



TAXES, REGULATIONS, AND THE VALUE OF US
CORPORATIONS: A REASSESSMENT

ELLEN MCGRATTAN

UNIVERSITY OF MINNESOTA

Tom Cooley Memorial Conference, May 5–6, 2023



The Story Begins in 1995



Frontiers of Business Cycle Research

*The most important aspect of the real business cycle development is that it established a prototype and a set of tools for computing the equilibria of artificial economies and studying their empirical properties... The chapters show how to structure and address important **questions** by using these tools.*

— Thomas F. Cooley



Fast Forward to December 1996



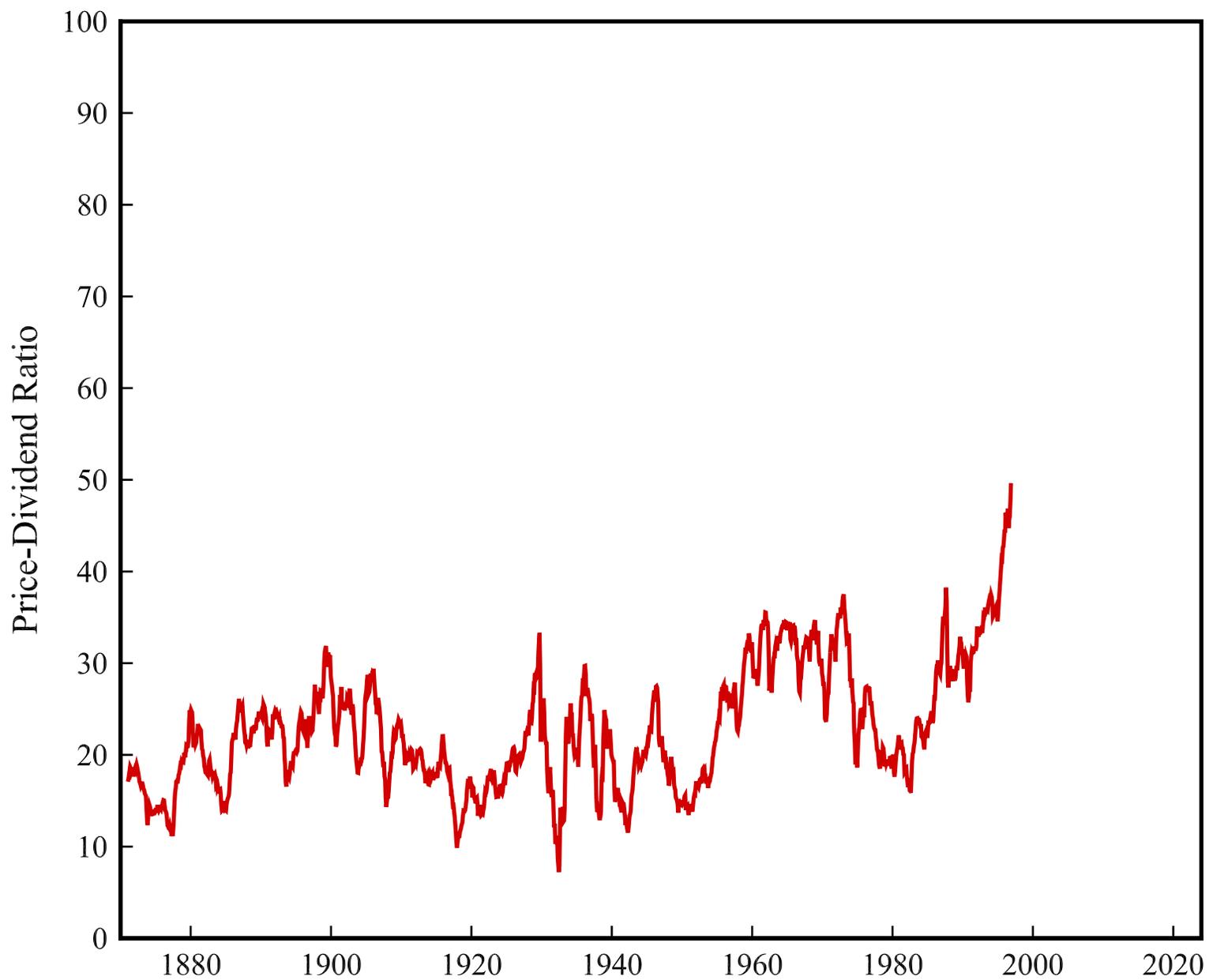
Campbell and Shiller

- Testified before Fed Board on 12/3/96
 - Price-dividend ratios historically high
 - Reversion to mean likely

- What were they seeing?

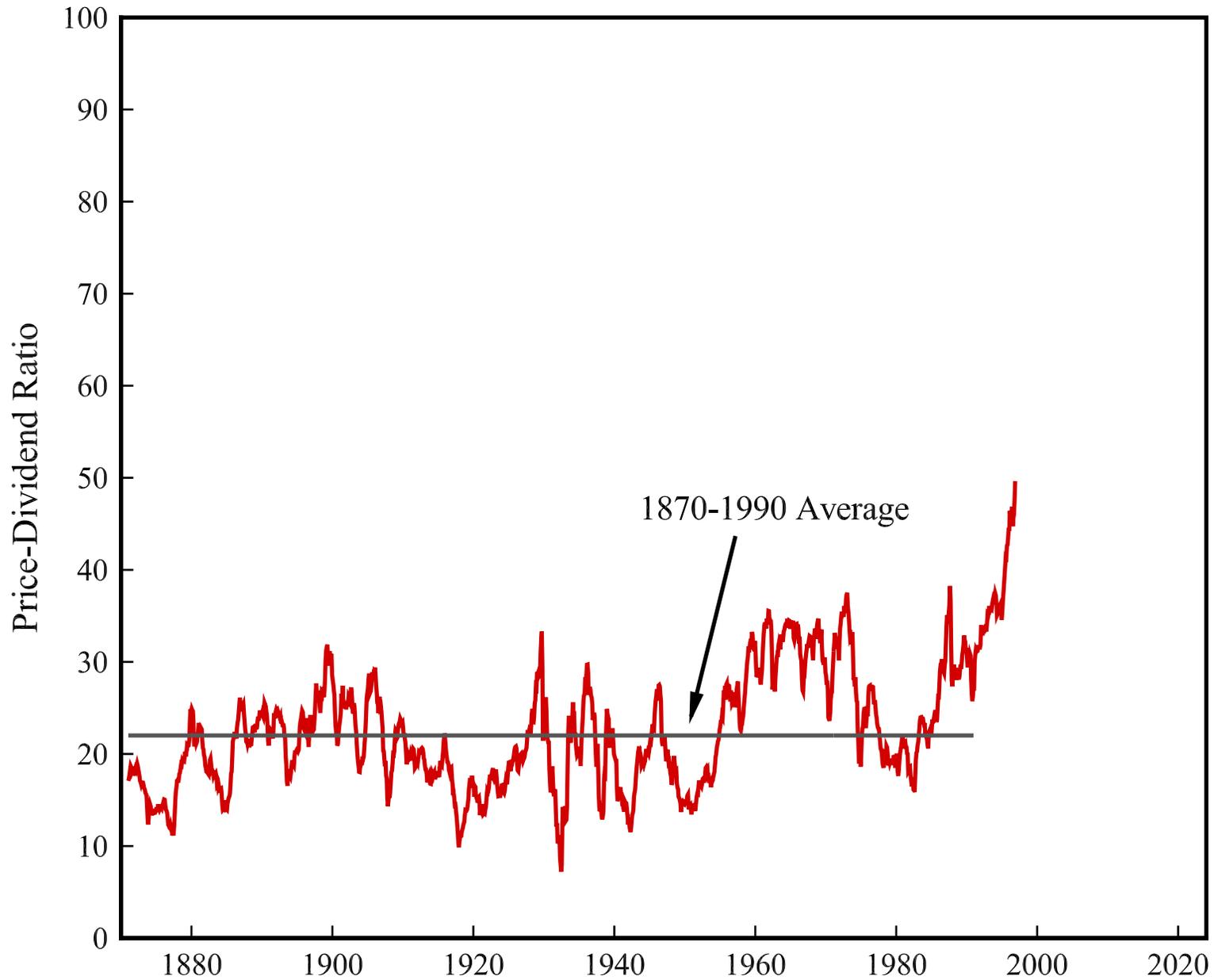


S&P Price-Dividend Ratio, 1871:01–1996:11





S&P Price-Dividend Ratio, 1871:01–1996:11





Meanwhile

- Greenspan publicly worried about irrational exuberance
- Prescott privately worried he invested too much in stocks!



