Discussion of:

The Stock Market Crash of 1929: Irving Fisher was Right!

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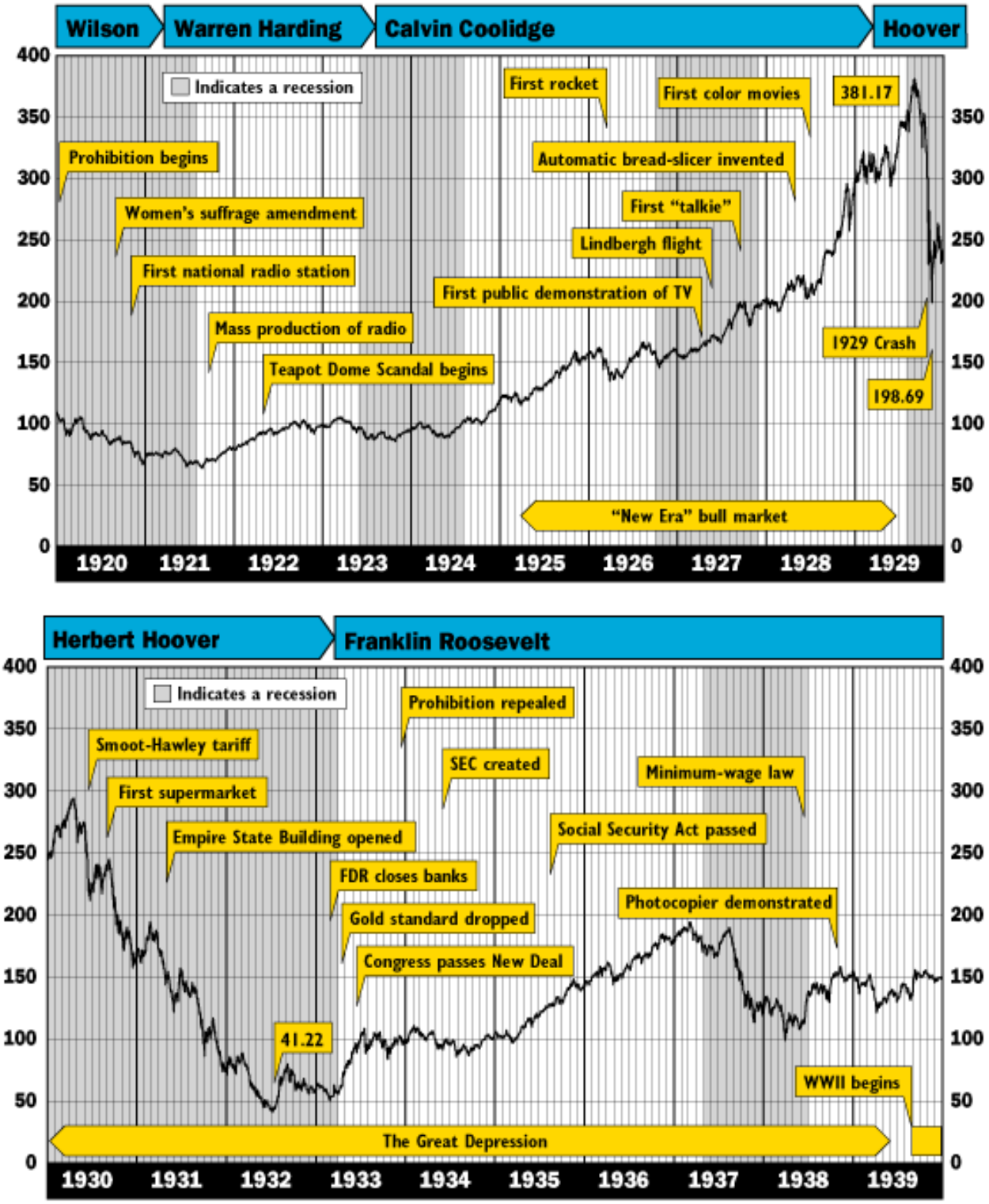
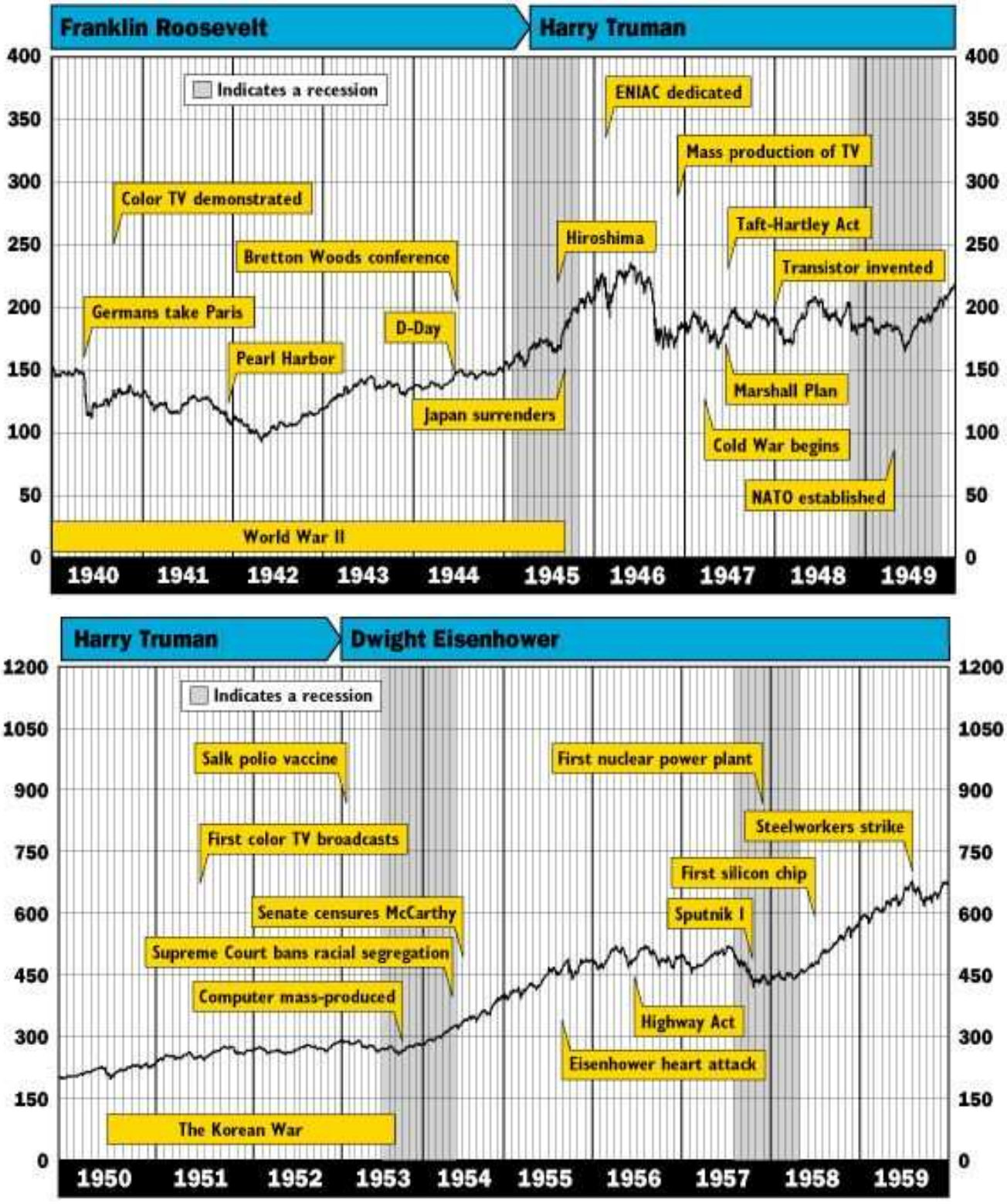
The Dow Jones Industrial Average, 1920-1939



