Advanced Topics in Quantitative Asset Management

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Overview

Advanced topics in investment management and trading

- Practical
- Relevant to today’s markets
- Indicative of evolution of asset management business

1. Trading business structures: Hedge Funds
2. Trading strategies: Arbitrage
3. Techniques: Short Selling
4. Market Innovation: High Frequency Trading

Investment Management Structures and Vehicles: Hedge Funds

What is a Hedge Fund?

Investment/trading vehicle

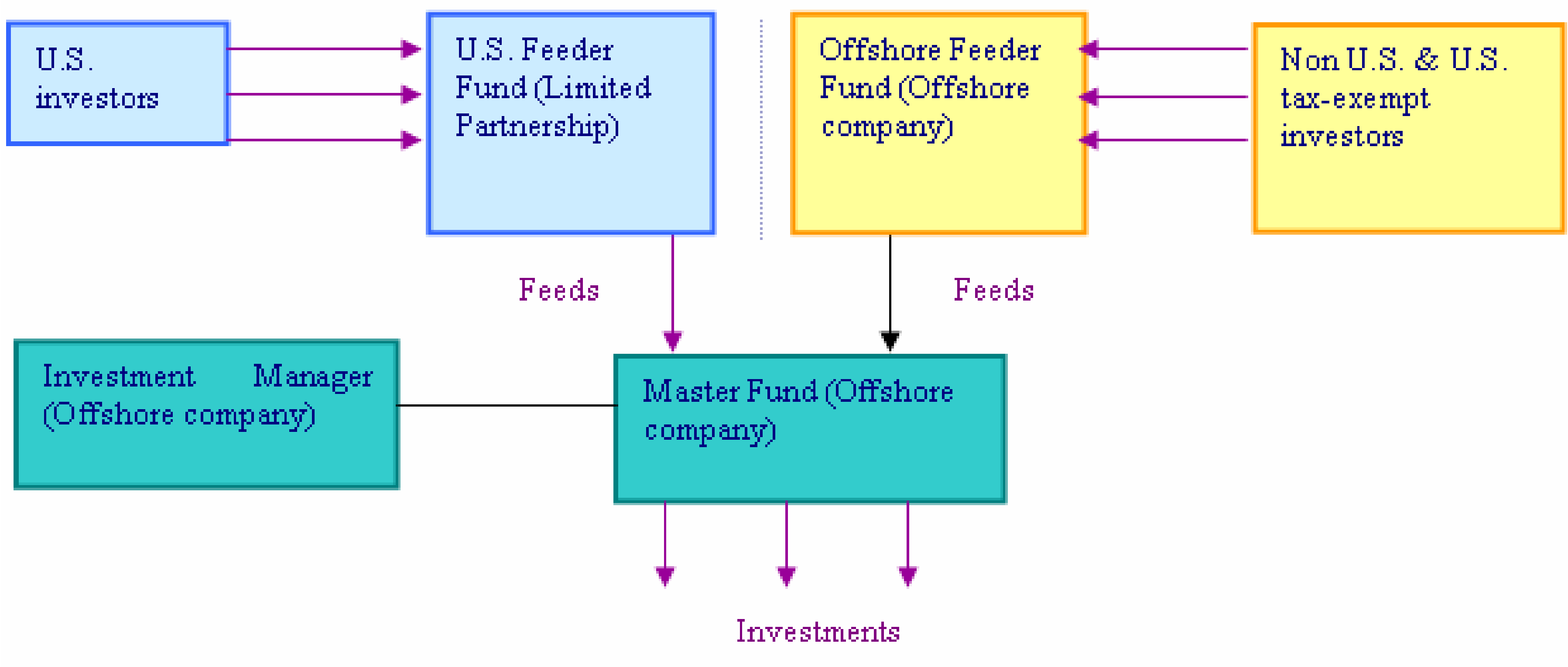
- Often indicates on-shore management company
- Typically off-shore (Cayman, BVI), or US LLP
- Wider choice of trading instruments and techniques

1. Can use leverage
2. Can sell short
3. Can invest in low-quality/unrated issues
4. Typically not open to retail investors

