



NOVA SCHOOL OF
BUSINESS & ECONOMICS

Hedge Funds

Statistical Arbitrage

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Arbitrage Strategies

Types of Arbitrage Strategies

- **Arbitrage** → trade 2 assets (or more) one against the other(s) in the expectation that their prices will converge
- Main **types** of arbitrage:
 - Pure Arbitrage
 - Risk Arbitrage
 - Statistical Arbitrage

Arbitrage Strategies

Pure Arbitrage

- **Pure Arbitrage** → trade long/short two (or more) assets that represent the same underlying
 - Examples: Fut x Cash, ADR x Stock, Convertible x Bond+Option, Warrants, etc
- **Best arbitrage type** but ... nevertheless still dangerous – mtm risk (mark to market)
 - "Mkt can stay irrational longer than you can stay solvent", Keynes
- Opportunities are very scarce = difficult to diversify

Ex: SX5E, PSI, LQD, VW, GBTC, Parpublica

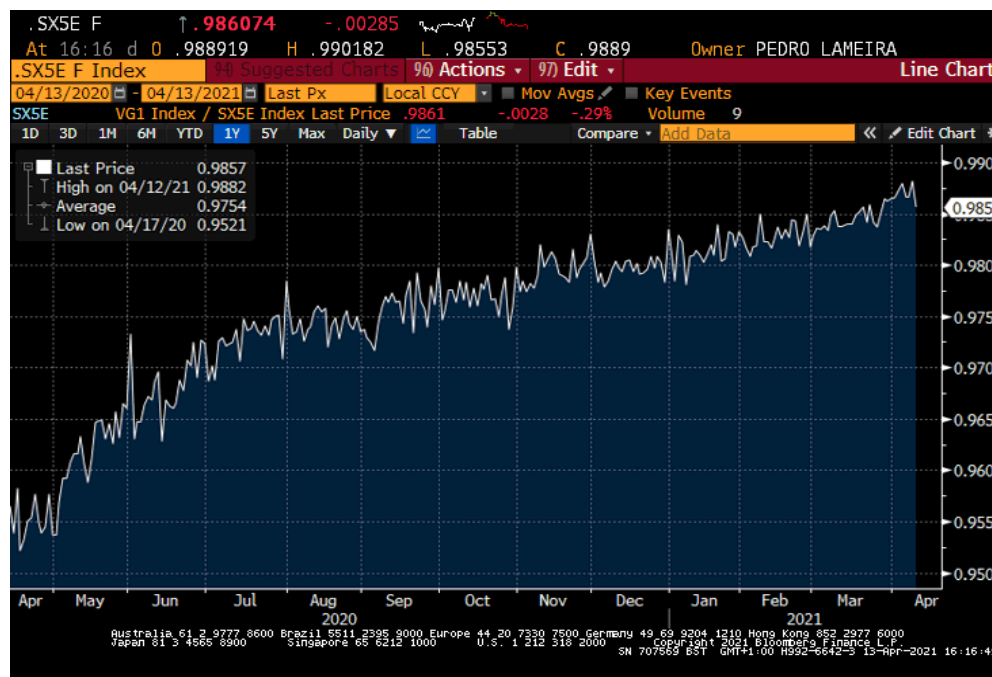
Arbitrage Strategies

Pure Arbitrage

Examples

Futures vs Cash Arbitrage

- The price of any future follows the equation $\Rightarrow VG1 = SX5E \times (1 + r)/(1 + \text{div})$
 - Usually tight range < 0.5%, below 1 because $\text{Div} > r$ and pull to par = carry



