Review of statistics

I. Description of stock price data to be used as an example

II. Mean, standard deviation, median

mean = average
median = middle value
standard deviation = measure of dispersion (measure of how spread out the data are)

III. Plots

- how a variable has evolved over time
- one variable vs. another

- 590 papers should typically include descriptive statistics

A. Stock price data

Recall that

- dividends are payments to owners of equity (stock)
- the total amount earned or lost by owning a share of stock for one year is the sum of the dividend and the change in the stock price
- the rate of return on owning a share of stock for one year is computed by dividing the total amount earned or lost by the stock price at the beginning of the year

Specifically:

R(t) = net real return on S and P 500 stock price index,
P(t) = real level of S and P 500,
D(t) = real dividends on S and P 500.

Thus

$$R(t) = \frac{P(t) - P(t-1) + D(t-1)}{P(t-1)}$$

Nominal data deflated by PPI (1982=100).

Annual data, 1871-2008 for dividends, 1871-2009 for prices; , P(t) measured in January. Note: return in (say) t=2009 means: return realized from January 2008 to January 2009

The underlying stock price series is an index, with 1941-43=10. Value on January 23, 2009:

January 2009 value = 832

The index is constructed from the actual dollar value of the 500 stocks that comprise the index.

This is a nominal figure. For economic analysis, we typically are interested in real figures. Following economists such as Shiller, we deflate using the Producer Price Index.

Basic statistics

We focus on the dividend-price ratio and on returns, because of some evidence linking the two.

A. Means, standard deviations

N=138

	R(t)	$\Delta P(t)/P(t-1)$	$D(t-1)/P(t-1)$
Mean	0.086	0.040	0.045
Std. deviation	(0.208)	(0.204)	(0.016)

B. Correlation between two variables

correlation[R(t),D(t-1)/P(t-1)] = 0.32
correlation[R(t),R(t-1)] = 0.037

C. Quantiles

	R(t)	$\Delta P(t)/P(t-1)$	$D(t-1)/P(t-1)$
minimum	-0.430	-0.451	0.011
25th percentile	-0.043	-0.091	0.035
median	0.087	0.037	0.044
75th percentile	0.190	0.148	0.055
maximum	0.711	0.642	0.092
No. of obs < 0 (% of total obs)	47 (34%)	55 (40%)	0 (0%)

