SMM Quantitative Trading Strategy

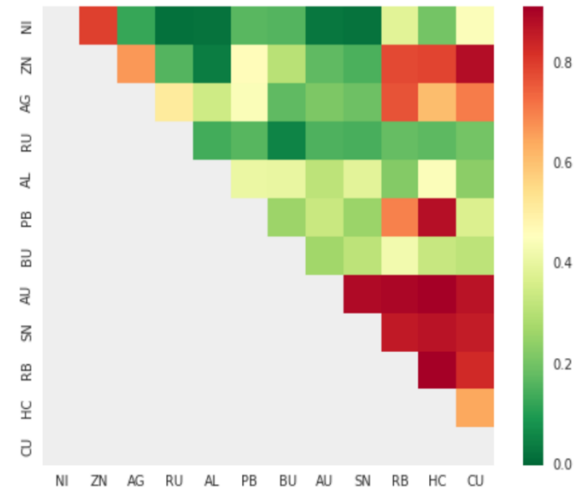
Contract		Arbitrage Type
Non-Ferrous	SHFE Copper	Inter-Commodity
	SHFE Aluminum	None
	SHFE Lead	None
	SHFE Zinc	Inter-Commodity
	SHFE Nickel	None
Ferrous	SHFE Steel Rebar	Inter-Commodity
	SHFE Hot-rolled coil	Inter-Commodity
	DCE Iron Ore	None

Source: SHFE, SMM

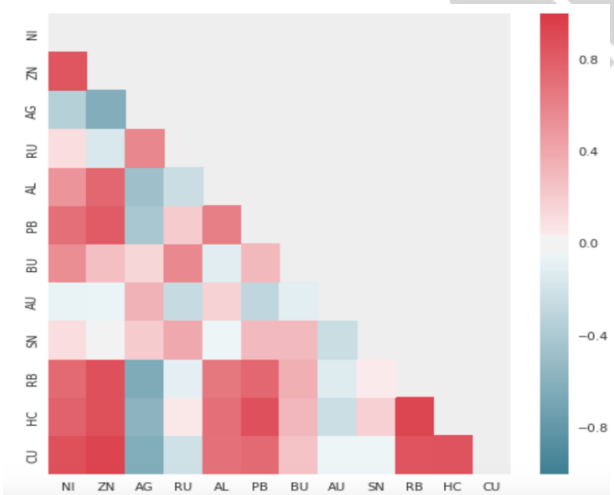
Methodology:

In this report, we use the statistical arbitrage strategy to find the historically correlated underlying assets, the profitability of pairs trading is selected by using the co-integration method in China's commodity market over the period of 2017 to 2018.

Co-integration Matrix



Correlation Matrix:



Source: SMM

Note: Deeper colors indicate higher correlation/co-integration

After applying the unit root test (in this case, the ADF method is applied) to identify the feasibility of the potential trading pairs, we choose the high-correlated pairs ($\rho > 0.80$) as follows:

Table1: Selected Correlation Matrix

	CU	ZN	HC	RB	NI	PB
CU	1.0000	0.9410	0.8621	0.8568	0.8766	0.7356
ZN	0.9410	1.0000	0.8789	0.8733	0.8460	0.8165
HC	0.8621	0.8789	1.0000	0.9362	0.7767	0.8710
RB	0.8568	0.8733	0.9362	1.0000	0.7391	0.7526
NI	0.8766	0.8460	0.7767	0.7391	1.0000	0.7526
PB	0.7356	0.8165	0.8710	0.7526	0.7526	1.0000

Source: SMM

We use linear regression to determine the integration equation (in Ton).

After standardizing the residuals series, we determine the long/short position of each portfolio as follows:

Table2: Trading Pairs

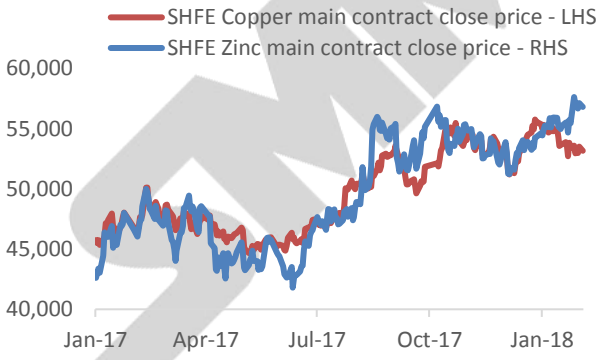
Contract	Trading Pair	Portfolio	Position
SHFE Zinc	SHFE Copper	2*ZN1803-CU1803	Short
	SHFE Hot-rolled coil	ZN1803-2*HC1805	Short
	SHFE Steel Rebar	2*ZN1803-9*RB1805	Short

