
FORWARDS OR OPTIONS: A CORRECTION

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INTRODUCTION

In many cases a security may be hedged with different derivative instruments, such as futures and options; choosing from among those is not an easy task. For example, Ahmadi, Sharp, and Walther (1986) argued that currency futures are better than currency options (and spreads) when hedging the downside risk of the British pound, the Deutsche mark or the Japanese yen. Similar conclusions were derived in Chang and Shanker (1986) based upon mean-variance-type criteria. Hancock and Weise (1994) showed that optimal hedge positions for S&P 500 index options (and spreads) and that for S&P 500 futures lead to similar mean returns. They concluded that other factors are responsible for the choice of the instruments. Benet and Luft (1995) extended the earlier work of Chang and Shanker (1986) to stock index instruments. They showed that S&P 500 futures outperform S&P 500 options in variance reduction. Without taking into account the transaction cost, options lead to a larger excess return per unit of risk than futures. Transaction cost reverses the above conclusion.¹

Despite the abundant empirical work comparing futures with options, analytical approaches are lacking in the literature. Lapan, Moschini, and Hanson (1991) and Lapan and Moschini (1995) consider hedging decisions that incorporate the use of both futures and options. In an important recent article, Bowden (1994) developed an ingenious

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¹Although these articles compare hedging effectiveness of futures and options, the conclusions are expected to carry over to the case between forward and options.

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nesting procedure to analyze the problem. Within the general expected utility framework, it was shown that a forward contract may outperform a bull (or bear) spread when the expected future spot price lies within a certain range of the forward price. Based upon this result, he argued that a portfolio of spot and forward contracts always dominates a bull spread. However, the relationship between the spot portfolio and a bear spread is undetermined. As a result, asymmetric roles are assigned to bull and bear spreads. This note demonstrates that these results are incorrect. Corrections and implications are then provided.

Bowden's analysis and conclusions were preceded by his Proposition 1 (p. 906). Unfortunately, this proposition is incorrect. Beginning with a bull spread, the expected utility is as follows:

$$v(\theta) = Eu(\theta) = u(g(\theta) + F - \theta)\Phi(F - \theta) + \int_{F-\theta}^{F+\theta} u(g(\theta) + s)\phi(s) ds + u(g(\theta) + F + \theta)[1 - \Phi(F + \theta)] \quad (10)$$

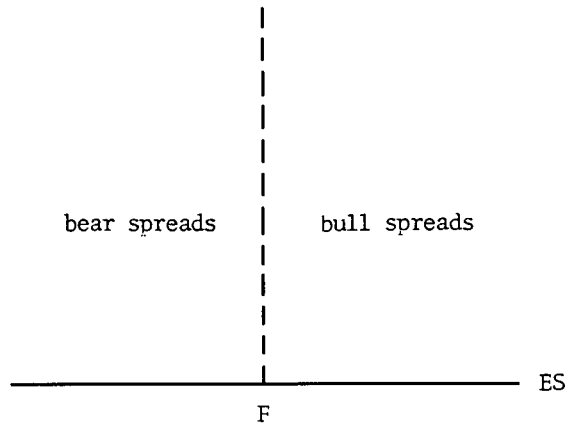
from which, Bowden derived

$$v'(0) = E\left(\frac{dv}{d\theta}\right)_{\theta=0} = u'(F)(1 + g'(0) - 2\Phi(F)) - 2u(F)\phi(F)$$

This is where the mistake arises. In fact, the last term should vanish. A similar case applies to the bear spread. The corrections lead to the following results: $x_A = x_B = -\sigma/2$. Thus, either the bull or the bear spread dominates the forward regardless of the parameter specifications. There is no possibility for a forward to outperform both spreads altogether.

If the forward market is unbiased, the forward price will equal the expected spot price. Given that the option premia are calculated by Black-Scholes formula, forward and options markets are both efficient and have similar performance. This argument is employed by Hancock and Weise (1994) to support their empirical findings. As long as the forward market is biased, the spread strategy will dominate forward hedging. A bull spread is favored when the forward price falls short of the expected spot price, whereas a bear spread is preferred if the forward price exceeds the expected spot price. The results are shown in Figure 1, which is a correction of Figure 4 from Bowden (1994). Note that Figure 1 is harmonious with Bowden's Proposition 2, in which he pointed out that the protective put options will substitute for the forward if and only if the expected spot price exceeds the forward price.

In contrast to empirical findings, the above analysis supports the dominance of options over forward (or futures). To reconcile these dif-



F: the forward price
 ES: the expected spot price

FIGURE 1

Trading bands: Forward versus bull/bear spreads.

ferences, note that the analysis is based upon the efficiency assumptions in calculating options premia. Once transaction cost and margin requirements are taken into account, the hedging effectiveness of futures contracts over options improves, as pointed out in Benet and Luft (1995). Moreover, although there are bull or bear spreads that dominate the forward, the particular spread strategy employed in the empirical study is likely not one of them.

To compare the spot portfolio and the spread, Bowden began with the observation that the portfolio dominates a forward, and then argued that a forward dominates the bull spread over a certain range. Thus, the spot portfolio dominates the bull spread. The range specification requires $F < \mu_s^A$ (the notation follows Bowden), which is not possible. In fact, with the due correction, the two are equal to each other. Bowden's conclusion is, therefore, dubious. Moreover, this analysis predicts a symmetry between bear and bull spreads. The relationship between the spot portfolio and the bull spread is, therefore, similar to that between the portfolio and the bear spread. Bowden (1994) suggested the latter is undetermined, and so is the former relationship.

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