Alternative Investment Management

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Hedge Funds

not open to general public < institution / high net value client

- Hedge funds are lightly regulated active investment vehicles with great trading flexibility.
- They are believed to pursue highly sophisticated investment strategies that:
  - Deliver more than factor risk (i.e., alphas). their return cannot be explained by factor risks.
  - Deliver returns to their investors that are unaffected by the vagaries of financial markets. market neutral
- The assets managed by hedge funds have grown substantially, increasingly driven by movement portfolio allocations from institutional investors (aggregate hedge fund AUM have grown from $\$72B - \$670B$ over $1994 - 2004$). ← good time

difficulty in making good returns in public markets.

Hedge Fund Managers vs Investors

- A significant gap has emerged between the culture and expectations of the institutional investors (e.g., pension fund sponsors) and hedge-fund managers.
- Differently from the requirements of the investors, hedge funds:
  - Rarely provide position-level transparency.
  - Impose minimal restrictions on their investment process, because restrictions often hurt performance.
  - Routinely impose lock-ups of $1-3$ years.
  - Often have limited capacity. often find arbitrage / mispricing opportunity, which will disappear after full trading
  - Charge high management and performance fees.

high water mark

Hasanhodzic and Lo (2007)

Can Hedge Fund Returns Be Replicated?

Is it possible to obtain hedge-fund-like returns without investing in hedge funds? In other words, can hedge-fund returns be cloned?

- Hasanhodzic and Lo (2007) provide one answer to this challenge by constructing linear clones of 1610 individual hedge funds.
- The clones are passive portfolios of common risk factors (e.g., $S\&P500$, US Dollar Index), with portfolio weights estimated by regressing individual hedge-fund returns on the risk factors.

like RX

$r_{i,t} = \alpha_0 + \alpha_1 R_{S\&P} + \alpha_2 R_X \ldots + \varepsilon$

Intuition: If a hedge fund generates part of its expected return and risk profile from certain common risk factors $\Rightarrow$ it may be possible to design a low-cost passive portfolio - not an active dynamic trading strategy - that captures some of that fund's risk/reward characteristics by taking on just those risk exposures.

α small ε
R^2 large

① Capital Decimation Partners (CDP)

put option:
Give the holder the right but not the obligation to sell a certain number of assets at a pre-specified price (strike price K) at a pre-specified date (expiration date t)

- CDP's investment strategy involves shorting out-of-the-money $S\&P500$ (SPX) put options on each monthly expiration date for maturities less than or equal to 3 months, and with strikes approximately 7% out of the money.
- The number of contracts sold each month is determined by the combination of:
  1. CBOE margin requirements
  2. an assumption that 66% of the margin is required to be posted as collateral
  3. $\$10M$ of initial risk capital

Capital Decimation Partners (CDP) cont'd

- The essence of CDP's investment strategy is the provision of insurance.
- CDP investors receive option premia for each option contract sold short, and as long as the option contracts expire out-of-the-money, no payments are necessary.
- $\Rightarrow$ the only time CDP experiences losses is when its put options are in-the-money, i.e. when the $S\&P500$ declines by more than 7% during the life of a given option

Intuition: investors willing to take on tail risk - the risk of rare but severe events - will be paid well for this service.

Performance Summary of CDP

Table 1 Performance summary of simulated short-put-option strategy consisting of short-selling out-of-the-money S&P 500 put options with strikes approximately 7% out of the money and with maturities less than or equal to 3 months, from January 1992 to December 1999.

Statistic	S&P500	CDP
Monthly mean	1.4%	3.6%
Monthly SD	3.6%	5.8%
Minimum month	−8.9%	−18.3%
Maximum month	14.0%	27.0%
Annual Sharpe ratio	1.39	2.15
# Negative months	36	6
Correlation to S&P 500	100%	61%
Return Since Inception	367%	2560%

Option : non-linear

Simulated Monthly Returns of CDP

Table 2 Monthly returns of simulated short-put-option strategy consisting of shortselling out-of-the-money S&P 500 put options with strikes approximately 7% out of the money and with maturities less than or equal to 3 months, from January 1992 to December 1999.

