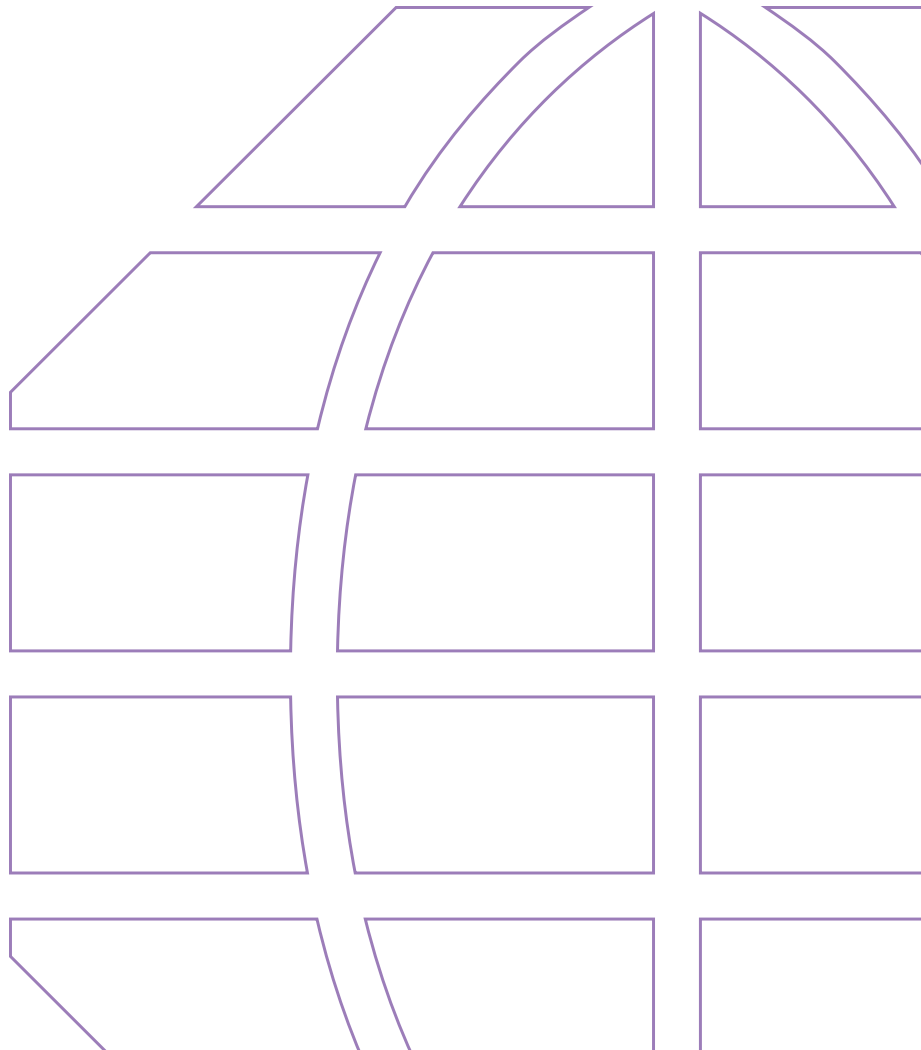


RESEARCH AND PRODUCT DEVELOPMENT

# Options on Index Futures as a Rebalancing Tool

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## This article discusses the benefits of using equity index options on futures to rebalance a portfolio.

Portfolio managers often operate under investment guidelines requiring them to maintain a certain mix between equity and fixed-income investments. If the ratio departs from the prescribed long-term target, they are obliged to tinker with the portfolio and, through rebalancing, restore the ratio to within an acceptable range.

In this article, we discuss one possible rebalancing strategy that uses options on equity index futures. A key benefit of this strategy is that the portfolio manager can monetize the inherent alpha-generating nature of the rebalancing strategy through an appropriate options writing program.

### Nature of Rebalancing Exercise

In a typical rebalancing scenario, the divergence of performance between fixed-income and equity investments can cause the portfolio mix to stray from a desired level. When the stock market rallies, for example, the value of the equity portion typically will outgrow the fixed-income portion. As a result, the weight of the equity component creeps up. While managers may have varying degrees of discretion for restoring the ratio, rebalancing typically involves selling a portion of the equity portfolio and reinvesting the proceeds in a fixed-income investment following the equity out-performance.

Conversely, the weight of the equity component will fall with the stock market, necessitating the additional purchase of equity investments.

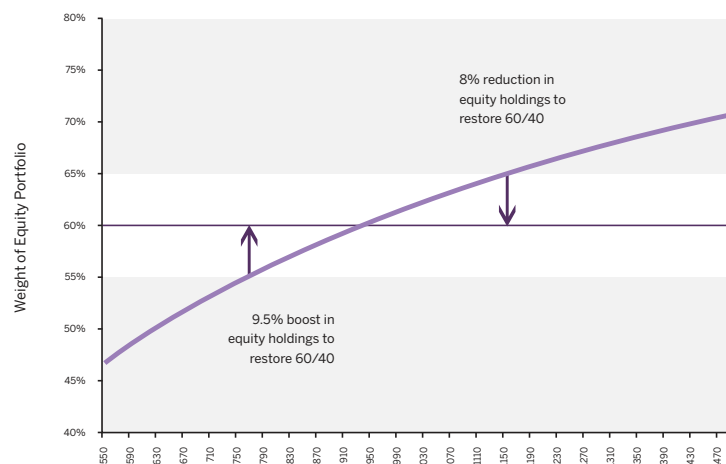
Exhibit 1 shows a hypothetical portfolio, in which the ratio of equity to fixed-income investments is prescribed to be 60/40, with the equity portion mandated to stay within 5 percent of the target. Further, assume that we start off at the desired mix while the current level of the index (S&P 500 Index) equals 940.

