Highest P/S Ratios Within the Internet Sector



n=106 companies

* Weighted by market cap size within respective sub-groups. 12 month trailing sales numbers are used as of 10/4/99

** Red indicates negative 1998 net income (1998), black indicates positive

*** Indicates maximum and minimum values

Source: Bloomberg; Parthenon analysis

Internet Valuation Methodologies

Market Capitalization / Revenue Model

Systematic Responses in Price-Sales Ratios to Sales Growth and Profit Margins

		Profit Margin				
		-60%	-30%	0%	10%	20%
Sales Growth	0%	0.9	1.8	3.5	4.6	6.0
	10%	1.0	2.0	3.9	5.1	6.6
	20%	1.1	2.2	4.3	5.6	7.3
	40%	1.4	2.7	5.3	6.9	8.9
	80%	2.1	4.1	7.9	10.3	13.3
	160%	4.7	9.0	17.5	22.8	29.7

**Share Price
as Multiple
of Sales**

These multiples are 2-3 times as great as those for Old Economy stocks with the same financial performance.

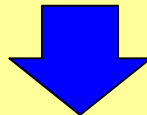
* Source: Parthenon Analysis

Lottery Ticket Valuation

- Where else in life are financial “assets” valued at 2.5-3 times the reasonable value?

Lottery Tickets

(\$1 wagered adds only \$.40-\$.45 to the prize pool.
The rest goes to state profits and costs.)



Implications for the Durability of the “Internet Bubble”

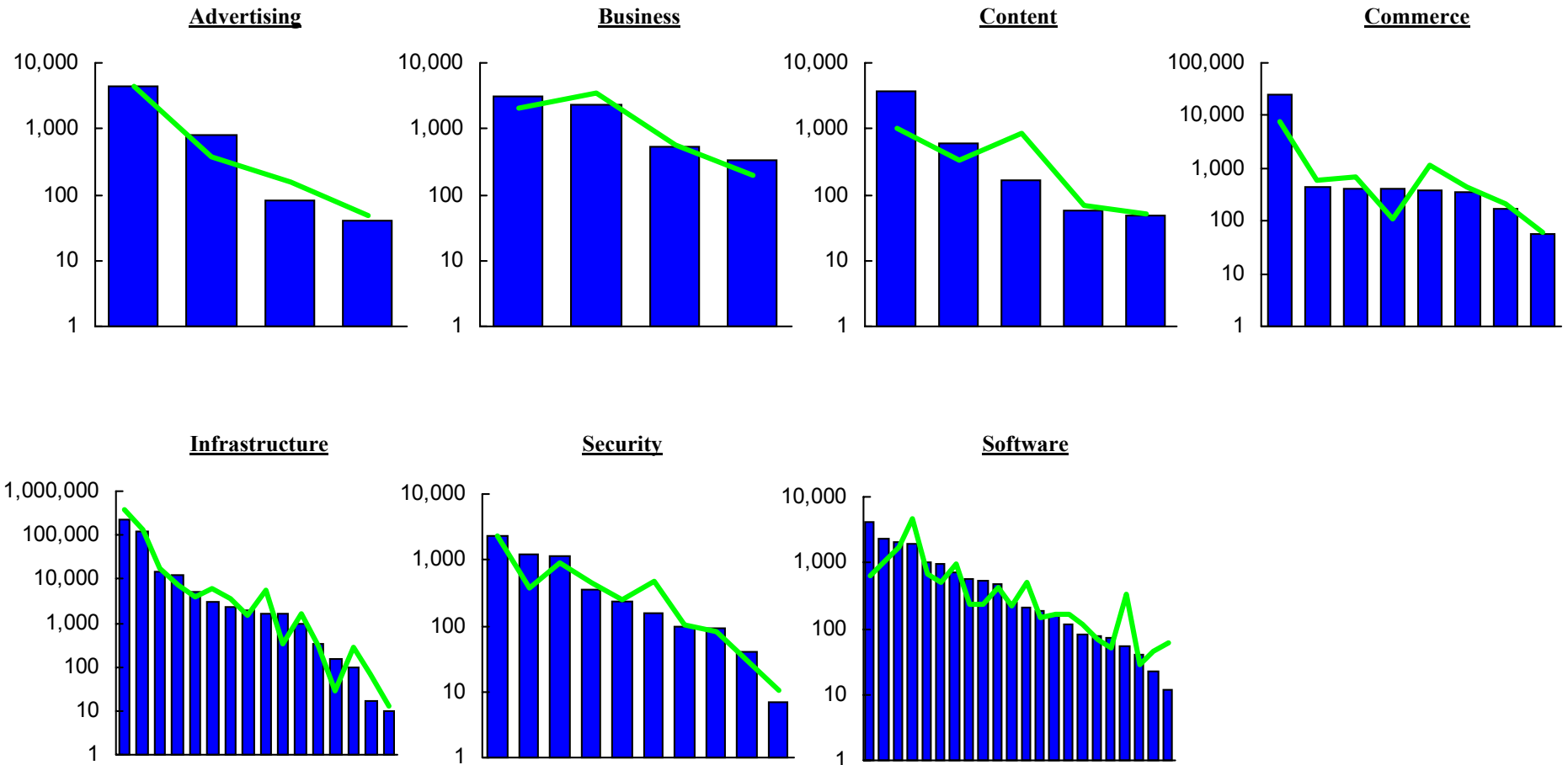
Implications for Portfolio Diversification