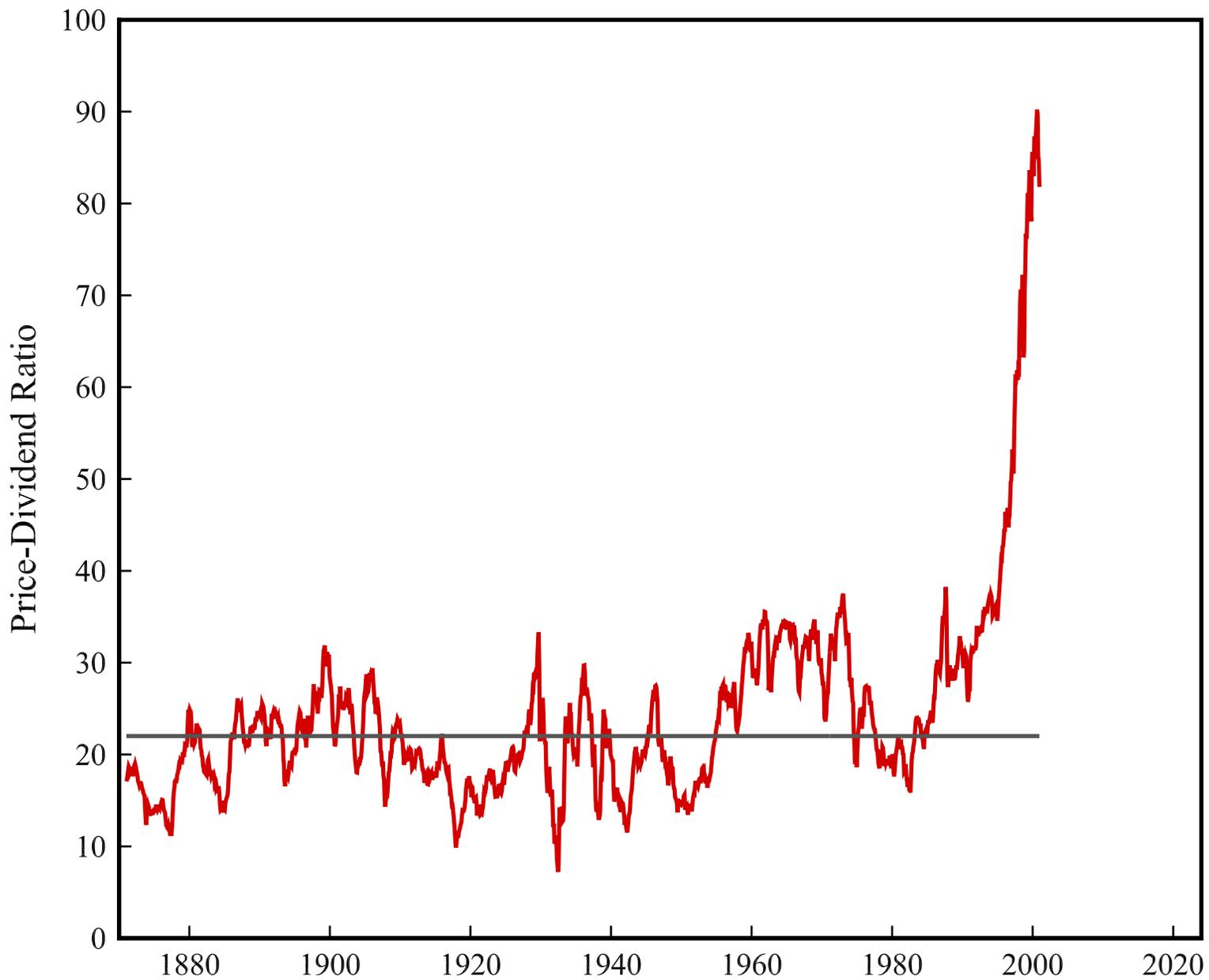
Fast Forward to 2001

- Campbell and Shiller updated their analysis
 - Price-dividend ratios were even higher
 - Reversion to mean very likely

- What were they seeing?



S&P Price-Dividend Ratio, 1871:01–2000:12

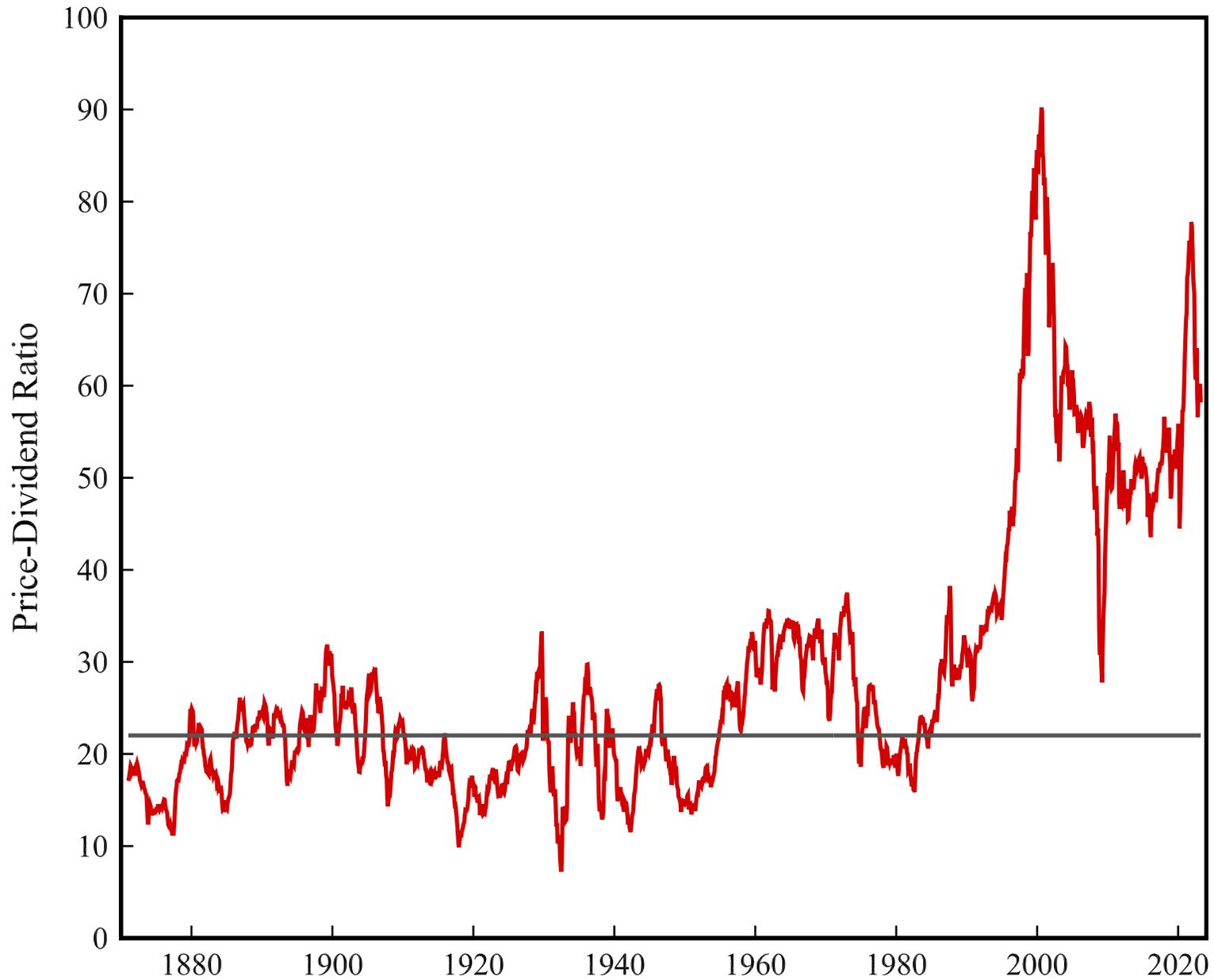




What would Campbell and Shiller conclude today?



