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The explosive growth in all kinds of exchange-traded funds (ETFs)—from broad-based indexes to narrow sector funds to commodities and fixed-income funds—has created a need to examine how to achieve best execution for these securities. Should one treat ETFs as just another security, much like an individual stock, and seek best execution on the ETF only? Or should one recognize that an ETF has replicating or alternative securities, some of which could be traded in lieu of the ETF, thus prompting consideration as to whether to buy the cheapest of the related securities and sell the dearest? (For Profit & Loss (P&L) reasons, if not yet for regulatory requirements, one should choose the latter.)

A LITTLE HISTORY (FROM INDEX ARBITRAGE TO BSK TO ETF)

In the mid to late 1980s, index arbitrage (arbitrage between an Index's components and its Future) was very profitable for the few firms with the resources to execute an unwieldy program with 500-plus names (S&P 500 basket, NYA basket) against a phone order for index futures. The spreads were wide, but the difficulty of execution and the huge capital requirement (despite the low 5% capital haircut requirement) narrowed the field of players. Some players used mainframe computers to execute market orders on all the names, while the innovators of that time used Sun workstations and IBM PCs to control the execution of limit orders.

Everyone wanted in but not everyone could play. One such group of outsiders was the NYSE, which proposed a market basket called BSK, consisting of the 500 names in the S&P 500 and equivalent to 29 S&P 500 futures. In essence the BSK was an exchange-traded fund limited to brokers and institutional players. As a junior trader at Salomon Brothers Inc. in September 1989, I was assigned the task of BSK market making, typing in bids and offers with frequent updates on an antique mainframe terminal, which entailed a lot of work for very little return. I once executed a basket for a $10 profit on each future, or about $29 \times \$500 \times \$10 = \$145{,}000$ profit. Not bad for a few minutes work, except that the firm on the other side of the trade called our trading desk and asked to cancel, saying that they had a "handle" error. Unfortunately my boss forced me to reverse the trade. Finally, I got another chance to execute a couple of baskets (with a corporate entity on the other side) for a small profit. The BSK product fizzled and died shortly thereafter.

In the early 1990s, when I was a trader with the Equity Derivatives team at Nomura Securities International, a powerhouse in index arbitrage as a result of hiring teams from Salomon Brothers and Kidder Peabody, we were asked about our interest in a new product

called a SPDR, an ETF on the S&P 500. We said we would trade it if we could arbitrage it after all fees involved. As a result, SPDRs started trading in January 1993, and ETFs just took off with successful innovations in index and sector products, such as the QQQQ and the XLF.

TRADING CHOICES

Let's take a look at choices available for trading the S&P 500. One can trade either the S&P 500 ETF (ticker symbol SPY); the (up to) 500 component stocks with the appropriate shares in each one; a pit-traded or electronic-traded S&P 500 future; options on the ETF; options on the S&P 500 index; or options on the futures, with the options traded as a combo (long call, short put at the same strike), split-strike (shades of Bernie Madoff), or delta-hedged call or put. There are lots of choices, with some being stochastically dominated by others, while others are out of consideration because of margin requirements or simply by the complexity of managing such positions. What's a trader to do?

One possibility is to trade the (up to) 500 basket components. I stress "up to" 500 for two reasons. One is that sometimes the index does not have its full complement of components, as when two stocks are dropped from the index immediately but Standard & Poor's decides to add another stock on a forthcoming day. However, even with a full complement, some traders are willing to use a stratified sample of the index and incur tracking error.

A second simpler choice is to trade the ETF as one unit—SPY, QQQQ, etc. A third choice, for some ETFs, is to trade the e-mini future, such as the ESZ9.

BEST EXECUTION

With these three choices a trader needs a robust trading solution, such as an Execution Management System (EMS), for comparing the choices in real-time; to get best execution; to manage the execution of the basket or the other choices at the target level(s); and for arbing in real time.

Additionally an EMS will assist the trader in normalizing the prices of all three instruments (ETF, basket, and future) using the same terms.

For example, imagine buying the ETF for 123.46, the basket for 1234.10, and the futures for an average price of 1239.40. The trader now has an apples-to-oranges problem. Now imagine a system where the trader can see the prices in real time in the *same units*. This requires knowing multipliers; cash and dividend adjustments to the basket; and fair value of the futures. So instead of seeing the prices as above, the trader sees:

SPY	123.46	
Basket	123.44	(cash 0.03)
ES9Z	123.46	(fv 0.50)
Sum	123.45	

The futures price was converted to a cash price using a fair-value formula, such as:

$$FV = Irt - D$$

(where FV = fair value of future; I = Index price; r = interest rate; t = time to expiration; and D = dividends in index units).

The future's theoretical fair value is a function of the spot instrument, and hence the fair-value adjustment itself will change in real time. The basket has to be converted into ETF terms taking into account such things as accrued dividends and settlement days. Just like football, it is a game of inches, requiring the trader to understand the specifications of the ETF as well as the ability to adjust for the details in real time. Only then can the trader be assured of buying the cheapest and selling the dearest. An important factor is the difference in weights between an index and the replicating ETF.

Following is a good description of this weight differential from the Nasdaq 100 website:

> The composition and percentage share weights provided are of the securities in the NASDAQ-100 Index. The composition of the NASDAQ-100 Trust will be adjusted from time to time to conform to changes in the composition and/or weighting of the securities in the Index. However, it is not always efficient to replicate identically the share composition of the Index if the transaction costs incurred by the Trust in so adjusting the securities held in the Trust would exceed the expected misweighting that would ensue by failing to replicate identically minor and insignificant share changes to the Index. Accordingly, to further the investment objective of the Trust, minor

misweightings are generally permitted within the guidelines set forth in the prospectus for NASDAQ-100 Index Tracking Stock. It is also possible that for short periods of time, the Trust may not fully replicate the performance of the Index due to the temporary unavailability of certain Index securities in the secondary market or due to other extraordinary circumstances. For these and other reasons described in the prospectus for NASDAQ-100 Index Tracking Stock, the composition and weighting of securities held in the NASDAQ-100 Trust may from time to time differ from the composition and weighting of securities in the Index.

If a trader wants to move a large size of ETFs and would like to minimize market impact, he or she can accomplish this by trading each of the three instruments nearly simultaneously. With an EMS, the trader can automate this process and get a normalized average price for the trade using all three instruments.

In conclusion, I would like to stress that in multi-asset trading, it is not sufficient to use best execution for each security in isolation; rather, do it in unity. The regulators may not have caught wind of that yet, but even if they never do, it will have a definite impact on your P&L. Without a robust system achieving best execution in ETFs, it is virtually impossible. Happy trading!

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