Internet Valuation Methodologies

Internet Market Capitalization / Revenue Model

Market capitalization on a log scale fits our market cap / revenue regression perfectly

Actual
Fitted



Valuation Methodologies

Market Capitalization / Revenue Model

The same structure regression provides the following equally successful valuation matrix for traditional companies, such as those in the Dow Jones index

		EBITDA/Sales <u>Margin</u>				
		-60%	-30%	0%	10%	20%
Sales Growth	0%	0.1	0.2	1.0	1.6	2.5
	10%	0.1	0.3	1.2	2.0	3.1
	20%	0.1	0.4	1.6	2.5	3.9
	40%	0.2	0.6	2.5	3.9	6.2
	80%	0.4	1.6	6.2	9.9	15.7
	160%	2.4	9.8	39.1	62.1	98.6

- However, the price/revenue multiples for the same financial performance are vastly different.

Value Drivers of Publicly Trading Internet Companies

Main Findings From Statistical Analysis

Conventional Wisdom

- Unique audience is the most important driver
- Earnings don't matter until you have them
- Capture market share at all costs

Reality-Check

- For the subset of Internet companies for which Unique Audience data is available, each 1% increase in audience yields a 1.49% increase in market capitalization. This is compared with a 1.69% increase in market capitalization for a 1% increase in sales. In other words, both indicators count
- In the Internet universe, positive earnings do matter: when EBITDA is positive, a unit increase in EBITDA / sales causes a 2.0% ($\pm 1.2\%$) increase in market capitalization
- Revenues do matter. Market capitalization tracks revenue very closely; essentially on a 1:1 ratio

**In the e-world, market capitalization is fueled by sales and sales growth,
but the revenue multiple is closely tied to earnings**

* This result may differ when this regression is repeated on only "new" internet companies

Source: Parthenon Analysis; see full regression model in appendix for more details

Internet vs. Dow

The Valuations for an Internet company are generally 2.5 to 3 times greater than those for a Dow Jones company with the same growth and profitability

However, the valuation models converge as normal profit margins are achieved.

		EBITDA/Sales Margin					
		-60%	-30%	0%	10%	20%	40%
Sales Growth	0%	15.2	7.4	3.6	2.9	2.4	1.6
	10%	13.4	6.5	3.2	2.6	2.1	1.4
	20%	11.8	5.7	2.8	2.3	1.9	1.2
	40%	9.1	4.4	2.1	1.7	1.4	1.0
	80%	5.4	2.6	1.3	1.0	0.9	0.6
	160%	1.9	0.9	0.4	0.4	0.3	0.2

- Financial Performance Typical of Dow Jones members
- Financial Performance Typical of Internet companies

Example of “Real World” Application

Core Forces Affecting Financial Markets

Key Question: What forces fueled the market boom in the 1990s, and will these forces persist?

Popular Explanations

Reality

Baby Boomers created savings boom

False

Elimination of the federal deficit rebalanced supply and demand for national savings and interest rates fell