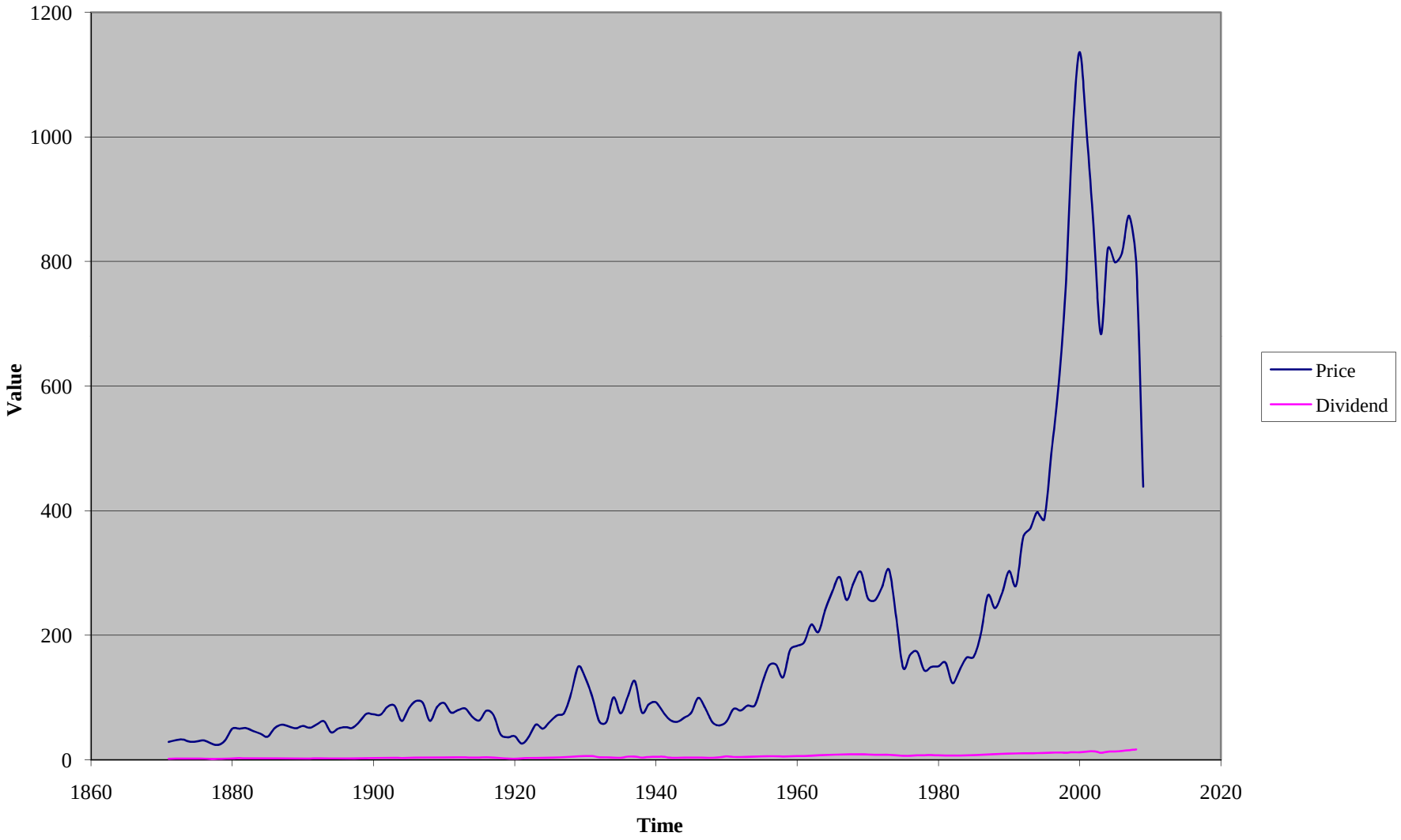
Values for the last 10 years

	R	D/P
1999	0.348	0.012
2000	0.144	0.011
2001	-0.103	0.013
2002	-0.143	0.016
2003	-0.179	0.017
2004	0.217	0.016
2005	-0.010	0.017
2006	0.036	0.018
2007	0.091	0.018
2008	-0.068	0.021
2009	-0.430	n.a.