	1992		1993		1994		1995		1996		1997		1998		1999	
Month	SPX	CDP	SPX	CDP	SPX	CDP	SPX	CDP	SPX	CDP	SPX	CDP	SPX	CDP	SPX	CDP
Jan	8.2	8.1	−1.2	1.8	1.8	2.3	1.3	3.7	−0.7	1.0	3.6	4.4	1.6	15.3	5.5	10.1
Feb	−1.8	4.8	−0.4	1.0	−1.5	0.7	3.9	0.7	5.9	1.2	3.3	6.0	7.6	11.7	−0.3	16.6
Mar	0.0	2.3	3.7	3.6	0.7	2.2	2.7	1.9	−1.0	0.6	−2.2	3.0	6.3	6.7	4.8	10.0
Apr	1.2	3.4	−0.3	1.6	−5.3	−0.1	2.6	2.4	0.6	3.0	−2.3	2.8	2.1	3.5	1.5	7.2
May	−1.4	1.4	−0.7	1.3	2.0	5.5	2.1	1.6	3.7	4.0	8.3	5.7	−1.2	5.8	0.9	7.2
Jun	−1.6	0.6	−0.5	1.7	0.8	1.5	5.0	1.8	−0.3	2.0	8.3	4.9	−0.7	3.9	0.9	8.6
Jul	3.0	2.0	0.5	1.9	−0.9	0.4	1.5	1.6	−4.2	0.3	1.8	5.5	7.8	7.5	5.7	6.1
Aug	−0.2	1.8	2.3	1.4	2.1	2.9	1.0	1.2	4.1	3.2	−1.6	2.6	−8.9	−18.3	−5.8	−3.1
Sep	1.9	2.1	0.6	0.8	1.6	0.8	4.3	1.3	3.3	3.4	5.5	11.5	−5.7	−16.2	−0.1	8.3
Oct	−2.6	−3.0	2.3	3.0	−1.3	0.9	0.3	1.1	3.5	2.2	−0.7	5.6	3.6	27.0	−6.6	−10.7
Nov	3.6	8.5	−1.5	0.6	−0.7	2.7	2.6	1.4	3.8	3.0	2.0	4.6	10.1	22.8	14.0	14.5
Dec	3.4	1.3	0.8	2.9	−0.6	10.0	2.7	1.5	1.5	2.0	−1.7	6.7	1.3	4.3	−0.1	2.4
Year	14.0	38.2	5.7	23.7	−1.6	33.6	34.3	22.1	21.5	28.9	26.4	84.8	24.5	87.3	20.6	105.7

- Strategy can be easily cloned.

(2) Capital Multiplication Partners (CMP)

- CMP's investment strategy is based on a dynamic asset-allocation strategy between the $S\&P500$ and 1-month US Treasury Bills, where the fund manager can correctly forecast which of the two assets will do better in each month and invests the fund's assets in the higher-yielding asset at the start of the month.
- $\Rightarrow$ the monthly return of this perfect market-timing strategy is simply the larger of the monthly return of the $S\&P500$ and T-Bills.
- Merton (1981): Perfect market-timing is equivalent to a long-only investment in the $S\&P500$ plus a put option on the $S\&P500$ with a strike price equal to the T-Bill return.

Performance Summary of CMP

Assume forcast cannot be wrong

Table 3 Performance summary of simulated monthly perfect market-timing strategy between the S&P 500 and 1-month US Treasury bills, and a passive linear clone, from January 1926 to December 2004.

Statistic	S&P 500	T-Bills	CMP	Clone
Monthly mean	1.0%	0.3%	2.6% some	0.7%
Monthly SD	5.5%	0.3%	3.6% months	3.0%
Minimum month	−29.7%	−0.1%	−0.1% in r-f	−16.3%
Maximum month	42.6%	1.4%	42.6%	23.4%
Annual Sharpe ratio	0.63	4.12	2.50	0.79
# Negative months	360	12	10 real rate	340
Correlation to S&P 500	100%	−2%	84%	100%
Growth of $1 since inception	$3,098	$18	2.3×10^{10}	$429

- The option-like nature of CMP's perfect market-timing strategy cannot be easily cloned using linear clones.