True





The profit boom of the 1990s created greater investment incentives

True, but misunderstood source

Core Forces Affecting Long-Term "Corp. X" Financial Markets

Long-Term Financial Industry Growth

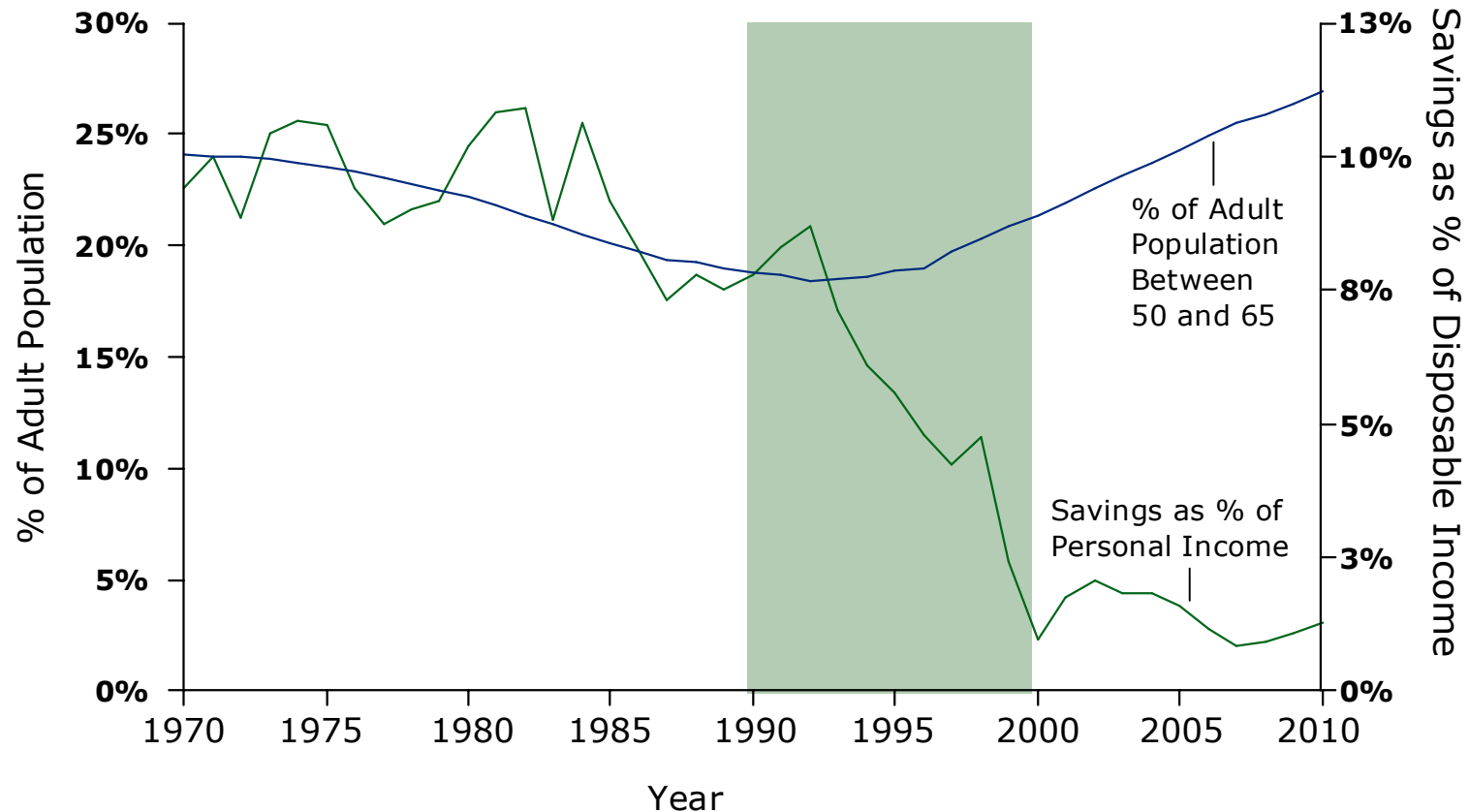
Key Question: What forces fueled financial industry growth in the 1990s, and will these forces persist?

Popular Explanations	Reality	Long-Term Implications for "Corp. X" Financial Markets
Baby Boomers generated a significantly larger savings pool as they hit pre-retirement age (50-65) in 1995	False: stock and bond market price appreciation effortlessly built retirement nest eggs throughout the 1990s, driving national savings rate down	 <p>The weak markets of 2001-2002 may boost saving rates, but saving will stall when Baby Boomers retire and draw down funds</p>
Elimination of the federal deficit rebalanced supply and demand for national savings and interest rates fell	True	 <p>Surpluses shifting to deficits will push bond yields up, P/E ratios down, and dampen share price appreciation</p>
The profit boom of the 1990s created greater investment incentives	True	 <p>Recession and high-tech bust in 2001-2002 evaporated the last several years of profit growth; recovery expected to begin in 2003</p>
Rapid growth in the number of wealthy households, and shift to public equity ownership, creates rising demand for financial services	True: the 2000-2001 market bust stalled wealth growth; however, levels pulled back only slightly (to 1998-1999 levels)	 <p>Market retrenchment did not destroy wealth accumulation from the entire decade; thus, market demand persists</p>