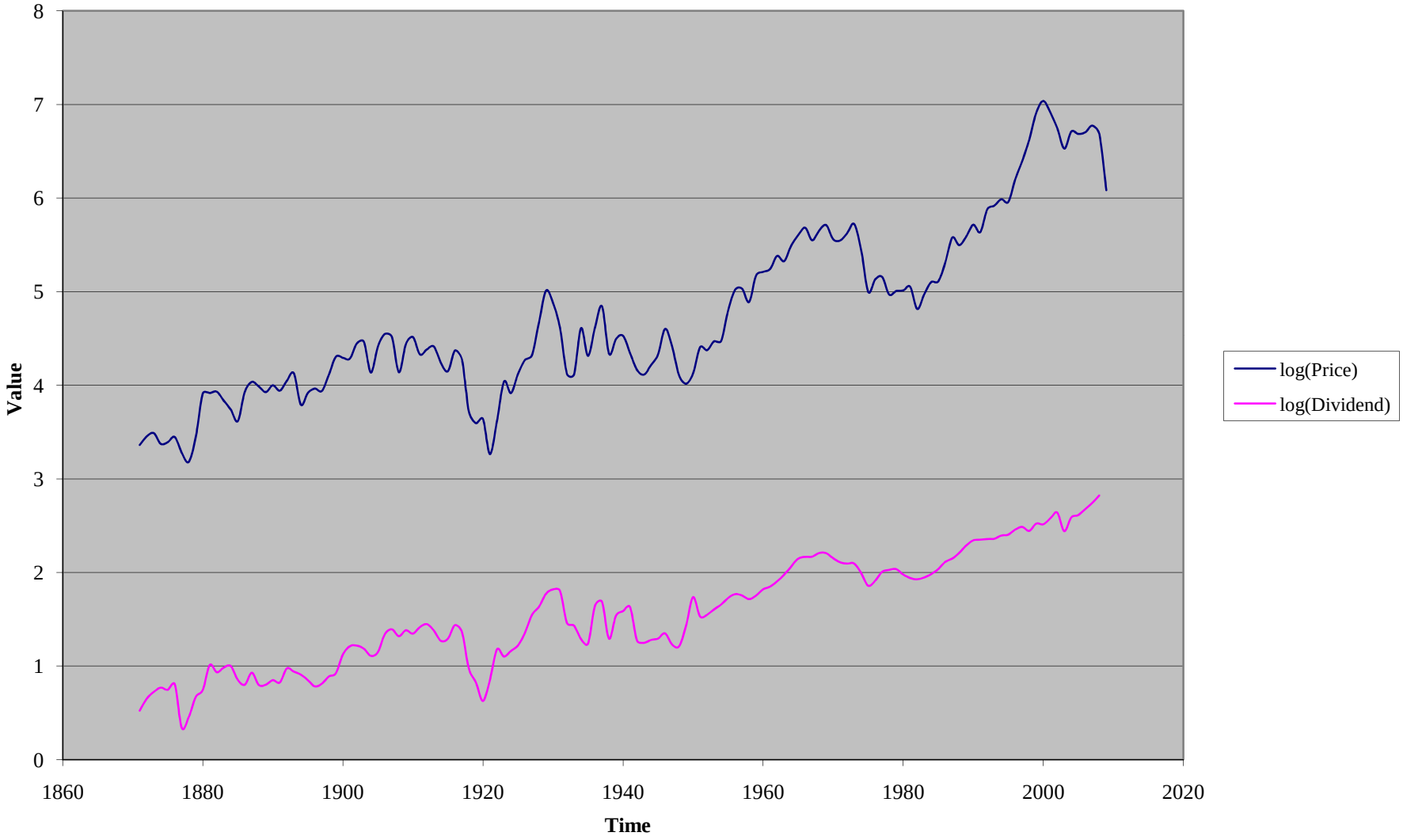
III. Plots

S&P 500 Real Price and Real Dividends
S&P 500 Real Price and Real Dividends (Log Scale)
S&P 500 Real Returns and Dividend - Price Ratio
Histogram of S&P 500 Real Returns
Histogram of S&P 500 Dividend - Price Ratio
S&P 500 Real Return vs. Previous Year's Real Return
S&P 500 Real Return vs. Previous Year's Dividend - Price Ratio