Typical US Hedge Fund Setup

Source: InvestoPedia

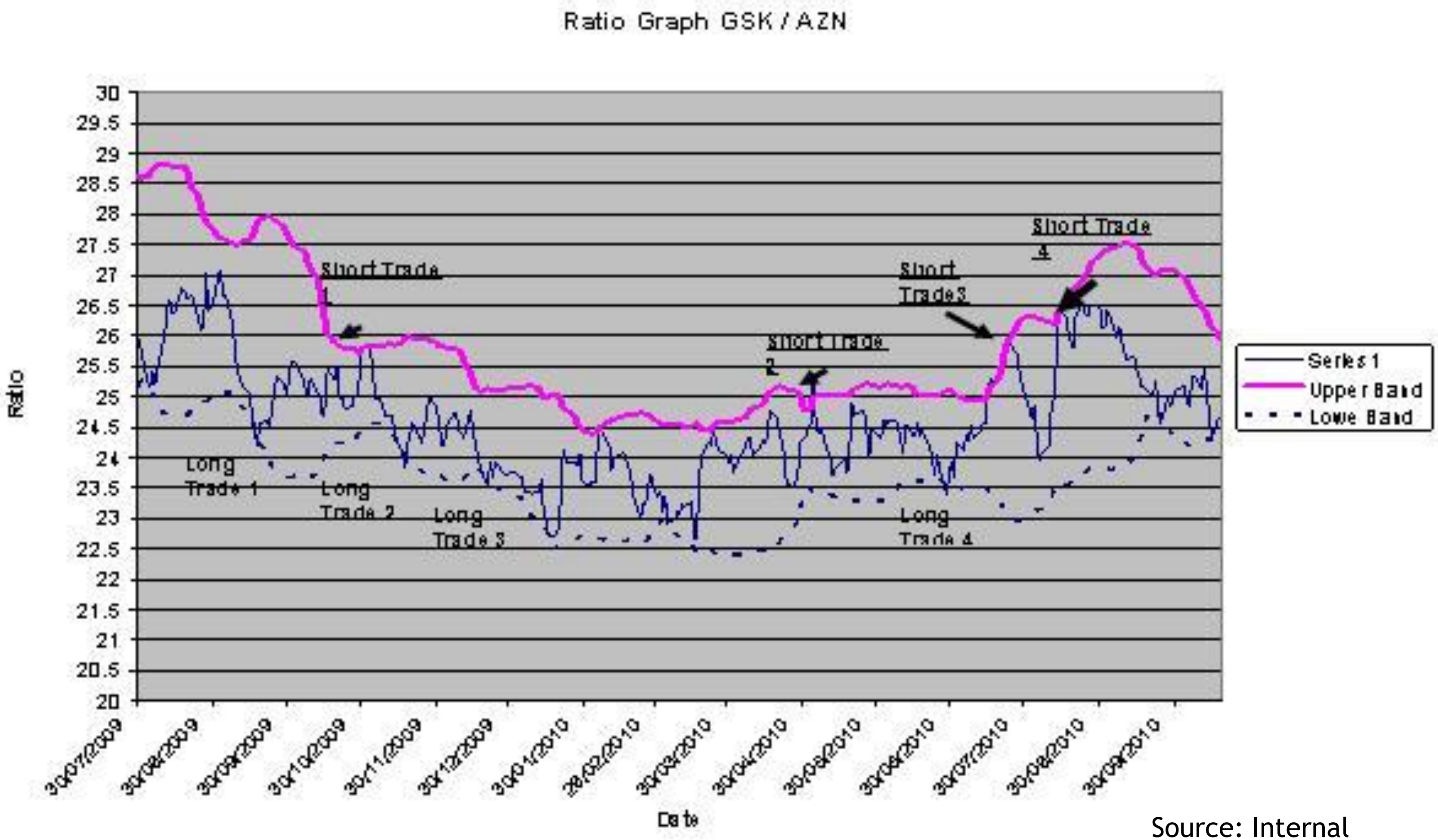
Hedge Fund Structures: US/Offshore Master-Feeder