Core Forces Affecting Financial Markets

Popular Explanation # 1

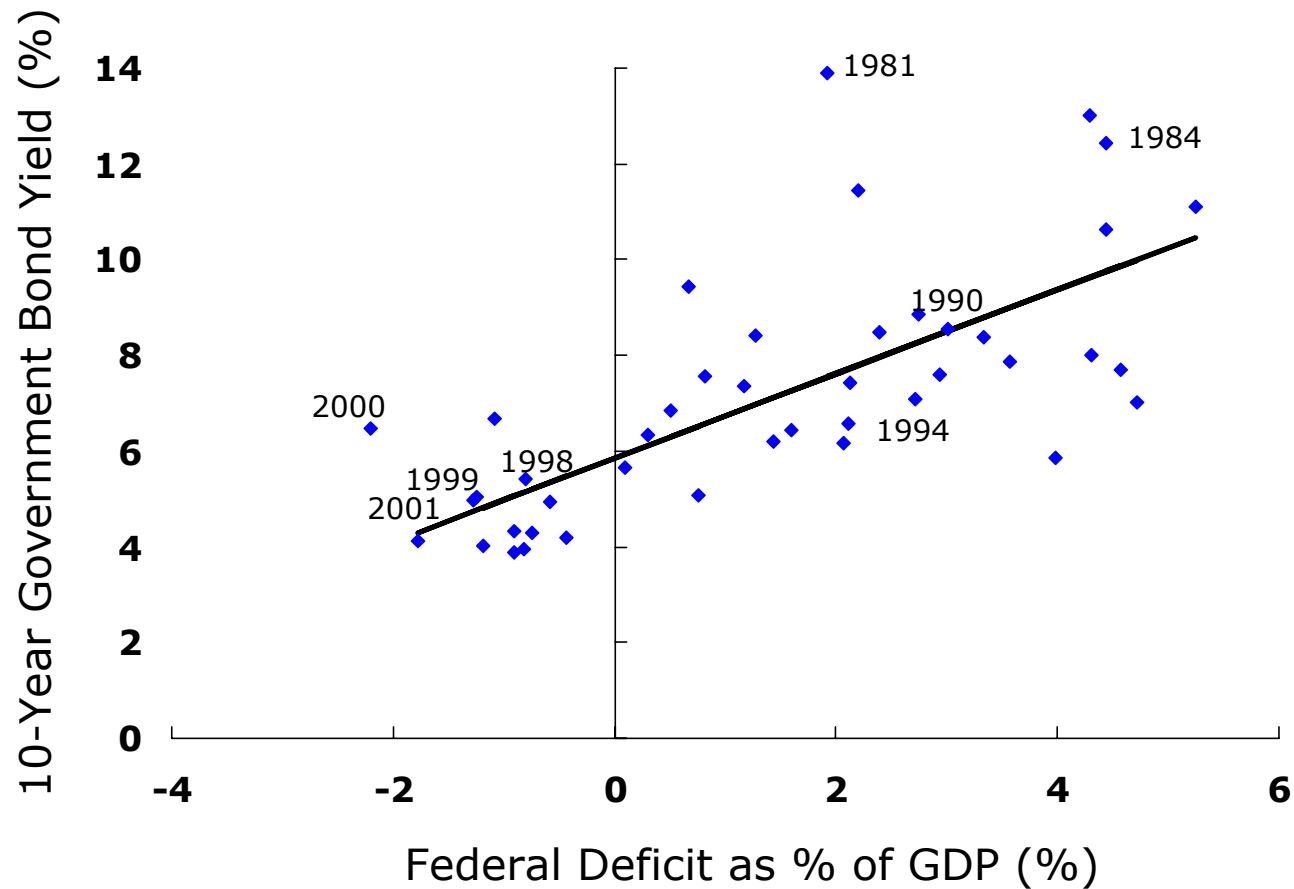
One popular explanation is that higher savings by Baby Boomers preparing for retirement is raising national savings and investment levels
Although this demographic trend is accurate, the implied impact on financial markets is incorrect, as savings have actually declined over this same time period