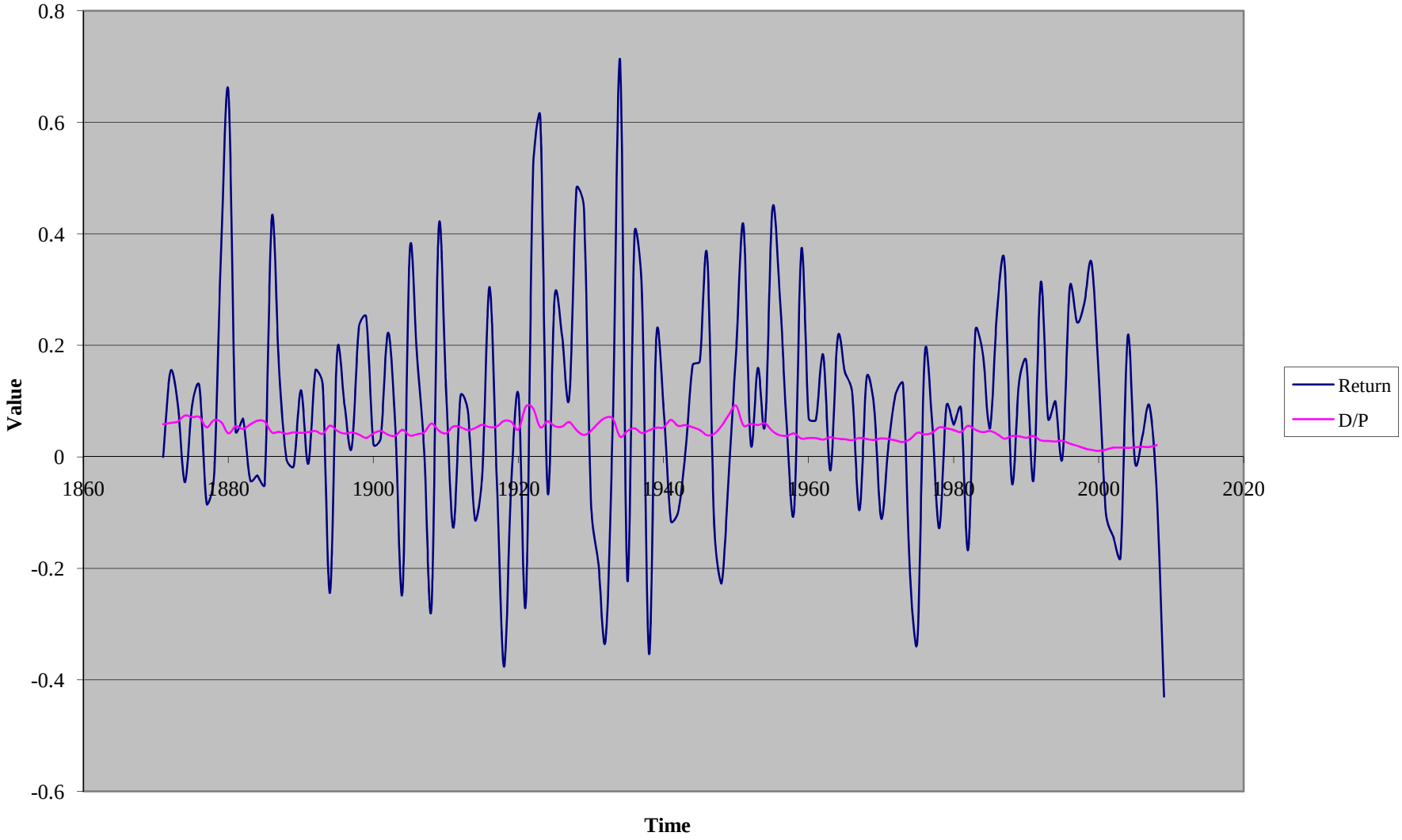
S&P 500 Real Price and Real Dividends



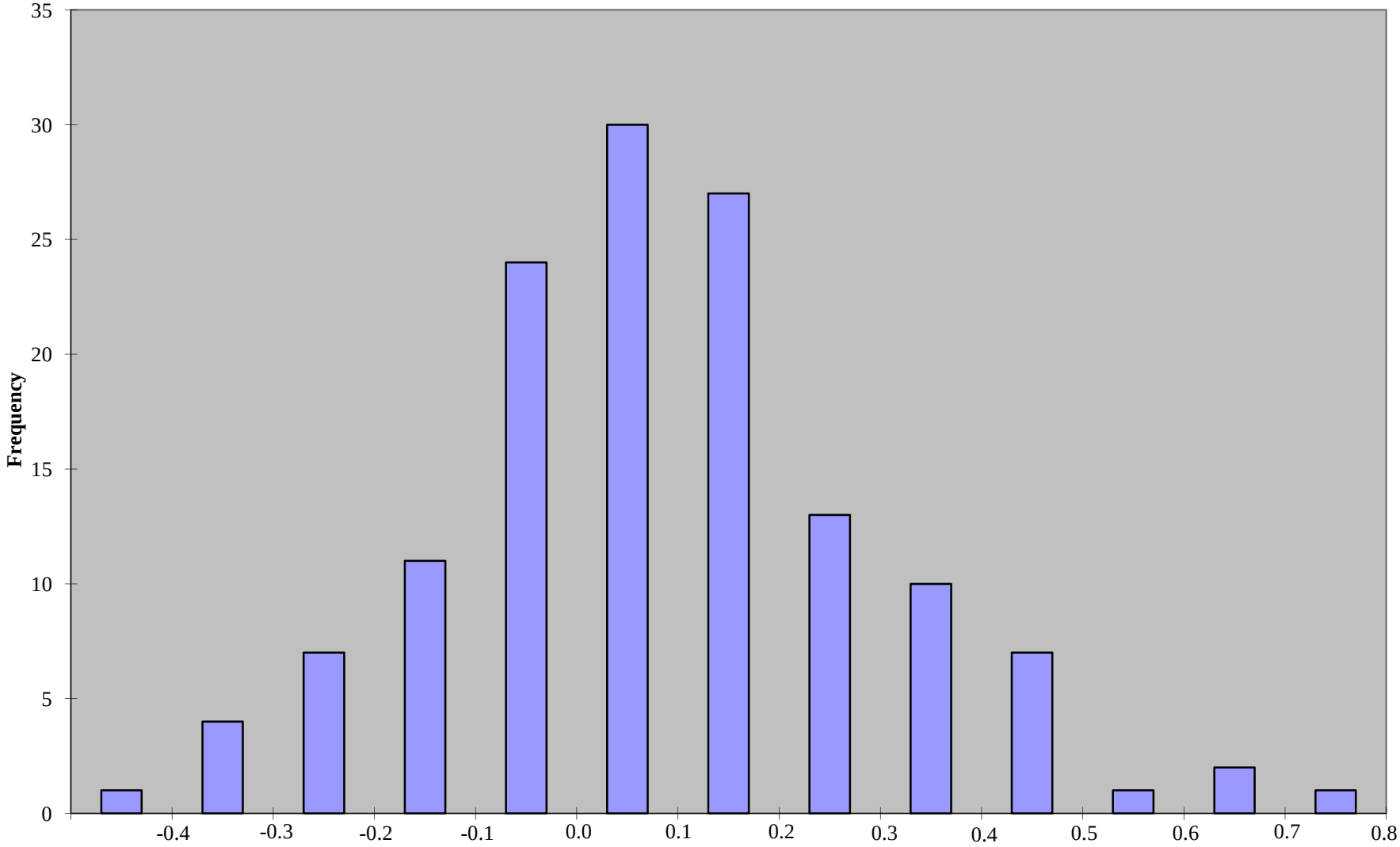
S&P 500 Real Price and Real Dividends (Log Scale)