Source: EurekaHedge

Arbitrage Trading Examples

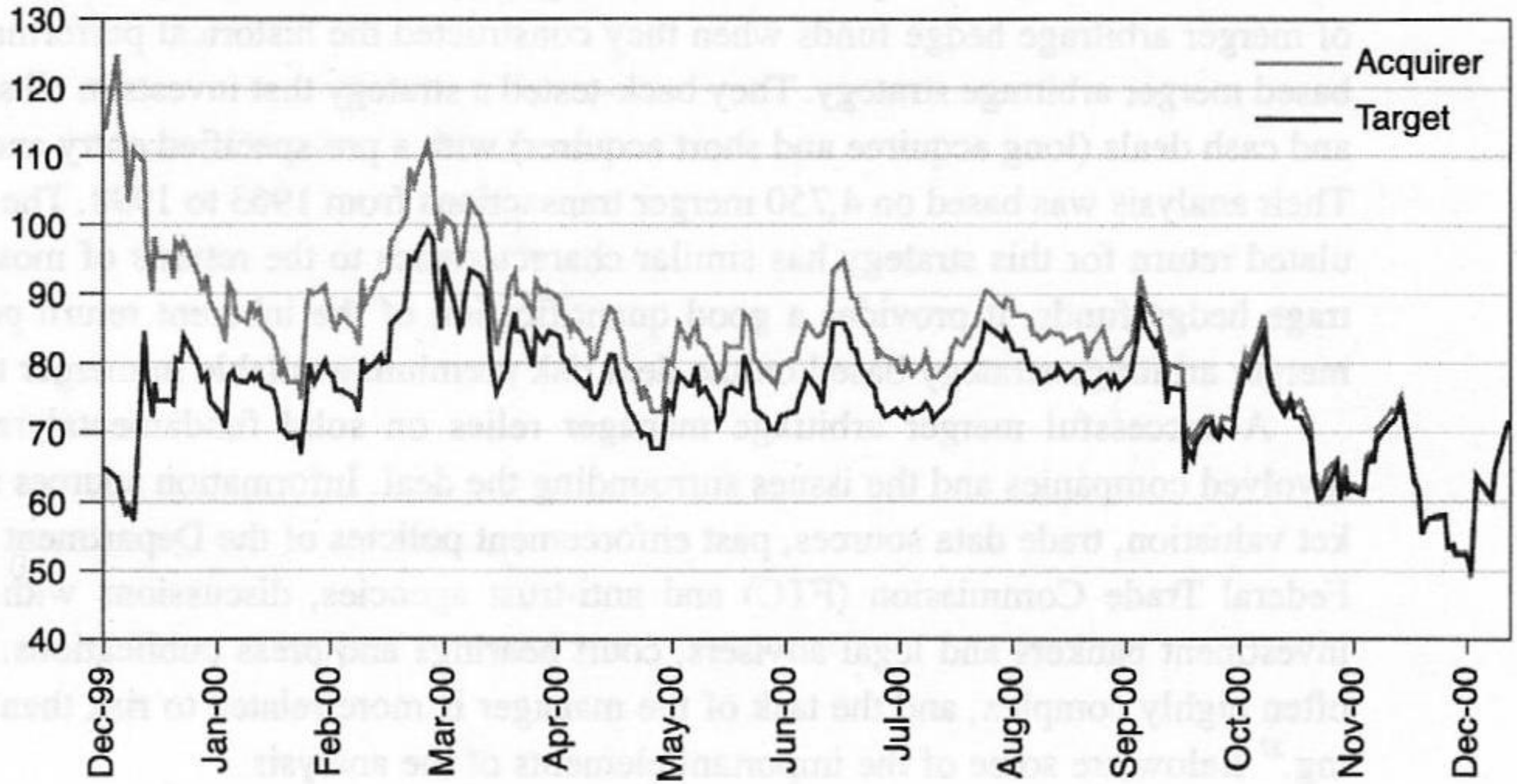
Statistical Arbitrage: Trade Example



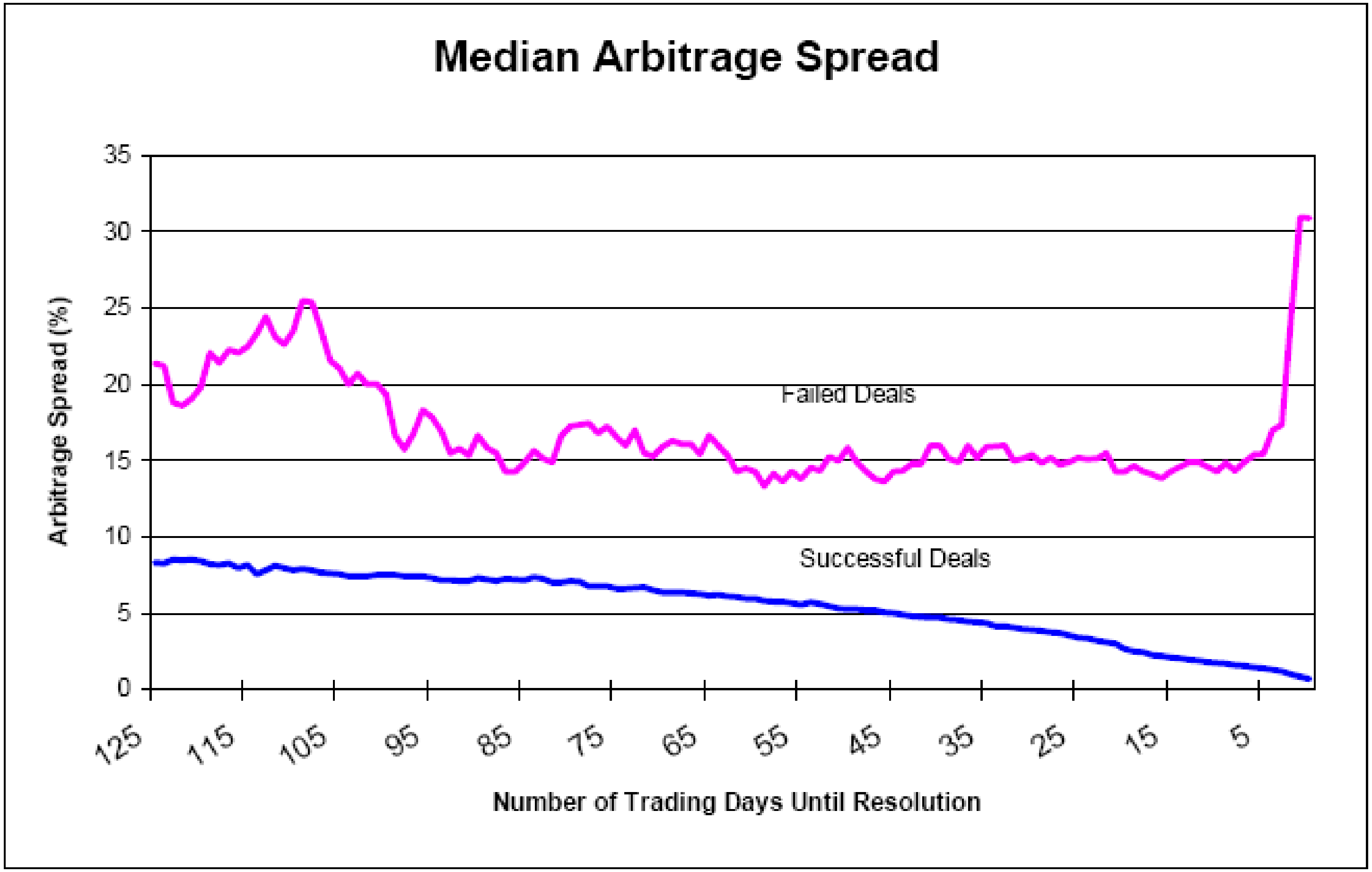
Source: Internal

