Getting Exposure: Hedge Funds, Leverage, and Derivatives

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Overview

- Derivatives and Leverage: The Economic Interrelationships
- The Public Policy Interest in Hedge Funds, Derivatives and Leverage
- Derivatives and Leverage as Means for Hedge Funds to Gain Exposure to Assets: Performance and Risk Management Implications

Leverage, Derivatives and Exposure are interlinked—especially for Hedge Funds

- Leverage may be best understood as the creation of exposure greater in magnitude than the initial dollar amounts posted to an investment. It is a significant factor in the risk and return profiles of various hedge fund strategies.
- Leverage may be achieved through borrowing, deployment of proceeds from short sales, or, crucially, through the use of derivatives.
- Derivatives are designed to separate cash flows associated with assets from the need to fully fund positions in those assets
- Economic functions of derivatives and leverage are intimately related: derivatives are the primary tool for achieving leverage, especially for hedge funds

Hedge Funds, Leverage, and Derivatives: A Crucial Public Policy Issue

- Hedge Funds can have substantial exposure, achieved primarily through derivatives and leverage
  - Estimated Notional Value of Long Term Capital Management (LTCM) contracts was greater than USD 1 Trillion
- Hedge Funds can have role in systemic risk
- Hedge Funds are generally outside of the supervisory, regulatory and monitoring ability of governments, self-regulatory organizations and counterparties
- Hedge Funds, Leverage and Derivatives are a main focus of recent report of Counterparty Risk Management Policy Group II
  - CRMP II is a successor to CRMP, a public-regarding private sector task force formed in the wake of LTCM

Hedge Funds Actively Use Derivatives to Acquire, Focus or Hedge Exposure

- Forwards, Futures and Options
- Interest Rate Swaps
- Total Return Swaps
- Credit Default Swaps
- Tranche Products

Derivative-based Exposure offers alternatives to typical finance via collateralized borrowing

- Term:
  - Derivative contracts are generally of fixed maturity, but supported by collateral
  - Most collateralized securities lending is ‘demand’ based
- Counterparty Risk:
  - Derivatives financing can be diversified or hedged across multiple counterparties
    - E.g. Futures Clearinghouses lay risk off on counterparties
  - Most collateralized securities lending is concentrated with one counterparty

Background: Hedge Fund Strategies

- Hedge Fund Strategies
  - **Convertible Arbitrage:** Long convertible bonds or preferred, short underlying common stock and short underlying credit risk;
  - **Equity Hedge:** Long or short equities, typically with a net long bias;
  - **Event Driven**: Corporate transactions and special situations
  - **Distressed Securities**: Long undervalued securities of companies in financial distress or operating under Chapter 11;
  - **Merger Arbitrage**: Long/short equity securities of companies involved in corporate transactions; and
  - **Equity Market Neutral**: Long undervalued equities and short overvalued equities, usually coordinated on a factor exposure basis;

Typical Quoting Conventions for Leverage Vary By Hedge Fund Strategy

- Convertible Arbitrage:
  - Gross Longs / Net Assets
- Equity Hedge
  - (Gross Longs + Gross Shorts)/Net Assets
- Event Driven
  - (Gross Longs + Gross Shorts)/Net Assets, with “hedges” not included (e.g. Credit Default Swaps)
- Distressed
  - Gross Longs/Net Assets
- Merger Arbitrage
  - (Gross Longs + Gross Shorts)/Net Assets
- Equity Market Neutral
  - (Gross Longs + Gross Shorts)/Net Assets

Sources of Exposure by Hedge Funds: The Example of Convertible Arbitrage

- Convertible Arbitrage:
  - Long Cash Instruments (with embedded option)
  - Proceeds from Short Sales
  - Listed Futures and Options
  - Credit Derivatives
    - Single Name
    - Index
    - Tranche
  - Asset Swap
  - Interest Rate Swaps
  - Credit Line
  - Forex Instruments

