Securities Finance Research

Signal enhancement from combining stock borrow and short-sell volume datasets – Evidence from Japan equities

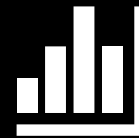Securities Finance Research & Analytics

June 2023

Securities Finance

Proprietary, independent securities finance database

Tracks global, daily short interest supply, demand, borrow fee and squeeze risks

Diverse signals for optimizing excess returns, and refining risk management

Introduction to Securities Finance

Solution

- **Comprehensive Coverage**
  Independent, proprietary database providing daily transparency for securities financing levels globally

- **Sourced from Leading Industry Participants**
  Prime brokers, custodians, asset managers and hedge funds

- **Integrated Workflow**
  Delivery via web applications, Excel add-in, data feeds, API and third-party vendors

- **News and Research**
  Independent research and commentary from industry experts

Key Benefits

- **Investment Insight**
  Ability to analyze long and short fund flow activity at stock, sector and market level; identify potential turning points and contrarian ideas

- **Quantitative Signals**
  Improve multi-factor model performance. Uncorrelated with traditional quantitative factors.

- **Trading Transparency**
  Refine trade entry and exit points, understand the availability of borrow, the concentration of supply, and benchmark your cost of carry

- **Risk management**
  Identify and track portfolio exposure to both downward price reversals and short squeezes. Identify concentration risk and risks of recalls

- **Holistic View on Short Interest**
  Combine securities lending flow with publicly disclosed short positions. View short interest across the capital structure.