Spread Convergence: Merger Arbitrage

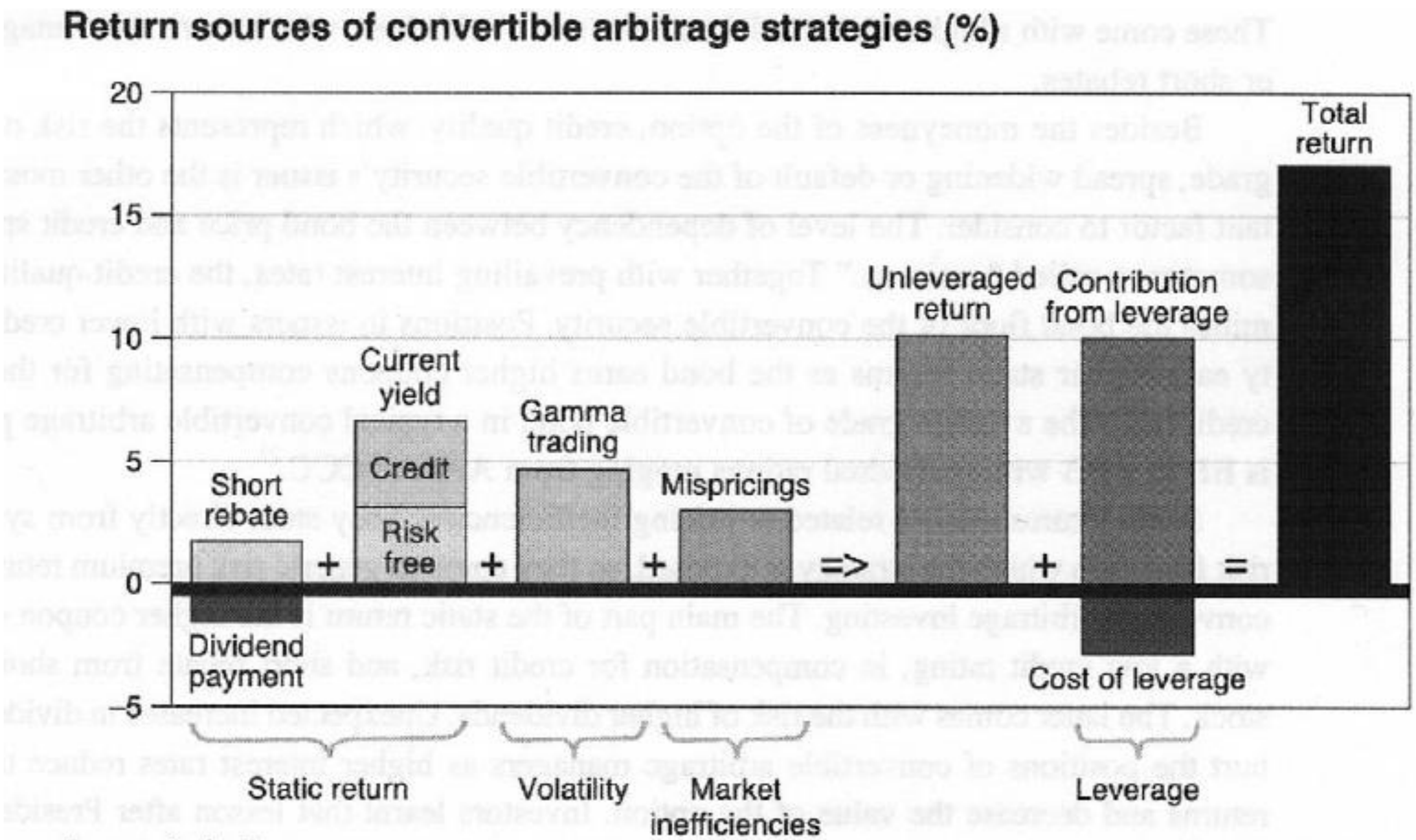
Spread convergence in a successful merger deal over the unusually long period of one year