The Investment Implications of Hedge Fund Leverage

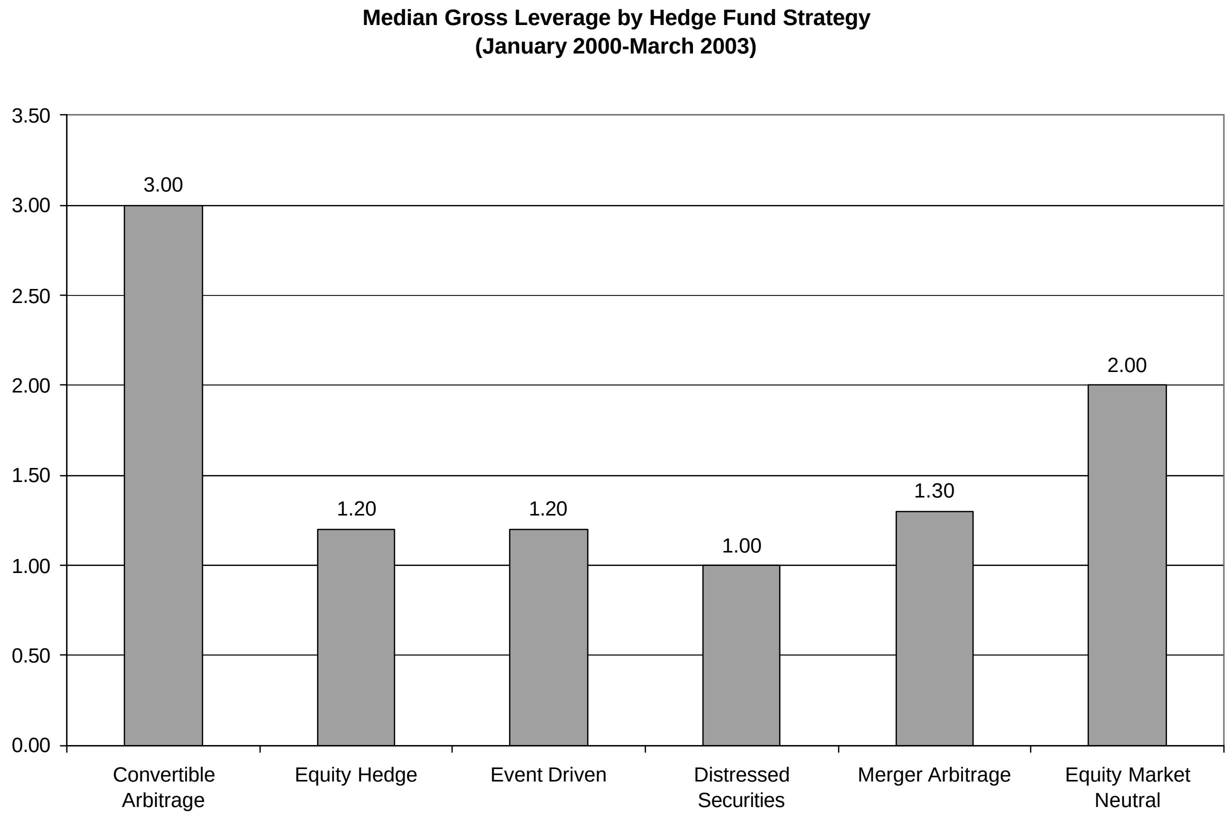
Question: Is there a general relationship between hedge fund leverage and performance?

- Do hedge funds that use leverage trade differently from those that do not?
  - How does hedge fund leverage vary across hedge fund strategies
  - Does the greater or lesser use of leverage within strategies have impacts on performance?
    - Economies or diseconomies of scale in security selection
    - Investor risk tolerance
    - Constraints from counterparties
- Are the return exposures different?
- Are the risk exposures different?

