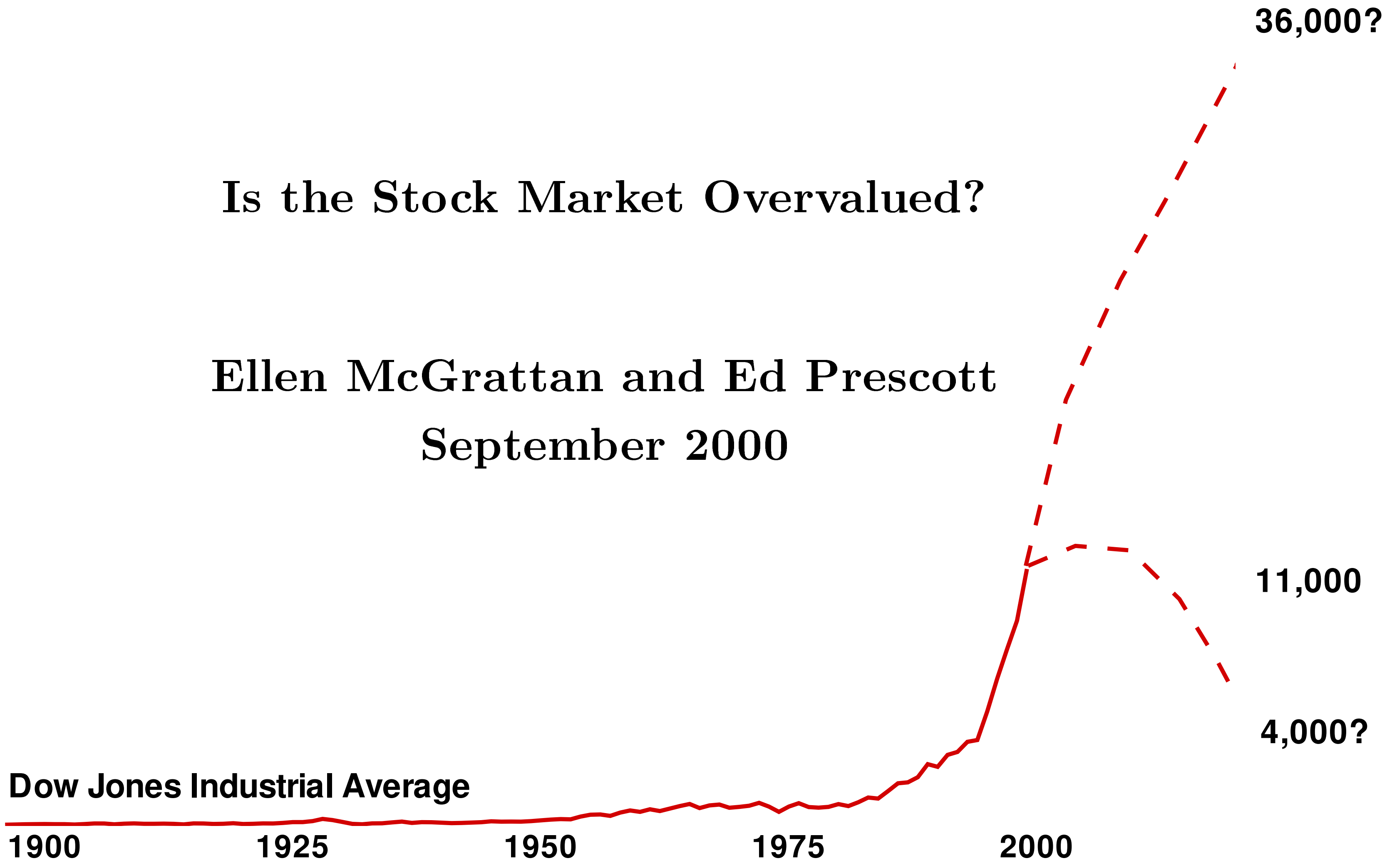
Is the Stock Market Overvalued?