Arbitrage Risk Profile: Mergers

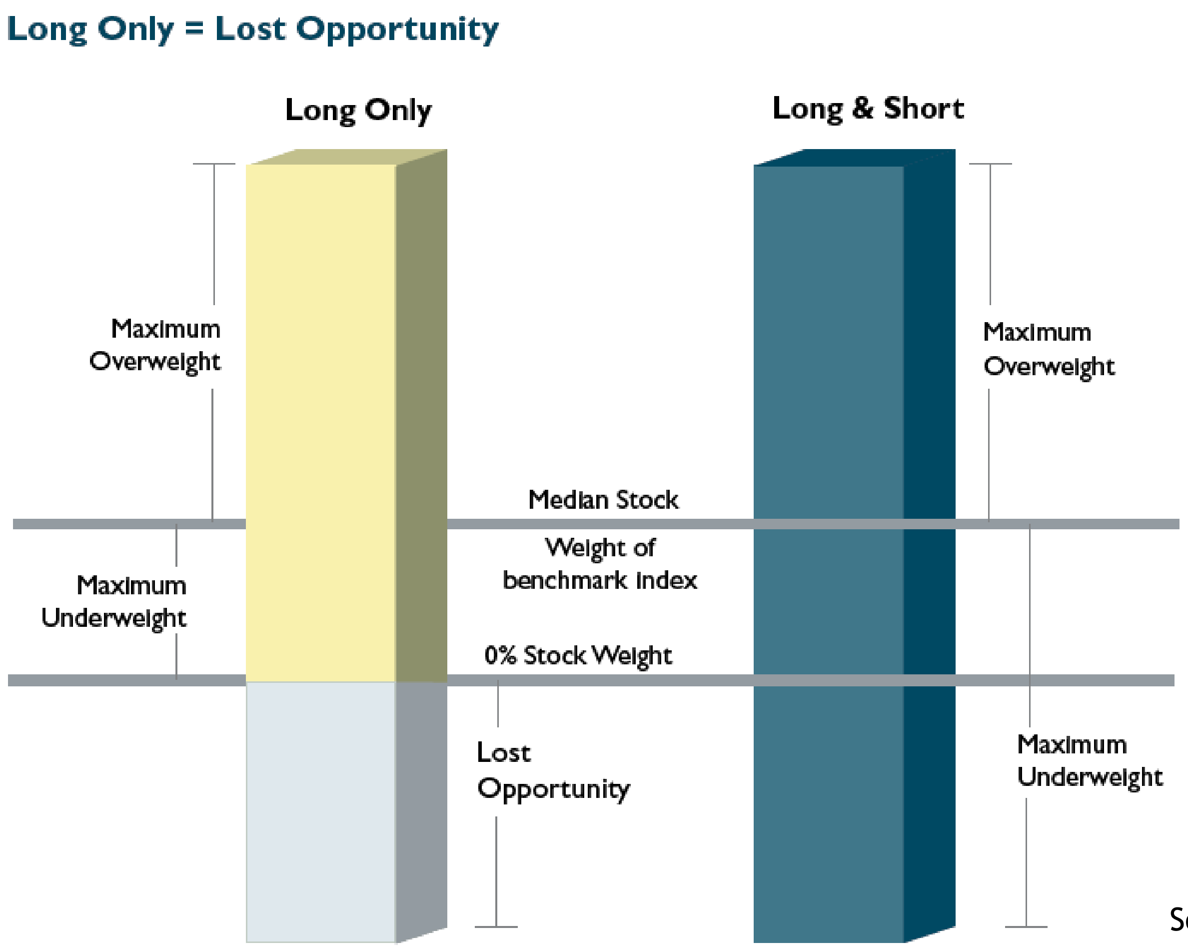


Arbitrage Return Sources: Convertible Arbitrage



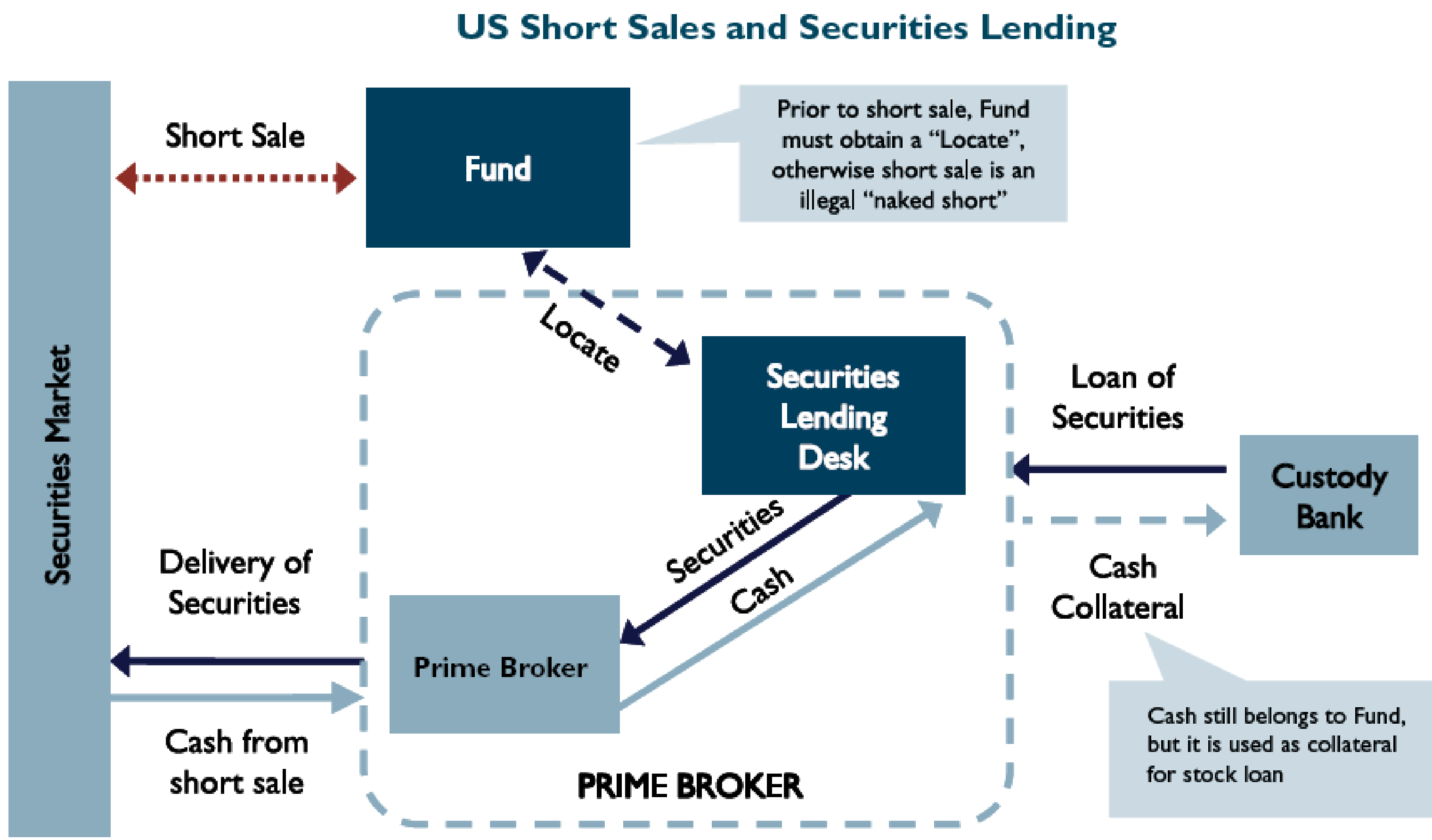
Short Selling: Concept, Techniques, Impact