- From 1929→1932, the DJIA dropped 89.2% (381.17 → 41.22)

The Dow Jones Industrial Average, 1940-1959

- The DJIA reached its 1929 level of 380 again in 1954.



Was the 1929 Market Peak an Irrational Bubble?

- The very low $ex\text{-}post$ returns that followed the 1929 market peak convinced many subsequent observers (like Galbraith) that the market had been overly optimistic.
- Even Fisher himself said that:

  > "...between two-thirds and three-fourths of the rise in the stock market between 1926 and September, 1929 was justified. The unjustified character of the remainder is best registered by the swelling of brokers' loans [prior to the crash] ($JASA$, March 1930)

- Interestingly, he further said in the same article:

  > I think, as we look back – and hindsight, of course, is always better than foresight – we may now say that it would have been wiser had the Federal Reserve system, in order to nip this speculation in the bud, raised the rate of re-discount indiscriminately over a year ago.

- Others have also attempted to argue, by various means, that the market was somehow "irrationally exuberant" at this point in time.
  - Price-earnings ratios
  - Closed-end fund discounts
- This paper takes another crack at assessing the level of the market in 1929, based on $ex\text{-}ante$ information, and concludes that the market was in fact $undervalued$.

What Does This Paper Do?

- Prescott and McGrattan (2001) show that in an environment with stable tax policy, the market value of a corporation *along a balanced growth path* should be equal to:

$$V = (1 + \tau_{pers})(K'_T + (1 + \tau_{corp})K'_I) \qquad (1)$$

  where:

  - K'_T and K'_I are the end-of-period resource cost of tangible and intangible capital, respectively
  - τ_{pers} is the tax rate on personal income including stock dividends, and τ_{corp} is the tax rate on corporate profits.

- Intuition:

  - The price of $tangible$ capital is $(1 - \tau_{pers})$ (< 1) because a dollar reinvested is not taxed, but a dollar distributed is taxed.
  - The price of $intangible$ capital is $(1 - \tau_{corp})(1 - \tau_{pers})$. Intangible capital is cheaper than tangible capital because investments in R&D, etc, can be expensed.

- The authors use non-market-based estimates of K'_T and K'_I, calculate what V $should\ have\ been$ based on these estimates, and compare this to the actual traded price of the market.

The authors note that:

> In the literature concern for stock market bubbles, the standard formula used for V is the present discounted value of expected future stock dividends rather than (1). In theory, both can be used. The advantage of (1) is that it requires no assumptions about the market participants expectations.

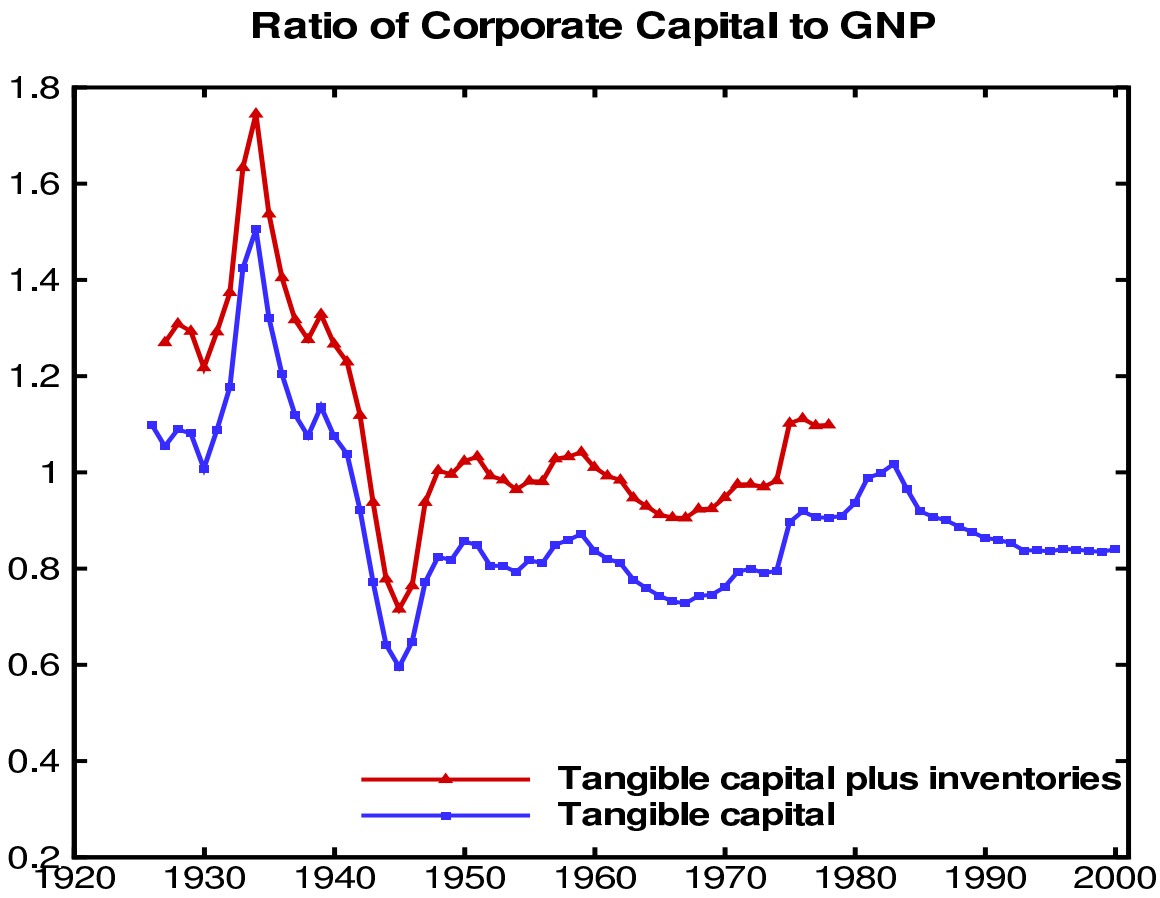
Estimating the Value of Tangible Capital:

