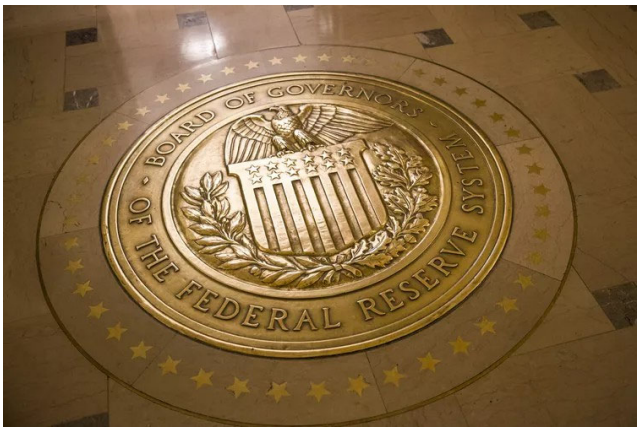
Breaking Down the Fed Model

By **TIM KEEFE** Updated February 14, 2025
Reviewed by **CHIP STAPLETON**



The Fed model emerged at the beginning of the 21st century as a stock valuation methodology used by Wall Street gurus and the financial press. The Fed model compares stock yield to bond yield. Proponents almost always cite the following three attributes as the reasons for its popularity: It's simple, it's backed by empirical evidence, and it's backed by financial theory.

KEY TAKEAWAYS

- The Fed model is a valuation tool that's used to evaluate the bullishness of the stock market.
- It was originally named the "Fed's Stock Valuation Model" by Edward Yardeni who researched the relationship between bonds and equities in the late 1990s.
- The Fed model works by comparing earnings yields with the yield of the 10-year Treasury bond.
- Some economists have argued against the Fed model on both empirical evidence and theoretical grounds.

What Is the Fed Model?

The Fed model is a valuation methodology that recognizes a relationship between the forward earnings yield of the stock market, typically the S&P 500 Index, and the 10-year Treasury bond yield to maturity (YTM).

The yield on a stock is the expected earnings over the next 12 months divided by the current stock price. It's symbolized here as (E_1/P_S). This equation is the inverse of the familiar forward P/E ratio but it highlights the same concept as the bond yield (Y_B) when it's shown in the same yield form. It's the concept of a return on investment.

Some advocates of the Fed model believe the yield relationship varies over time so they use an average of each period's yield comparison. The more popular method is where the relationship is fixed at the value of zero. This technique is referred to as the strict form of the Fed model because it implies that the relationship is strictly based on equality.

The relationship in the strict form is such that the forward stock yield equals the bond yield:

$$Y_B = \frac{E_1}{P_S}$$

where:

$Y_B =$ bond yield

$\frac{E_1}{P_S} =$ forward stock yield

Two conclusions can be drawn from this:

1. The difference in the forward stock yield equals 0:

$$\frac{E_1}{P_S} - Y_B = 0$$

2. The ratio of the forward stock yield divided by the bond yield equals 1:

$$(\frac{E_1}{P_S}) \div Y_B = 1$$

The premise behind the model is that bonds and stocks are competing investment products. An investor is constantly making choices between products as the relative prices between them change in the marketplace.

IMPORTANT

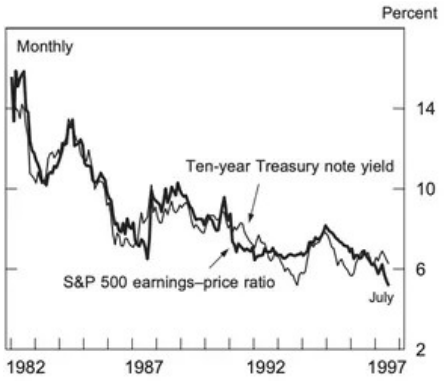
The Fed model isn't endorsed or associated with the Federal Reserve despite its name.

https://www.investopedia.com/articles/stocks/08/fed-model.asp

Origins of the Fed Model

The name "Fed model" was manufactured by Wall Street professionals in the late 1990s. The Fed's Humphrey-Hawkins Report introduced a graph of the close relationship between long-term Treasury yields and the forward earnings yield of the S&P 500 on July 22, 1997. It covered the years from 1982 to 1997[1]

Equity Valuation and Long-Term Interest Rate



Note: Earnings-price ratio is based on the I/B/E/S International Inc. consensus estimate of earnings over the coming 12 months. All observations reflect prices at mid-month.
Credit: Source: Federal Reserve

Edward Yardeni, then at Deutsche Morgan Grenfell, published several research reports shortly thereafter in 1997 and 1999. These further analyzed this bond yield/stock yield relationship. He named the relationship the Fed's Stock Valuation Model and the name stuck.[2] The original use of this type of analysis isn't known but a bond yield versus equity yield comparison was used in practice long before the Fed graphed it out and Yardeni began marketing the idea.

Robert Weigand and Robert Irons commented in their March 2005 paper titled "The Market P/E Ratio: Stock Returns, Earnings, and Mean Reversion" that empirical evidence suggests that investors began using the Fed model in the 1960s. This was after Myron Gordon described the dividend discount model in the seminal paper "Dividends, Earnings, and Stock Prices" in 1959.[3]

Using the Fed Model

The Fed model evaluates whether the price paid for the riskier cash flows earned from stocks is appropriate. It compares expected return measures for each asset: YTM for bonds and E_1/P_S for stocks.

