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## The Price of the Smirk: Returns to Delta and Vega Neutral Portfolios of S&P 500 Futures Options

30 Pages

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### Abstract

We construct portfolios of S&P500 futures and their associated options, which are long out of (in) the money puts and short out of (in) the money calls, and which are delta (price) and vega (volatility) neutral, with respect to a GARCH type model for the underlying price. These systematically earn less (more) than the riskless return. We give evidence that this loss is not a payment for insurance against a market crash, by separately including a deep out of the money put in the portfolio, which makes it neutral to a market crash, but does not substantially alter the result.

Our result is consistent with a market imperfection interpretation of the smirk: out of the money puts are "too dear", relative to out of the money calls, perhaps because these puts are valuable in providing portfolio insurance. Our strategies do not earn excessive profits, and so we argue that the smirk will not disappear in an efficient market.

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