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Summary of “The Growth and Limits of Arbitrage: Evidence from Short Interest”¹

By exploiting the cross-sectional stock return anomalies, market-neutral equity strategies, such as value and momentum, construct long-short portfolios that generate abnormal risk-adjusted returns or “alpha” to well-diversified investors.² In a perfect financial market, arbitrage capital would swiftly flow toward such investment opportunities and quickly eliminate alpha. However, various real-world frictions can slow down the capital movement, and the level of arbitrage capital allocated across strategies differs.³ This paper proposes a method to track strategy-level arbitrage capital and studies the relation between arbitrage capital and arbitrage profitability.

The authors focus on the two prominent signals, book-to-market ratio (B/M) of the value strategy and past twelve-month return of the momentum strategy. Stocks are decile-sorted by each signal every month from 1988 to 2011. The lowest decile stocks have the worst signal and are likely to be short-sold by professional arbitrageurs.⁴ They measure strategy-level arbitrage capital monthly, quarterly, and annually, by the strength of the cross-sectional relationship between the signal and short interest (normalized by total shares outstanding).⁵ For example, during the internet bubble (1997-2001), being an extreme growth stock (in the lowest B/M decile) attracts relatively little short sale, which indicates less arbitrage capital deployed on the value strategy in this period.

The correlation between this measure and the asset under management of equity market neutral hedge funds reported by Thompson Lipper is 0.83 for B/M and 0.6 for momentum. Over the 24 years, arbitrage capital devoted to value and momentum has grown more than fivefold. More arbitrage capital has been allocated to the value strategy than momentum, as value strategies have a longer history among practitioners dating back to Graham and Dodd (1934).⁶ The authors also find the growth of arbitrage capital devoted to other strategies based on post-earnings announcement drift (PEAD), accruals, and issuance over the sample period.

Expected returns to arbitrage strategies decline as capital devoted rises competing away abnormal returns. A large number of equity anomalies are often thought to reflect some form of investor underreaction to new information. Therefore, as more capital flows into these strategies, one would expect information to be impounded into prices more rapidly, leading the profitability of anomaly signals to decay more rapidly following portfolio formation. Their findings confirm these predictions.⁷ Furthermore, they find the post-formation cumulative return of momentum strategy turns negative ten months faster at the end of sample than in the beginning.⁸

The literature on limits of arbitrage suggests that, despite the growth of arbitrage capital, arbitrageurs may not be able to completely eliminate the excess returns to anomaly strategies in the long run. First, the authors find a positive performance-flow relationship for momentum strategy: low past returns lead to decrease of arbitrage capital. Since a lower level of arbitrage capital is associated with higher alpha, such a positive performance-flow relationship limits the ability of arbitrageurs to take large positions precisely when their investment opportunities are attractive.⁹

Second, there exists a “spillover effect”. In response to fund outflow triggered by the poor performance of one strategy, multi-strategy arbitrageurs may have to liquidate positions in other strategies. Holding past market return and momentum return fixed, two standard-deviation decrease in the lagged return on HFR’s equity hedge index is associated with one standard-deviation decrease in arbitrage capital devoted to the momentum strategy.

Finally, the authors examine whether leverage constraints limit arbitrage capital. Higher strategy-level volatility induces the lenders to raise “haircuts” on the collateralized loans they extend to the arbitrageurs. Usually, hedge funds borrow from broker-dealers, so a widening Treasury Eurodollar spread (TED), a proxy for financial intermediary’s financial stress, may indicate tight leverage constraints for arbitrageurs. The authors find that, for the value strategy, arbitrage capital tends to decline following increased volatility of past returns but doesn’t respond to variation in TED, while arbitrage capital deployed on momentum strategy is more sensitive to TED but less so to volatility.

¹ Hanson, Samuel G., and Adi Sunderam, 2014, *Review of Financial Studies* 27, 1238-1286.

² There is a lively debate about whether these abnormal returns represent true alpha for diversified investors or whether they compensate for unobserved priced risks. In this paper, the authors adopt the alpha interpretation.

³ The learning of arbitrage opportunity may be costly and gradual, and it often takes time to build arbitrage vehicles. Arbitrageurs’ access to capital may be limited due to poor past performance, and their total positions are often constrained by the reduced leverage capacity following increased volatility or financial sector distress.

⁴ Short interest data tend to be more informative than data on long-side stock holdings because, in the aggregate, long-side investors hold the market portfolio and show little tendency to bet on characteristics known to predict stock returns in the cross-section. Any long-side analysis must also screen out the passive index funds. In contrast, short sale is mainly utilized by professional arbitrageurs to exploit return signals. According to a cited report by Goldman Sachs in 2008, hedge funds account for 85% of short interest.

⁵ Every month, quarter or year, they pool the stocks and run a regression of normalized short interests on sets of decile dummy variables. Each set of decile dummy variables correspond to a signal that sorts the stocks, and a dummy variable is equal to one if the stock falls in the corresponding decile and equal to zero otherwise. The dummy variable for the fifth decile is always ignored to avoid repressors’ collinearity. Thus, the coefficient on the dummy variable of the lowest decile of a signal reflects the increases in short interest associated with having the worst signal value (relative to the omitted decile 5 category), and thereby, proxies how active arbitrageurs are in exploiting this signal. In the regression, they control for variables that have previously been shown to affect short interest, including institutional ownership, three-month turnover, trailing twelve-month return volatility, dummies for the exchange on which a stock trades, and a dummy that indicates whether a firm has convertible securities outstanding.

⁶ Graham, Benjamin, and David Dodd, 1934, *Security Analysis*. New York: McGraw-Hill.

⁷ Following the convention in the academic literature, the authors construct the returns to an arbitrage strategy by longing the stocks in the top decile and shorting the stocks in the bottom decile.

⁸ The authors admit limited ability to assess “whether increases in strategy capital, itself trending up over time, have played a role in determining the persistence of namely profits or whether the underlying factors generating these anomalies has trended down over time.”

⁹ Value strategy doesn’t exhibit this pattern. Increased arbitrage capital diminishes the cross-sectional spread of B/M, and thereby, the informativeness of the signal by pushing up the market price of value stocks and pushing down the market price of growth stocks, because the signal is “anchored” by an accounting variable, book equity, which is isolated from market activities at least in the short run. Recognizing this relationship between arbitrage capital and the informativeness of signal, investors may rationally choose not to chase past performance.