This analysis is done by looking at the difference between the two expected returns. The value of the spread between $(E_1/P_S) - Y_B$ indicates the magnitude of mispricing between the two assets. The bigger the spread, the cheaper the stocks relative to bonds and vice versa. This valuation suggests that a falling bond yield dictates a falling earnings yield that will ultimately result in higher stock prices. P_S should rise for any given E_1 when bond yields are below the stock yield.

Financial market pundits sometimes claim that stocks are undervalued according to the Fed model or interest rates. This may be true but it's careless because it implies that stock prices will go higher. The correct interpretation of a comparison between the stock yield and the bond yield isn't that stocks are cheap or expensive but that stocks are cheap or expensive relative to bonds.

It may be that stocks are expensive and priced to deliver returns below their average long-run returns but bonds are even more expensive and priced to deliver returns far below their average long-run returns. It might be possible that stocks could continuously be undervalued according to the Fed model while stock prices fall from their current levels.

Observational Challenges

Opposition to the Fed model has been based on both observational evidence and theoretical shortcomings. Stock and long-term bond yields appear to be correlated from the 1960s onward but they appear to have been less correlated before the 1960s.

There may also be statistical issues in the way the Fed model has been calculated. Statistical analysis was originally conducted using ordinary least-squares regression but bond and stock yields may seem cointegrated and this would require a different method of statistical analysis.

Javier Estrada wrote a paper in 2006 titled "The Fed Model: The Bad, The Worse, And The Ugly." He looked into the empirical evidence using the more appropriate cointegration methodology. His conclusions suggest that the Fed model may not be as good a tool as originally thought.[4]

Theoretical Challenges

Opponents of the Fed model also pose interesting and valid challenges to its theoretical soundness. Concerns arise over comparing stock yields and bond yields because Y_B is the internal rate of return (IRR) of a bond and accurately represents the expected return on bonds. Remember that IRR assumes that all coupons paid over the life of the bond are reinvested at Y_B whereas, E_1/P_S isn't necessarily the IRR of a stock and it doesn't always represent the expected return on stocks.

E_1/P_S is also a real inflation-adjusted expected return. Y_B is a nominal unadjusted rate of return. This difference causes a breakdown in the expected return comparison.

Opponents argue that inflation doesn't affect stocks in the same way it affects bonds. Inflation is typically assumed to pass to stockholders via earnings but coupons to bondholders are fixed. P_S isn't affected when the bond yield rises due to inflation because earnings rise by an amount that offsets this increase in the discount rate. E_1/P_S is a real expected return and Y_B is a nominal expected return.

The Fed model will therefore incorrectly argue for a high stock yield and depress stock prices in periods of high inflation. It will incorrectly argue for low stock yields and increase stock prices in periods of low inflation.

The above circumstance is referred to as the illusion of inflation which Franco Modigliani and Richard A. Cohn presented in their 1979 paper "Inflation, Rational Valuation, and the Market." Unfortunately, the inflation illusion isn't as easy to demonstrate when dealing with corporate earnings. Some studies have shown that a great deal of inflation does pass through to earnings while others have shown the opposite.

What Is the Earnings Yield of a Stock?

Earnings yield is calculated by dividing the earnings per share of a stock over 12 months by the current share price. This is the inverse of the P/E ratio and is used to determine if a share is overpriced or underpriced.

What Is the First Step in the Fed Model?

The first step in the Fed model is to calculate the forward earnings yield of the stock market typically using a benchmark index like the S&P 500. This is then compared to the yield of the 10-year Treasury bond to gauge whether the market is bullish or bearish overall.

What Is a Good P/E Ratio?

Average P/E ratios will vary from industry to industry so there's no fixed bar for what makes a "good" P/E ratio. The median P/E ratio of the S&P 500 companies is around 22, however. Anything lower than 20 is comparatively inexpensive.

What Is Forward Earnings Yield?

Forward earnings yield is calculated by taking the projected earnings of a given stock over the next 12 months divided by the current price at the time of calculation. This is the inverse of the forward P/E ratio.

The Bottom Line

The Fed model may or may not be an effective investment tool but one thing is certain: An investor can't logically invest their capital based on the Fed model if they consider stocks to be real assets that pass inflation through to earnings.

Article Sources

Investopedia requires writers to use primary sources to support their work. These include white papers, government data, original reporting, and interviews with industry experts. We also reference original research from other reputable publishers where appropriate. You can learn more about the standards we follow in producing accurate, unbiased content in our editorial policy.

1. The Federal Reserve Board. "Humphrey-Hawkins Report, July 22, 1997, Section 2: Economic and Financial Developments in 1997."
2. Deutsche Morgan Grenfell. "Topical Study #38: Fed's Stock Market Model Finds Overvaluation," Page 3.
3. The Journal of Portfolio Management. "The Market P/E Ratio, Earnings Trading, and Stock Return Forecasts."
4. SSRN. "The Fed Model: The Bad, the Worse, and the Ugly."