$31tn*
Lendable inventory

$3tn*
Value on loan

3mn
Daily transactions

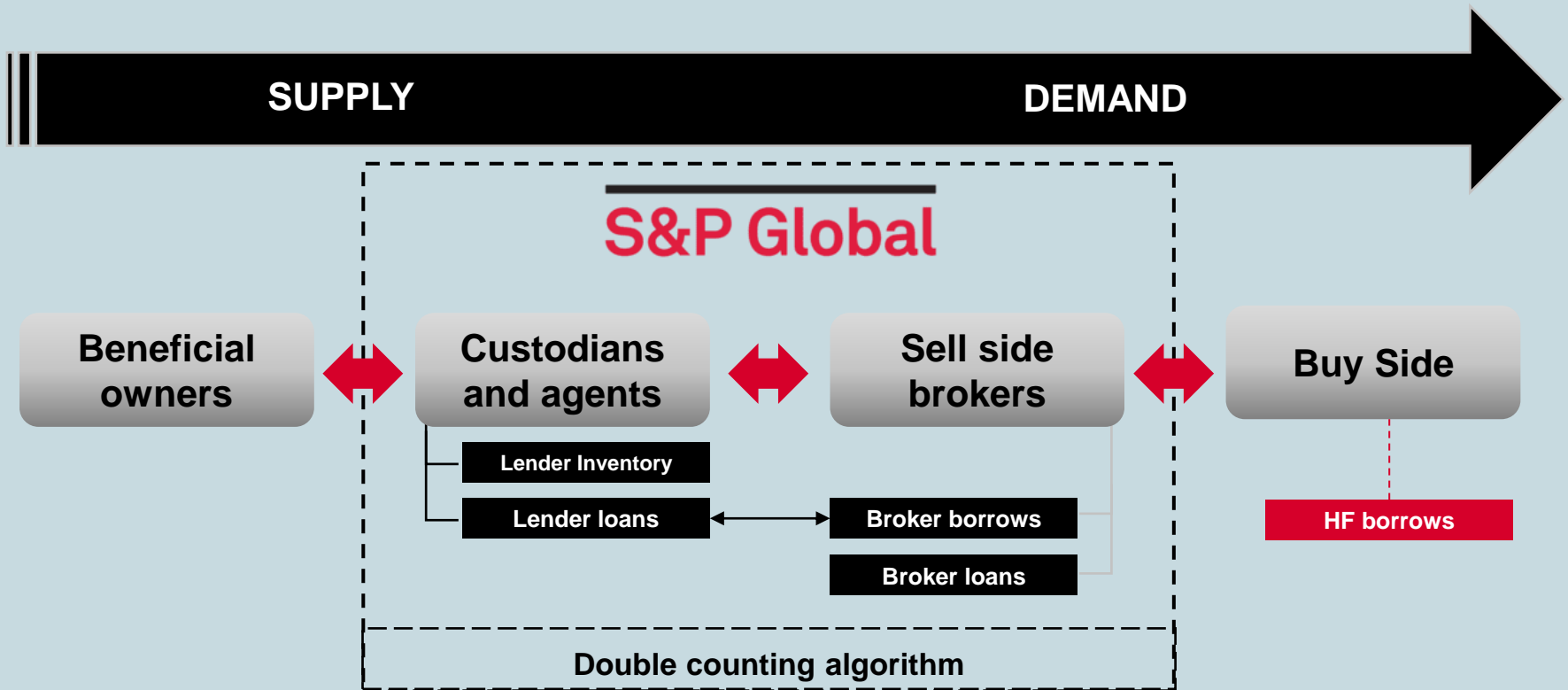**20,000+**
Equity instruments

200,000+
Fixed Income instruments

2002

Earliest History

* YTD Average Lendable Inventory and Value on Loan calculated as of 31st May 2023 for global securities

S&P Global
Market Intelligence

Sourced daily from industry participants

SUPPLY   DEMAND

S&P Global

| Beneficial owners | | Custodians and agents | | Sell side brokers | | Buy Side |

Lender Inventory

Lender loans ↔ Broker borrows

Broker loans

HF borrows

Double counting algorithm

Data Overview

JPX

- Daily sell and buy trade volume data going back up to the beginning of 2014 for all the TSE listed stocks. The sell and buy orders are further broken down into cash and margin account.

- Sell volume is further classified into short sells done against cash and margin account.

Securities Finance

- 15+ years of daily Securities Finance lendable supply, borrow demand and borrow fee across global securities. Additional analytics around lending & borrow market share, factors related to short squeeze, stability of lendable supply and multi-factor indicators are also available.

- The Securities Finance dataset has ~140 trillion of lendable assets & ~18 trillion assets on loan for Japanese equities. *

Note: Based on YTD average lendable inventory and value on loan calculated as of 31st May 2023. Figures are mentioned in Japanese Yen

Executive Summary - Key Findings in Japan Equities

- In this research study, we exhibit the benefits of combining the Securities Finance borrow dataset with the short-sell volume dataset from TSE for portfolio construction in Japanese equities. Our back-test simulations based on a weekly rebalance strategy during the period Jan 2014 – May 2023 reveal that the datasets can be combined for a more consistent stock selection signal in comparison to using the two datasets independently.

- The cross-sectional rank correlation during the period of our study between % shares outstanding on loan (Short Interest) and short volume relative to the overall sales volume (Short Volume) was found to be low with an average of ~0.06. This is expected as Short Interest represents total outstanding short positions at any given point in time whereas Short Volume is a measure of short selling activity on a given day.

- The average Information Coefficient (IC) with 1-week forward returns for Short Interest was found to be ~0.024 (significant at 99% confidence interval) and was close to 0 for Short Volume. This highlights that Short Interest in general has a strong negative relationship with 1-week forward returns i.e., higher the Short Interest, lower the forward returns.

- For a Long-Short strategy formed using the Top/Bottom 20% of the factor values, Short Interest offered a higher risk-adjusted return (IR) than Short Volume (IR of 1.24 vs. IR of 0.64). However, using a combination of the two factors enhances the security selection further with an improved IR of 1.87 as compared to using them independently.

Executive Summary - Key Findings in Japan Equities

- For a long-short strategy, using a combination of the two factors gives a more consistent performance over the years and in different market regimes as compared to the individual factor performance. Short Volume performs better in Up Market periods while Short Interest performs better in Down Market periods.

- For the short-leg of the strategy (unfavourable leg using the bottom 20% ranked stocks), the Short Interest factor offered more underperformance relative to the universe in comparison to the Short Volume and the combined factors. The risk-adjusted excess return (IR) for the Short Interest factor was found to be 1.17 as compared to an IR of 0.56 for the Short Volume and an IR of 0.71 for the combined factor.

