Chapter 18

Testing for Stock Market Overvaluation/Undervaluation

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The purpose of this conference is to discuss the potential role of central banks and regulatory agencies in preventing asset price overvaluations and subsequent financial and real instability. We can imagine the same conference being held in 1929 following the October crash of the U.S. stock market. Our discussion here focuses on 1929 because we believe that there are important lessons to be learned from this historical episode.

Annual reports of the Board of Governors of the Federal Reserve System are clear—open market committee members were alarmed by the dramatic rise in stock prices before the 1929 crash. They viewed investment in stocks as speculative and wanted member banks to cut credit to stock investors. This was done through a policy of “direct pressure,” through sharp increases in discount rates, and through discriminatory lending in favor of farmers and businesspeople.¹

Now that we have the advantage of hindsight and the tools of modern theory, we can ask if there was reason for alarm. This is exactly what we do in McGrattan and Prescott (2001b). In particular, we test Irving Fisher’s view that stock values were in line with fundamentals.

Various approaches can be used to estimate the fundamental value of corporate equities. The standard approach is to estimate the present value of dividends net of taxes. Absent transaction costs and other frictions, competitive theory implies that this measure is equal to the market value of corporate equities. The problem with the standard approach is that it requires the set of Arrow-Debreu event-contingent prices
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and dividends. These elements are not directly observable and must be estimated. It is not surprising, then, that researchers using this method have come to opposite conclusions about the value of the market in 1929. Compare, for example, Shiller (1981, figure 1) and Donaldson and Kamstra (1996, figure 7).

1. Our Approach to Estimating the Fundamental Value of the Stock Market

We adopt a different approach, which we developed in McGrattan and Prescott (2000, 2001a). With our approach, we exploit another implication of competitive theory to estimate the fundamental value of corporate equity: The value of a set of real assets is just the sum of the values of the individual assets in the set. In the public finance literature, this implication is referred to as the q theory of stock market value, where the value of a corporation is just the value of its capital corrected for tax consequences. We take this approach in our research (McGrattan and Prescott, 2001a), but advance it in two respects. First, we do not ignore intangible capital, which, like tangible capital, adds to the value of corporations. Instead, we develop a method for estimating its magnitude using national accounts data. Second, our model economy has capital gains taxed on a realized basis rather than some fraction of capital gains taxed on an accrual basis. Under U.S. tax code, only realized capital gains are taxed. Both of these modifications are quantitatively important in estimating the fundamental value of the stock market.

Our formula for the fundamental value of corporate equities $V$ is:

$$V = (1 - \tau_d)K'_T + (1 - \tau_d)(1 - \tau_c)K'_I,$$

where

- $\tau_d$ is the tax rate on distributions,
- $\tau_c$ is the tax rate on corporate income,
- $K'_T$ is the end-of-period tangible corporate capital stock, and
- $K'_I$ is the end-of-period intangible corporate capital stock.

The reasons for the tax factors are as follows. Corporate earnings significantly exceed corporate investment and, as a result, aggregate corporate distributions are positive. Historically these distributions have been in the form of dividends. Therefore, the cost of a unit of tangible capital on margin is only $1 - \tau_d$ of forgone consumption. In the case of intangible capital, the consumption cost of a unit of capital is even smaller because investments in intangible capital reduce corporate tax liabilities.

We construct measures of tangible capital and corporate tax rates using data from the U.S. Department of Commerce’s Bureau of Economic Analysis. We construct measures of tax rates on distributions using data from the Internal Revenue Service’s Statistics of Income. These measures indicate that tax rates in 1929 were very low and that the reproducible cost of capital was very high relative to postwar levels.

The tricky part of our calculation is constructing a measure of intangible capital. These investments reduce current accounting profits, and they increase future economic profits. The formula for steady-state before-tax accounting profits is:

$$\pi = \frac{i}{1 - \tau_c} K_r + iK_r - gK_r,$$
where \( g \) is the steady-state growth rate of the economy and \( i \) is the steady-state after-tax real interest rate. Note that \( gK_i \) is steady-state investment in intangible capital, which reduces accounting profits because it is expensed. The reason that the after-tax and not the before-tax real interest rate is the return on intangible capital is that intangible capital investments are expensed. Note also that all the variables in this formula are reported in the system of national accounts except \( i \) and \( K_i \).

2. Our Findings

In McGrattan and Prescott (2001a), we estimate the steady-state after-tax real interest rate using national income data. In particular, we estimate the after-tax return on capital in the noncorporate sector, which has as much capital as the corporate sector. We found that the stock market was neither overvalued nor undervalued in 1962 and 2000. The reason for the low valuation relative to gross national product (GNP) in 1962 and the high valuation relative to GNP in 2000 is that the tax on distributions was much higher in 1962 than it was in 2000.