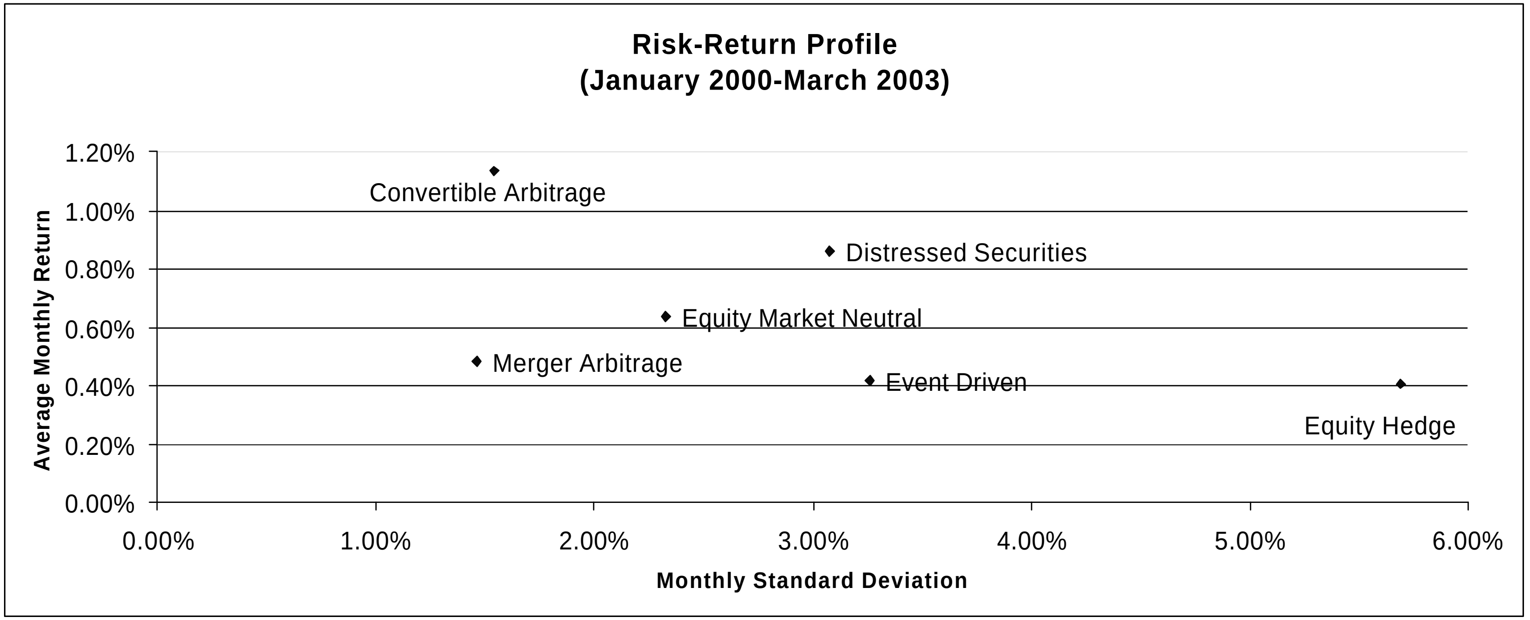
Some Empirical Data of Use of Leverage by Hedge Funds

- Leverage data on 500+ managers from CISDM and TASS databases
- Leverage data at the fund level is difficult to come by
- Manager must have performance data 2000-3/2003
  - Statistical tests of performance characteristics of managers reporting leverage data and those not reporting indicate there is no selection bias at the aggregate