Portfolio Enhancement with Short Sales



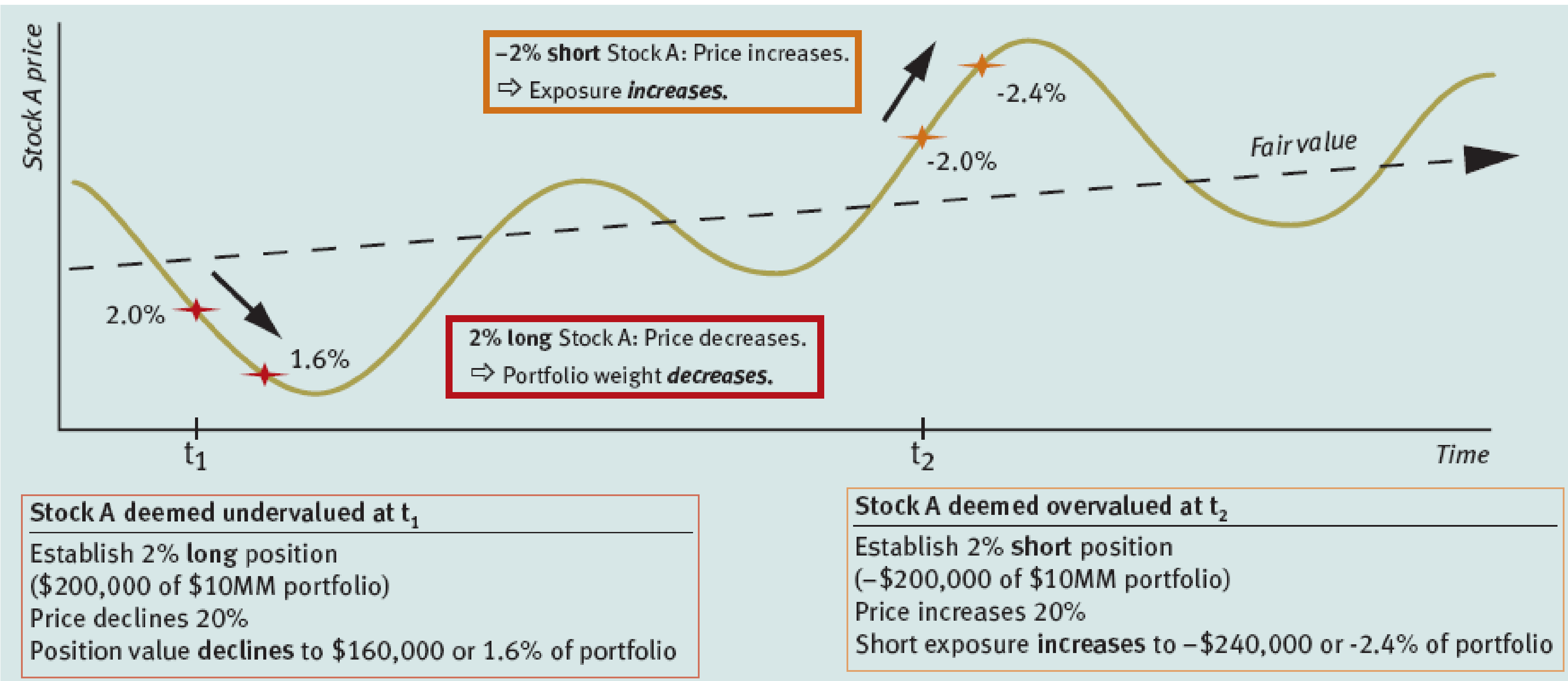
Source: Merrill Lynch

The Mechanics of Short Selling



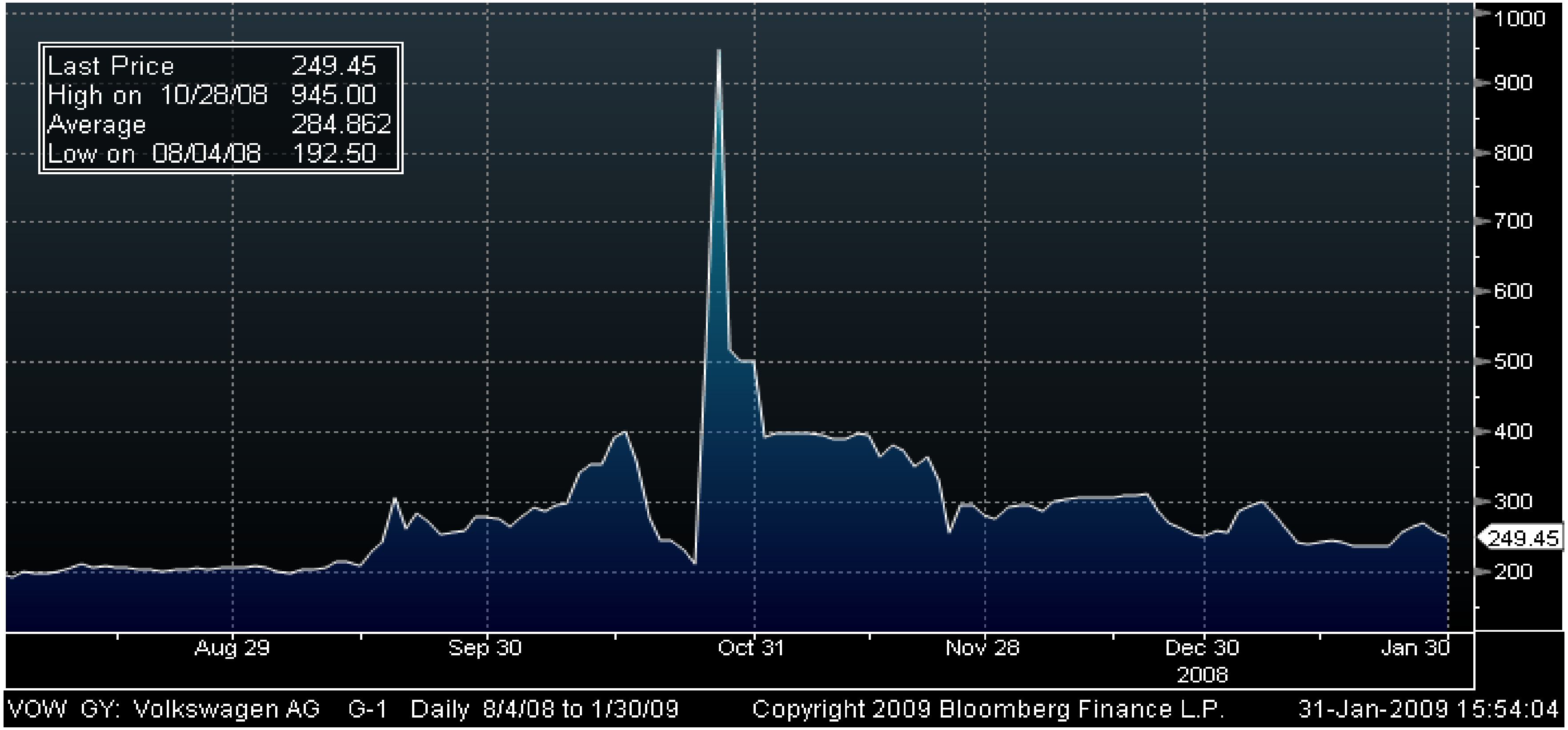
Source: Merrill Lynch

Short Selling: Asymmetric Risk Profile