Because the fixed-income portfolio value would change the mix, we hold it constant for purposes of our stylized illustration. As mentioned earlier, if the S&P 500 Index appreciates, the value of the equity portfolio will increase, dragging up its weight in the overall portfolio. In our example, if the Index reaches 1160, the weight of the equity portfolio would be 65 percent, or at the upper limit of the mandated band. To restore the 60/40 split, approximately 8 percent of the portfolio should be sold and reallocated to the fixed-income portion of the portfolio.

Likewise, a decline in the Index to 760 would decrease the weight of the equity portion in the overall portfolio to the lower limit of the permissible band. Reallocating the equity portfolio to the 60 percent level would require the manager to increase the holdings by approximately 9.5 percent to restore a 60/40 balance.

Of course, he/she could liquidate some positions following a rally and buy additional stocks after the downturn as a rebalancing strategy. But, depending on the discretion granted to the manager, many other tactical avenues are available. Of these possibilities, consider how the rebalancing can be partially accomplished by writing options on S&P 500 futures.

**EXHIBIT 1: Hypothetical Rebalancing Levels For A Typical 60/40 Portfolio**  
Holding constant the performance of the fixed-income portion of the portfolio, and assuming that the equity portion is based on the S&P 500 Index, a strict 5 percent band around the 60/40 split would require intervention at the index levels 760 and 1160 (current level = 940).



## Using Options to Rebalance

Continuing with our example, we can sell calls with an 1160 strike as well as puts with a 760 strike that have the same expiration date. If the market falls inside the range at the expiration, both options will be left unexercised. The portfolio will benefit from the premium.

If the market ventures beyond this range at expiration, either the call or put will be assigned, resulting in short or long futures positions, respectively. These positions mirror the ones the portfolio manager likely would have established sans the options writing program given the market movements.

### A few observations:

- While the band is symmetric, it takes less of a decline in the stock market than a rally to get to the edge (19 percent down vs. 23 percent up).
- Likewise, the magnitude of the rebalancing is different. Three times as many puts as calls are needed to restore the original 60/40 split.

Clearly, a wide array of possible combinations is admissible. Managers can pick different mixes of options to their liking. For example, to make trade execution simple, a portfolio manager could write the 760/1160 option strangle at a 1:1 ratio on 5 percent of the equity position. In doing so, the manager automates about 63 percent of the rebalancing on the upside and only about 52 percent of the rebalancing on the downside, leaving the remainder to discretionary trading down the road.

Alternatively, given the relatively higher implied volatility for put options, the manager could write more puts than calls, such as at a ratio of 9:8 on 5 percent of the equity holding, and retain less discretion going forward.

Another interesting point involves the inherent “positive gamma” nature of the rebalancing act. From the point of view of the overall portfolio, rebalancing involves selling over-performing assets and acquiring underperforming assets periodically. As such, the rebalancing strategy is akin to the concept of selling high and buying low, so to speak. By repeatedly buying low and selling high, the portfolio benefits from the volatility of the market – very much akin to having long options embedded in the strategy.

Thus, by selling options against the portfolio, the manager is monetizing the inherent positive gamma of the rebalancing strategies via the collection of the options premiums.

One last comment before we move on to the mechanics of the trade – note that the options spreads will present an additional directional exposure for the underlying index. Generally, given the strike asymmetry (puts written nearer to the current levels than the calls), the skew in the implied volatility and the spread ratio, it is highly likely that the options positions will result in a small positive directional exposure to the index. In options parlance, we have a small net positive delta exposure with the options strategy. Because the options positions are written on a small portion of the equity portfolio (5 percent), the net delta from the options overlay is unlikely to force the equity/fixed-income mix beyond the desired band. Managers can elect to leave it in the portfolio or can remove the extra directional exposure by scaling back the S&P 500 futures position used for cash equitization purposes. More on this topic later.

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## Interplay Between Futures and Options

An additional reason to consider using options on futures for this purpose (as opposed to cash index options) relates to the margining advantage of futures, as well as the physical exercise nature of certain expirations of options on futures.

Many managers have S&P 500 futures positions for cash equitization purposes. Overlaying options on futures with the futures for cash equitization would turn the positions into, for margining purposes, a combined covered call position plus short put positions.

In particular, the covered call held in the same clearing house will provide much margin relief, given the practice of daily mark-to-market variation margin. Pretend that the puts are absent for a moment. When the market rallies, the long futures position would gain. Cash variation margin then would be due from CME Clearing. At the same time, call prices would rally, requiring the deposit of additional margin with CME Clearing. The former cash flow would certainly offset the need for the additional margin from the latter.