Unfortunately, data limitations preclude estimating the real after-tax interest rate in 1929 in the same way. Given these limitations, we use equation 2 to determine the implied stock of intangible capital for a range of real interest rates. For real interest rates below 6 percent—an upper bound based on theory and empirical evidence—we find that the stock market was actually undervalued in 1929. We were surprised by this result because our priors found that the market was overvalued in 1929. We viewed our exercise as one in which we would quantify the extent of overvaluation. However, we found instead that the quantification was on the extent of undervaluation.

An after-tax real interest rate over 6 percent is not reasonable for many reasons. One is that national income accounts show the rate between 4 and 4.5 percent throughout the postwar period (see McGrattan and Prescott, 2001a). Another reason is that yields on the highest-grade corporate bonds in 1929, a period when prices had been stable and it was reasonable to think that they would continue to be, were near 5 percent. Still, another reason is that this high interest rate, given the rate of growth of consumption, would have implied a curvature parameter larger than that found in other general equilibrium studies of growth and fluctuations.

3. Why Did the Stock Market Crash in 1929?

If the 1929 stock market was not overvalued, why did it crash? It is true that corporate valuation relative to GNP was higher in 1929 than in the preceding four years and that earnings relative to GNP were about the same (see McGrattan and Prescott, 2001b, figures 1 and 3). These facts, however, do not imply that the stock market was overvalued in October of 1929 just before the crash. Indeed, we found that the market was not overvalued.

Our theory is that the crash was due in large part to the Federal Reserve’s reaction to the rising stock prices, which it viewed as reducing real investments in the corporate sector. Determined to stem investment in stocks, the Federal Reserve increased short-term interest rates dramatically (see McGrattan and Prescott, 2001b, figures 5 and 6). The short-term interest rates that increased the most were those on brokerage
loans, and this was almost surely the result of the Federal Reserve’s “direct pressure” policy. This policy entailed the threat to deny member banks that made brokerage loans access to the discount window, which was heavily used in that era.

When prices started to decline and margin calls were made, loan extensions became difficult to get. Stock prices slipped further as investors had to sell. As the Federal Reserve eased credit, the stock market recovered. By the middle of 1930, stocks had recovered much of the ground lost in 1929. Perhaps the crash could have been avoided. This historical episode is strong evidence that Federal Reserve policy can create a stock market crash by disrupting the credit system. If stock market participants are subject to an unexpected credit crunch, a stock market crash is likely.

4. Concluding Comment

We have developed a way to determine whether the stock market is overvalued or undervalued and applied it to the 1929 U.S. stock market. We found that the reason for the 1929 crash was not that the stock market was overvalued relative to fundamentals.

Significant overvaluation of the stock market is reason for concern. If the market is overvalued, the likelihood of a crash is high, and a crash would result in large declines in net worth of people and corporations. A stock market crash would cause state and local pension plans to suffer large declines in the value of their assets, and this would necessitate increases in taxes if promises were to be honored. The same decline would occur for private defined benefit plans, which would further reduce the value of the stock market. People with individual retirement accounts would also suffer losses. In such situations, there is a danger that policies will be adopted that have adverse real economic effects.

Are there any consequences to the stock market being undervalued? Our answer is “Yes.” An undervaluation will lead to greater underinvestment in the corporate sector and lower economic efficiency.

Should the Federal Reserve take into consideration the consequences of its policy for the value of the stock market? Our answer is “No.” The role of the Federal Reserve is to maintain an efficient payment and credit system, and it should not consider the effect of its policies on the value of the stock market. The central bank should not try to prop up the value of the stock market as it did recently in Hong Kong and Taiwan or depress the stock market as the Federal Reserve did in the United States in 1929.

If not the central bank, then who should deal with stock market overvaluation or undervaluation? Our answer is that economists should convey to the public information about the degree of overvaluation or undervaluation. If the public has this information and acts on it, the problem of incorrect stock market valuation will not arise.

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Notes
1. See Federal Reserve Board of Governors (1930, p. 4).
2. For excellent reviews of this development, see Auerbach (2000) and Poterba (2000).
3. We also found that the transition from a system where almost no corporate equity is held in retirement accounts and as pension fund reserves introduces long transitional dynamics because people cannot shift their equity from nonretirement to retirement accounts without penalty.
4. In fact, formula 1 must be adjusted if economic depreciation and accounting depreciation are not equal and if there is an investment tax credit.
5. The rise in the value of the stock market in the 1925–29 period could very well have been the result of people becoming more confident that the current system would persist into the foreseeable future. A maintained hypothesis in this analysis is that people did not expect the Great Depression in 1929.

References