Source: SMM

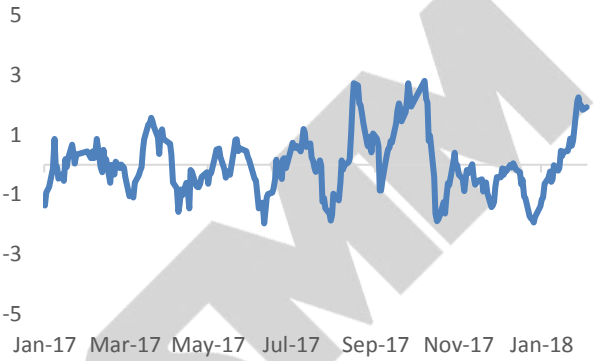
SHFE Zinc pair trading analysis

2*ZN1803-CU1803

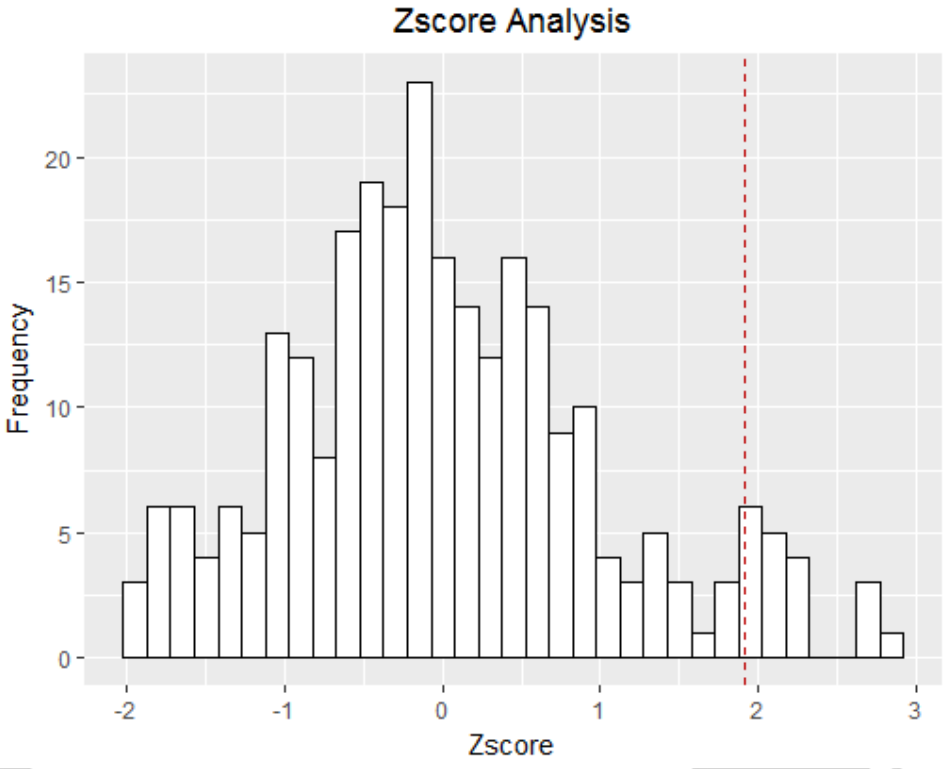
1.SHFE Close Price(CNY/Ton)



2.Residual Series



3.Histogram



Dash line: Current z-score by 02/02/2018

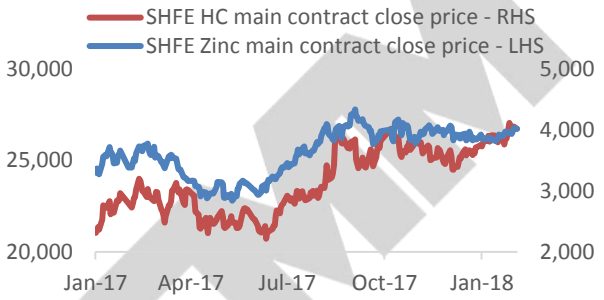
Source: SHFE, SMM

Statistical arbitrage analysis: by 02/02/2018, the standardized residual of the corresponding portfolio 2*ZN1803-CU1803 is 1.92 which is **higher than 93%** of the sample observed. **Thus, SMM forecasts that the spread would revert to the previous mean.**

