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Understanding Equity Risk Premium

by Richard Q. Wendt

Several recent books and articles have addressed the issue of expected equity returns, with a range of opinions—from dourly pessimistic to irrationally optimistic. This article attempts to answer the following questions:

- What is equity risk premium?
- How should equity risk premium be measured?
- Does a constant risk premium provide the best model?
- What are reasonable expectations for the future?

What is Equity Risk Premium?

Equity Risk Premium (ERP) measures the excess equity return[1] over a specified time horizon with respect to a benchmark. The benchmark could be inflation, a rate of return, or a bond yield. ERP is thought to be the extra return demanded by investors for taking on a risky investment. ERP is usually stated for relatively long time horizons—either for a specific period, usually ten years or more, or for an indefinitely long horizon. For post-1960s U.S. history, ERP has been one of the most stable statistics in the equity market.

One of the advantages of using ERP is that the benchmark can dynamically reflect current market conditions, implicitly subsuming investor risk tolerance, economic growth expectations and uncertainty. For example, higher long bond yields generally indicate increased expectations for future returns, both in stock and bond markets. Some practitioners believe that price-to-earnings ratio or dividend yield statistics are superior to ERP for estimating future returns, but ERP has the advantage of automatically self-correcting for changes in market valuation.

Measuring ERP

Practitioners have used several methodologies to measure ERP, with two approaches becoming the most popular. These methods measure equity returns with respect to either:

- Long T-Bond returns over the measurement period, or
- Long T-Bond yields at the beginning of the measurement period[2]

Figure 1 shows the historical 15-year compound returns for the S&P 500 Index and Long T-Bonds, as well as the long T-Bond yields at the beginning of each 15-year measurement period. Figure 1 starts with the 1926–1940 measurement period and ends with the 1986–2000 measurement period. As in the recent article on the TimeTrack methodology [Risk & Rewards, July 2001], monthly data is shown in overlapping 15-year periods, starting each month from January 1926 through January 1986. Fifteen-year measurement periods were chosen so as to provide a moderately long time horizon, with a sufficient number of data points.

1 In this article, equity returns are represented by the S&P 500 Index total return.

2 For example, Ibbotson Associates' Yearbook measures ERP as average equity return over government bond income, ignoring principal changes. For forecasting returns, the Yearbook adds the historical average ERP to risk-free returns, as indicated by zero coupon bond yields for the appropriate maturity.

3 Long T-Bond returns and yields are for 20-year or 30-year maturity Treasury bonds, whichever was the longest maturity available at each date.

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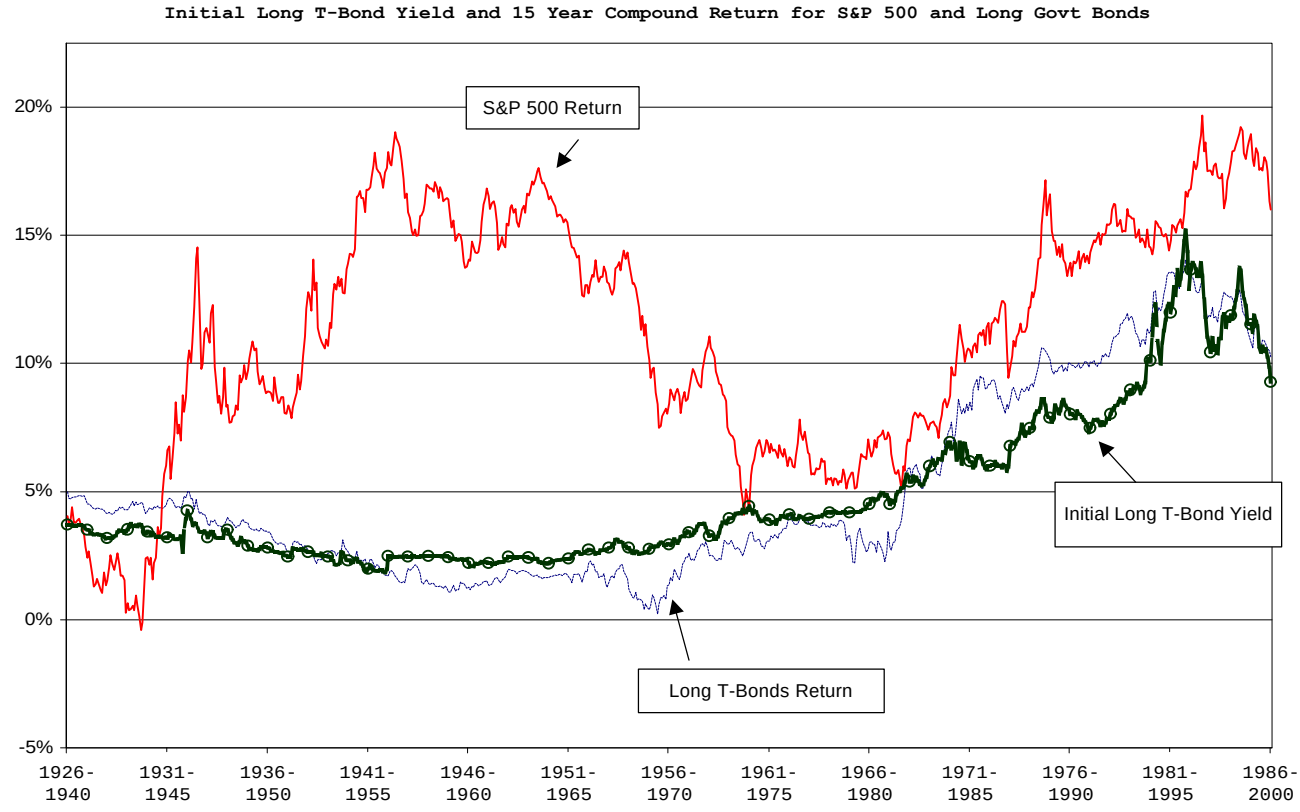