S&P Price-Dividend Ratio, 1871:01–2023:03





Was/Is the Market Overvalued? A Cooley Perspective



Using Theory

- Predictions of neoclassical theory:
 - (1) Value of corporations = value of fixed assets
 - (2) = present value of distributions
- Checking (1) is easier than (2)



Theory: Incorporating Intangibles

- Preferences:

$$\sum_{t=0}^{\infty} \beta^t U(c_t, n_t)$$

- Corporate technology:

$$y_t = f(k_{T,t}, k_{I,t}, z_t n_t)$$

- Variables:

c = consumption, ℓ = leisure, y = output

k_I, k_T = in/tangible capital, n = labor, z = technology



Theory: Incorporating US Tax System

- Corporate income tax
- Distribution tax
- Labor income tax
- Sales/excise tax
- Property tax



Theory: Incorporating US Tax System

- Corporate income tax
- Distribution tax[†]
- Labor income tax
- Sales/excise tax
- Property tax

[†] Not included in “Is the Stock Market Overvalued?” (QR 2000)



The US Tax System

- and the Corporation:

$$\begin{aligned} \max \sum_{t=0}^{\infty} p_t \{ & y_t - w_t n_t - x_{T,t} - x_{I,t} \\ & - \tau_{\text{corp}} [y_t - w_t n_t - \delta_T k_{T,t} - \tau_{\text{prop}} k_{T,t} - x_{I,t}] \\ & - \tau_{\text{prop}} k_{T,t} + \tau_{T,\text{subs}} x_{T,t} + \tau_{I,\text{subs}} x_{I,t} \} \end{aligned}$$

- and the Household:

$$\begin{aligned} \sum_{t=0}^{\infty} p_t \{ & (1 + \tau_{\text{cons}}) c_t + v_t (s_{t+1} - s_t) \} \\ \leq \sum_{t=0}^{\infty} p_t \{ & (1 - \tau_{\text{dist}}) d_t s_t + (1 - \tau_{\text{labor}}) w_t n_t + y_{\text{other},t} \} \end{aligned}$$



Main Theoretical Results



$V =$ Value of Corporate Capital (k_T, k_I)

$$V_t = (1 - \tau_{\text{dist}}) [(1 - \tau_{T,\text{subs}})k_{T,t+1} + (1 - \tau_{\text{corp}} - \tau_{I,\text{subs}})k_{I,t+1}]$$

V aggregate value of corporate equities ($= \sum_i v_{it} s_{it}$)

τ_{dist} tax rate on corporate distributions

τ_{corp} tax rate on corporate income

$\tau_{T,\text{subs}}$ subsidy for tangible investments

$\tau_{I,\text{subs}}$ subsidy for intangible investments

k_T tangible corporate capital stock

k_I intangible corporate capital stock



Distribution Tax Relevance for V

$$V_t = (1 - \tau_{\text{dist}}) \underbrace{\left[(1 - \tau_{T,\text{subs}})k_{T,t+1} + (1 - \tau_{\text{corp}} - \tau_{I,\text{subs}})k_{I,t+1} \right]}_{\text{Not directly affected by } \tau_{\text{dist}}}$$

\Rightarrow If tax rate on distributions falls

- Corporate value-output ratio rises
- Capital-output ratios remain flat



Treatment of Capital Gains

- Previous work assumed tax on accrual, not realization:

$$\tau_{\text{dist}} = 1 - \left(\frac{1 - \tau_{\text{pers}}}{1 - \tau_{\text{cg}}} \right)$$

- US taxes on realization:
 - $\tau_{\text{dist}} = \tau_{\text{pers}}$ if distribution by dividends
 - $\tau_{\text{dist}} = \tau_{\text{cg}}$ if distribution by buying back shares



Treatment of Tax Deferral

- If tax deferral through retirement accounts allowed
- Then:

$$\tau_{\text{dist}} = 0$$

- Intuition: invest \$1
 - Give up $(1 - \tau_{\text{pers}})$ today
 - Get $(1 - \tau_{\text{pers}})(1 + i)^T$ in T periods



NIPA Profits and Corporate Capital

- If returns to tangible and intangible assets equated
- Then, on a balanced growth path:

$$\text{NIPA profit} = \frac{i}{1 - \tau_{\text{corp}}} k_T + (i - g)k_I$$

- Intuition:
 - Capitalize tangibles: $(r_T - \delta_T)k_T$
 - Expense intangibles: $r_I k_I - x_I$

⇒ Estimates of i , g , k_T can be used to infer k_I



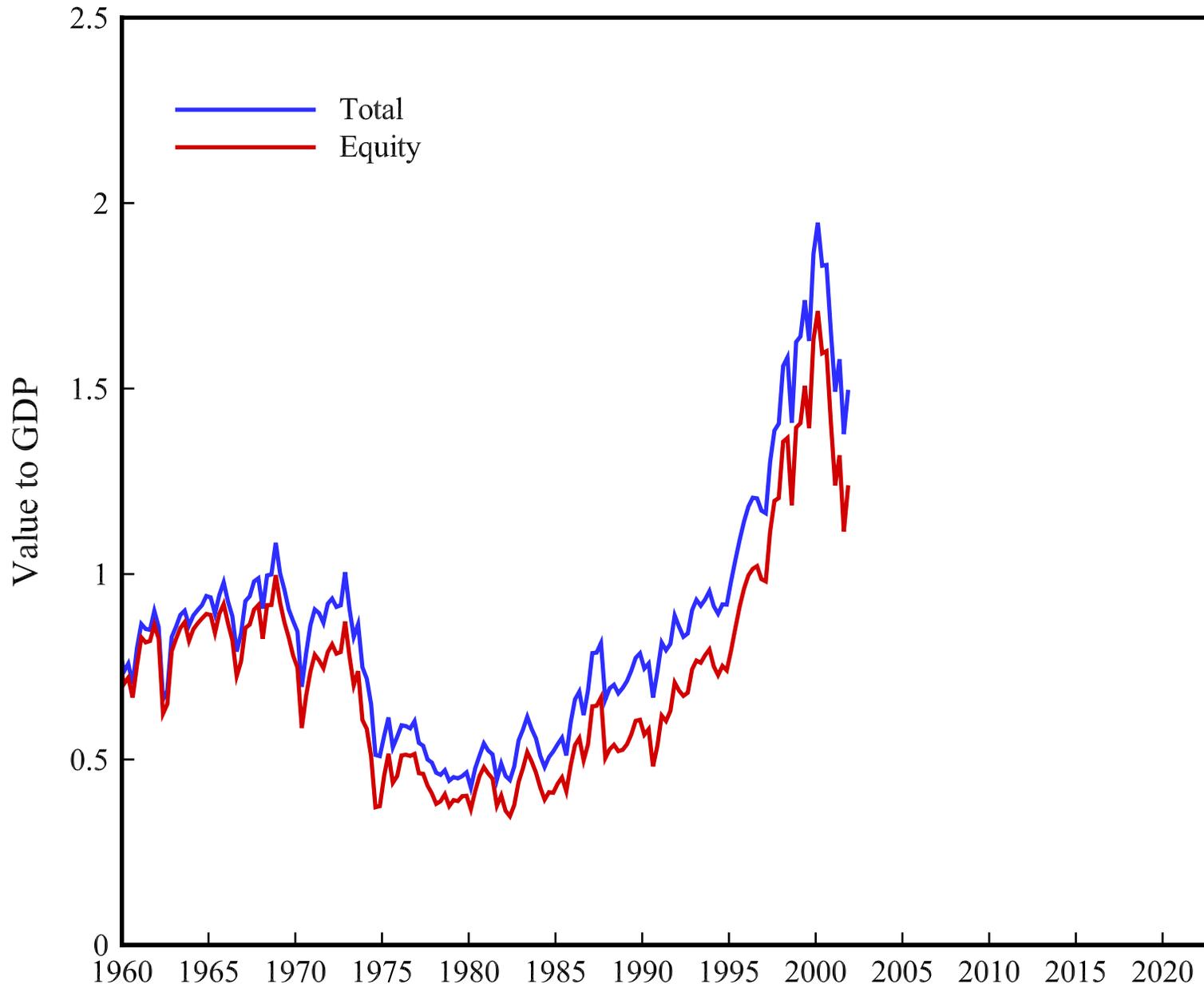
Rise in US Corporate Value

- Analyzed growth model with
 - NIPA data for 1960–2001
 - Profit relation to infer intangible stock
- Predicted that V/GDP should have roughly doubled
 - Large decline in tax on distributions
 - Large rise in outward FDI