Source: JPMorgan Asset Management; the above hypothetical is for illustrative purposes only.

Distressed Coverage of Short-Selling Positions: Volkswagen AG Shares, October 2008



Max potential loss of long VW Stocks: -100%

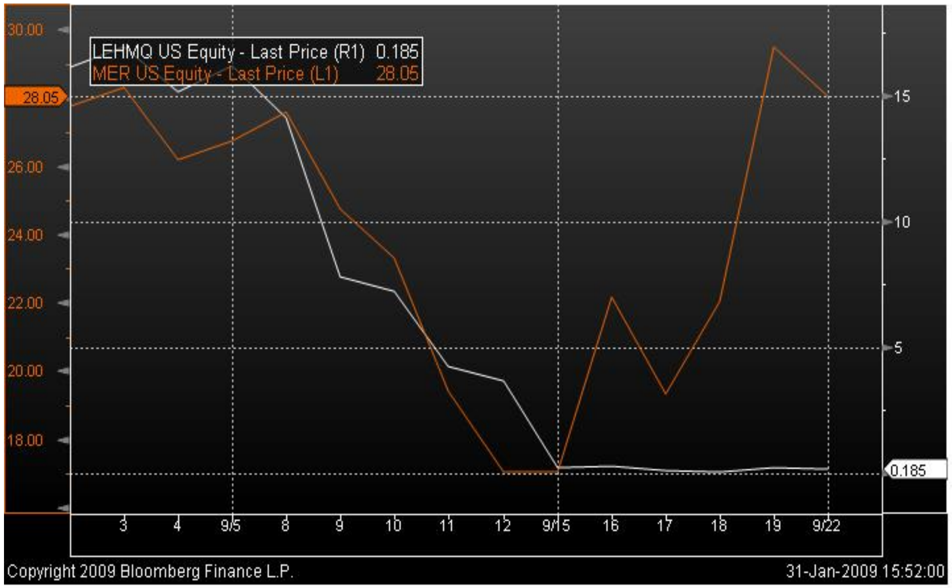
Max potential loss of short VW Stocks: -400%