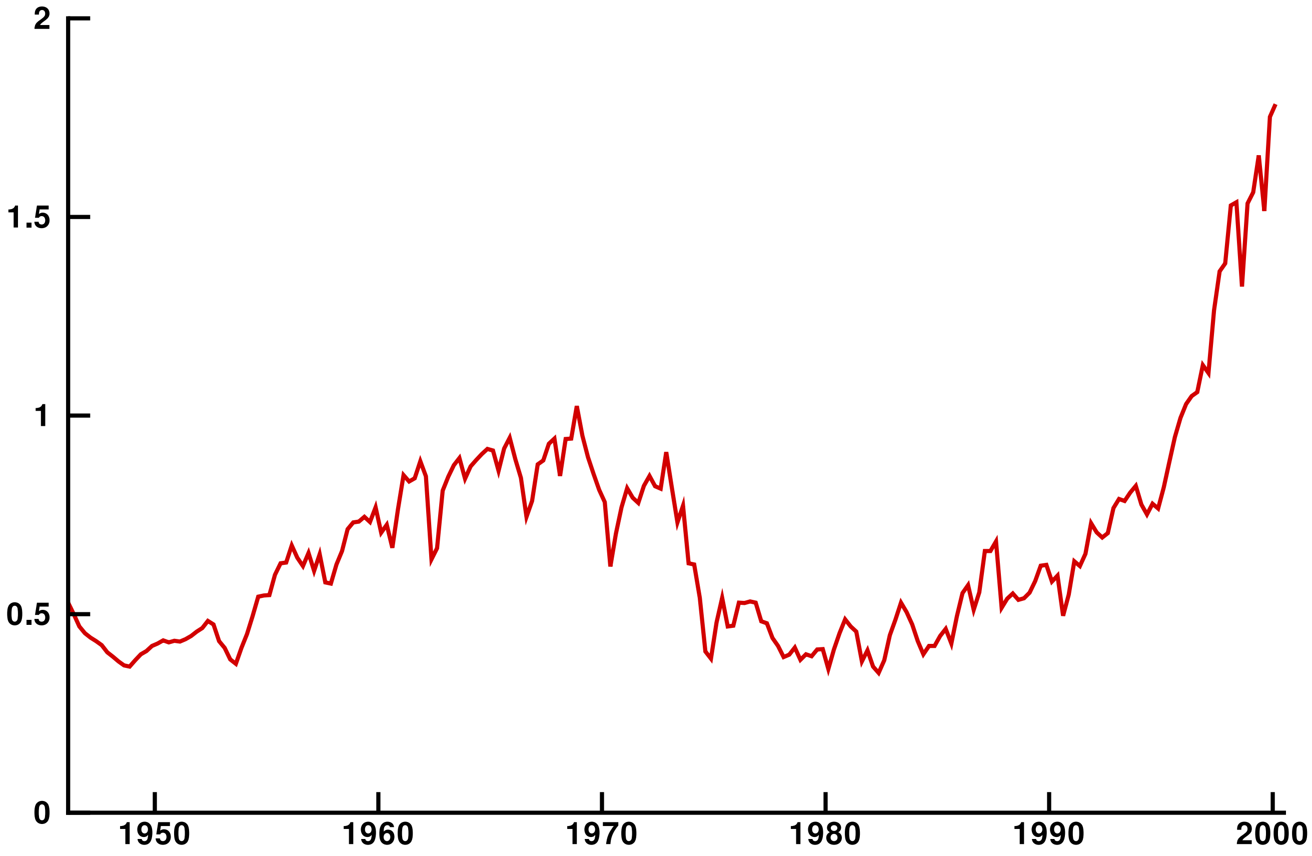
Ellen McGrattan and Ed Prescott

September 2000



Stock Market Value to GNP

- Doubled since 1994
- Previous peak in 1968