† See McGrattan and Prescott (Restud 2005)
Taxes, Regulations, and the Value of US and UK Corporations



Corporate Value to GDP, 1960–2001





Predicted and Actual US Corporate Values

	1960–69	1998–2001
PREDICTED FUNDAMENTAL VALUES		
Domestic tangible capital	.563	.838
Domestic intangible capital	.229	.350
Foreign capital	<u>.086</u>	<u>.379</u>
TOTAL RELATIVE TO GDP	.877	1.567
ACTUAL MARKET VALUES [†]		
Corporate equities	.898	1.576
Net corporate debt	<u>.041</u>	<u>.028</u>
TOTAL RELATIVE TO GDP	.940	1.604

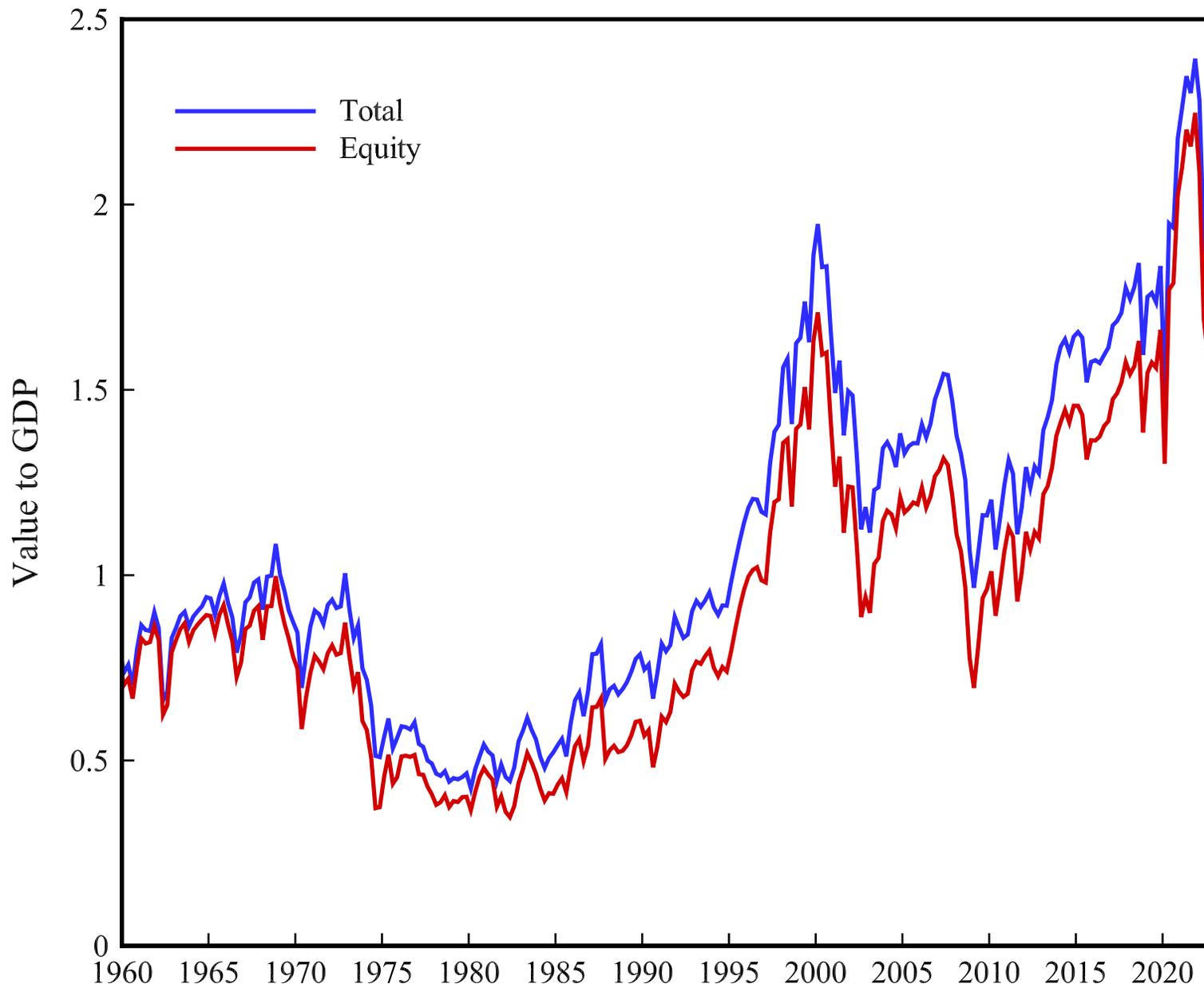
[†] Peaked in 1999 at 1.9 GDP



What are we seeing now?



C-Corporate Valuations





Updates



Updates

- Theory:
 - Incorporate nonrival intangibles of multinationals
 - Distinguish S- and C-corporations

- Data:
 - Booms and busts (eg, 2001,2008,2020,2021)
 - Tax reforms (eg, JGTRRA03, NIIT13, TCJA17)
 - Intellectual property products (IPP) introduced in 2013



Treatment of Nonrival Intangible Assets

- If some intangibles used at home and abroad
- Then:

$$V_t^{\text{US}} = (1 - \tau_{\text{dist}}) \left[\sum_i V_{it}^{\text{US}} + (1 - \tau_{\text{corp}}) M_{t+1}^{\text{US}} \right]$$

where

- V_{it}^{US} are values of location-specific assets (as above)
- M_{t+1}^{US} is nonrival US R&D, brands, etc.



Treatment of S- versus C-corp Activity

- S corporations are *pass-through* entities
- If there are no investment subsidies, then
 - S-corp profits, dividends, values:

$$\pi_{st} = d_{st} = p_{st}y_{st} - w_t n_{st} - \delta_T k_{T,st} - x_{I,st}$$

$$V_{st} = k_{T,s,t+1} + (1 - \tau_{\text{dist}})k_{I,c,t+1}$$

- C-corp profits, dividends, values:

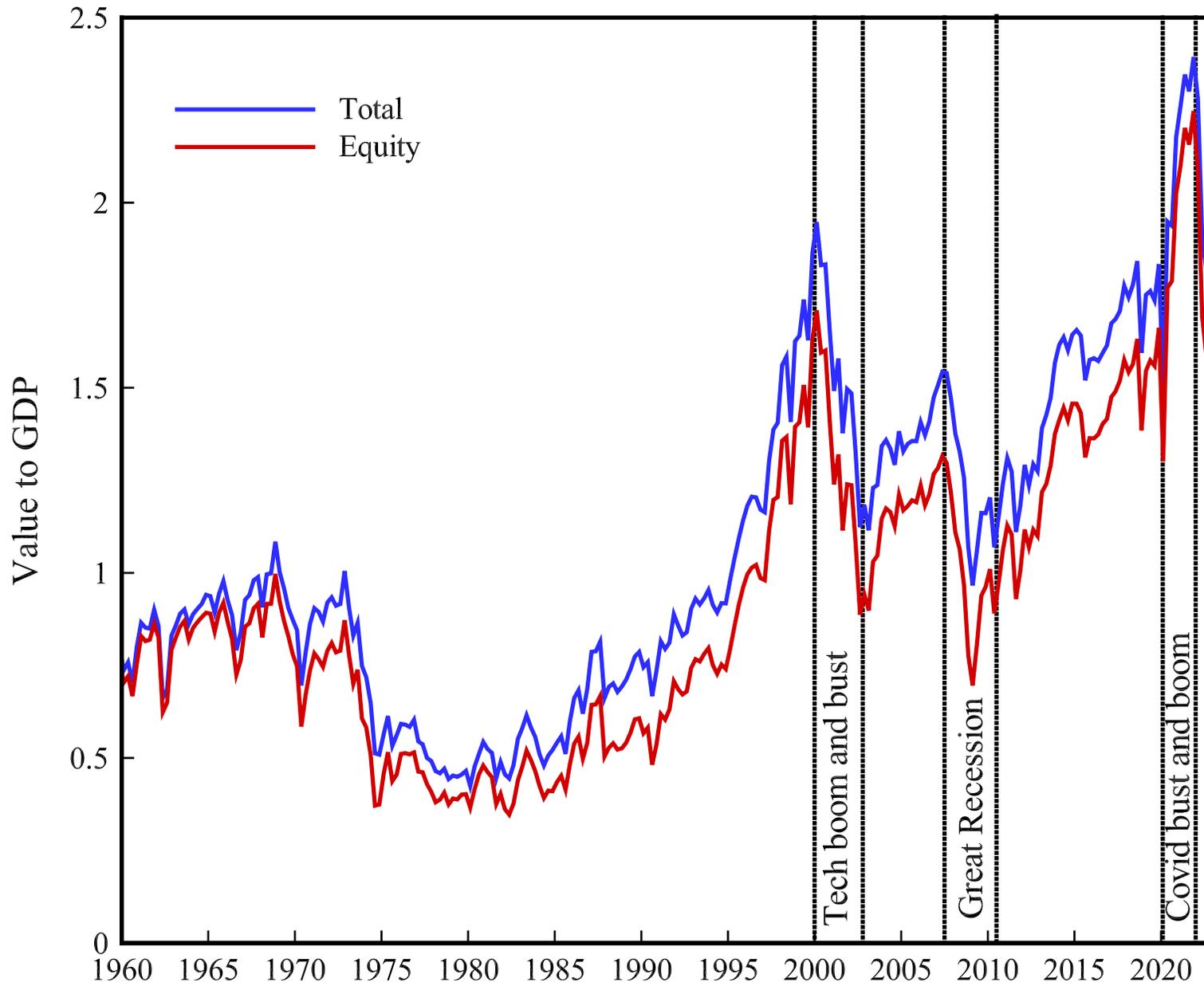
$$\pi_{ct} = p_{ct}y_{ct} - w_t n_{ct} - \delta_T k_{T,ct} - x_{I,ct}$$

$$d_{ct} = (1 - \tau_{\text{corp}})\pi_{ct} - k_{T,c,t+1} + k_{T,ct}$$

$$V_{ct} = (1 - \tau_{\text{dist}})\{k_{T,c,t+1} + (1 - \tau_{\text{corp}})k_{I,c,t+1}\}$$