- For the long-leg of the strategy (favourable leg using the top 20% ranked stocks), the combined factor offered significant risk-adjusted excess returns with an IR of 2.7. This was found to be higher than the Short Interest factor (IR of 1.17) and the Short Volume factor (IR of 0.67).

- It is worth mentioning that the performance of the Short Interest factor was mainly dominated by the performance of the most shorted stocks whereas for the Short Volume factor, the performance was dominated by stocks with the least Short Volume.

Universe, Factors and Back-Test Criteria

- Universe: Around 1450 Japanese stocks which cover approximately 95% of the cumulative market capitalization in Japan.

- Short Interest: Percentage of shares outstanding on loan reported to Securities Finance. This factor was ranked in ascending order as stocks with low Short Interest are expected to have a higher positive sentiment in general.

- Short Volume: Total short sell volume relative to the total sell volume reported to TSE . This factor was ranked in ascending order as stocks where % of short sell volume relative to overall sales is high can be considered as stocks with high short selling activity in general. See next slide for factor calculation.

- Composite Factor: We first calculate the percentile rank of the stocks based on the two factors above individually and then used an equally-weighted average to create a combined factor. Stocks with low Short Interest and low Short Volume get a favourable rank in general.

- 1-week forward total returns in JPY were sourced from S&P Global's ClariFI platform to judge factor performance. We followed a weekly rebalance schedule and total returns were equally weighted. Extreme return outliers were removed from the sample to avoid a few securities from impacting the overall performance of the back tests results.

- Weekly return calculation period: Jan 2014 – May 2023 (488 weekly time-stamps).

- A 2-business day lag was taken when using the Short Interest factor and a 1- business day lag was taken when using the Short Volume factor to avoid the look-ahead bias in our back-test results.

- Factor coverage for both the Short Interest and the Short Volume factors was close to 99% of the universe.

Short Volume Factor Construction

- **Short Volume:** Total short sell volume relative to the total sell volume reported to TSE . Stocks where % of short sell volume relative to the overall sell volume is high can be considered as stocks with high short selling activity and vice-versa.

$$\text{Short Volume} = \frac{[ShortSellwoMargin + MarginSell\_New]}{[ShortSellwoMargin + MarginSell\_New + LongSell + MarginSell\_Close]}$$

where:

ShortSellwoMargin : The quantity of short sell without new margin sell to create new short position.

MarginSell_New : The quantity of margin sell to create new short position.

LongSell : The quantity of long sell to close original long position.

MarginSell_Close : The quantity of margin sell to close original margin long position.

S&P Global
Market Intelligence

Creating the Composite Factor

A composite factor score that was created by using an equally weighted percentile rank score based on the Short Interest and Short Volume factors sourced from the Securities Finance dataset and the Tokyo Stock Exchange, respectively.

Methodology

Every week on the rebalance date, percentile ranks of these factors were compiled independently and then an equally weighted average score of these ranks was calculated.

- **Finally, a percentile rank of this equal weighted average score was calculated to get the combined factor.** If data on one of the factor was not available, the remaining factor was used independently in creating the combined factor.

- Both Short Interest and Short Volume were ranked in ascending order as stocks with high factor values are associated with negative sentiment compared to stocks with low factor values.

- As such, stocks with low Short Volume and low Short Interest formed the long-leg of our strategy and stocks with high Short Volume and high Short Interest formed the short-leg.
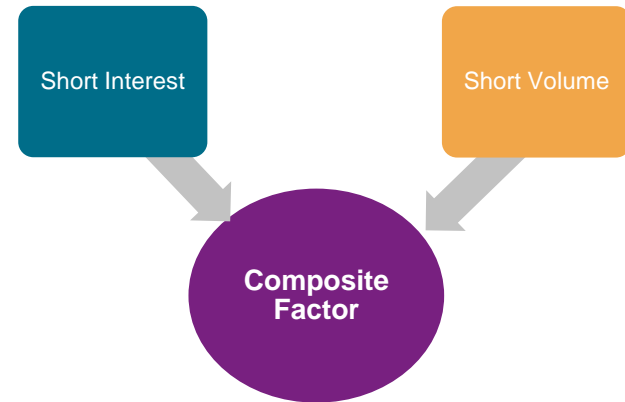
Back-Test Results

Long Short Portfolio Performance

For a Long-Short strategy formed using the Top/Bottom 20% of the factor values, Short Interest offered a higher risk-adjusted return (IR) than Short Volume (IR of 1.24 vs. IR of 0.64). However, using a combination of the two factors enhances the security selection further with an improved IR of 1.87 as compared to using them independently.