Arbitrage Strategies

Pure Arbitrage

Examples

Eurostoxx 50 Futures

- Occasionally some opportunities in high volatility periods



Arbitrage Strategies

Pure Arbitrage

Examples

PSI20 Futures

- In less liquid markets opportunities may be bigger



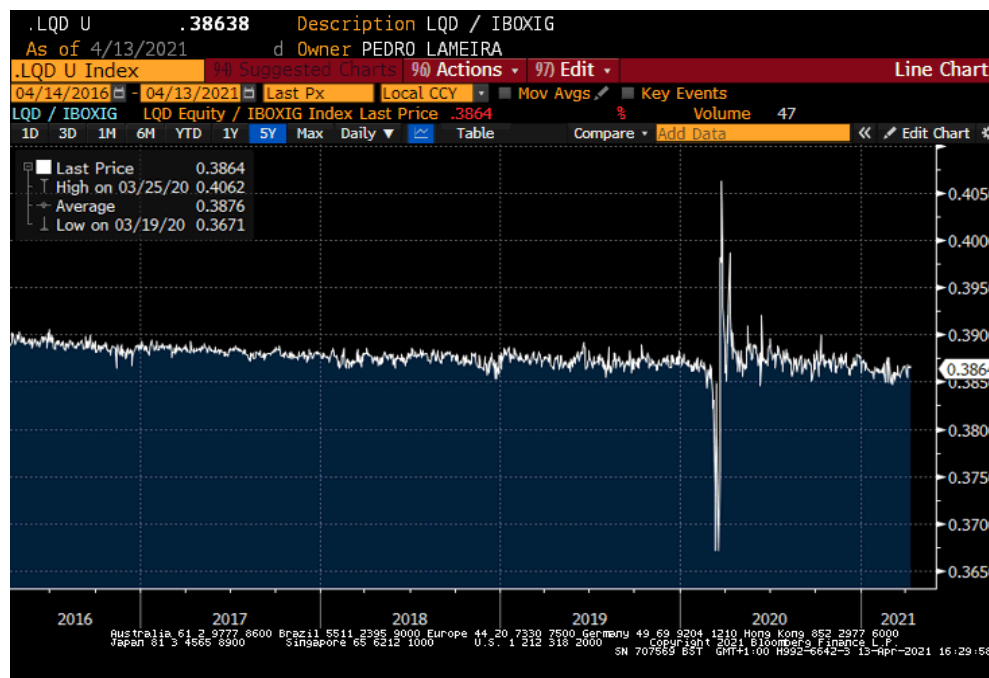
Arbitrage Strategies

Pure Arbitrage

Examples

ETF vs Underlying Arbitrage - LQD ETF vs IBOX IG

- Even in highly liquid markets, opportunities may arise due to temporary liquidity constraints



Arbitrage Strategies

Pure Arbitrage

Examples

ETF vs Underlying Arbitrage - GBTC ETF vs XBT

- Usually opportunities are more frequent in new, less arbitrated markets



Arbitrage Strategies

Pure Arbitrage

Examples

Common vs Preferred Shares – VW case

- But remember there is no such thing as risk free arbitrage



Arbitrage Strategies

Pure Arbitrage

Examples

CDS Arbitrage – EDP

- CDS on the same entity at different prices



Arbitrage Strategies

Pure Arbitrage

Examples

Convertibles Arbitrage – Parpublica vs Galp

- More comfortable to invest when we 'know' the cause of the price dislocation
- Conv Bond = PGB + Call on Galp or Galp + Call on PGB or Rainbow option



Arbitrage Strategies

Risk Arbitrage

- **Risk Arbitrage** → trade one or two companies involved in some types of special corporate events, most commonly M&A situations or bankruptcies/liquidations
- Usually **uncorrelated** with the market
- Specific risk of deal completion – legal, political, competition, shareholders, financing, etc
- Lots of deals - can diversify portfolio
- Expected return = $f(\text{premium, probability, } t \text{ to completion})$

Ex: ABInbev x SABMiller, Qcom x Bcom

Arbitrage Strategies

Risk Arbitrage

Examples

Merger Arbitrage – Ab InBev vs SABMiller

- Anheuser-Busch InBev offered £38 per SABMiller share; but deal was rejected
- Then ABInbev increased the offer price to £44 and deal was completed



Arbitrage Strategies

Risk Arbitrage

Examples

Merger Arbitrag - Broadcom x Qualcomm

- Broadcom offered \$70 per Qualcomm share but deal was blocked by US authorities
- 5% upside versus 20% downside



Arbitrage Strategies

Statistical Arbitrage

- **Statistical Arbitrage** → trade two assets (or more) that have been correlated in the past in the expectation that their prices will continue to mean revert/converge
- 5 main types of strategies (so far):
 - Pair Trading – equity spreads tend to revert to a mean [Look for: high correlation (Pearson), high rank correlation (Spearman), co-integration, fundamental links]
 - Baskets - multiple pairs (see “What happened to the quants?”)
 - Baskets with forced diversification (Ind.Groups)
 - Factor Analysis to identify groups
 - Residuals from Multiple Regressions (see “Extract Alpha”)

Ex: Pair Trading, SXXE All, SXXE IG, Index rors