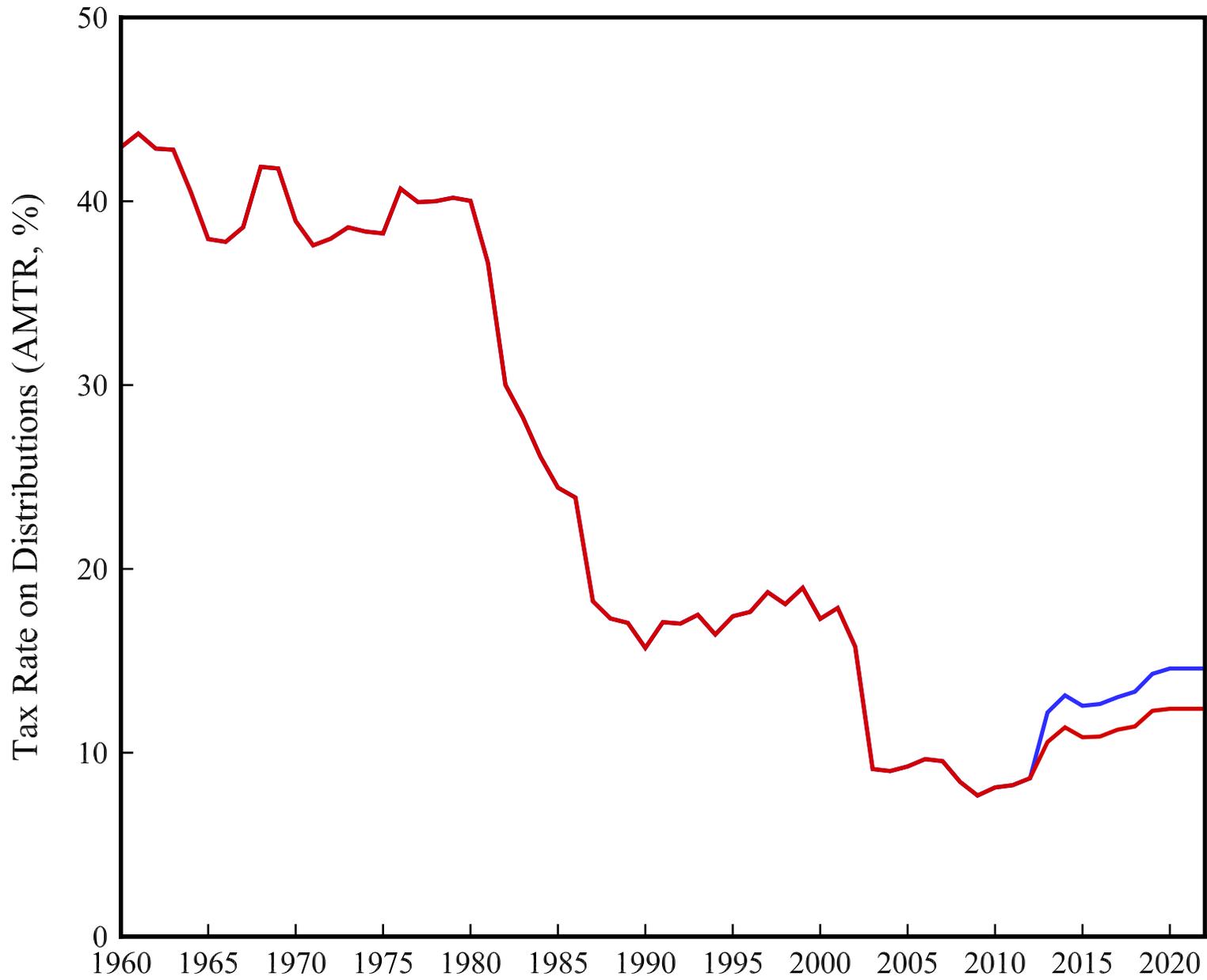


C-Corporate Valuations: Booms and Busts



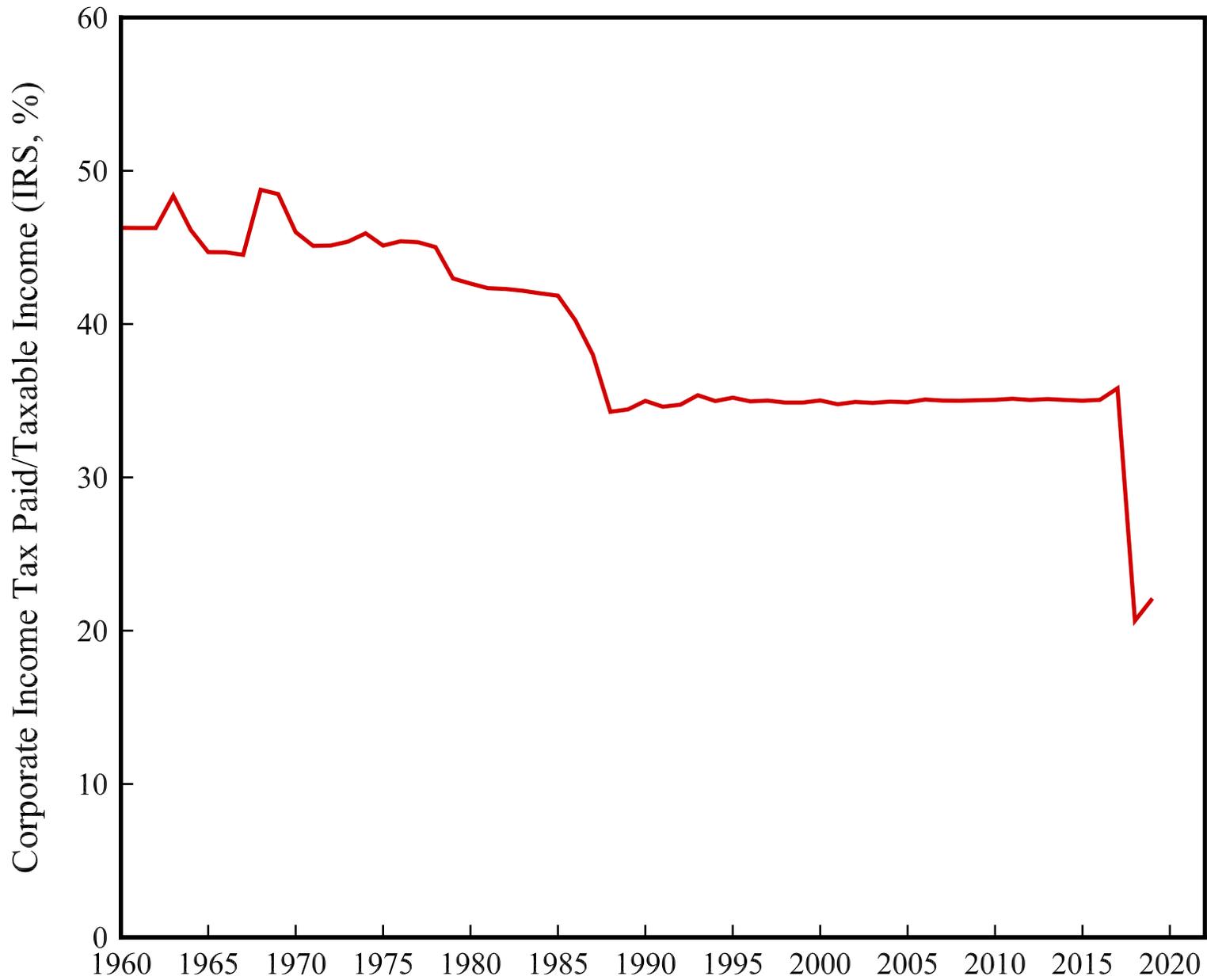


Tax Reforms: Distributions



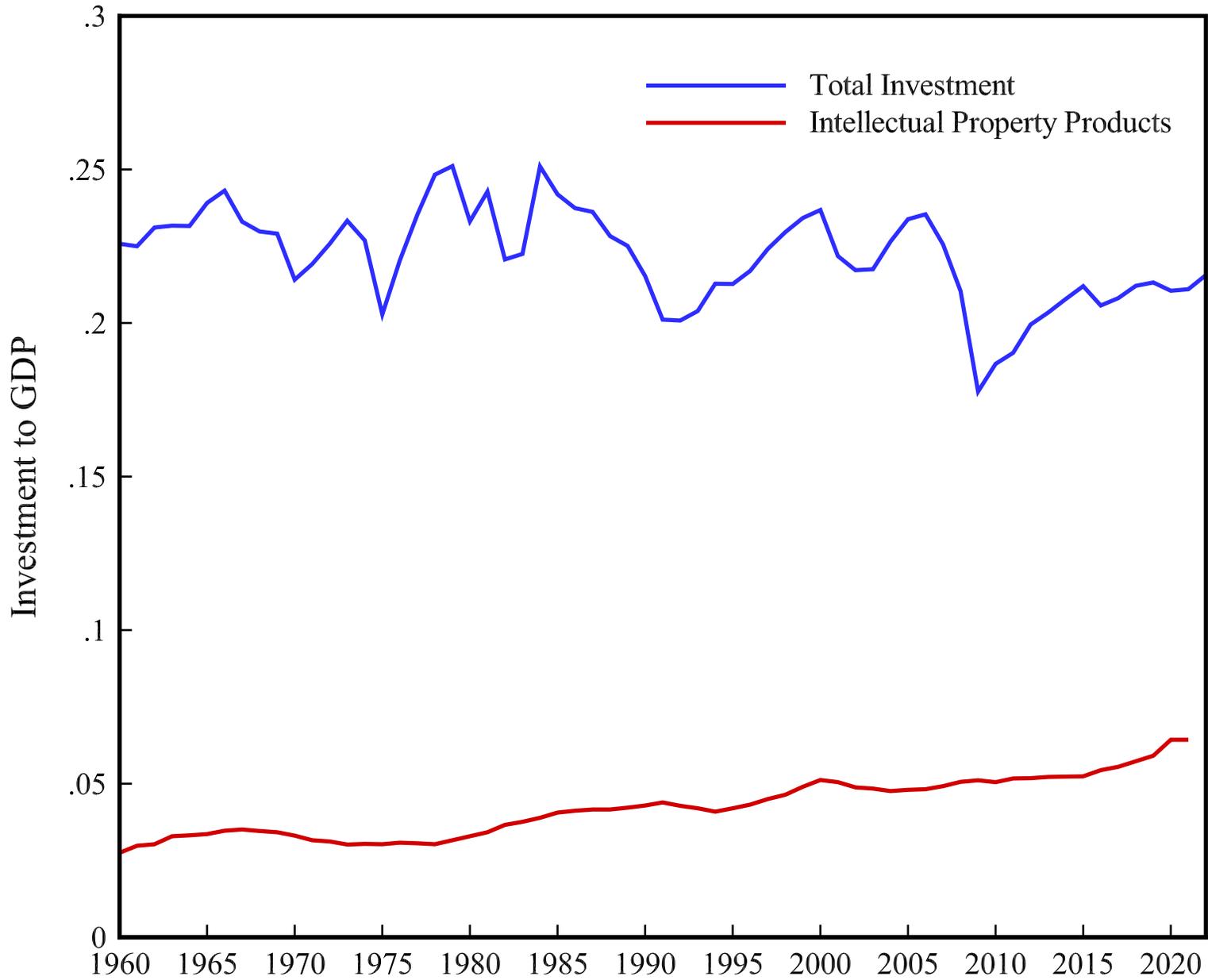


Tax Reforms: Corporate income





New BEA Investment Category





How Does the Analysis Change?