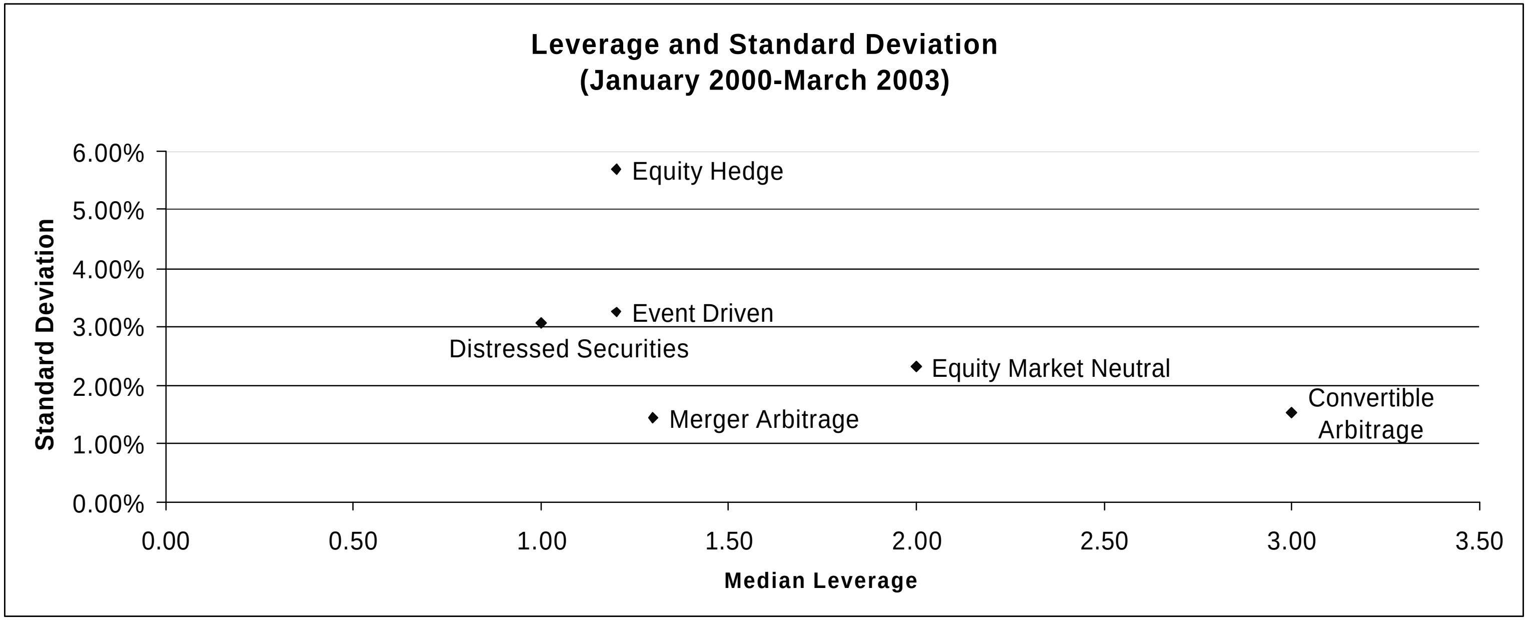
Leverage Usage



Risk and Return Profile: Risk Levels Vary More than Return Levels



Leverage and Volatility—Inversely Correlated across Strategies

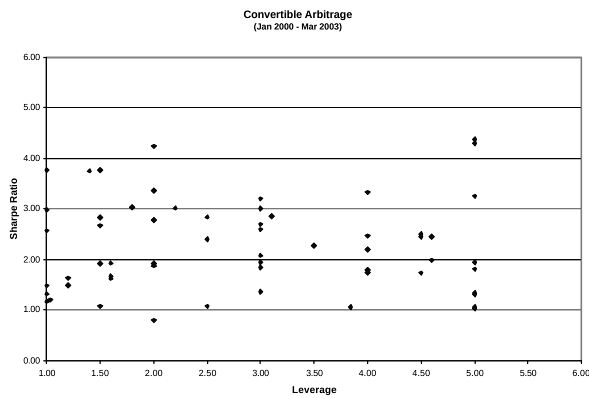


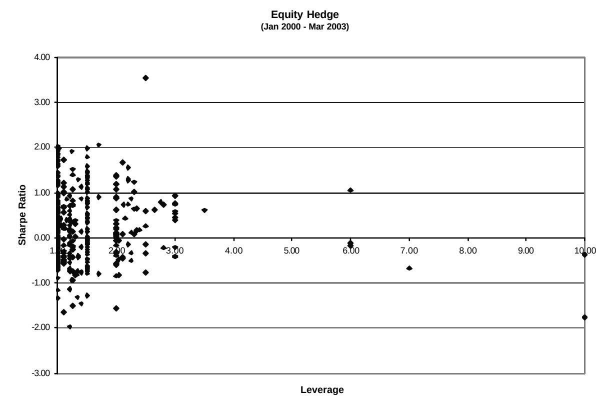
Leverage and Manager Performance:

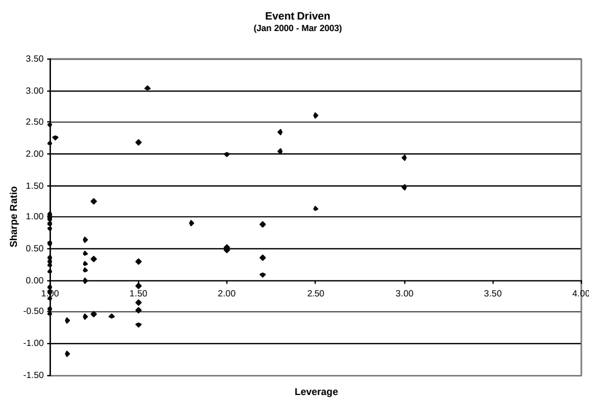
Low Correlation Between Leverage and Other Characteristics