Figure 1

Figure 1 suggests some comments. The predominant impression is that the equity experience prior to 1960 looks quite different than the experience after 1960. It may be an optical illusion, at least to my eyes, that makes the early equity returns look higher than the later equity returns. Actually, the average equity return for each period is very similar; it's the bond yield and return that is significantly higher for the periods starting in 1960 and later. In addition, there appears to be very little relationship between equity returns and either bond returns or yields prior to 1960; after 1960, there appears to be a fairly strong relationship.

Some practitioners, myself included, believe that the extraordinarily large ERPs in those early years provide a distorted view of likely future relationships. Ibbotson, for example, uses all the historical data from 1926 onwards to calculate the average ERP over bond yields, arriving at an ERP of about 8%. That high average is principally due to the inclusion of the extraordinarily high historical ERPs in the 1935–1965 time frame.

Note also that the T-Bond 15-year return tracks the initial yields reasonably closely, sometimes higher, sometimes lower. The T-Bond 15-year return is a function of yield changes during the 15 years, as well as the initial yields. Over 15-year periods, the initial yield is a very powerful indicator of future bond returns.

(continued on page 3)

In order to use timely and relevant historical data, the analysis will include only the 15-year periods starting in 1960 and later. Through December 2000, that is a total of 313 overlapping periods.

15-year Periods Starting:	Observations	Average Compound Equity Return	Average Compound Bond Return	Average ERP Over Bond Returns	Average Initial Yield	Average ERP Over Initial Yield
1926-1959	408	11.0%	2.6%	8.4%	2.9%	8.1%
1960 & later	313	11.6%	8.1%	3.5%	7.4%	4.1%
All Periods	721	11.2%	5.0%	6.2%	4.8%	6.4%

Figure 2 isolates the results for periods starting 1960 and later.

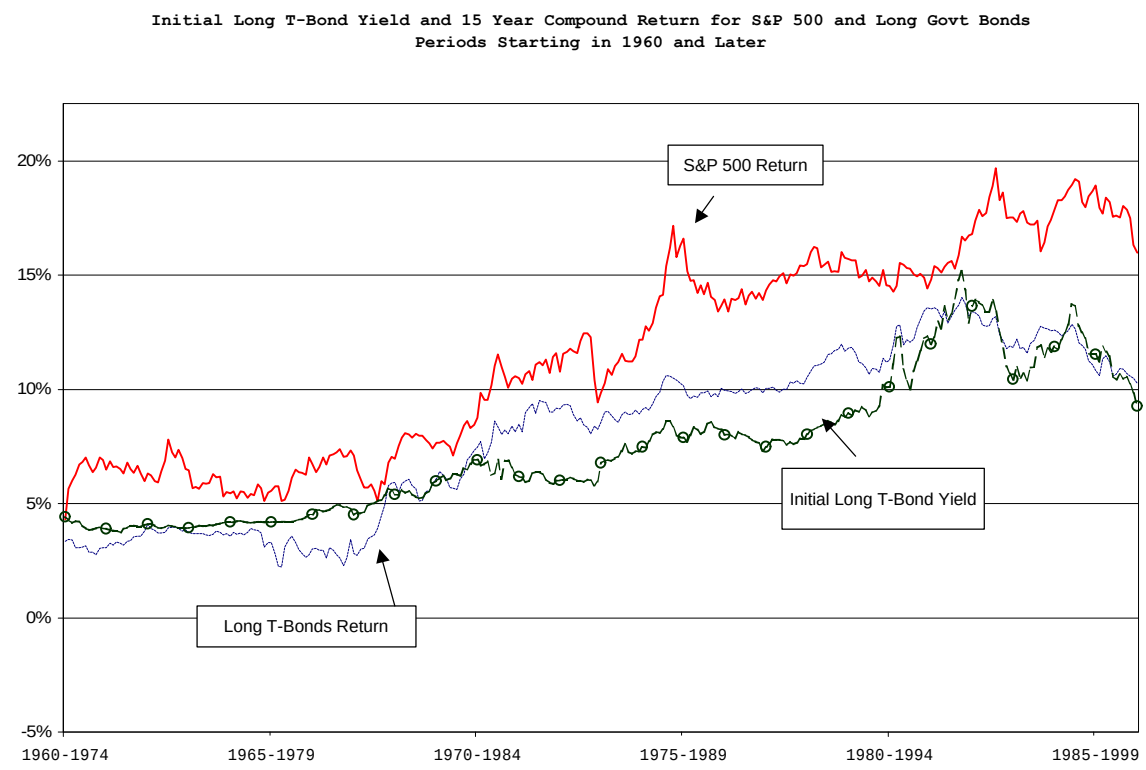

Figure 2

ERP Relative to Bond Returns or Yields?

