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The expected real return to equity

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ABSTRACT

The expected return to equity – typically measured as a historical average – is a key variable in the decision making of investors. A recent literature uses analysts' forecasts, investor surveys or present-value relationships and finds estimates of expected returns that are sometimes much lower than historical averages. This study extends the present-value approach to a dynamic optimizing framework. Given a model that captures this relationship, one can use data on dividends, earnings and valuations to infer the model-implied expected return. Using this method, the estimated expected real return to equity ranges from 4.9% to 5.6% . Furthermore, the analysis indicates that expected returns have declined by about 3 percentage points over the past 40 years. These results indicate that future returns to equity may be lower than past realized returns.

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1. Introduction

The expected return to the aggregate stock market is a key variable in the decisions of both individual investors and corporations, as emphasized by Merton (1980). A sample average of realized returns provides the simplest, and most widely used, estimate of expected returns. However, future returns may differ from past values. A recent literature examines this possibility by constructing forward-looking measures of expected returns based on analysts' forecasts, investor surveys or a present-value relationship linking dividends to valuations.[2]

Analysts' forecasts and investor surveys have their own limitations. Easton and Sommers (2007) argue that analysts' forecasts have an upward bias that can significantly affect estimates of expected returns based on their forecasts. Findings from surveys capture the views of only one segment of the market and, in addition, survey-based methods can suffer from many statistical biases (see Foreman, 1991).

Using a present-value relationship avoids the above problems with analysts' forecasts or investor surveys. The present-value approach uses data on dividend yields and dividends (or earnings yields and earnings) and computes expected returns based on the static Gordon growth model for dividends (see Gordon, 1959). However, there exists a much richer relationship between dividends and valuations than given by the present-value relationship. Specifically, dividends and valuations are related through a dynamic optimizing model. The key insight of this study is that given such a model, one could use data on the dividends, earnings, investment and valuations of the US stock market to estimate the model parameters and thereby

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[1] The views expressed in this manuscript are mine and do not reflect the views of the Board of Governors of the Federal Reserve System or its staff.

[2] Graham and Harvey (2005) and Fernandez and Baonza (2010) employ investor surveys; Claus and Thomas (2001) and Pastor et al. (2008) use analysts' forecasts; and Blanchard (1993), Jagannathan et al. (2001) and Fama and French (2002) base their analysis on present-value relationships.

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infer the expected return to equity. This idea differs from the approach in the broader equity premium literature, which fits models to data on fundamentals and asset returns to draw inference on the models. Instead, the novel approach in this study fits a model to data on fundamentals only, and uses the estimates to draw inference on asset returns.

There are many benefits to taking a model-based approach to estimating expected returns. Such an approach avoids potential biases associated with analysts' forecasts. The estimation uses data for the aggregate market, thus taking into account the expectations of all market participants as opposed to only analysts or survey participants. The model features productivity shocks, earnings dynamics and the endogeneity of dividends, all of which are absent from the Gordon growth model. The model also incorporates a time-varying pricing kernel that places a greater valuation on dividend payouts in recessions. The estimation simultaneously includes data on dividends, earnings, investment and valuations, thereby incorporating more information than that used by the present-value approach. On the other hand, a model-based approach is necessarily predicated on a particular model of equity values. As such, I investigate the robustness of the findings to some changes to the underlying model.

The model underlying the estimation is a variant of the standard production-based asset pricing model employed by Cochrane (1991), Cochrane (1996), Jermann (1998), Gomes et al. (2003), Kogan (2004), Zhang (2005), Gomes et al. (2006), Liu et al. (2009), Jermann (2011) and others. The model prices an aggregate equity claim, compared to the per-share claim typically priced in the literature.[3] One deviation from the standard model is to incorporate decreasing returns to scale in the profit function, reflecting firm markups. This feature enables a more general treatment of profits than in a constant returns to scale framework. It also leads firms to vary their optimal scale following persistent shocks to productivity and helps provide an additional source of value compared to models that take dividends as exogenous.

I estimate the parameters of the model using data on a US representative firm constructed by aggregating firm level data from the CRSP/Compustat merged data set. I perform the analysis on two samples: the first uses annual data from 1966 to 2009; the second uses quarterly data from 1984:Q1 to 2009:Q4. Data availability on stockholders' equity and dividends constrain the start dates of the two samples, respectively. Both samples exclude financial firms and regulated utilities.

The parameter estimates from the annual data imply a mean expected annual real return to equity of about 4.9%–5.6% over the period from 1966 to 2009. These estimates are within the range of values for expected returns obtained by Blanchard (1993), Fama and French (2002), and Graham and Harvey (2005).[4] The findings also support the decision in the limited participation literature to use a lower return to equity than would be indicated by historical returns (see Gomes and Michaelides, 2005; Polkovnichenko, 2007).

Separating the sample into two periods, I find that average expected returns to equity decline sharply from about 6.6% in the period from 1966 to 1987 to about 3.7% in the period from 1988 to 2009. This decline reflects the fact that while earnings and dividends are lower in the latter periods, valuations are higher. The model reconciles this apparent discrepancy with a lower expected return, which raises valuations by lowering the discount rate applied to future dividends. Repeating the estimation using the quarterly data from 1984:Q1 to 2009:Q4 generates an average real return to equity of 3.6%, similar to that obtained using the annual data from 1988 to 2009. This finding is also consistent with the theoretical models of Lettau et al. (2008) and Cogley and Sargent (2008), which emphasize a potential reduction of risk in the economy.

The model performs fairly well on a range of diagnostic tests. Comparing moments not used in the estimation with the corresponding data reveal that the model generates similar properties for the value-to-dividend ratio as the data. The standard deviation of returns implied by the estimates ranges from 7.0% to 11.6%, compared to about 18.3% in the data. The model also fares well on an external validation test, with the model-implied consumption series having similar moments as the actual data. In addition, one could use the parameter estimates and data on earnings to generate a model-implied conditional expected return series. Consistent with economic intuition, this series is countercyclical, with annual expected returns around 8% or higher in recessions. In comparison, the conditional expected return series reported in the literature exhibits less volatility (see Campbell and Thompson, 2008; Rapach et al., 2010).

One limitation of the model is that it also generates a relatively high risk-free rate. As I argue later, this reflects the fact that standard production-based models cannot generate risk-free rates much below the economic growth rate. Thus, the approach used in the study cannot be used to provide an estimate of the equity premium. However, this does not invalidate using the model to estimate the expected real return to equity.

The findings have sharp implications for the investment decisions of investors. Current asset allocation advice is mostly based on properties of historical returns. A lower expected return to equity implies that individuals need to save more to fund retirement expenses. They may also need to reduce their allocation to equities in their portfolios. A lower expected return also impacts the actuarial calculation of pension funds and insurance firms, who base their decisions on annual expected nominal returns around 8%. In particular, it would further exacerbate the under-funding problems of state pension funds, as discussed by Novy-Marx and Rauh (2009).

This study is organized as follows. Section 2 presents the model relating earnings, dividends, and valuations. Section 3 discusses the data and the identification of the model parameters. Section 4 presents the results. Section 5 examines other implications of the model and Section 6 concludes.

[3] Bansal and Yaron (2007) emphasize this distinction and compare the implications of pricing an aggregate equity claim versus a per-share claim. Larrain and Yogo (2008) examine the present-value relationship between asset prices and payouts using data on the aggregate stock market.

[4] The estimated expected returns are higher than the estimates of Claus and Thomas (2001).