Cumulative Returns - Weekly Rebalance: Jan 2014 – May 2023
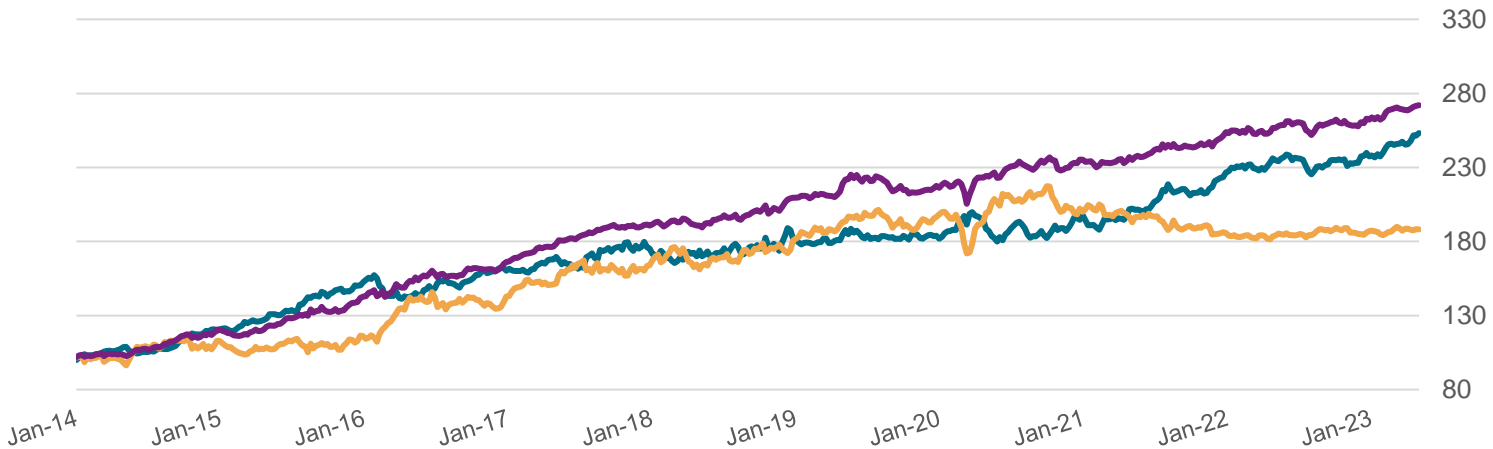
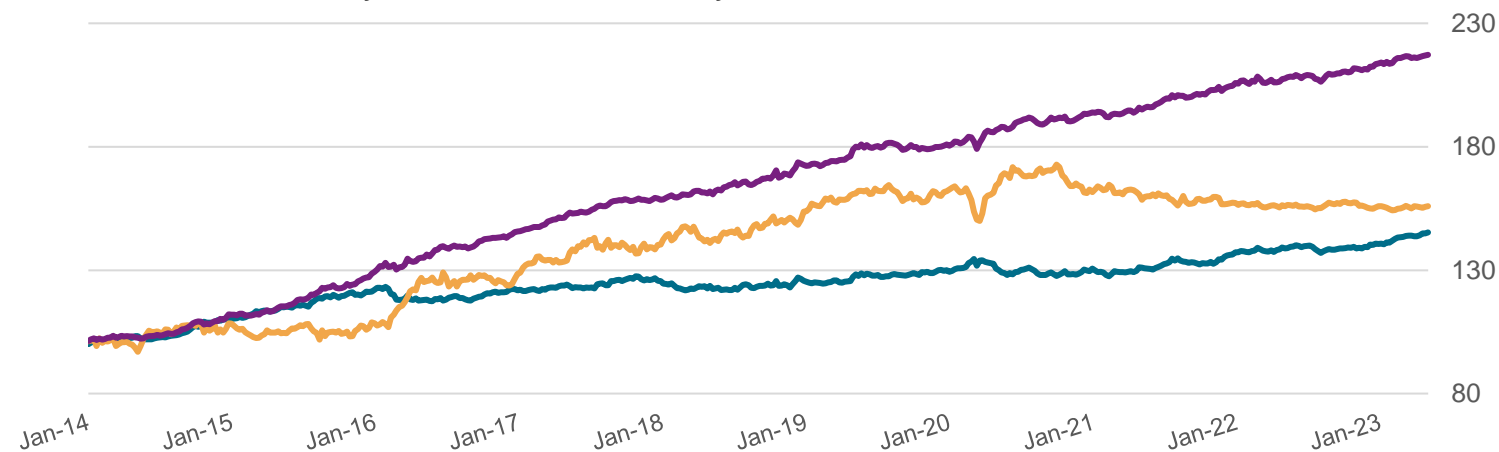| Favourable Stocks vs. Unfavourable Stocks - Weekly Rebalance - Jan 2014 - May 2023					
Factor	Annualized Returns	Annualized Volatility	Information Ratio	Average Weekly Returns	% Contribution from Short Portfolio
Short Interest	10.4%	8.4%	1.24	0.20%	61%
Short Volume	7.0%	10.9%	0.64	0.14%	32%
Combined	11.3%	6.0%	1.87	0.21%	23%