Which relationship is the most appropriate—equity returns over bond returns or equity returns over initial bond yields? Since bond returns track initial bond yields reasonably well, either returns or yields can be used to measure ERP. However, there are some important differences. For one thing, the average ERP with respect to yields is about 60 basis points more than the average ERP with respect to returns.

(continued on page 4)

When practitioners set assumptions for determining asset allocation policy for a pension plan, insurance company or other institutional investor, the relationship between the asset class returns is usually more important than the absolute level of expected returns. For instance, in an ALM analysis for a pension plan, the key determinant is the relationship of portfolio return to pension liabilities. Since liabilities typically mimic bond returns, ERP for ALM purposes should normally be based on bond returns; that approach leads to estimates of relative equity return.

On the other hand, realized equity and bond returns can only be known after the time period is completed, while bond yields are known at the start of the period. Therefore, if one wants to predict the level of equity returns for the next 15 years, the model should reference the ERP to initial yield. Otherwise, one must first predict 15-year bond returns and then add the estimated ERP with respect to bond returns. Using bond returns as the basis of predicting equity returns creates two sources of error—bond return and ERP. Using yields has only one source of error—estimated ERP. The additional source of error makes it inefficient to use estimated bond returns to predict the absolute level of equity returns.

For the purpose of this article, I will focus on a predictive model of ERP relative to initial bond yields, using return data for 15-year periods starting from 1960 to 1986. The ERP statistics relative to bond return are fairly similar to the statistics relative to yield. But a predictive expectation is probably more interesting to our readers, most of whom would rather not wait fifteen years to determine bond returns. Figure 3 shows the historical ERP with respect to bond yield for those periods.

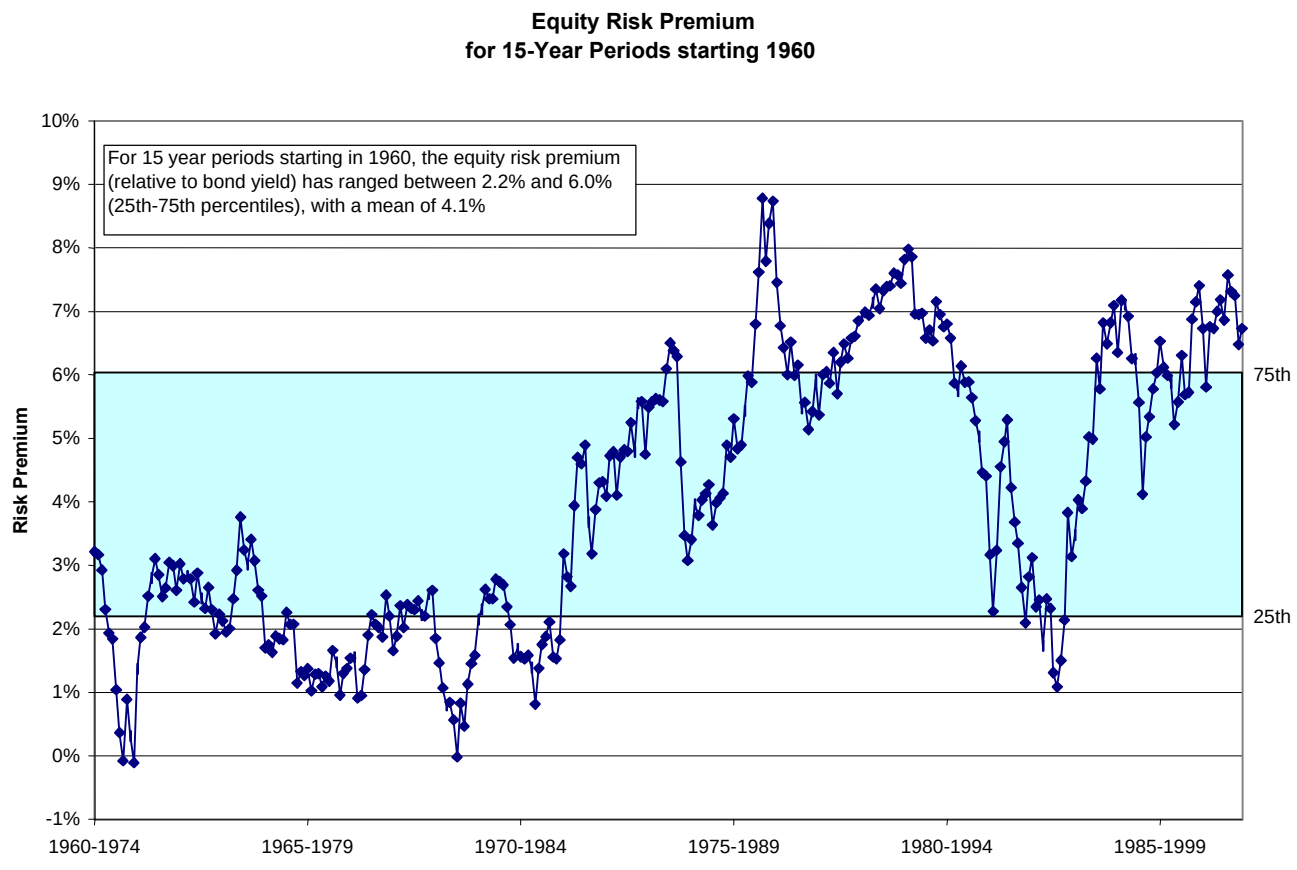

Figure 3

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Is Constant ERP a Reasonable Model?