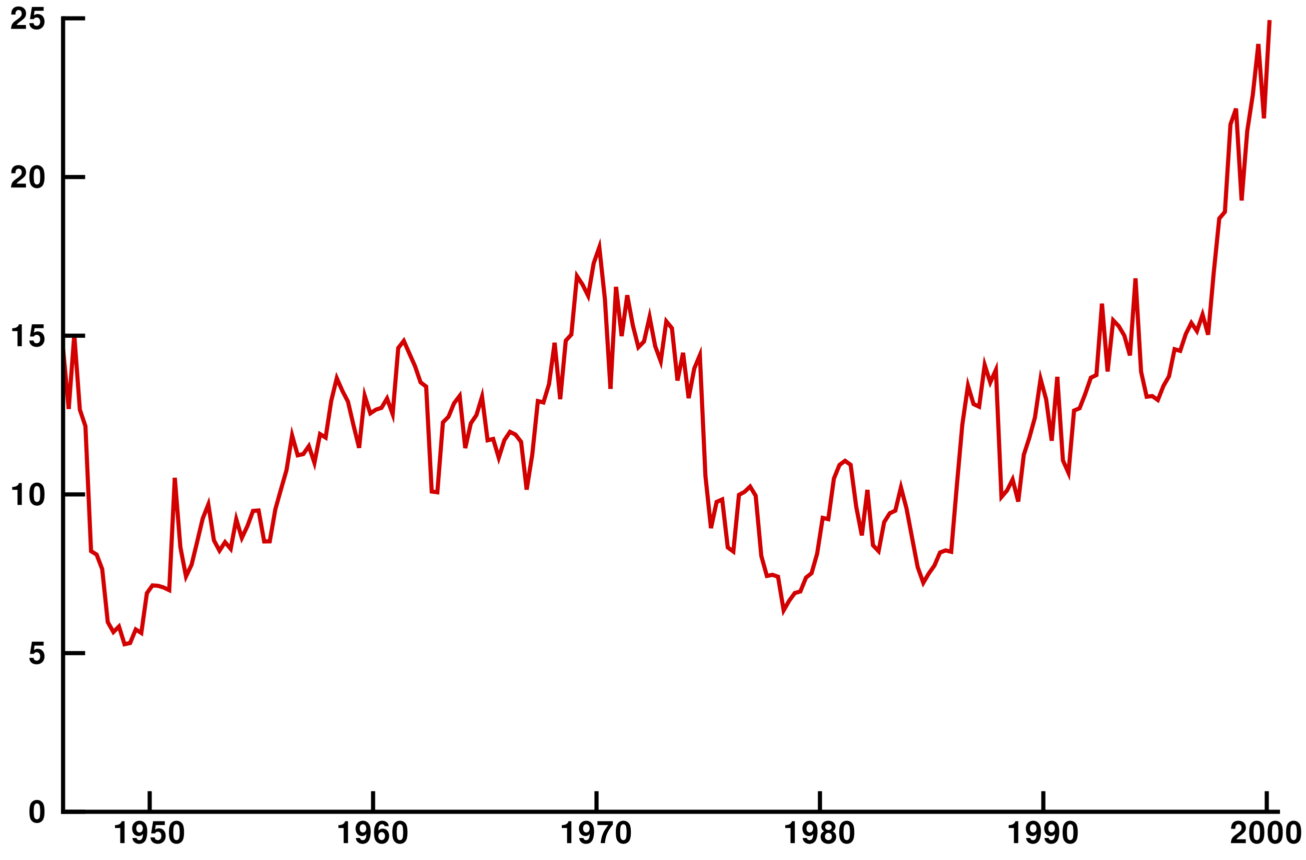


Stock Market Value

- Is 1.8 GNPs too high?
- Should Greenspan be concerned?
- Should investors switch from stocks to bonds?