Core Forces Affecting Financial Markets

Popular Explanation # 2

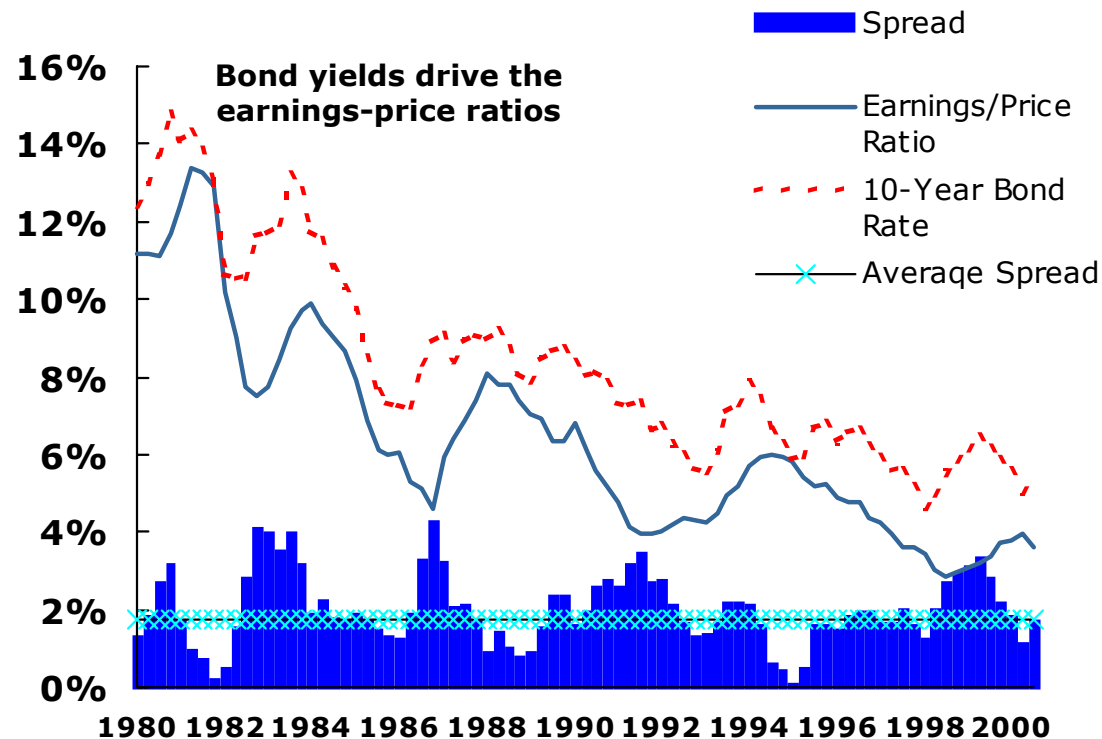
A second explanation involves fiscal policy in the 1980s and 1990s which drove the federal deficit to zero and later to surplus
The result of this policy was a steady decline in bond yields



Regression line is the fitted relationship between deficits and 10-Year Bond yields between 1959 and 1998
Source: Bureau of Economic Analysis

