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An Unbiased Reexamination of Stock Market Volatility: Discussion

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DISCUSSION

ROBERT SHILLER*: Mankiw et al. find that the variable P_t^0 (equal to the dividend D_t divided by a discount rate r) is a better predictor of P_t^* (the present value of dividends discounted by r) than is P_t , the actual price. Moreover, $P_t - P_t^0$ shows some tendency to be more variable than does $P_t^* - P_t^0$. These observations display in an impressive new way the excess volatility of stock prices relative to the simple efficient markets model [their Equation (1)].

Grossman and Shiller [2] had noted that the simple efficient markets model implies that $\text{var}(P_t^* | D_t) \geq \text{var}(P_t | D_t)$ and had asserted that this inequality was violated, but did not present evidence other than a plot of the data. I think we had in mind the assumption that dividends might be a random walk, and thus an inequality like theirs. Their new argument, however, does not rely on the random walk assumption. They also have discovered that their approach deals neatly with the nonstationarity and heteroskedasticity issues that have become the subject of some controversy. In short, they have written a neat paper that makes an important new point.

I had taken different approaches to the nonstationarity and heteroskedasticity issues. I found that it was possible to put a variance inequality on the first-differenced price and dividend series [6]. However, this variance inequality was not violated by the data. Another approach that I had taken [7] was to detrend the data using an earnings series. I constructed a price and dividend series of a hypothetical mutual fund that buys back and issues its own shares so as to stabilize its earnings per share. This approach might plausibly deal with both the nonstationarity and heteroskedasticity issues, but the approach is rather complicated. The detrended dividend series depends not only on the aggregate dividend series but also on the price and earnings series and on the method used to stabilize earnings per share. The variance inequality was, this time, violated when the stabilization rule was not such as to cause too much trading in shares.¹

I think that the reason I did not quite see the inequalities put forth in this paper was that I tried in most of my work to get away from consideration of P^* . I wanted to avoid using P^* since the series used to represent it depends on a substitution for an unknown terminal price. This remains so in their work, although they do show that it does not open them up to a Marsh-Merton [5] style criticism that under certain assumptions we might *expect* the inequality to be violated for sample variances if the substitution is made.

What is interesting about their Figure 1 is that it shows that while the expectation of the sample variance of P may be greater than that of P^* , it could not be *much* greater. For the relevant sample size of about 100 then no matter what the value of ρ the ratio of the expected standard deviation of P to the expected standard deviation of P^* never exceeds about 1.3, while the actual ratio I reported with the data reported here was over 5. Earlier critics of the variance bounds tests, Flavin [1] and Kleidon [3], emphasized the tendency in certain

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¹ LeRoy and Porter [4] used a correction for earnings retention which they said appeared to produce a stationary series.

cases for the sample variance of P to exceed that of P^* . However, their own small sample results for their special cases show too that it is unlikely to exceed it as much as it does in the actual data.²

It is perhaps surprising that it makes so much difference to the results when the observations are weighted to deal with heteroskedasticity. That inequality 12 is generally not violated then may have to do with the fact that the major "speculative bubbles" in this century of data, that of the 1920's and that of the 1950's, are given less weight.

² See Flavin [1], Figures 1 to 3c or Kleidon [3], Table 4.

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