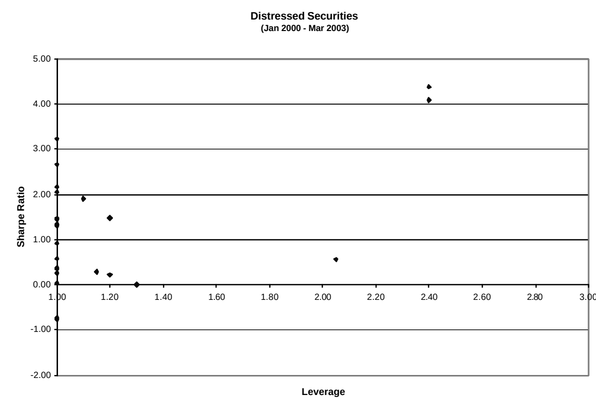
	Correlation (January 2000-March 2003)			
	Leverage/ Monthly Return	Leverage/ Standard Deviation	Leverage/ Sharpe Ratio	Return/ Standard Deviation
Convertible Arbitrage	0.28	0.16	0.24	0.83
Equity Hedge	-0.09	-0.01	-0.11	-0.27
Event Driven	0.16	-0.13	0.23	-0.70
Distressed Securities	-0.12	-0.21	0.09	-0.07
Merger Arbitrage	-0.11	0.12	-0.23	-0.68
Equity Market Neutral	-0.06	-0.12	0.16	0.38

Leverage and Risk-Adjusted Performance by Manager

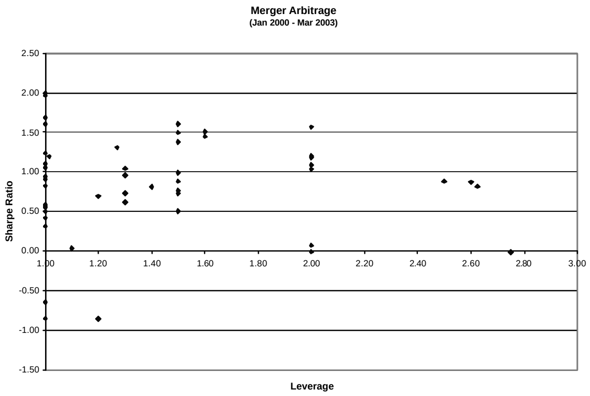


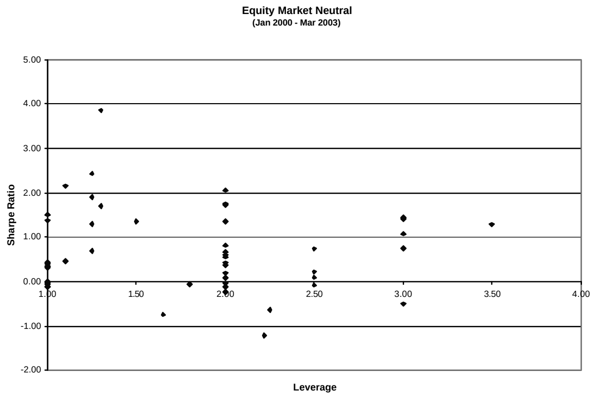






Leverage and Performance by Manager (cont.)