Changes in Analysis

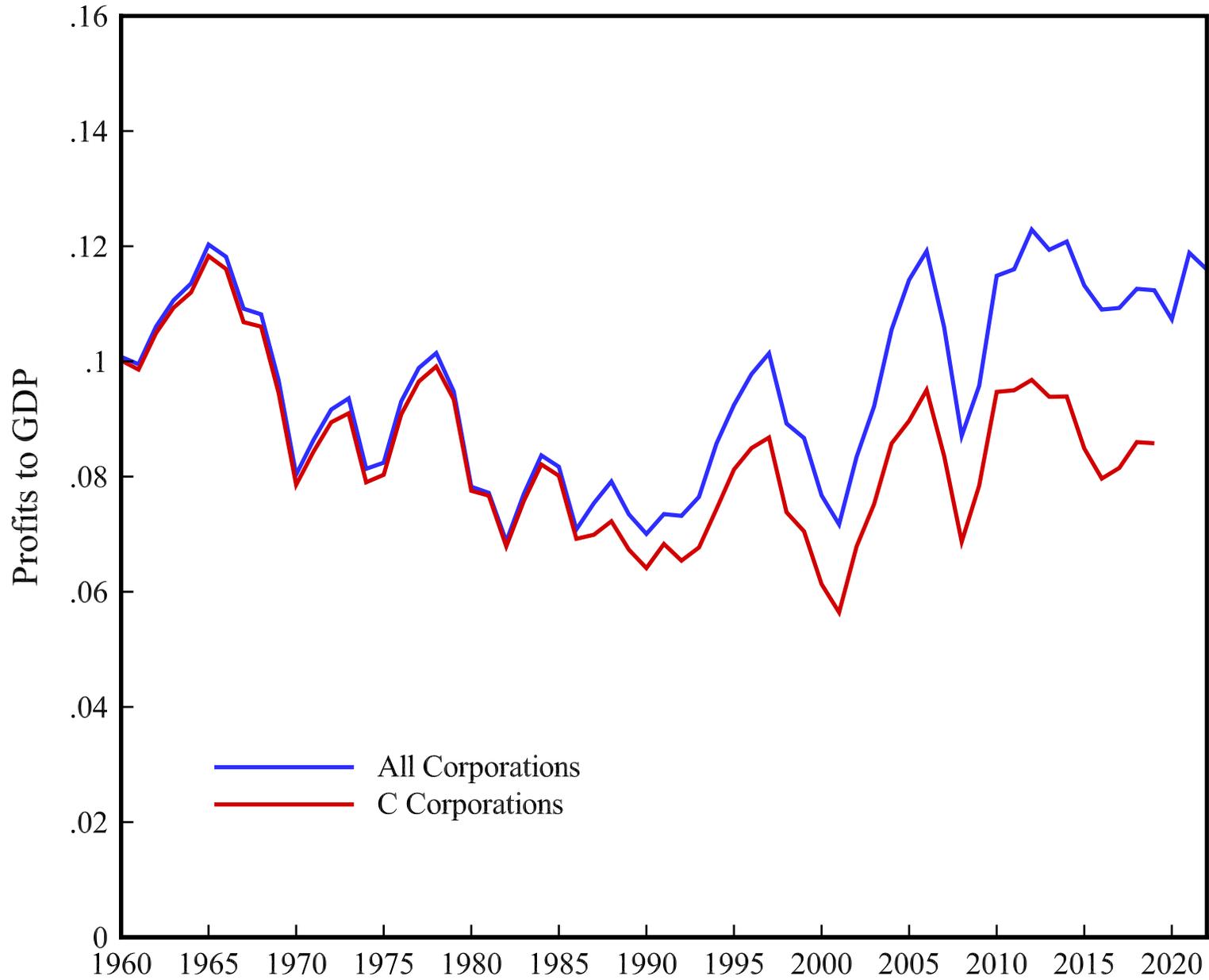
- Profits
 - Use national profits
 - Subtract S-corporate profits

- Distributions
 - Subtract S-corporate distributions
 - Align data with BEA definitions

- Capital stocks and investment
 - Use C-corporate structures and equipment for tangibles
 - Infer total intangible capital measure as before