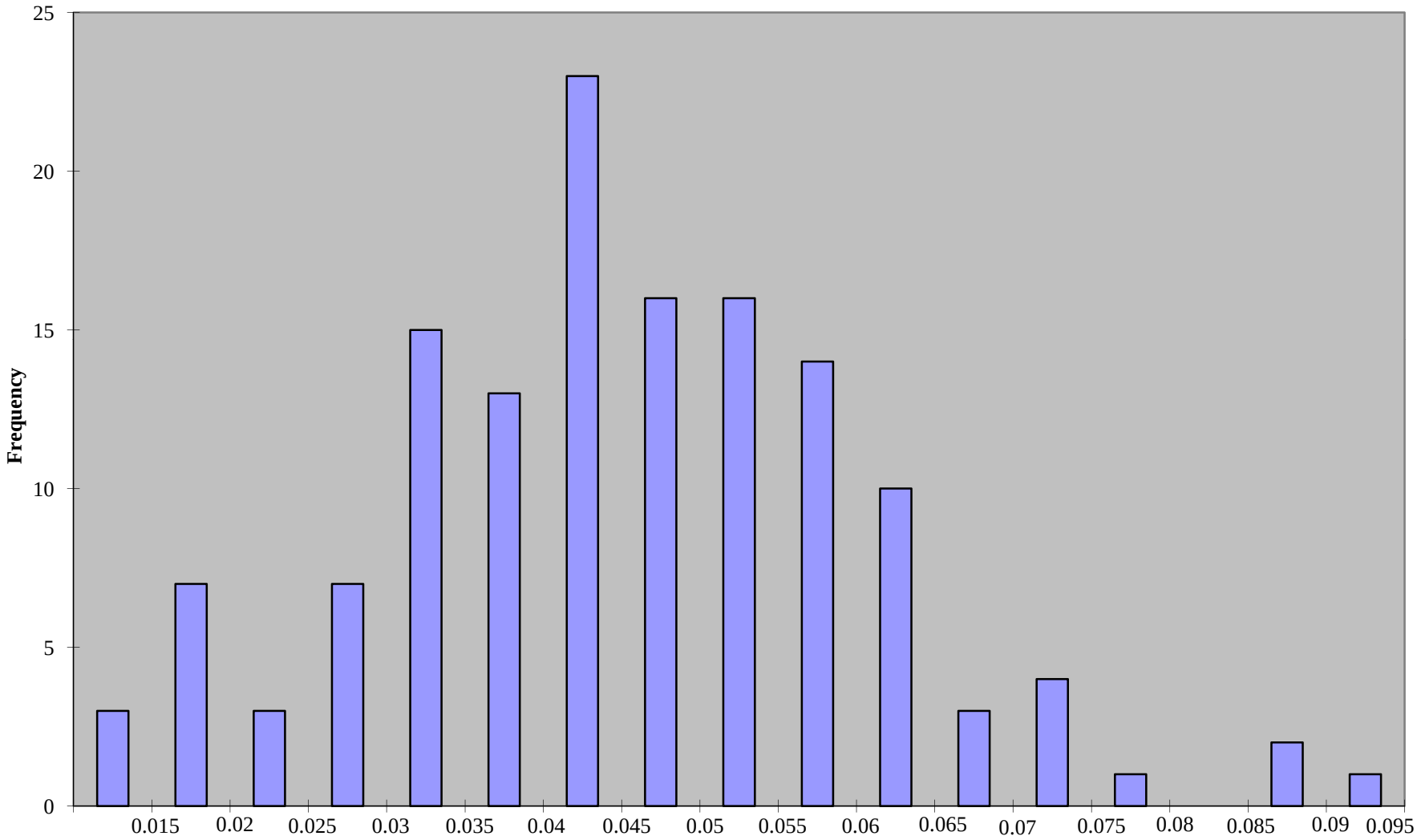
S&P 500 Real Returns and Dividend Price Ratio