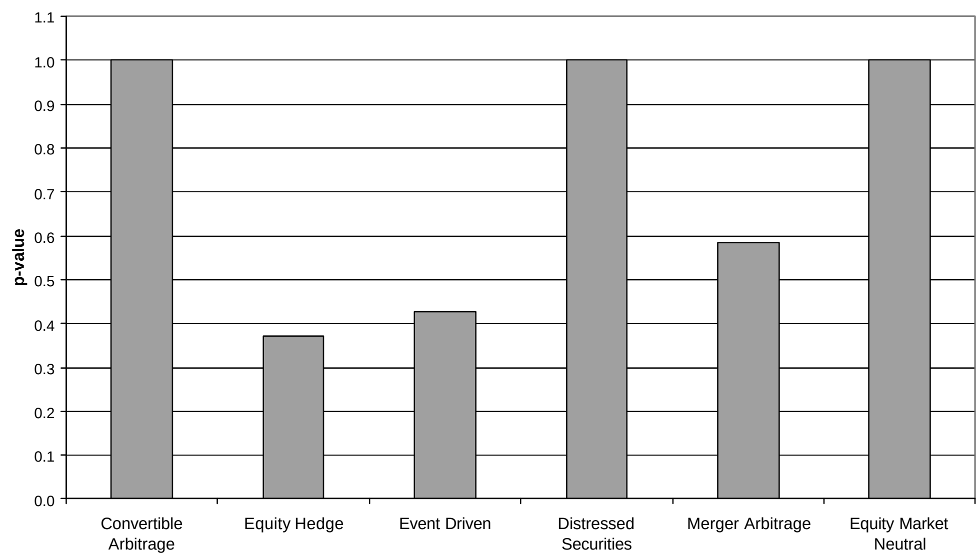




Statistically Testing the Relationship Between Leverage and Performance:

Leverage is Independent of Risk Adjusted Performance

Probability That High Leverage Funds Have Same Sharpe Ratio As Low Leverage Funds (Fisher Median Test) Jan 2000 - Mar 2003



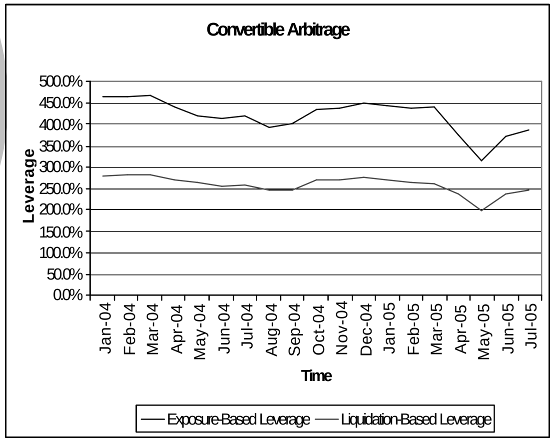
Median Sharpe Ratio
High (Greater than Median) and Low (Less than Median) Leverage

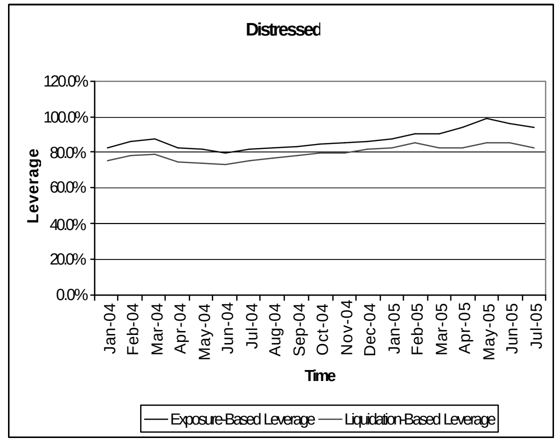
	Median Hi Lev Sharpe	**Median Low Lev Sharpe**
Convertible Arbitrage	2.44	2.24
Equity Hedge	0.13	0.23
Event Driven	0.89	0.33
Distressed Securities	1.02	1.34
Merger Arbitrage	0.88	0.78
Equity Market Neutral	0.74	0.45

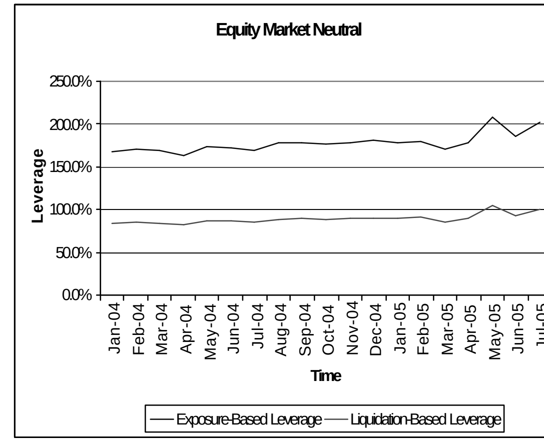
Hedge Fund Leverage and Changing Market Conditions

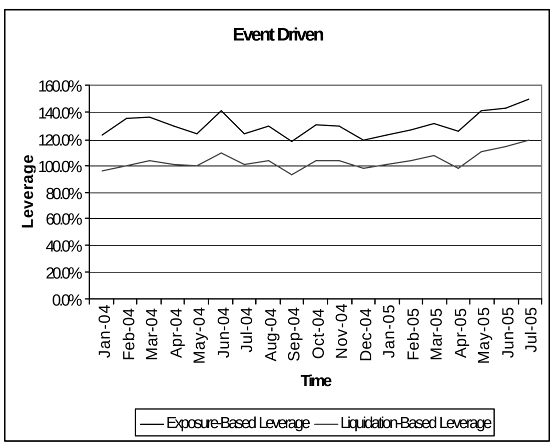
How Does Hedge Fund Leverage Vary over Time?