- Performance of favorable stocks relative to unfavorable stocks based on a weekly rebalance strategy is reported for the different factors used in our study. Factor performance is measured using the Information Ratio which is calculated as annualized excess returns / annualized std dev.
- Stocks are ranked in ascending order weekly as per intuition and stocks ranked in the top 20% are classified as favorable (long leg) and stocks ranked in the bottom 20% are classified as unfavorable (short leg). Returns are equally weighted for the universe and the factor portfolios.

S&P Global
Market Intelligence

Performance of the Short Portfolio relative to the Universe

For the short-leg of the strategy (unfavourable leg using the bottom 20% ranked stocks), the Short Interest factor offered more underperformance relative to the universe in comparison to the Short Volume and the combined factor. The risk-adjusted excess return (IR) for the Short Interest factor was found to be 1.17 as compared to an IR of 0.56 for the Short Volume and an IR of 0.71 for the combined factor.

Cumulative Returns - Weekly Rebalance: Jan 2014 – May 2023
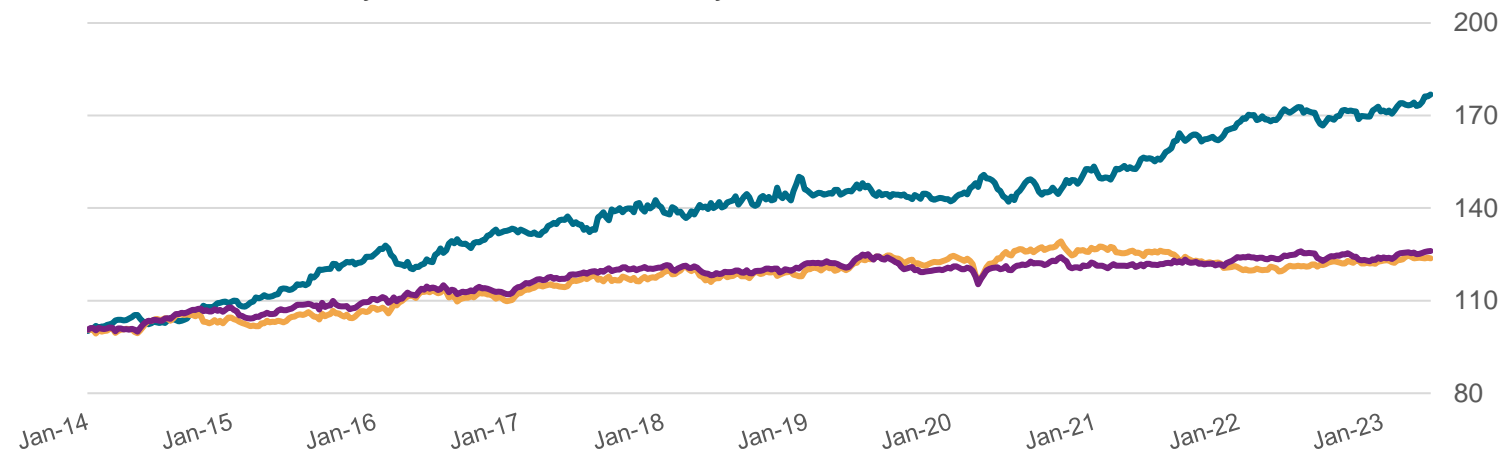
Universe vs. Unfavourable Stocks - Weekly Rebalance - Jan 2014 - May 2023				
Factor	Annualized Returns	Annualized Volatility	Information Ratio	Average Weekly Returns
Short Interest	6.3%	5.3%	1.17	0.12%
Short Volume	2.3%	4.1%	0.56	0.05%
Combined	2.5%	3.5%	0.71	0.05%