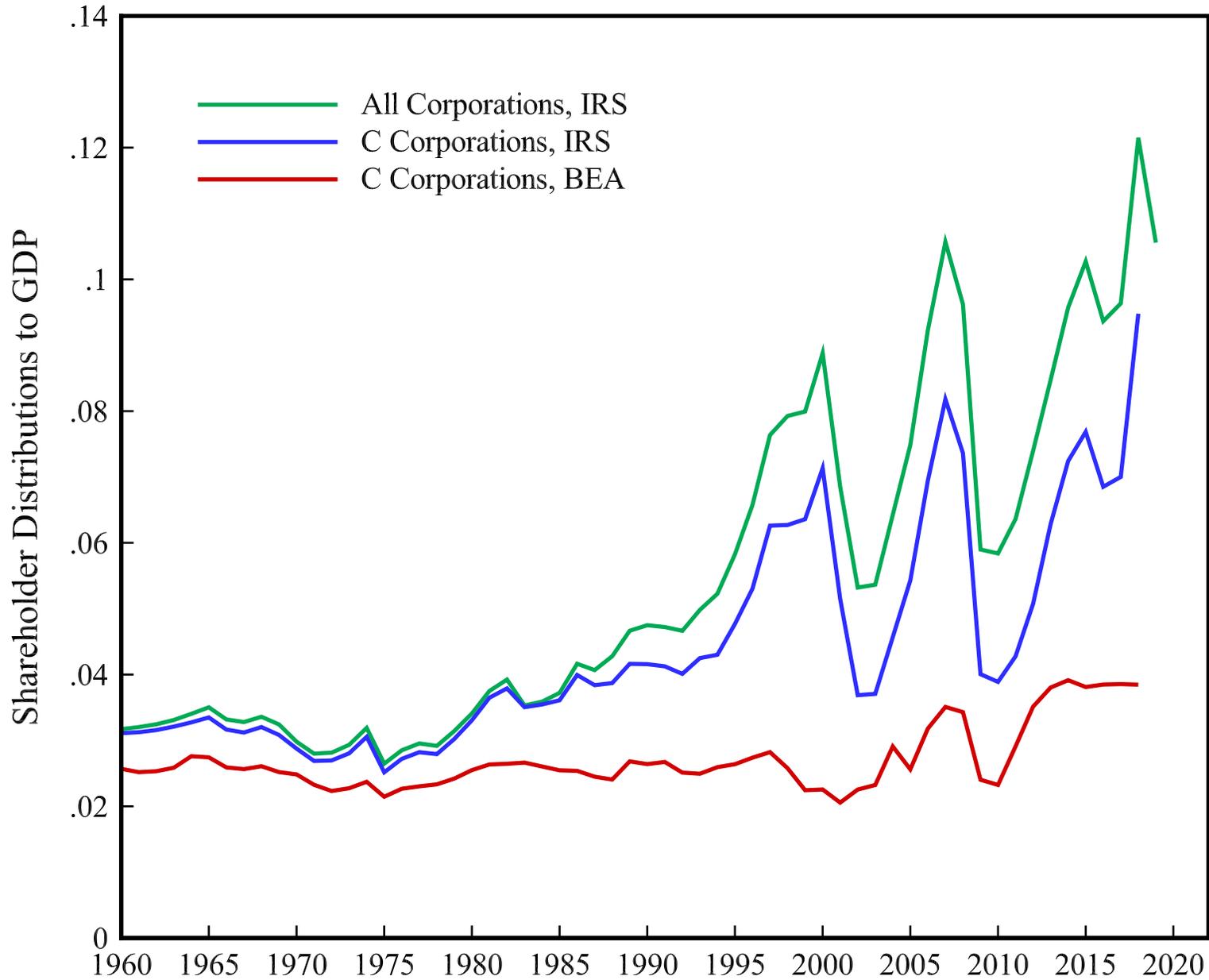


Corporate Profits to GDP, 1960–2022



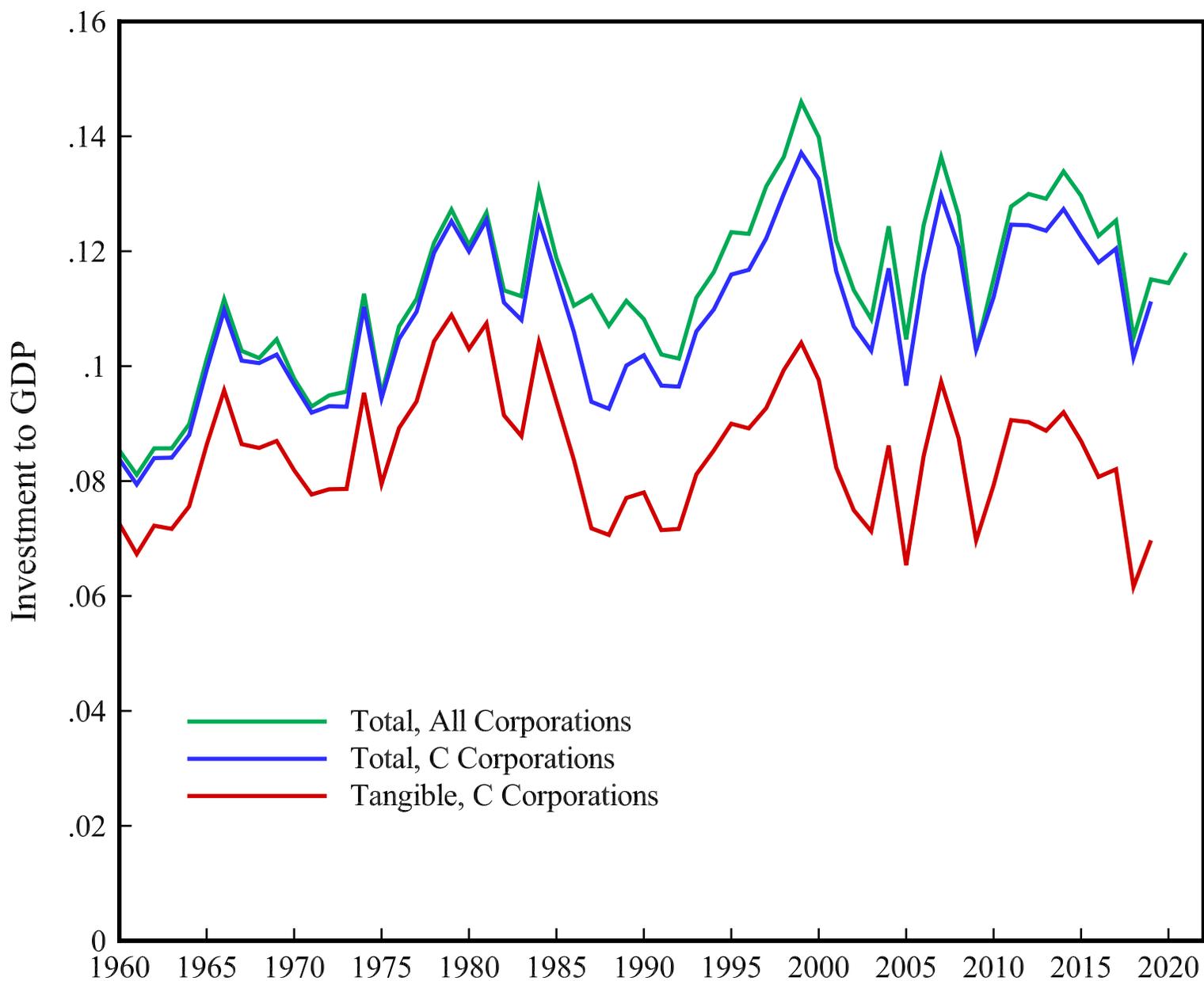


Corporate Distributions to GDP, 1960–2019





Corporate Investment to GDP, 1960–2021





Results



Re-estimating Intangible Contributions, 2000–2019

- Assume:
 - Real GDP growth of 3%
 - Discount factor of 0.98
 - Average tangible capital of 1.22 times GDP
- What are the implied intangible contributions to π, V ?



Estimated Intangible Contributions

Shares	Corporate Income Tax Rate (%)			
	35	30	25	21
In NIPA profits				
Intangible capital	8	14	20	24
Tangible capital	92	86	80	76
In market values				
Intangible value	24	39	48	54
Tangible value	76	61	52	46



Estimated Intangible Contributions

Shares	Corporate Income Tax Rate (%)			
	35	30	25	21
In NIPA profits				
Intangible capital	8	14	20	24
Tangible capital	92	86	80	76
In market values				
Intangible value	24	39	48	54
Tangible value	76	61	52	46

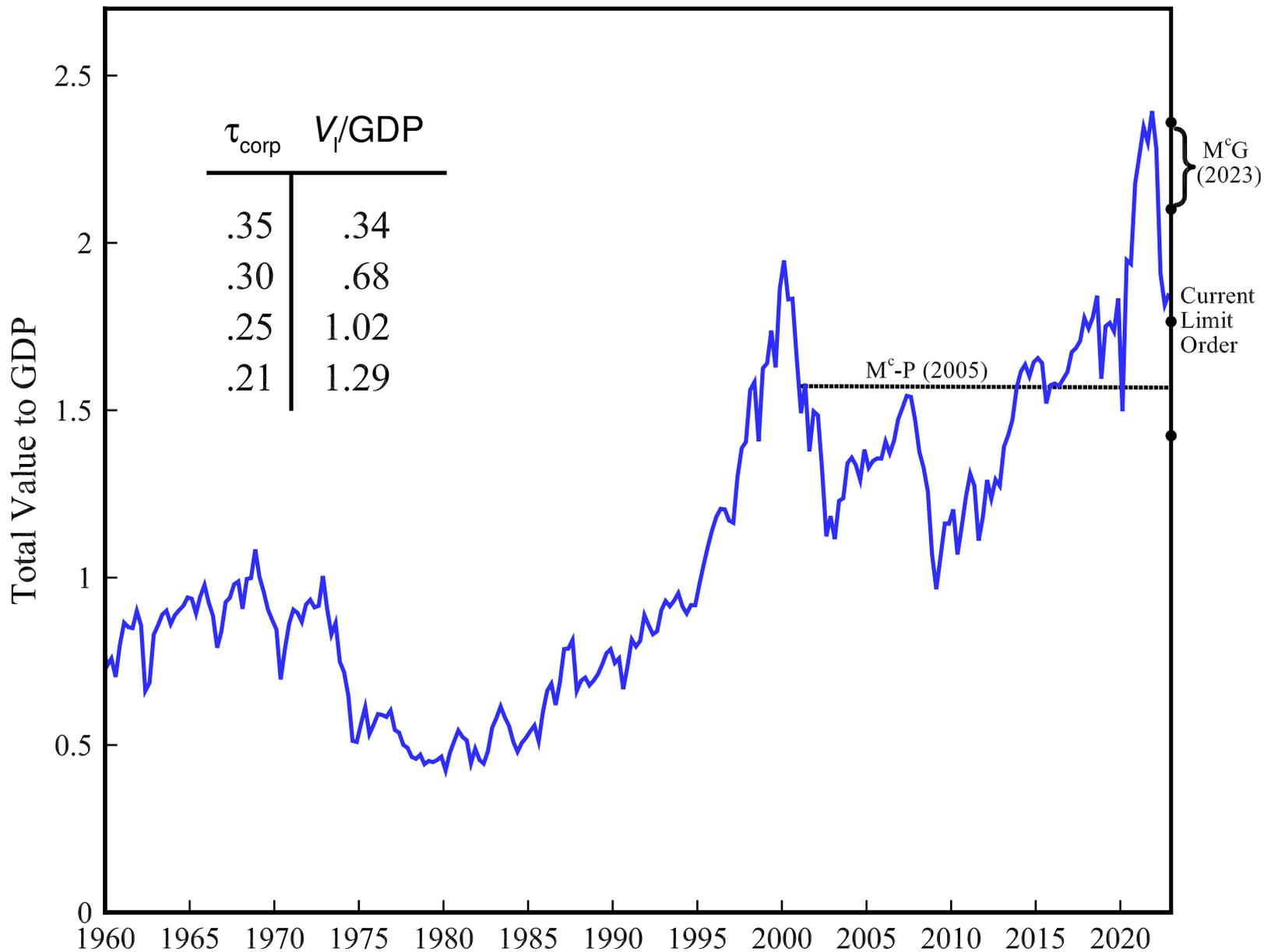
What does this imply for the bottom line?



Bottom Line: A Visual Summary



C-Corporate Total Value





Was the Stock Market Overvalued in 2000-2019?

- Reasons for answering no:
 - Investments were steady through 2001-02 & 2008-09
 - Distributions were steady through 2001-02 & 2008-09
 - Taxes on distributions were low
 - Outward FDI continued rising

⇒ Mostly undervalued relative to theory



Is the Stock Market Overvalued in 2023?

- Reasons for answering no:
 - Large decline in corporate tax rate, τ_{corp}
 - Multinationals have had time to figure out TCJA
 - Taxes on distributions have remained low
 - Outward FDI still rising

⇒ Revising current estimate upward based on theory

Thank you Ed and Tom!