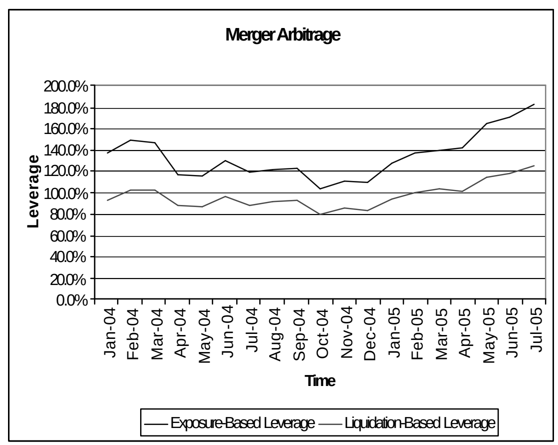
Leverage for some strategies is more variable than others

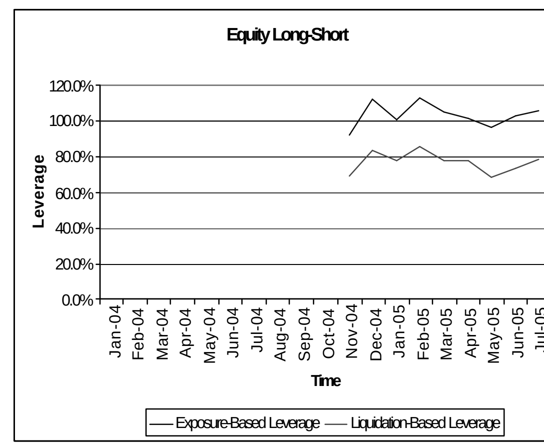










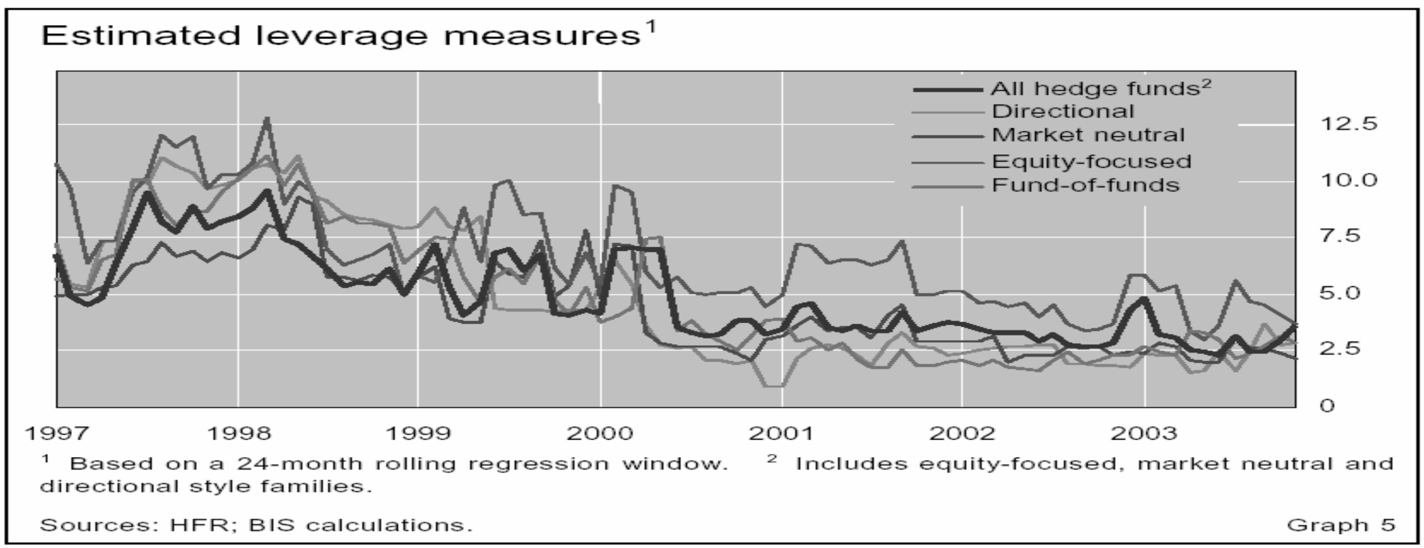


Data Source: Dow Jones Hedge Fund Benchmarks

Exposure Based Leverage=(Longs+Shorts)/NAV
Liquidation Based Leverage=(Longs)/NAV

"Indirect" Methods for Measuring Leverage are not very informative

- Bank for International Settlements (BIS) study measures risk by using "Sharpe" style analysis, but comes up with measures that, at best, difficult to interpret
- Need direct measures of leverage and exposure for accurate assessment



Source: BIS

Hedge Fund Leverage Changes with Market Environment (1/2004 – 7/ 2005)

Strategy	Leverage	Corr with Contemporaneous Return	Corr with Last Month's Return
Convertible Arbitrage	Exposure-Based Leverage	70%	13%
	Liquidation-Based Leverage	66%	13%
Distressed	Exposure-Based Leverage	-5%	25%
	Liquidation-Based Leverage	18%	39%
Equity Market Neutral	Exposure-Based Leverage	1%	-47%
	Liquidation-Based Leverage	2%	-50%
Event Driven	Exposure-Based Leverage	14%	-16%
	Liquidation-Based Leverage	18%	-13%
Merger Arbitrage	Exposure-Based Leverage	41%	12%
	Liquidation-Based Leverage	43%	8%
Equity Long-Short	Exposure-Based Leverage	76%	-5%
	Liquidation-Based Leverage	54%	10%

Exposure Based Leverage=(Longs+Shorts)/NAV
Liquidation Based Leverage=(Longs)/NAV

Data Source: Dow Jones

- Contemporaneous correlations tend to be greater
- Convertible Arb, Merger Arb, and Equity Long Short vary most significantly with market
- Correlations are typically positive

Elasticity of Hedge Fund Leverage to Market Returns

Estimate:

(Change in Leverage) = Intercept + Beta * (Hedge Fund Return)

Strategy	Leverage	Sensitivity of Leverage to Return
Convertible Arbitrage	Exposure-Based Leverage	15.1
	Liquidation-Based Leverage	7.9
Distressed	Exposure-Based Leverage	-0.1