Short-Selling in Distressed Situations

- Limited supply of stock to borrow
- High cost of borrow
- Asymmetric payoff/risk profile
- Short cover/squeeze risk

- Distressed stocks unlikely candidates for speculative short selling

LEHMAN VS. MERRILL LYNCH PRICE, 9/2008



High Frequency and Algorithmic Trading

Algorithmic Trading: A Definition

- The use of electronic platforms for entering trading orders with an algorithm deciding on aspects of the order such as the timing, price, or quantity of the order, or in many cases initiating the order without human intervention

Source: Wikipedia

Algorithmic Trading: Users and Providers

- Widely used by pension funds, mutual funds, and other buy side (investor driven) institutional traders, to divide large trades into several smaller trades in order to manage market impact, and risk

- Sell side traders, such as market makers and some hedge funds, provide liquidity to the market, generating and executing orders automatically

Source: Wikipedia

Algorithmic Trading: Recent Developments

- A special class of algorithmic trading is "high-frequency trading" (HFT), in which computers make elaborate decisions to initiate orders based on information that is received electronically, before human traders are capable of processing the information they observe

- This has resulted in a dramatic change of the market microstructure, particularly in the way liquidity is provided.

Source: Wikipedia

High-Frequency vs. Traditional Quantitative Management

High Frequency Trading

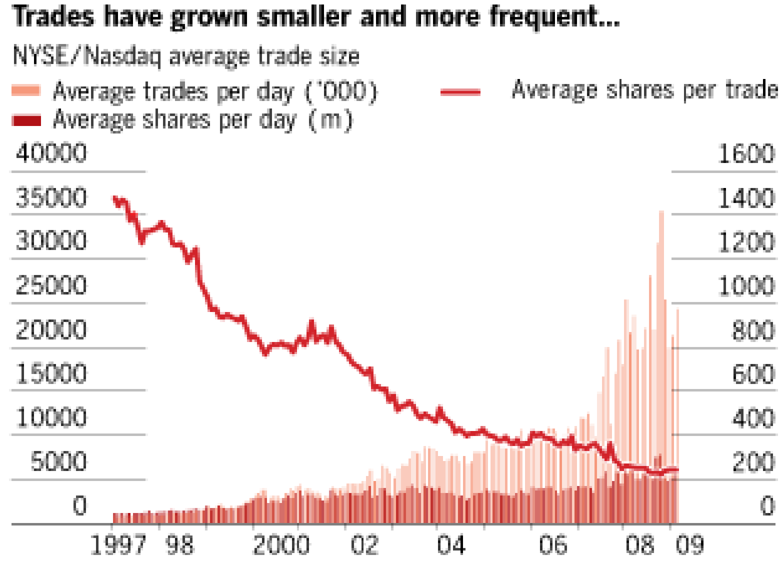
- Execution through broker-provided “pipes”
- Hardware “co-located” at exchanges
- Little or no overnight
- IT-driven investment models/no fundamentals
- High Volume per unit of capital/Low Capacity
- Liquidity provider

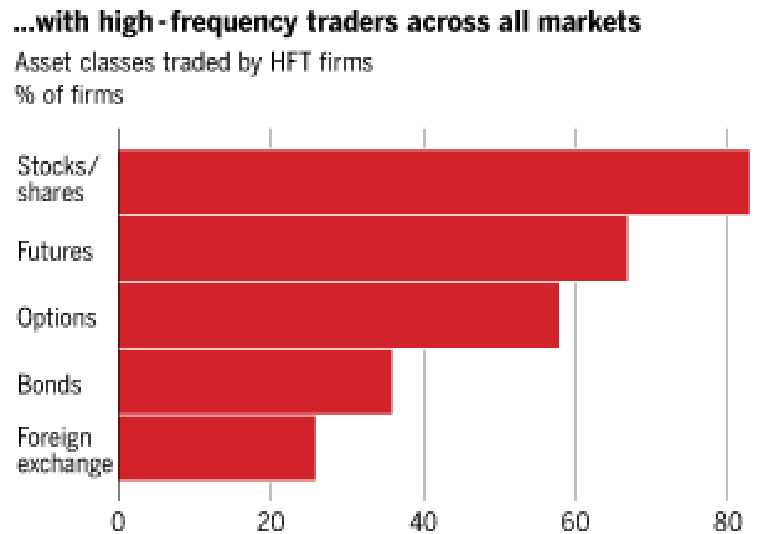
Traditional Quant

- Trading Desk/DMA algorithmic execution
- Hardware kept in-house
- Holding time days to months
- Models based on fundamental & technical
- Low volume per unit of capital/High Capacity
- Liquidity taker or provider

Impact of Algorithmic Trading

- Smaller Trade Size
- More Frequent Trading
- Higher Proportion of HFT





Source: Tabb Group

High Frequency Trading: Strategies and Trade Timing

Strategy	Typical Holding Period
Automatic liquidity provision/synthetic M-M	1 minute or less
Order-flow recognition through observed quotes	10 minutes or less
Short-term trading on macro or stock-level events	1 hour or less
Statistical Arbitrage/basis trading of stocks and derivatives	1 day or less

Evolution of Bid-Ask and Liquidity During High Frequency and Algorithmic Trading Growth

- Bid Ask Spread declined
- Volumes Increased pre-2009
- Smaller Average Order Size

Picture consistent with positive contribution of faster trading to cost reduction and market liquidity