A common practice is to determine an historical average ERP and use that value as an estimate of future ERP— regardless of current economic conditions. Using a constant value as a "model" of an economic variable is obviously a very simplistic model. That type of model would be appropriate when there is either no, an unknown, or an overly complex relationship between two variables. Perhaps the strong need for simplicity could justify such a—well, simple—model.

To explore this data, Figure 4 shows a scatter plot of 15-year equity returns versus initial long T-Bond yields.

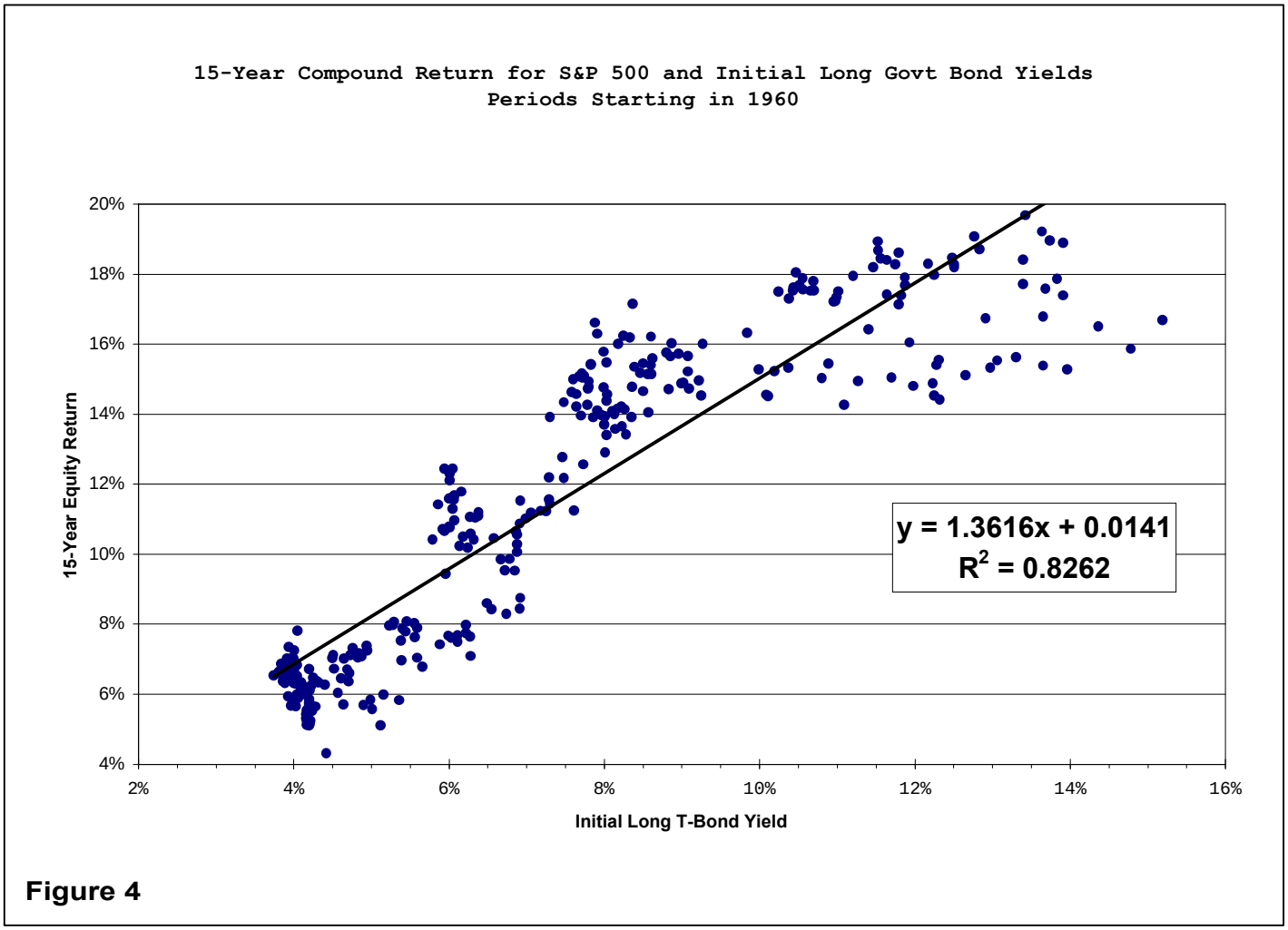

Figure 4

Figure 4 shows that, indeed, there is a strong relationship between 15-year equity returns and initial bond yields. The graph also includes a linear regression trend line, which shows an R^2 of 0.83. That level is not as significant as one might otherwise think, since the data has a very high amount of serial correlation.

Looking at Figure 4, it appears that the points at the upper right part of the chart are much more erratic than the remainder of the points. Given today's yield environment of 5%, it does not seem likely that yields will exceed 10% in the near future; therefore, it is not currently critical to model expected returns at those yield levels.