- Performance of unfavorable stocks (short portfolio) relative to the universe based on a weekly rebalance strategy is reported for the different factors used in our study. Factor performance is measured using the Information Ratio which is calculated as annualized excess returns / annualized std dev.
- Stocks are ranked in ascending order weekly as per intuition and stocks ranked in the top 20% are classified as favorable (long leg) and stocks ranked in the bottom 20% are classified as unfavourable (short leg). Returns are equally weighted for the universe and the factor portfolios.

Performance of the Long Portfolio relative to the Universe

For the long-leg of the strategy (favourable leg using the top 20% ranked stocks), the combined factor offered significant risk-adjusted excess returns with an IR of 2.7. This was found to be higher than the Short Interest factor (IR of 1.17) and the Short Volume factor (IR of 0.67).

Cumulative Returns - Weekly Rebalance: Jan 2014 – May 2023

Favourable Stocks vs. Universe - Weekly Rebalance - Jan 2014 - May 2023				
Factor	Annualized Returns	Annualized Volatility	Information Ratio	Average Weekly Returns
Short Interest	4.1%	3.5%	1.17	0.08%
Short Volume	4.8%	7.2%	0.67	0.10%
Combined	8.6%	3.2%	2.68	0.16%

- Performance of favorable stocks (long portfolio) relative to the universe based on a weekly rebalance strategy is reported for the different factors used in our study. Factor performance is measured using the Information Ratio which is calculated as annualized excess returns / annualized std dev.
- Stocks are ranked in ascending order weekly as per intuition and stocks ranked in the top 20% are classified as favorable (long leg) and stocks ranked in the bottom 20% are classified as unfavorable (short leg). Returns are equally weighted for the universe and the factor portfolios.

S&P Global
Market Intelligence

Yearly Breakdown & Performance in Up vs. Down Markets

Using a combination of the two factors gives a more consistent performance over the years and in different market regimes as compared to the individual factor performance. Short Volume performs better in Up Market periods while Short Interest performs better in Down Market periods.

	Yearly Breakdown - Average Spread - Weekly Rebalance									
Factor	2014	2015	2016	2017	2018	2019	2020	2021	2022	Jan - May 2023
Short Interest	0.37%	0.43%	0.16%	0.20%	0.11%	-0.05%	0.13%	0.26%	0.13%	0.31%
Short Volume	0.20%	0.07%	0.37%	0.34%	0.15%	0.25%	0.05%	-0.12%	-0.01%	0.10%
Combined	0.34%	0.32%	0.30%	0.32%	0.17%	0.07%	0.15%	0.14%	0.08%	0.23%

Average Weekly Returns in Up/Down Market Periods			
Factor	Up	Down	Overall
Short Interest	-0.04%	0.61%	0.20%
Short Volume	0.30%	-0.13%	0.14%
Combined	0.13%	0.34%	0.21%

- Time Period: Jan 2014 – May 2023, weekly rebalance.
- Performance of favorable stocks relative to unfavorable stocks based on a weekly rebalance strategy is reported for the different factors used in our study.
- Stocks are ranked in ascending order weekly as per intuition and stocks ranked in the top 20% are classified as favorable (long leg) and stocks ranked in the bottom 20% are classified as unfavorable (short leg). Returns are equally weighted for the universe and the factor portfolios.
- Down Market = When Universe return < 0, Up Market = When Universe return > 0. There are a total of 180 Down Market and 308 Up Market periods during our time period of study.