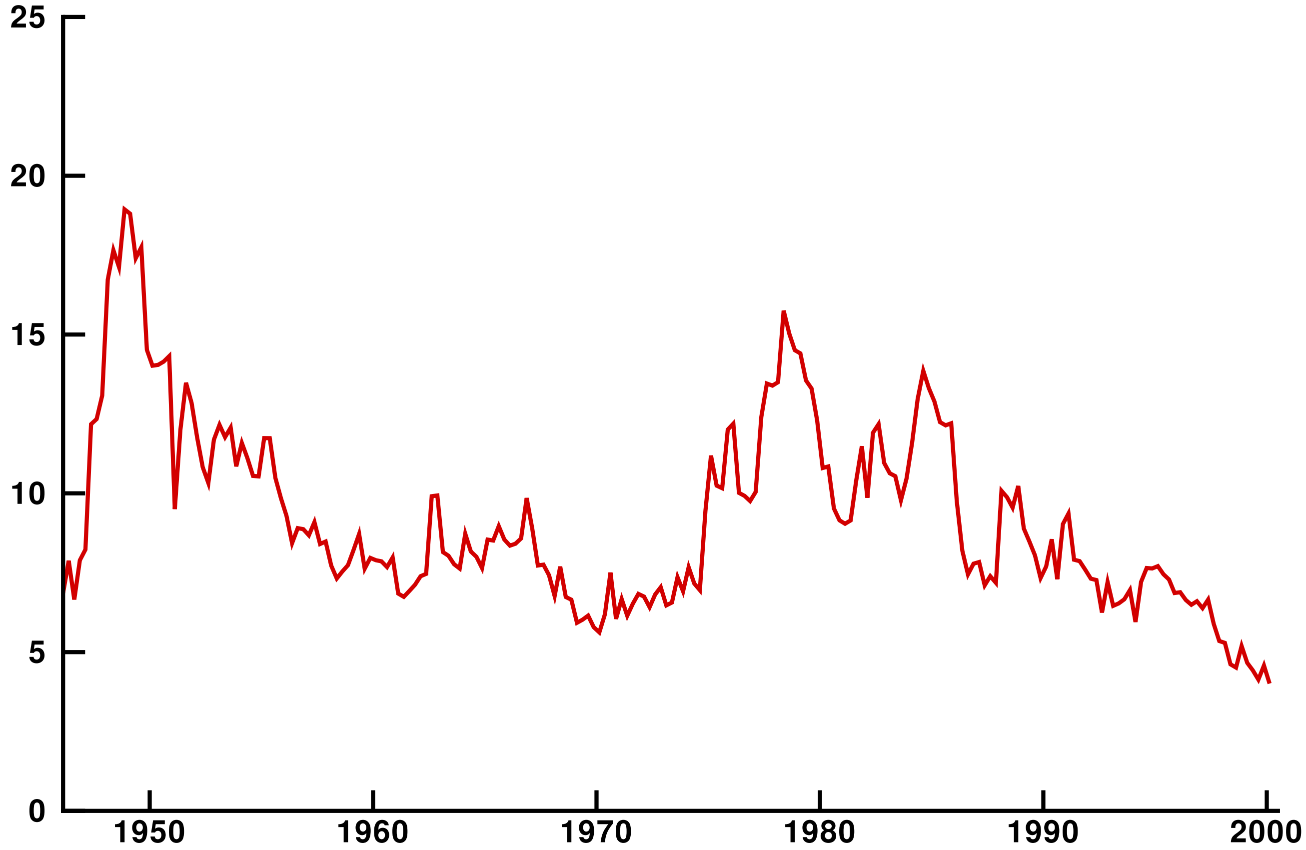
Price-Earnings Ratio

- At historical high
- Earnings not rising with price



Another look: Earnings-Price Ratio

- E/P like return
- At historical low



Earnings-Price Ratio

- **Is earnings-price ratio of 4% too low?**
- **Should we expect 7% *real* stock returns of the past?**

\$1 in 1802 in stocks $\Rightarrow$ \$658,000 in 2000

in long-term bonds $\Rightarrow$ \$900

Bubble?

- **Or should we expect a crash like in Japan?**

PICTURE OF NIKKEI

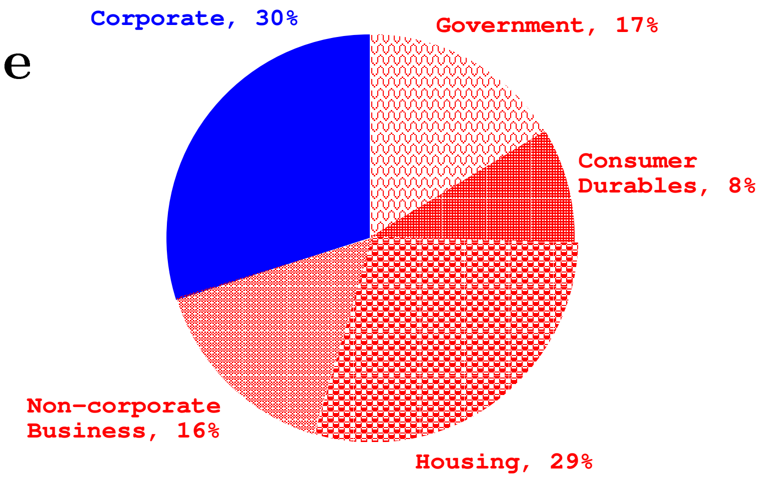
Our Reading of the Data

- Is 1.8 GNPs too high? No.
- Should Greenspan be concerned? No.
- Should investors switch from stocks to bonds? Possibly.
- Is earnings-price ratio of 4% too low? No.
- Should we expect 7% real returns of the past? No.
- Should we expect a market crash? If it goes higher.