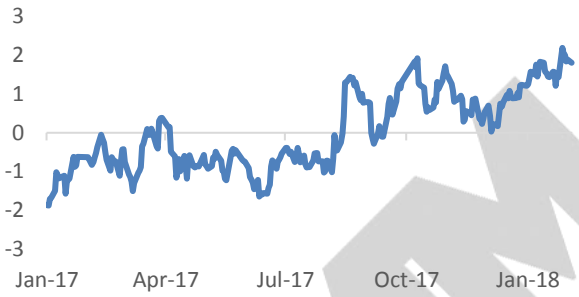
Recommended strategy: **Taking the short position of the portfolio, close position when the standardized residual close to zero.**

ZN1803-2*HC1805

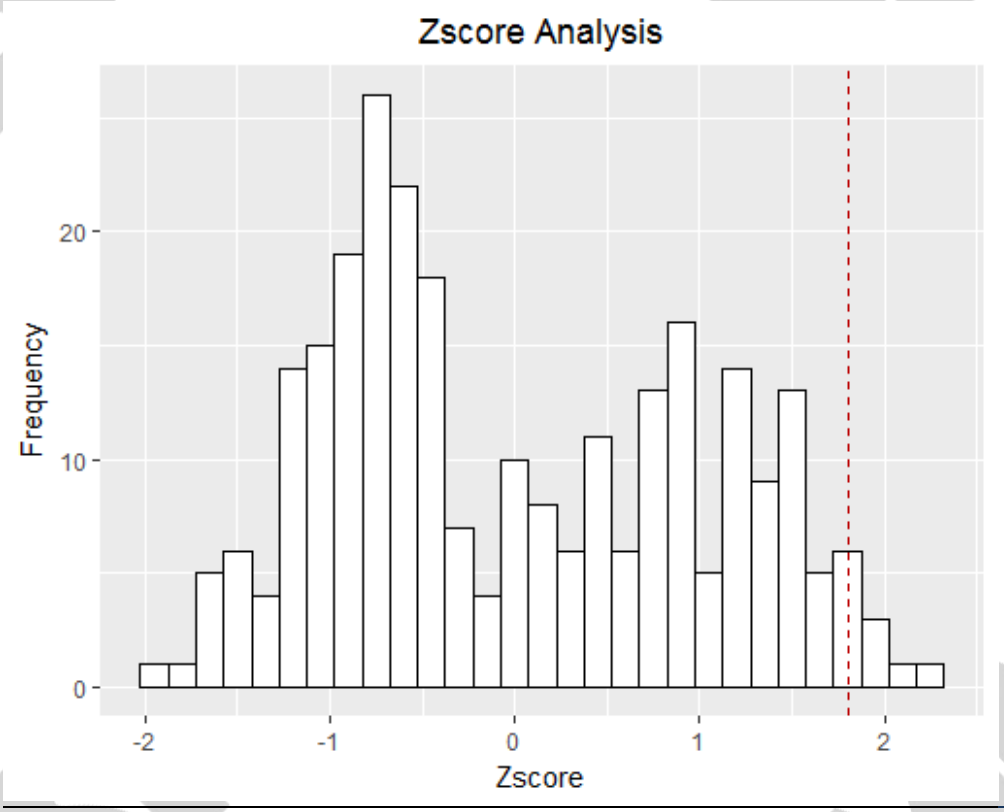
1.SHFE Close Price(CNY/Ton)



2.Residual Series



3.Histogram



Dash line: Current z-score by 02/02/2018

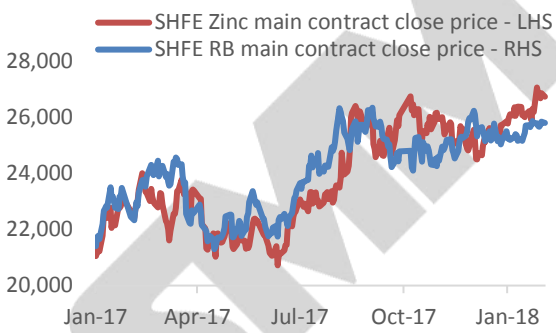
Source: SHFE, SMM

Statistical arbitrage analysis: by 02/02/2018, the standardized residual of the corresponding portfolio ZN1803-2*HC1805 is 1.82, which is **higher than 97%** of the sample observed. **Thus, SMM forecasts that the spread would revert to the previous mean.**