If the portfolio manager had written cash index options instead, the cash variation from futures would need to be withdrawn and reposted at the Options Clearing Corp.

Reintroducing the puts into the portfolio makes illustrating the effects on margin requirement slightly more involved. In this case, the effect on margin requirements would depend on the exact configuration of the options strategy. It could be no worse, however, than the margin requirements for the short puts plus the covered calls. The aforementioned margining advantage remains, especially for a scenario in which the index rallies, knocking the calls in the money.

Further, serial month options and end-of-month (EOM) options are both physically settled at expiration. “Live” futures positions are created as a result of the options exercise and assignments. These futures positions will fall directly onto the futures account.

Thus, the directional exposure is maintained beyond the options expiration. In fact, because these futures will be the most actively traded contract month of those listed for the underlying index futures, it's highly likely that the contract is already being employed for cash equitization purposes by the manager.

If the manager writes cash index options instead, the directional exposure vanishes at the point of cash settlement. Portfolio managers then would need to re-establish the exposure via either futures or cash equity trades (or would have to roll the options positions).

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The margining advantage of futures and the physical exercise nature of certain expirations of options on futures are two reasons to consider this strategy for rebalancing versus using cash index options.

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Timing of the Options Expirations

As of this writing, options on S&P 500 futures listed at CME have two expirations per month (see Exhibit 2). With the various expiration points, portfolio managers can pick their optimal spots based on various rebalancing constraints as well as tactical needs. In particular, the End-of-Month options represent very natural rebalancing points. They expire on the last business day of each month. Exercises are determined against the 3:00 p.m. Chicago Time (CT) prices of the underlying futures. Portfolio managers might find the timing of the options expiry very convenient for their reporting cycle.

To tie up a loose end from the previous section, the net delta in the options writing program can be addressed by reducing the exposure in the cash equitization program, for example. The overall exposure likely will be monitored and adjusted frequently due to inflows and outflows. As such, the adjustments due to the delta represent no additional burden.

Further, inherent to a portfolio margining system, the vehicles from which exposure is derived are differentiated, i.e., delta from options and futures are treated equally. Margins will not be impacted materially.

Concluding Remarks

Options represent an interesting way for portfolio managers to monetize certain aspects of the rebalancing strategies inherent in their investment guidelines. When applied judiciously, this strategy can generate additional performance under various market environments.

EXHIBIT 2: Expirations Available on S&P 500 Options on Futures.

Listings	Timing of Expiration
<b>Quarterly options</b> (i.e., March, June, September, December)  Exercise type: American-style	Expires with the underlying futures, i.e., at the opening on the 3rd Friday of the quarterly contract month, exercisable into the expiring futures that would be cash settled at the Special Opening Quotation (SOQ) price
<b>Serial options</b> (i.e., January, February, April – months other than March, June, September, December months in the quarterly cycle)  Exercise type: American-style	Expires at the close of business on the 3rd Friday of the month, exercising into the next futures (i.e., May options exercise into June futures)
<b>End-of-Month (EOM) options</b> (Six consecutive monthly listings)  Exercise type: European-style	Expires at 3:00 p.m. CT on the last business day of the month, exercising into the next quarterly futures (i.e., June EOM options are exercise into September futures)

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For more information on how to use our liquid equity index futures and options to manage these gamma losses, contact the Equity Products team at 312 930 1000 or e-mail [equities@cmegroup.com](mailto:equities@cmegroup.com).

Futures and options on the S&P 500 Index are listed with, and subject to, the rules and regulations of CME.

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- 1 Please see our article "Leveraged ETFs vs Futures: Where Is the Missing Performance?" for an expanded discussion of gamma exposure. The gamma effect works in reverse for leveraged ETFs and is more pronounced due to the frequent rebalancing, but the principle remains the same.
- 2 There are cash management programs available, known as the IEFs, to help manage the cash balance residing at CME Clearing.
- 3 Technically, it is the broker/futures clearing member's back office that needs to perform the cash juggling act against different clearing houses. For end customers, however, the added cash movement might still entail additional account reconciliation and/or monitoring work.
- 4 More specifically, volume weighted average traded price of the E-mini S&P 500 index futures is calculated for the last 30 seconds leading up to the 3:00 p.m. CT (4:00 p.m. ET) cash close. This VWAP is the special fixing price used to determine whether an option is in the money and exercisable. In-the-money options are automatically exercised and out-of-the-money options are automatically abandoned. No contrarian exercise instructions are allowed. Therefore, users will know exactly their positions following the publication of the 3:00 p.m. VWAP, typically within a second of 3:00 p.m. For more information about the options specifications, please visit [www.cmegroup.com/equities](http://www.cmegroup.com/equities).

Futures trading is not suitable for all investors, and involves the risk of loss. Futures are a leveraged investment, and because only a percentage of a contract's value is required to trade, it is possible to lose more than the amount of money deposited for a futures position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles. And only a portion of those funds should be devoted to any one trade because they cannot expect to profit on every trade.

All references to options refer to options on futures.

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