Core Forces Affecting Financial Markets

Popular Explanation # 2 continued

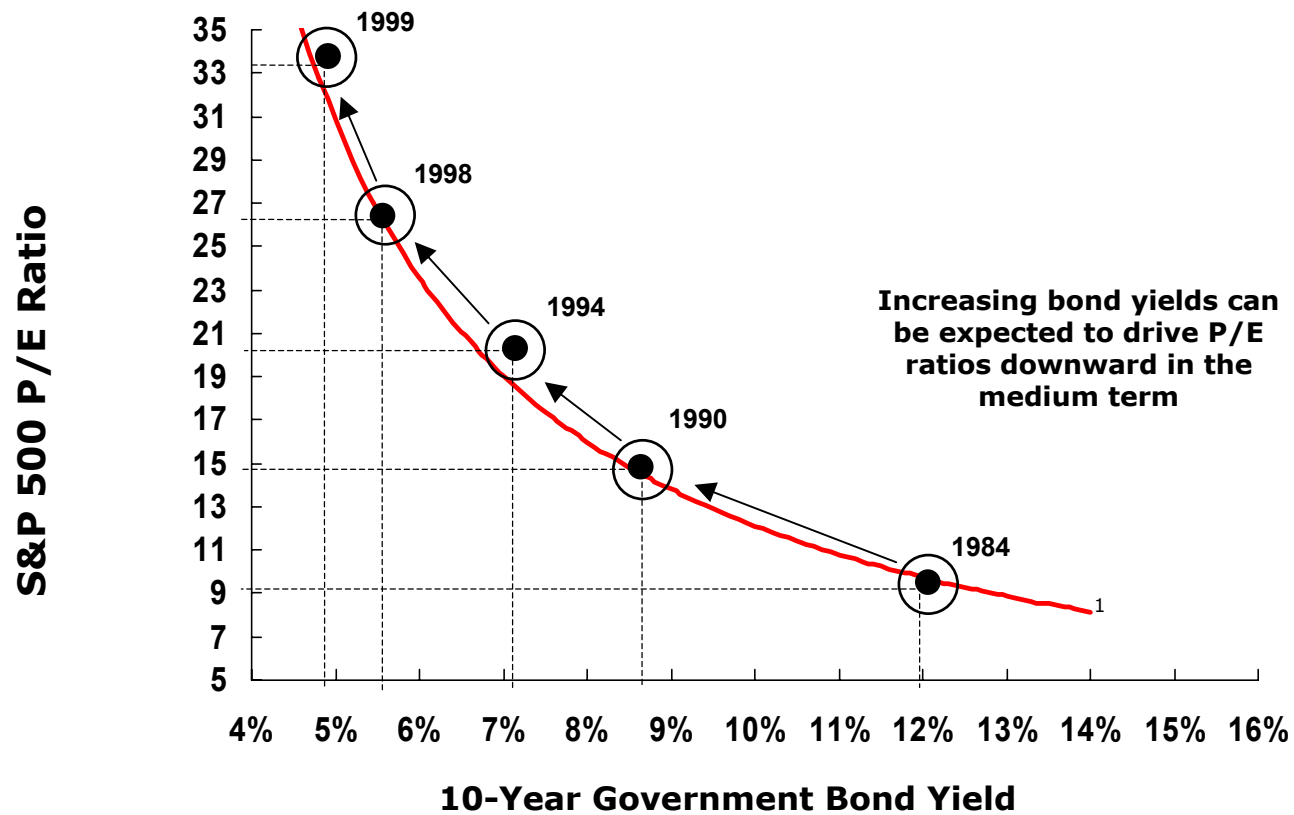


$$\text{Norm: } \frac{E}{P} = i - 1.75\%$$

Note: The smooth curve indicates a bond yield 1.75% above the earnings-price ratio