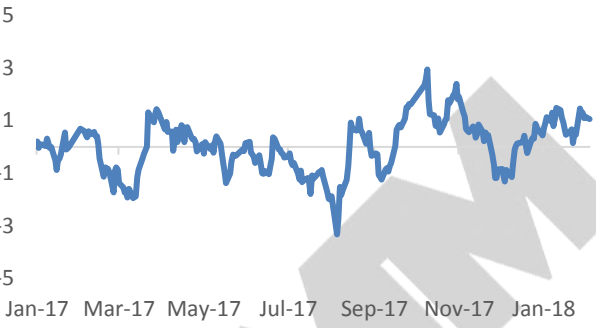
Recommended strategy: **Taking the short position of the portfolio, close position when the standardized residual close to zero.**

2*ZN1803-9*RB1805

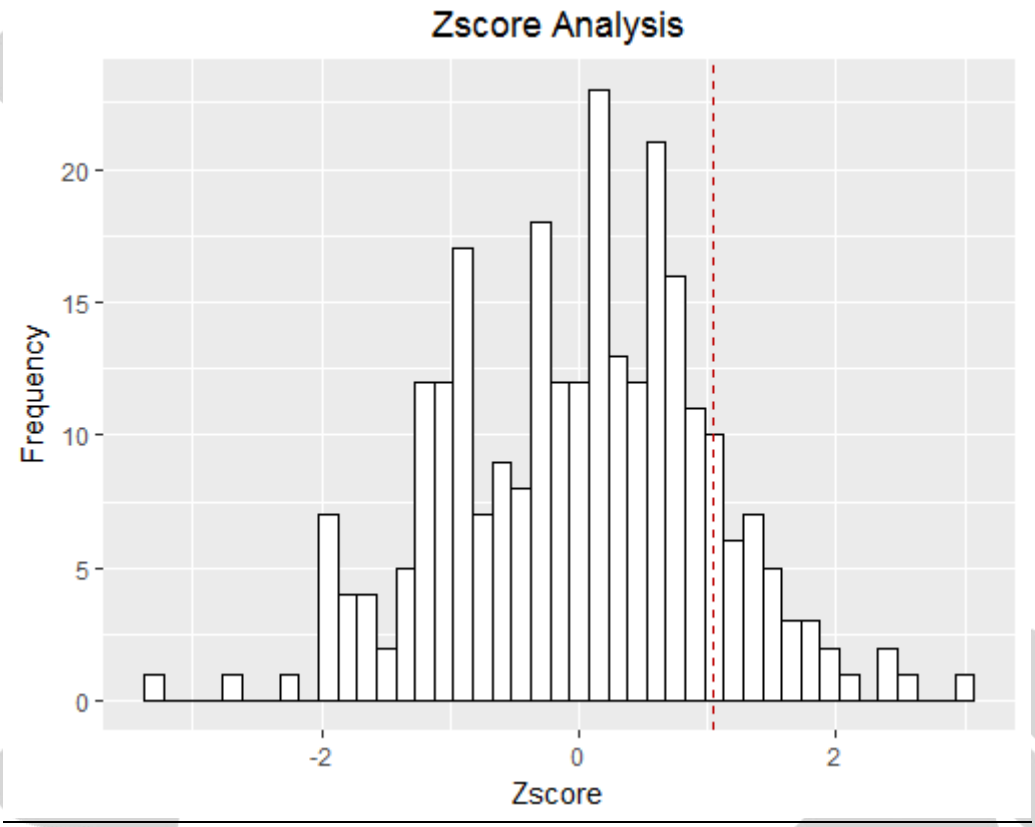
1.SHFE Close Price(CNY/Ton)



2.Residual Series



3.Histogram



Dash line: Current z-score by 02/02/2018

Source: SHFE, SMM

Statistical arbitrage analysis: by 02/02/2018, the standardized residual of the corresponding portfolio2*ZN1803-9*RB1805 is 1.05, which is **higher than 86%** of the sample observed. **Thus, SMM forecasts that the spread would revert to the previous mean.**

Recommended strategy: **Taking the short position of the portfolio, close position when the standardized residual close to zero.**

The information contained in this report is only as current as of the date indicated, and may be superseded by subsequent market events or for other reasons. Neither the author nor SMM undertakes to advise you of any changes in the views expressed herein.

The views and opinions expressed in this report are not related to any specific trading strategy that SMM offers. It is being provided merely to provide a framework to assist in the implementation of an investor's own analysis and investor's own view on the topic discussed herein.

Past performance is no guarantee of future results.

SMM SMM SMM SMM