(continued on page 6)

To test the relationship without the outlying high yields, Figure 5 shows the linear regression, including only returns with initial yields less than 10%. This includes 252 data points. For that subset of the data, the average ERP is 3.75%. To compare the linear model trend line to the constant ERP, the graph also shows the estimated returns for a 3.75% constant ERP. With this version of the model, the R^2 of the trend line increases to 0.88.

The estimated returns from each model are quite different. Both models give consistent estimates of 9.75% equity return for initial yields of 6%. For initial yields below 6%, the constant ERP model is higher than the linear model, while the opposite is true for initial yields above 6%.

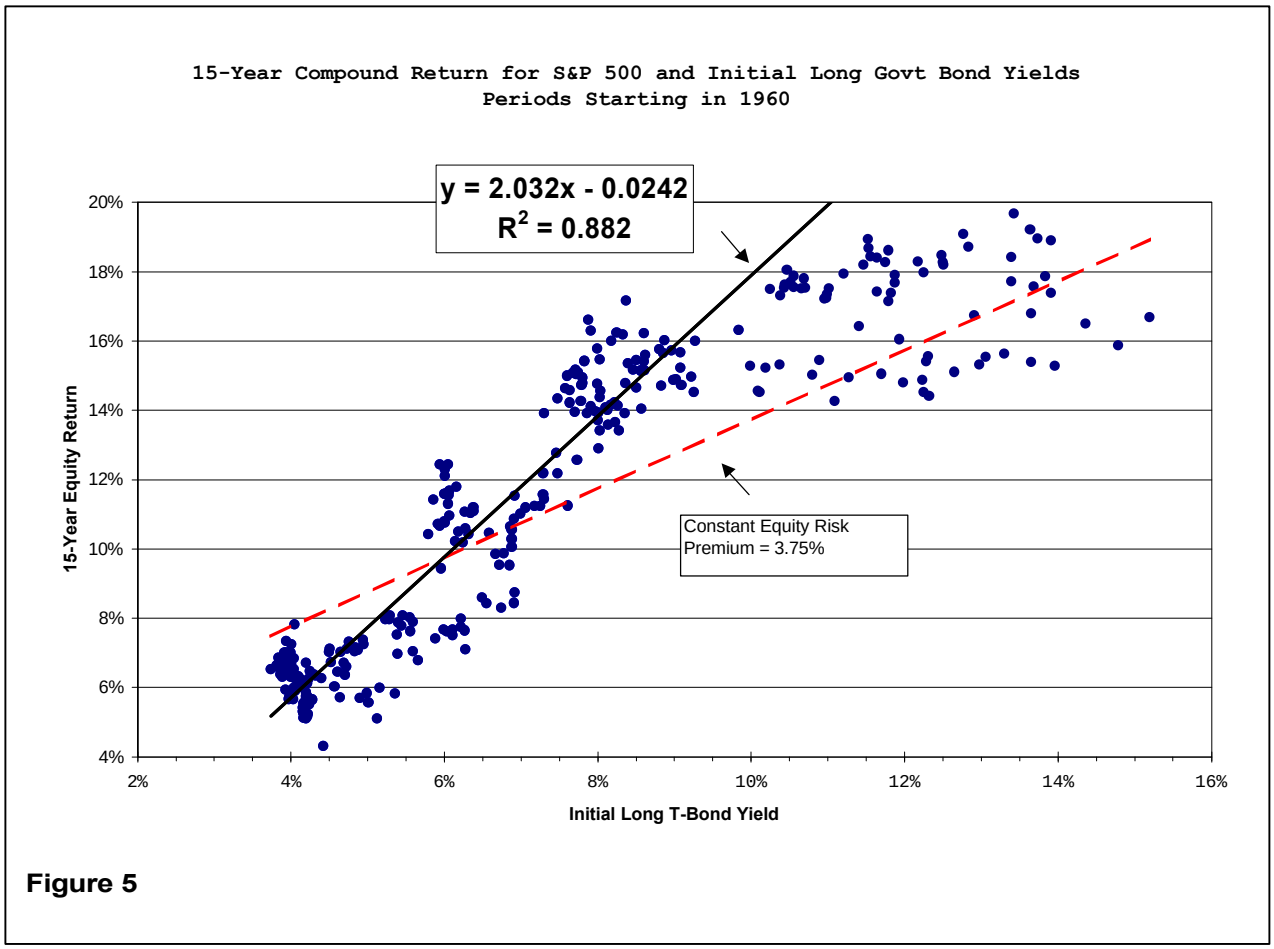

Figure 5

To complete the model for all yield levels, Figure 6 extends the model with an additional trend line that only applies to yields over 10%. That line is very flat, with a low R^2.