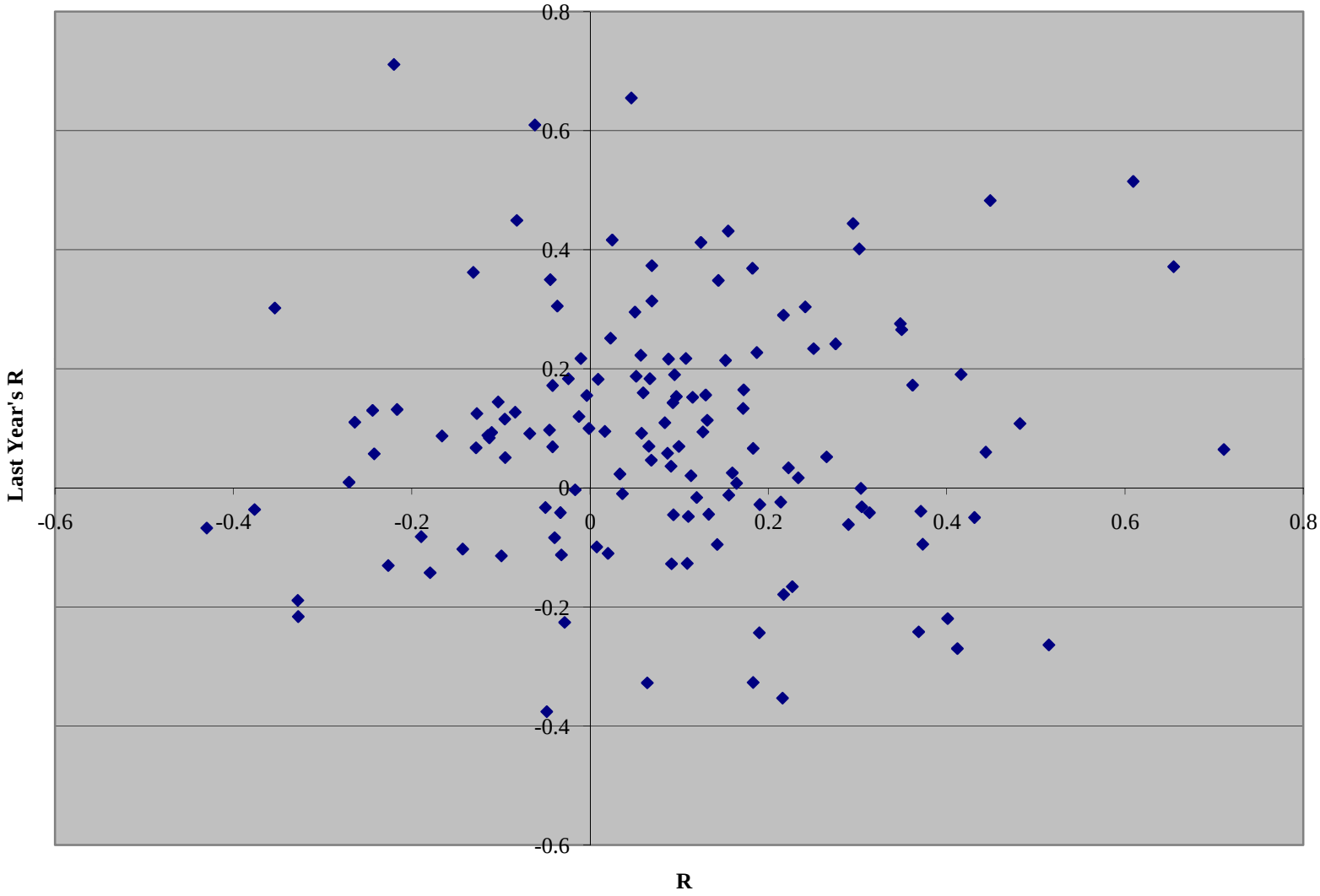
Histogram of S&P 500 Real Returns



Histogram of S&P 500 Dividend-Price Ratio



S&P 500 Real Return vs. Previous Year's Real Return



S&P 500 Real Return vs. Previous Year's Dividend-Price Ratio