The authors estimate the *fundamental value* of tangible capital as:

$$\begin{aligned} K'_T &= (1 - \tau_{pers}) \times 1.27 \times \text{GNP} \\ &= (1 - .103) \times 1.27 \times \text{GNP} \\ &= 1.14 \times \text{GNP} \end{aligned}$$

where 1.27 is the 1926-1929 average of the ratio of tangible capital plus inventories to GNP, and .103 is the tax rate on dividends

- Ratio became very high in the great depression (≈1.7)
- Measurement Issues? Value relative to Cost? Irreversibility?



Estimating the Value of Intangible Capital:

$$\Pi = iK_t + (i - g)(1 - \tau_{corp})K_I$$

where

- Π is total corporate after tax profits
- i is the real rate of return ($i.e.$, cost of capital).
- g is the current rate of growth of intangible capital.
  - the growth rate is here because reported profits are lowered by the amount of new investment in intangible capital

Dividing both sides by GNP gives:

$$\left(\frac{\Pi}{\text{GNP}}\right) = i\left(\frac{K_T}{\text{GNP}}\right) + (i - g)(1 - \tau_{corp})\left(\frac{K_I}{\text{GNP}}\right)$$

Estimates used for these parameters are:

(i) $\Pi/\text{GNP} = 0.088$ ($for\ 1929 - from\ BEA\ data$)

(ii) $K_T/\text{GNP} = 1.27$

(iii) $g = 0.0364$ ($1925\text{-}1929\ average$)

The only remaining variable is i (the cost of capital). The authors calculate the ratio of Fundamental Value to GNP, and estimate market over-valuation, as a function of i:

$$\left(\frac{K_I}{\text{GNP}}\right) = \frac{1}{(i - g)}\left(\frac{1}{1-\tau_{corp}}\right)\left[\left(\frac{\Pi}{\text{GNP}}\right) - i\left(\frac{K_T}{\text{GNP}}\right)\right] \quad (2)$$

Estimated Market Over-Valuation:

The estimate of the market valuation is critically dependent on the estimated cost of capital:

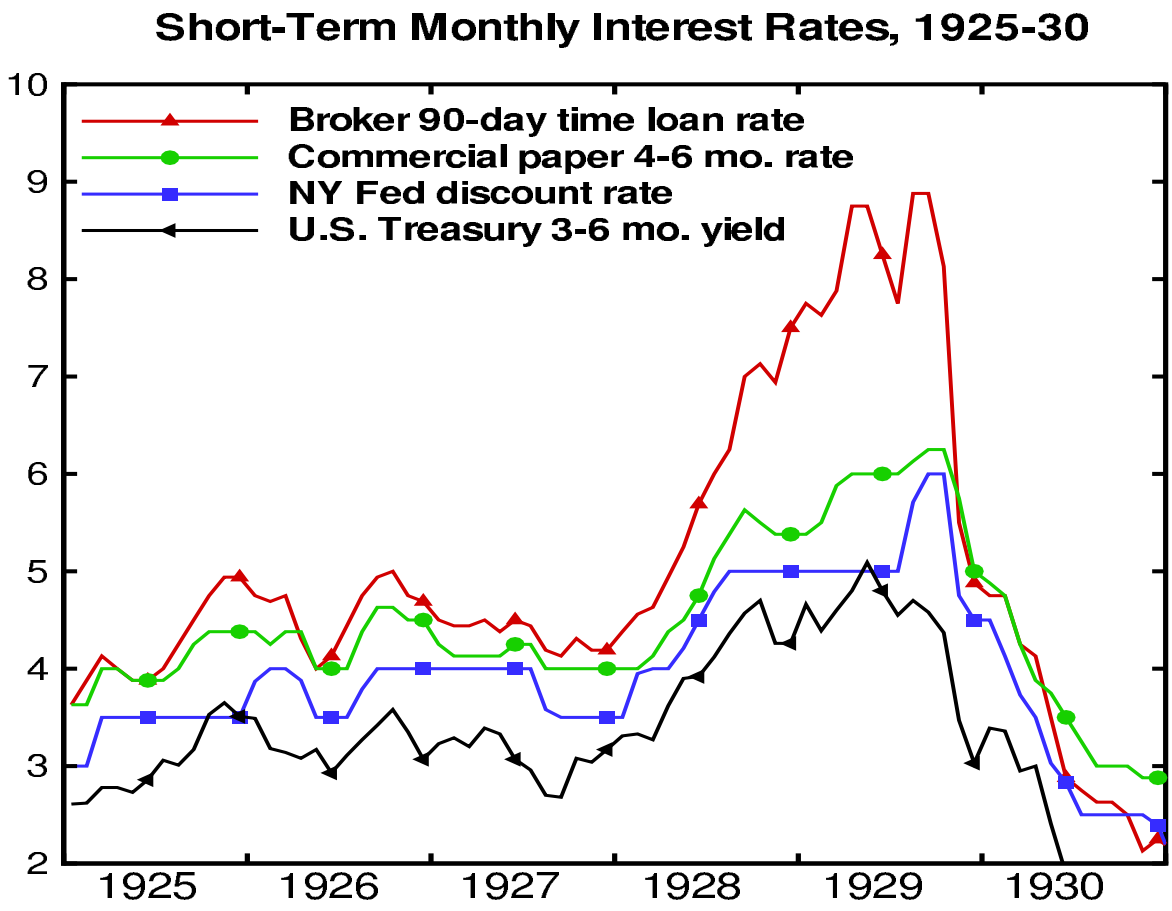
	Estimated	
i(%)	V/GNP	OverValuation(%)
5.00	2.75	-39
5.25	2.33	-28
5.50	2.01	-17
5.75	1.78	-6
6.00	1.59	5
6.25	1.43	16
6.50	1.32	27
6.75	1.21	38
6.93	1.14	46

What is the Cost of Capital:

- The authors conclude that the real-interest-rate/cost-of-capital is less than 6%.
- Estimates are based on:
  - US T-Bill and Commercial Paper Rates; Corporate Bond Yields
  - Macro- and Micro-Economic data and analysis based on:

$$(1+i) = \frac{(1+\gamma)^{\sigma}}{\beta}$$

- Short Term Rates in the 26-30 period look like this:



Risk Premium & Assumed Growth Rates

Risk Premium: One could argue that a discount rate/cost-of-capital should be used that incorporates an equity premium:

- The average return of equities, over and above the t-bill rate, has averaged about 8% since 1926.
- This would suggest a considerably cost of capital, and consequently a much lower value of K_I.

In addition, the corporate profit equation used is for economic profits as opposed to accounting profits, or equivalently, accounting profits along a balanced growth path:

- For example, assume for a moment that $K_T = 0$, $\tau_{corp} = 0$, then equation (2), after multiplying through by GNP, becomes:

$$K_I = \frac{\Pi}{(i - g)}$$

- This is just the formula for the value of a growing perpetuity, where Π is the year 1 cash flow, i is the discount rate, and g *is the expected future cash-flow growth rate.*
  - This estimation method implicitly assumes that the $ex\text{-}ante$ expected growth rate for after-tax profits is the same as the rate at which they have grown in the past.

Was the Market Under- or Over-valued?

- Any estimate of market value at a single point in time necessarily involves assessing whether the market's implied estimate of the growth rate of future cash flows is rational.
- To say that the level of the market is wrong is equivalent to saying that the growth rate that the market anticipates is wrong/biased.
- This is a very difficult exercise for a single point in time:
  - For example, a result that the market level was too low could simply mean that the market had information that growth rates were going to be lower in the future (and that, $ex\text{-}post$ the market was right!!)
  - Similarly saying the market was "too high" in 1929 is equivalent to saying profits/dividend growth turned out to be lower than the market anticipated, in this one instance.
- Note that Campbell and Shiller (2001) are doing some different than this: they show that a trading rule based on having bought at "peaks" (based on aggregate D/P or P/E) earned consistently low returns.
  - However, even this test doesn't not demonstrate conditional over- or under- valuation. It could be evidence of time varying expected returns.