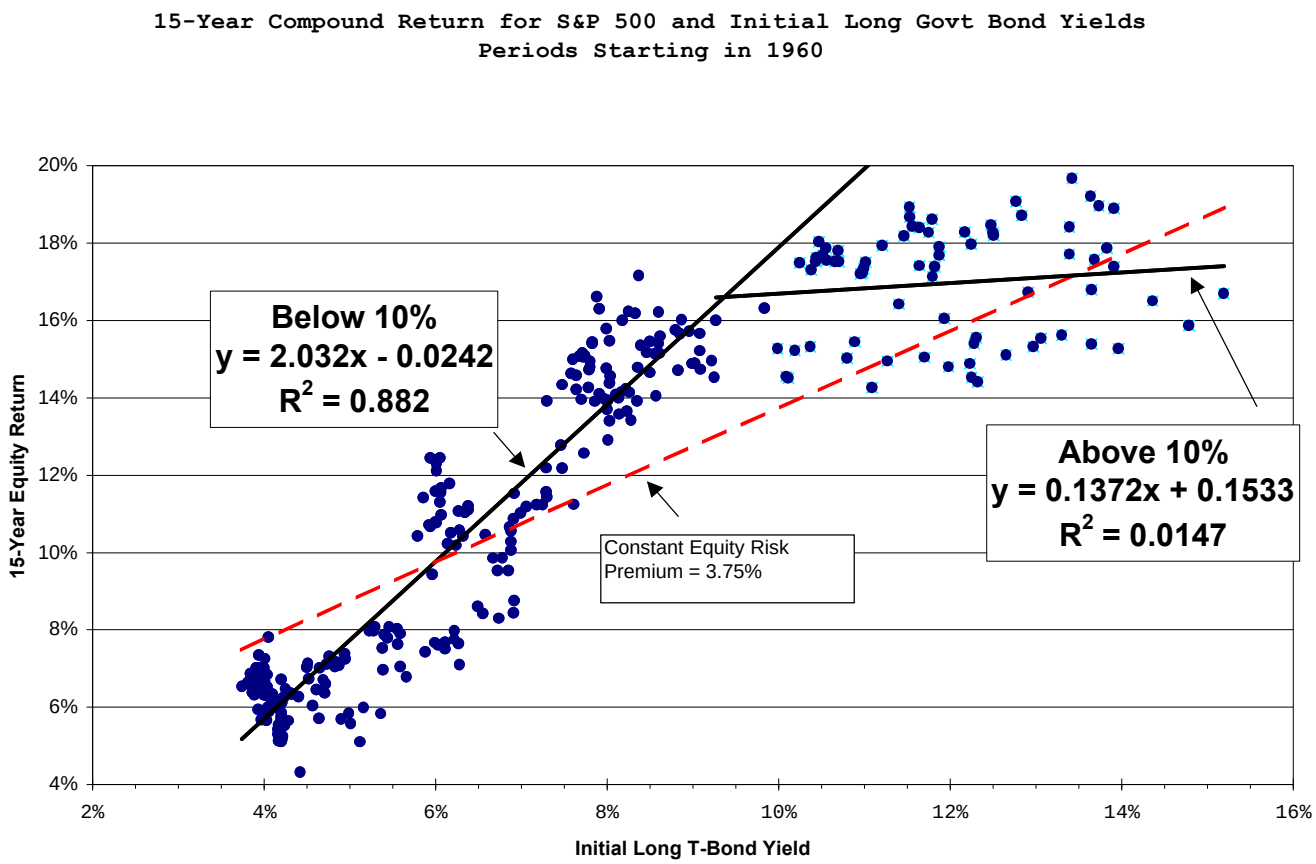

Figure 6

Figure 7a compares the constant ERP model to history from 1960 and Figure 7b compares the linear ERP model to history. Both graphs indicate the region where initial yields were above 10%; at those points, the secondary regression is used.

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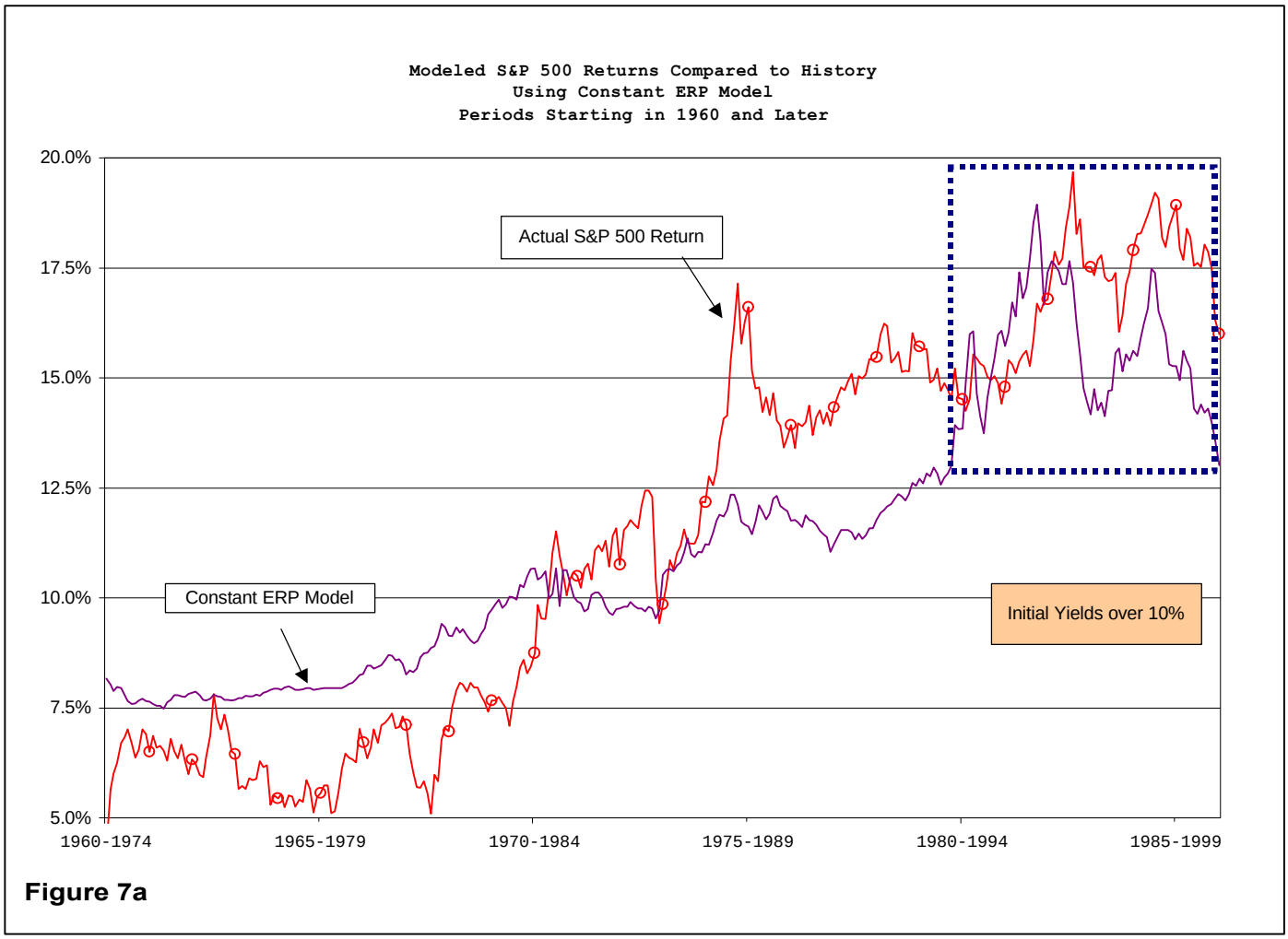