	Liquidation-Based Leverage	0.3
Equity Market Neutral	Exposure-Based Leverage	0.1
	Liquidation-Based Leverage	0.1
Event Driven	Exposure-Based Leverage	1.3
	Liquidation-Based Leverage	1.2
Merger Arbitrage	Exposure-Based Leverage	6.5
	Liquidation-Based Leverage	4.0
Equity Long-Short	Exposure-Based Leverage	5.9
	Liquidation-Based Leverage	3.1

Exposure Based Leverage=(Longs+Shorts)/NAV
Liquidation Based Leverage=(Longs)/NAV

Data Source: Dow Jones

Example: A 3% Decline in Convertible Arbitrage Benchmark Performance would result in a 24% decline in Gross Longs relative to invested assets

Implications of Sensitivity of Hedge Fund Leverage to Market Movements

- Substantial amount of investment in hedge funds is itself levered through portfolio insurance products including constant proportion portfolio insurance (CPPI).
- A downward shock in hedge fund returns can cause liquidation of hedge fund assets, both at the manager level and at the portfolio insurer level
- Liquidation of hedge fund holdings can cause further downward spiral in asset values
- From the previous analysis, strategies like convertible arbitrage are more prone to downward spiral
  - Greater sensitivity to market movements
  - Given small universe of buyers and small amount of convertible assets, likely greater market impact of sales of convertible assets

Conclusions

- Hedge Funds make active use of derivatives to get, focus or hedge exposure
- Such use of derivatives, and leverage more generally, has public policy implications
- Hedge fund use of derivatives and leverage does not seem to have any direct impact on investment performance of hedge fund managers, so investment policies that focus on such issue need alternative justification
- Hedge fund leverage and exposure varies significantly over time for some strategies, and can be sensitive to short run market movements