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Discussion of "Implied Equity Duration: A New Measure of Equity Risk"

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Abstract. Equity duration offers an interesting new approach to measuring stock risk. The cross-sectional relation between duration and returns is puzzling and invites further investigation.

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The intuition for the measure of equity duration introduced by Dechow, Sloan, and Soliman (DSS henceforth) can be obtained from the Gordon growth model:

$$P_{i,t} = \frac{CF_{i,t+1}}{r - g_{i,t}}, \tag{1}$$

where $P_{i,t}$ is the stock price of firm i at time t, $CF_{i,t+1}$ is the expected cash flow next period, r is the discount rate, and $g_{i,t}$ is the growth rate of future cash flows. In this model, the modified duration of the stock is simply the negative of the semi-elasticity of the stock price relative to the discount rate:

$$D_{i,t} = -\frac{\partial P_{i,t}/P_{i,t}}{\partial r} = \frac{1}{r - g_{i,t}}. \tag{2}$$

The higher the growth rate in future cash flows, the farther into the future the cash flows will occur on average, and the longer the duration of the stock. In the simple Gordon model, the duration measure is also equal to $P_{i,t}/CF_{i,t+1}$ which illustrates the relations found by DSS between duration and valuation ratios.

DSS empirically estimate the duration measure by essentially:

- fixing r across firms and through time;
- estimating $CF_{i,t+1}$ from sales, earnings, market equity, and book equity; and
- using $P_{i,t}$ together with $CF_{i,t+1}$ to solve for $g_{i,t}$.

Substituting these quantities in equation (2) gives the stock's cash flow duration. Of course, in the paper, DSS use a much more careful approach based on detailed financial statement analysis and estimate duration through the equivalent approach of computing the weighted average of the maturities of each forecasted cash flow. Note that there is an inconsistency in assuming a constant discount rate and computing the sensitivity of price to changes in the discount rate, but this problem also exists when bond duration is computed.

One (reductionist) way to view the results of this paper is that the duration measure is nothing more than a composite of the firm's characteristics:

$$D_{i,t} = D(BV_{i,t}, ME_{i,t}, S_{i,t}, E_{i,t}; \theta), \tag{3}$$

where $BV_{i,t}, ME_{i,t}, S_{i,t}$, and $E_{i,t}$ are the firm's book value of equity, market value of equity, sales, and earnings, and θ is a vector of parameters (that DSS calibrate to macro quantities such as the long-term GDP growth rate). All the variables in this composite are known to be associated with risk (e.g., BARRA's risk model has been using them for more than 20 years) and returns (e.g., the Fama-French three-factor model sorts firms by BV/ME and by ME). It is therefore not surprising that the duration measure captures the risks of stocks and helps explain the cross section of returns. Under this view, the "duration" formula just provides a way of blending the component variables, and other functions of the same characteristics might work just as well.

Turning to the empirical analysis, in a nutshell, DSS find that high duration stocks are indeed riskier, having both higher total volatility and higher market beta, and also offer lower returns than stocks with short duration. The risk results agree with the intution behind the construction of the duration measure. The pricing results are troubling.

The problem is that the sign of the risk premium goes in the wrong direction and its magnitude is quite large. The premium to the HDMLD factor (long high-duration, short low-duration stocks) is approximately negative 6% per year! Therefore, high-duration firms (which are supposedly riskier) earn substantially less return than low-duration firms (which are less risky). And this premium is of the same magnitude as the market premium. Even worse: the (annualized) Sharpe ratio of HDMLD, at -0.66, is more than 50% bigger in absolute value than the market's Sharpe ratio of 0.43.

For a risk story to justify this finding, it must be that the risks uncovered by duration are not very important to investors (i.e., do not require much of a premium), and that high-duration firms are actually less risky than low-duration firms in some other dimensions of risk (which do require high compensation). Unfortunately, it is hard to imagine what other risks low-duration firms may have relative to high-duration firms that would justify such a high premium. Of course, this problem of HDMLD is similar to Fama and French's HML portfolio, although HML has a lower premium, of less than 5% per year, and a Sharpe ratio of only 0.44. Even so, HML's premium has triggered an enormous literature searching for a rationale for why value firms may be riskier than growth firms and therefore command a premium. The current paper only makes the search more difficult.

Several recent papers, including Campbell and Vuolteenaho (2003), Brennan and Xia (2003), and Bansal et al. (2002), have tried to explain the value premium in the context of Merton's ICAPM. Their argument is that value firms are actually riskier than growth firms based on the covariance of their returns with changes in the investment opportunity set. For instance, Campbell and Vuolteenaho (2003) use a discounted cash flow model to decompose the market's unexpected returns into news about future cash flows and news about discount rates. In their model, the market may fall because there is bad news about future cash flows or because of an increase in the discount rate. Importantly, in the first case, the market falls but investment opportunities stay the same, whereas in the second case, the market falls but future investment opportunities actually improve due to the higher expected returns going forward. The two components have different impact on long-term investors who hold the market portfolio. Those investors demand a higher premium to hold assets that covary with the market's cash-flow news than to hold assets that covary with discount rate news. Therefore cash-flow beta is "bad beta" since it commands a risk premium that is several times larger than the (relatively) "good" discount-rate beta. Note that stocks with high discount-rate risk (which are similar to stocks with high duration) are still risky for a long-term investor. Campbell and Vuolteenhao (2003) only show that stocks with high cash-flow risk are much riskier.

Campbell and Vuolteenhao (2003) find that discount-rate betas are a little greater for value stocks than for growth stocks, but cash-flow betas are much greater for value stocks than for growth stocks. The difference in the premia for each type of risk explains the difference between returns of value and growth stocks. For a similar story to justify the difference in return of high- and low-duration stocks, we would need to find that low-duration stocks (low discount-rate beta) have much higher cash-flow beta than high-duration stocks. Only then will their risks to long-term investors justify their high returns.

In summary, equity duration is an interesting new approach to measuring stock risk. The relation between equity duration and returns only deepens an already famous asset pricing puzzle.

References

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