Core Forces Affecting Financial Markets

Popular Explanation # 2 continued

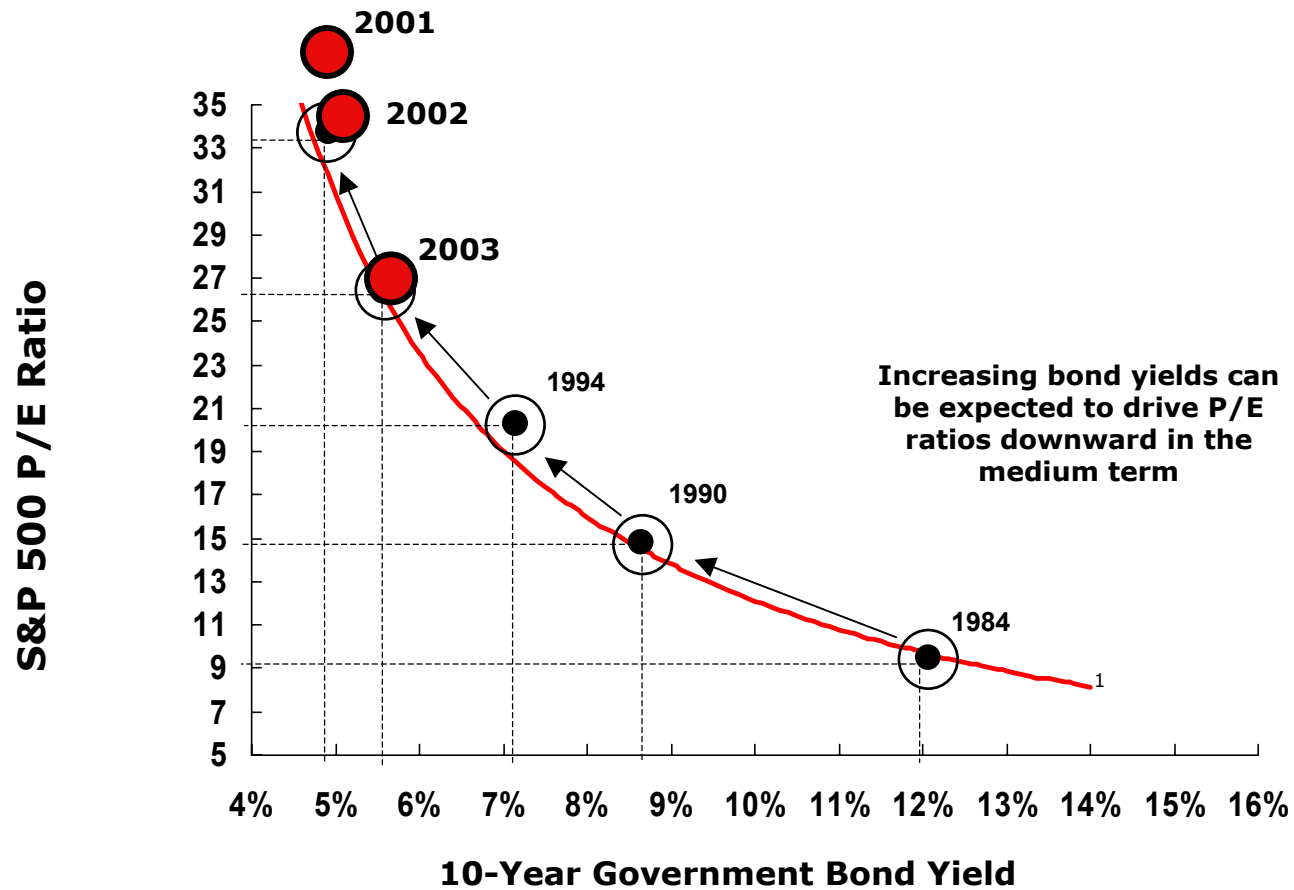


$$\frac{P}{E} = \frac{1}{i - 1.75\%}$$

Note: The smooth curve indicates a bond yield 1.75% above the earnings-price ratio

Core Forces Affecting Financial Markets

Popular Explanation # 2 continued



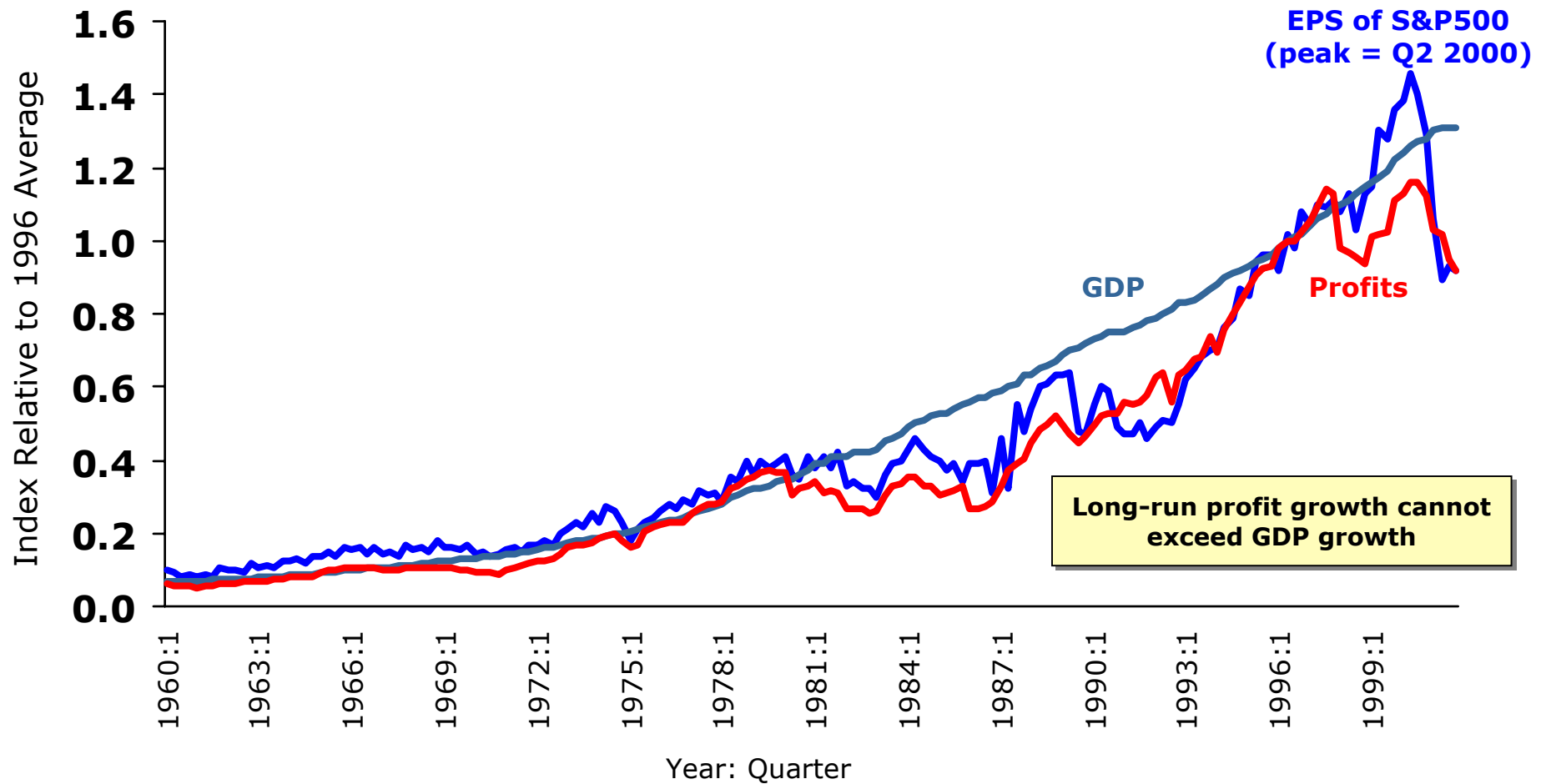
$$\frac{P}{E} = \frac{1}{i - 1.75\%}$$

Note: The smooth curve indicates a bond yield 1.75% above the earnings-price ratio

