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Virtual Volatility, an Elementary New Concept with Surprising Stock Market Consequences RICHARD PRANGE, A. CHRISTIAN SILVA, University of Maryland — Textbook investors start by predicting the future price distribution, PDF, of a candidate stock (or portfolio) at horizon T, e.g. a year hence. A (log)normal PDF with center (=drift =expected return) μT and width (=volatility) $\sigma\sqrt{T}$ is often assumed on Central Limit Theorem grounds, i.e. by a random walk of daily (log)price increments Δs. The standard deviation, stdev, of historical (*ex post*) Δs 's is usually a fair predictor of the coming year's (*ex ante*) stdev(Δs) = σ_{daily}, but the historical mean E(Δs) *at best* roughly limits the true, to be predicted, drift by $\mu_{true}T \sim \mu_{hist}T \pm \sigma_{hist}\sqrt{T}$. Textbooks take a PDF with $\sigma \sim \sigma_{daily}$ and μ as somehow known, as if accurate predictions of μ were possible. It is elementary and presumably new to argue that an average of PDF's over a range of μ values should be taken, e.g. an average over forecasts by different analysts. We estimate that this leads to a PDF with a 'virtual' volatility $\sigma \sim 1.3\sigma_{daily.}$ It is indeed clear that uncertainty in the value of the expected gain parameter increases the risk of investment in that security by most measures, e. g. Sharpe's ratio $\mu T/\sigma\sqrt{T}$ will be 30% smaller because of this effect. It is significant and surprising that there are investments which *benefit* from this 30% virtual increase in the volatility

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