Appendix

S&P Global
Market Intelligence

Cross Sectional Rank Correlation

Short Interest and Short Volume have a low positive cross-sectional rank correlation of around 0.06 across the time-period. The correlation between the two factors have seen an increasing trend over the past few years.
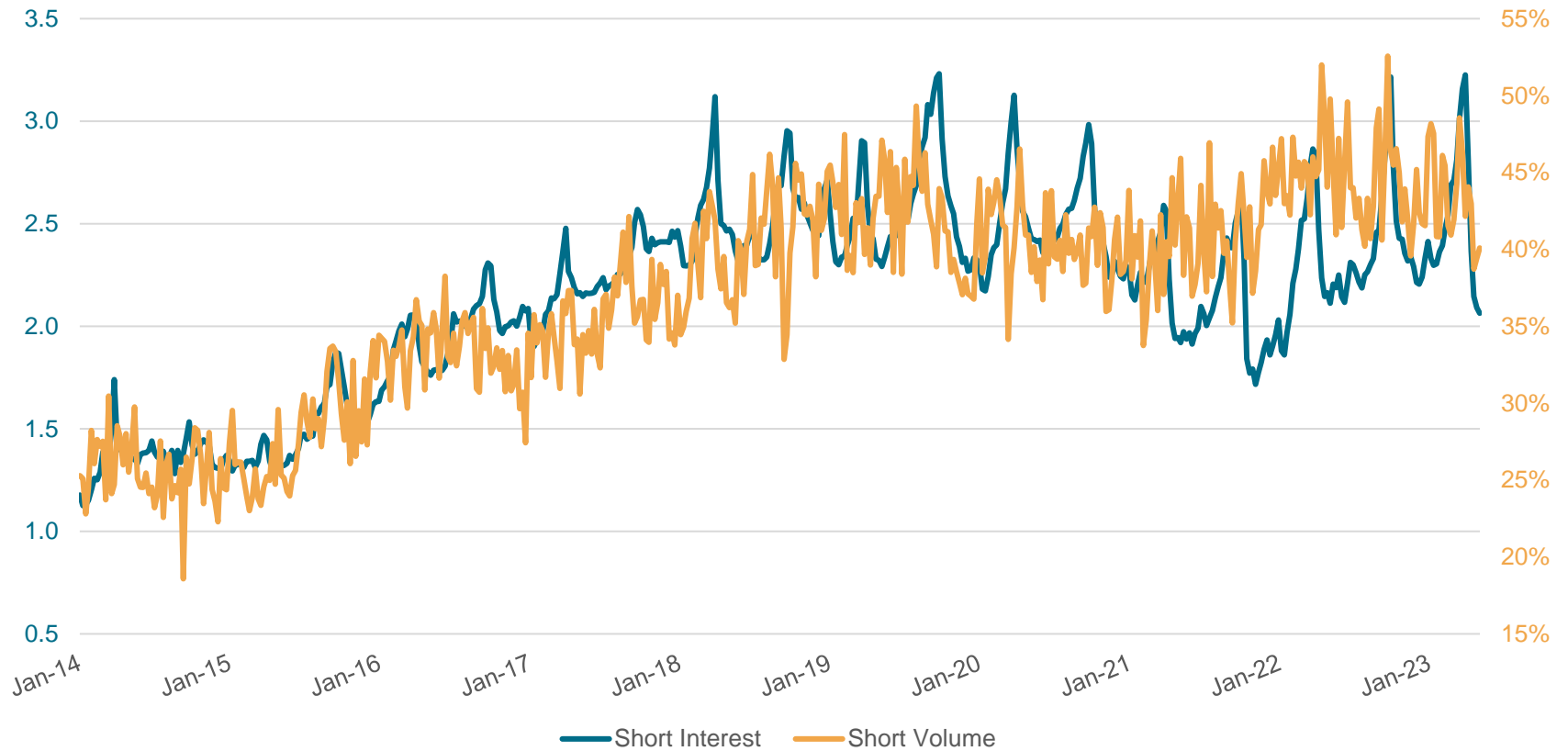
Cross Sectional Rank Correlation: Short Interest and Short Volume, Jan 14 – May 23

