

EQUITY PRODUCTS

Tracking Error for E-mini MSCI EAFE Futures

A Quick and Dirty Calculation

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It has been almost two full years since the E-mini MSCI EAFE futures contracts were initially listed in March 2006. The contract has since attracted significant interest from market participants, as evidenced by the growth of its open interest. As of this writing, the open interest is knocking at the door of 15,000 contracts and gaining at a healthy pace. It is perhaps an opportune time to review the performance of the futures contract with respect to its tracking error versus the underlying index. Methodological notes will follow the comparison.

Monthly Performance Comparison

The table at right contrasts the performance of the index with gross and net dividends, as well as the strategy of using futures to replicate the index. With April 2006 being the first full calendar month of the contract, we have the performance of the last 22 full months. We observe that:

- The long-term performance of the futures is actually very attractive. The average monthly tracking error is practically zero in the 22-month sample.
- The monthly performance does exhibit some swings, as evidenced by the estimated standard deviation of 59 basis points. However, there is actually a discernible pattern – (i) a large deviation one month tends to have an offsetting deviation in the next month; (ii) they bunched together in months with significant distress in the market.

	MONTHLY PERFORMANCE			MONTHLY TRACKING ERROR	
	Index/Gross	Index/Net	Futures	vs. Gross	vs. Net
Apr-06	4.84%	4.83%	4.81%	-0.03%	-0.03%
May-06	-3.73%	-3.76%	-3.65%	0.08%	0.11%
Jun-06	0.06%	0.04%	-0.22%	-0.28%	-0.26%
Jul-06	1.00%	0.99%	1.06%	0.06%	0.07%
Aug-06	2.80%	2.76%	2.45%	-0.35%	-0.32%
Sep-06	0.16%	0.14%	0.05%	-0.11%	-0.09%
Oct-06	3.91%	3.91%	4.02%	0.11%	0.12%
Nov-06	3.03%	3.01%	3.18%	0.15%	0.17%
Dec-06	3.15%	3.14%	3.33%	0.18%	0.18%
Jan-07	0.69%	0.69%	1.22%	0.53%	0.53%
Feb-07	0.84%	0.82%	-0.35%	-1.20%	-1.17%
Mar-07	2.58%	2.56%	3.52%	0.93%	0.96%
Apr-07	4.53%	4.51%	3.52%	-1.01%	-0.99%
May-07	1.90%	1.88%	1.72%	-0.19%	-0.16%
Jun-07	0.20%	0.19%	0.41%	0.21%	0.23%
Jul-07	-1.47%	-1.47%	-2.54%	-1.07%	-1.06%
Aug-07	-1.51%	-1.55%	-0.20%	1.31%	1.35%
Sep-07	5.35%	5.34%	5.57%	0.21%	0.23%
Oct-07	3.94%	3.93%	3.71%	-0.23%	-0.22%
Nov-07	-3.25%	-3.27%	-3.37%	-0.12%	-0.10%
Dec-07	-2.25%	-2.26%	-2.32%	-0.06%	-0.06%
Jan-08	-9.20%	-9.20%	-8.58%	0.62%	0.62%
			Average	-0.01%	0.00%
			Std Dev	0.59%	0.59%

TABLE 1 E-mini MSCI EAFE Futures Tracking Error since inception.

This latter behavior seems to be explained by the idiosyncrasies with this particular index: The official closing price for the index is based on the closing prices of the underlying stock at their respective closes. With the close of the London trading hour at 10 a.m. Central time, the closing price¹ of the underlying index is largely determined. The futures on the index, however, continue to trade until the end of U.S. trading day, or some five-plus hours following the closing price of the index is set. As such, any new market moving information will be reflected in the futures prices but not the index itself. If the market rallied following the London close, futures performance for the month will be higher for the current month but lower in the next month, due to the higher starting point.

The foregoing is more likely to happen in a period of volatile markets, e.g. following the late-February 2007 “contagion” from the correction in Asia or July/August with the credit market upheaval.

Note on the Calculation Methodology

The performance of the cash index is determined by the price series plus the inclusion of the monthly gross or net dividend accrued at the end of the month. The performance of the futures contract, however, is not simply the percentage change of the futures prices.

- Futures contracts are “unfunded” instruments. One does not pay the price of the futures contract in cash. The money is actually sitting in interest accruing instruments and serves as collateral. Thus, if one commits 100 percent of the cash index, there will be no leverage involved, making the performance comparison “apple to apple.”
- The interest accruing ability, of course, depends on the choice of the instrument. As such, there is no universally applicable performance calculation for the futures strategy. In the foregoing calculation, we employed one-month LIBOR as the money market instrument. We also used effective overnight Fed Funds, compounded over the appropriate period², as another possible choice. The performance difference in the 22-month sample is minimal – the LIBOR-based calculation shows a slight advantage over the Fed Fund-based calculation (2 basis points, with same dispersion). However, during the credit market crisis in the latter half of the 2007, the discrepancy can be more pronounced, to the tune of 6 to 8 basis points a month.
- Thus, the performance calculation for the futures strategy is the futures price change³ for the month, divided by the initial cash index value, plus the interest accrual for the month. Prior to the expiration of the lead month futures contracts, the position is assumed to “roll over” to the subsequent quarterly contract at the settlement prices of the day. This rollover is assumed to be consummated on the Monday prior to the expiration Friday.

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¹ Some of the underlying stock even closed much earlier than the London close. For example, Japan closes at midnight Central time. The constituent Japanese stock prices would have been 9-10 hours stale even by the time the official closing price calculation is performed following the close of the last market.

² Cash stock trades are all assumed to be settled in a T+3 cycle. Thus, the money market investment is assumed to run through the same period dictated by the T+3 cycles. Given that LIBOR has a T+2 convention, the fixing is usually sampled on the London business day following the last business day of the previous month. Even though the holding period is usually not exactly the same as dictated by the LIBOR quote, we used the one-month LIBOR without further adjustments. The discrepancy should be de minimis. For the Fed Fund-based calculation, the investment is assumed to roll over everyday, with the start and end dates dictated by the dates corresponding to the T+3 cycles.

³ Based on the settlement prices of the lead month contract at the end of the month, versus that at the end of the previous month.

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