Figure 7a

Like a broken clock that is correct twice a day, the constant ERP model occasionally has estimates close to the actual S&P 500 history. Overall, the linear ERP model is superior to the constant ERP model.

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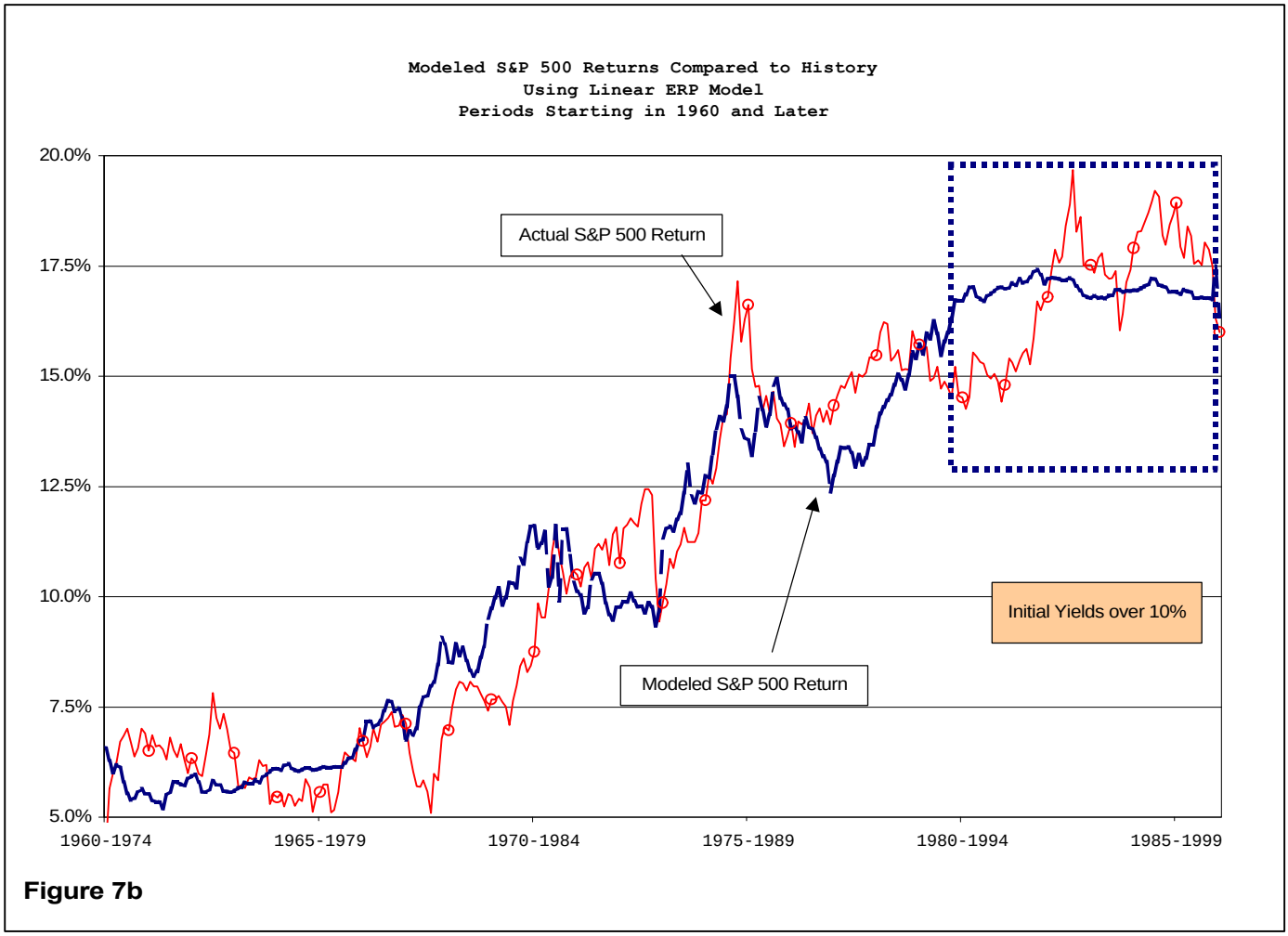