Core Forces Affecting Financial Markets

Popular Explanation # 3

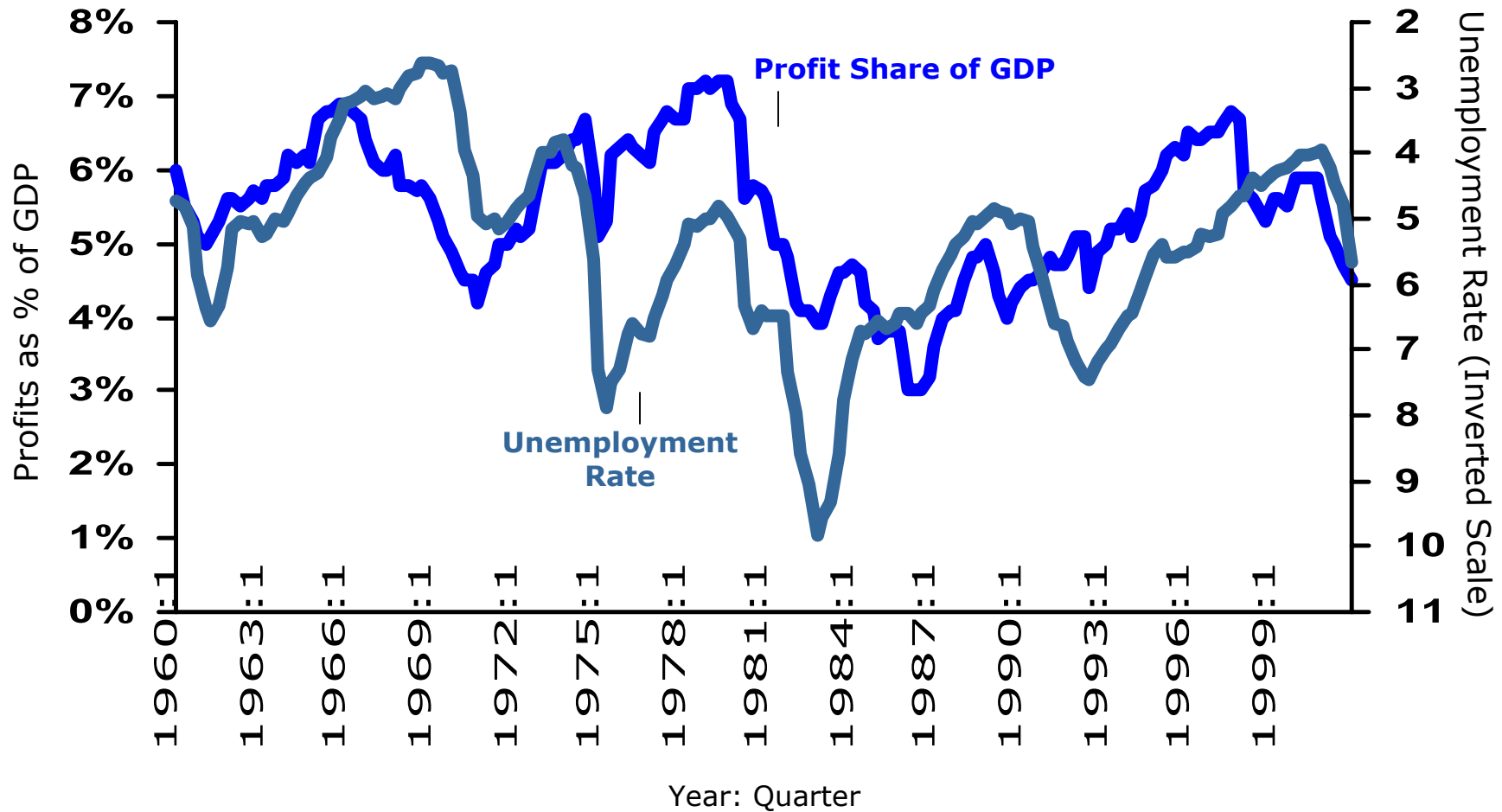
- The Technology Revolution Created Exceptional Productivity Growth and
- This created far higher profit growth



Core Forces Affecting Financial Markets

Popular Explanation # 3

The profit margin moves in a sharp, regular pattern



Core Forces Affecting Financial Markets

Popular Explanation # 3

Therefore short-run profit growth is a multiple of GDP growth