Theory

- **Main results:**
  - **Value of stocks = Value of corporate capital stock**
  - **Return on stocks $\approx$ Return on capital stock**
  - **Earnings-price ratio $\approx$ Return on stocks**
  - **Equity premium is small**

Key Facts Motivating Model We Use



- Corporate and non-corporate sectors large
  $\Rightarrow$ need 2 sectors

- Corporate sector nearly 100% equity financed
  $\Rightarrow$ don't worry about corporate debt

- Household debt/equity holding is 1.9/1.4 GNPs
  $\Rightarrow$ households not on corners

- Household pension debt/equity is .57/.63 GNPs
  $\Rightarrow$ can avoid transaction costs of switching

2-Sector Growth Model

- **Willingness to substitute:**

  $\sum_{t=0}^{\infty} \beta^t \left[\frac{1}{1-\sigma} (c_t \ell_t^{\psi})^{1-\sigma} \right] N_t$

- **Ability to transform (1=corporate, 2=noncorporate):**

$$y_1 = (k_{1m})^{\phi_m} (k_{1u})^{\phi_u} (z n_1)^{1-\phi_m-\phi_u}$$

$$y_2 = (k_2)^{\theta} (z n_2)^{1-\theta}$$

$$y = A \left(\mu y_1^{\rho} + (1-\mu) y_2^{\rho} \right)^{1/\rho}$$

Variables:

c = **consumption,** ℓ = **leisure,** N = **household size**

y = **output,** k = **capital,** n = **labor,** z = **technology**

Stock Value and Asset Returns

- **Value at date t**

$$V_t = \underbrace{k_{1m,t+1}}_{\text{value of tangible capital}} + \underbrace{(1-\tau_{1,t})k_{1u,t+1}}_{\text{value of intangible capital}}$$

- **Asset returns, t to $t+1$:**

$$r^e_{t,t+1} = \frac{V_{t+1} + d_{t+1}N_{t+1}}{V_t} - 1$$

$$r^f_t = \left[\beta E_t \frac{(c_{t+1})^{-\sigma}(\ell_{t+1})^{\psi(1-\sigma)}}{(c_t)^{-\sigma}(\ell_t)^{\psi(1-\sigma)}}\right]^{-1} - 1$$

Note: τ_1 is the corporate tax rate

d is corporate distributions

Value of Corporate Capital, 1990-1999

Structures	0.47 GNPs
Equipment	0.36
Inventories	0.16
Land	0.06
U.S. capital abroad	0.29
Unmeasured intangible capital	0.41
Total	1.75 GNPs

Current Value of Stocks	1.80 GNPs

$\Rightarrow$ 1.8 GNPs is not too high.

Estimates of Capital, 1990-1999

- **U.S. Capital Abroad**
  - **Profits of foreign subsidiaries = .012 GNPs**
  - **Return on their capital $\approx$ 4.1 %**

  $\Rightarrow$ **Value of stock $\approx$ .012/.041 = .29 GNPs**

- **Intangible Capital**
  - **Assume returns to capital in all sectors equal**
  - **Assume part of corp. profits from intangible capital**

  $\Rightarrow$ **formula for value of intangible capital = .41 GNPs**

Asset Returns: Prediction of Theory

- **Steps taken:**
  - **Calibrate model to U.S. 1990-1999**
  - **Simulate model – compute average returns**
- **Findings:**
  - **Average returns on equity (r^e) and debt (r^f) $\approx$ 4.1%**
  - **Equity premium less than .1%**

$\Rightarrow$ **earnings-price ratio of 4% not too low**

$\Rightarrow$ **we should not expect 7% real returns of the past**

Equity Premium Puzzle

- **Mehra and Prescott (1985):**
  - **showed large historical premium inconsistent with standard theory**
  - **this lead to many theories of large premium**

- **Current data show a vanishing premium**

What Should Investors Do?

- **Diversify**
- **Consider inflation-protected bonds**
- **Sell if market value continues to rise**
- **Buy if it crashes**