Figure 7b

Expectations for the Future

Our linear regression model for initial yields below 10% has the following equation:

S&P 500 Return = 2.032 * T-Bond Yield – .0242 ($R^2 = 0.88$)

This equation can be algebraically transformed to a more useful form by referencing the average ERP. The restated equation is then:

S&P 500 Return = T-Bond Yield + [1.032 * (T-Bond Yield – .06) + .0375]

and

ERP = 1.032 * (T-Bond Yield – .06) + .0375

In other words, the ERP is 3.75% at an initial yield of 6%, increasing about 103 basis points for every 100 basis point increase in yield. The estimated equity return increases 203 basis points for every 100 basis point increase in yield.

Similarly, the transformed equation for yields above 10% is:

(continued on page 10)

S&P 500 Return = 0.1372 * (T-Bond Yield – .122) + .17

This equation does not directly reflect the ERP, as estimated equity returns are very close to 17% for all yields over 10%.

Figure 8 shows the historical equity returns and forecast equity returns from the linear ERP model for the 15-year periods ending from 1/31/1974 to 12/31/2015. With the 1/1/2001 yield at 5.5%, the estimated 15-year ERP for 2001-2015 is 3.3%, giving an estimated compound equity return of 8.8% for the 2001-2015 period.

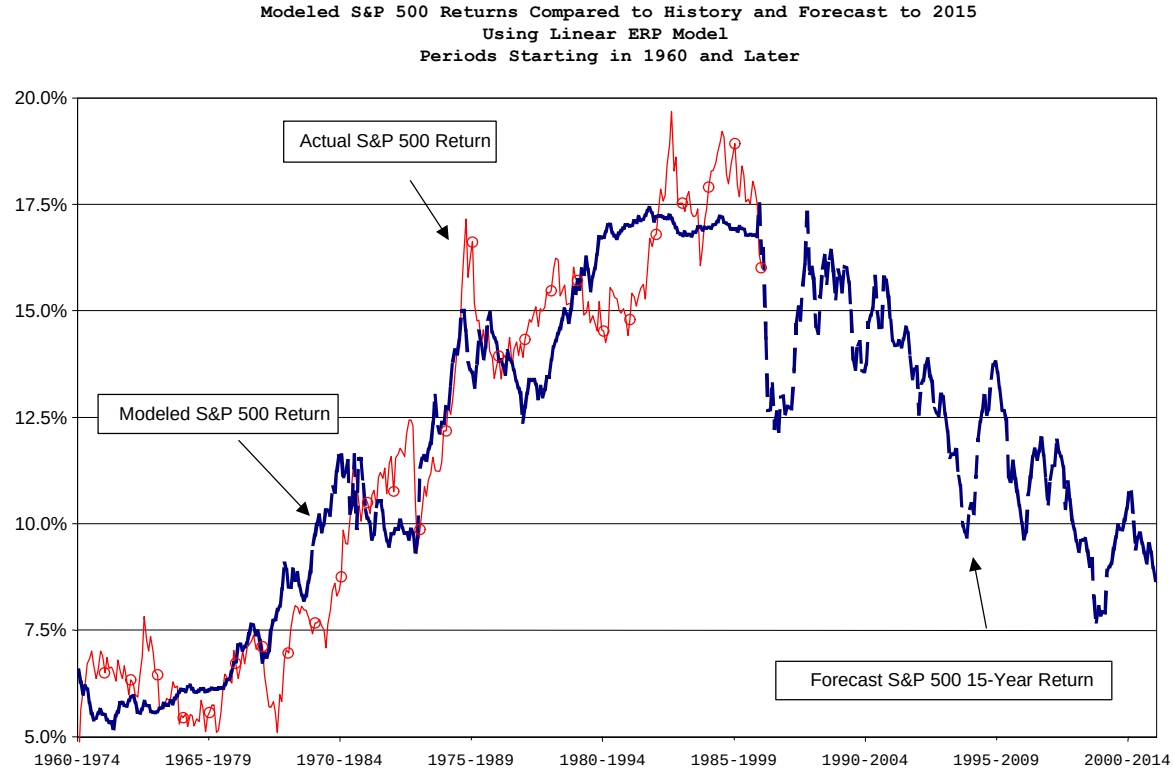

Figure 8

As of early December, long T-Bond yields were close to 5.3%; for that yield level, the linear model estimates a 15-year ERP of 3.1%. That would give an estimated 15-year equity return of 8.4%.

Summary:

Long-run equity returns and ERP are closely tied to long T-Bond yields, particularly for starting yields below 10%. The analysis shows that a simple linear regression model is a more effective predictor of 15-year equity returns than simply assuming a constant ERP. While the average ERP at a 6% initial yield is 3.75%, estimated 15-year equity returns increase 203 basis points for every 100 basis point increase in initial yield over 6%.