S&P Global
Market Intelligence
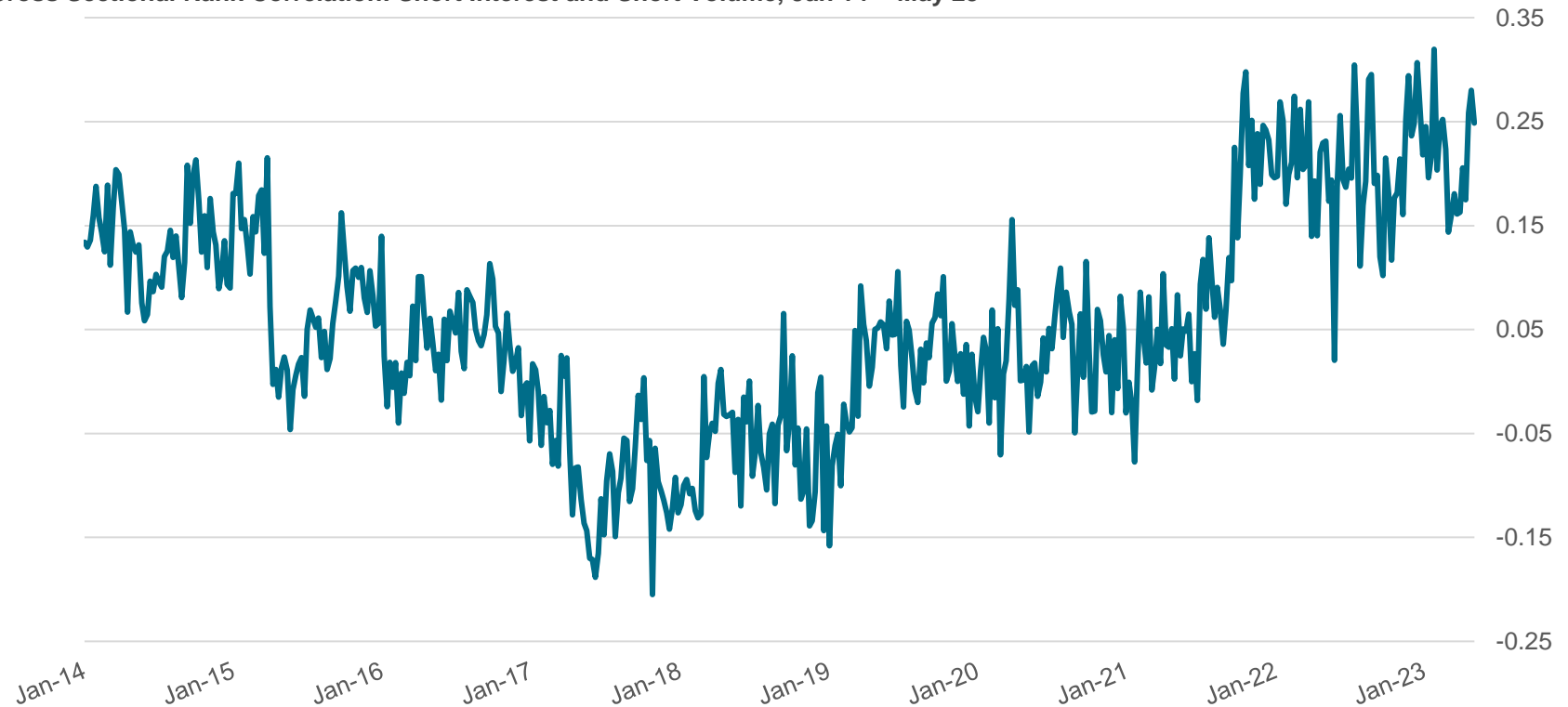
Average Factor Values: Short Interest and Short Volume

Average Factor Values: Short Interest and Short Volume, Jan 14 – May 23

Legend: Short Interest, Short Volume

Americas- Sales

P. +1 877 863 1306

E. market.intelligence@spglobal.com

APAC- Sales

P. +852 2533 3565

E. market.intelligence@spglobal.com

EMEA- Sales

P. +44 20 7176 1234

E. market.intelligence@spglobal.com