MPA's Daily LME Metals Price & Spreads Report

17 Feb 2017. In China, banks extended 2.03 trillion yuan in net new yuan loans in January, the second-highest monthly tally on record. Stimulus in China is set to offer another boost to global metals prices, according to Goldman Sachs Group Inc. A larger-than-expected growth in U.S. crude stocks and production was overshadowed by news that the Organization of the Petroleum Exporting Countries could consider extending its production cuts for more months.

Summary Tables

Last 3M prices and 3M minus Cash Prices as published on the LME website together with the corresponding Modelled Prices, Actual minus Modelled Price Difference ($ and Standard Deviation (SD)) and 5 Day Support and Resistance Levels as calculated by MPA. See charts on p 2-7. The models are recalculated daily as new information becomes available.

3M Prices	Cu	Al	Ni	Zn	Pb	Sn
Actual $	6036	1892	10915	2840	2288	19950
Modelled $	6058	1899	10573	2769	2305	19630
Difference $	−22	−7	342	71	−17	320
Difference (SD)	−0.27	−0.26	1.03	0.90	−0.45	0.67
5D resistance $	6248	1945	11461	2964	2388	20597
5D support $	5827	1852	10453	2758	2204	19281

3M – Cash	Cu	Al	Ni	Zn	Pb	Sn
Actual $	21	14	40	4	14	45
Modelled $	12	7	48	12	3	−9
Difference $	9	7	−8	−8	11	54
Difference (SD)	1.48	1.31	−0.82	−1.44	1.17	0.70
5D resistance $	27	19	74	12	19	143
5D support $	5	3	29	−5	1	−60

120 and 60 Trading Day Change and % Change for the LME Metal 3M Actual and Modelled prices (charts p2-7).

Ch. 120 D	Cu	Al	Ni	Zn	Pb	Sn
Actual Ch.$	1396	302	785	505	326	325
Actual Ch.%	30.10	18.96	7.75	21.63	16.59	1.66
Modelled Ch. $	1343	288	274	506	357	213
Modelled Ch. %	28.48	17.91	2.66	22.35	18.36	1.10

Ch. 60 D	Cu	Al	Ni	Zn	Pb	Sn
Actual Ch.$	86	123	−815	−71	−184	−1105
Actual Ch.%	1.45	6.95	−6.95	−2.44	−7.46	−5.25
Modelled Ch. $	125	170	−1345	145	8	−1502
Modelled Ch. %	2.10	9.86	−11.28	5.51	0.35	−7.11

LME 3M Metal Price and Drivers Correlation Tables for 120 and 60 Trading Days for Brent Crude Oil (BZ), iShares 10-20 Year Treasury Bond price ETF (TLH), EURUSD (EUR$),USDCNY ($CNY), y-o-y Industrial Production (yoyIP) and LME Stock (Stock). See Charts on p8-9.

COR 120	BZ	TLH	EUR$	$CNY	yoyIP	Stock
Cu	0.58	−0.92	−0.81	0.89	0.84	−0.85
Al	0.55	−0.71	−0.59	0.77	0.69	0.49
Ni	−0.25	−0.28	−0.28	0.15	0.39	−0.20
Zn	0.60	−0.87	−0.76	0.86	0.81	−0.76
Pb	0.47	−0.74	−0.61	0.71	0.72	−0.10
Sn	0.13	−0.52	−0.55	0.51	0.69	−0.50

COR 60	BZ	TLH	EUR$	$CNY	yoyIP	Stock
Cu	−0.17	0.41	0.72	−0.18	−0.39	−0.83
Al	0.13	0.31	0.60	0.11	−0.74	0.65
Ni	−0.57	−0.15	−0.16	−0.68	0.53	−0.49
Zn	−0.32	0.35	0.64	−0.23	−0.35	−0.54
Pb	−0.48	0.24	0.61	−0.48	−0.06	−0.59
Sn	−0.25	−0.23	−0.47	−0.18	0.72	−0.91

MPA's Daily LME Metals Price & Spreads Report

Historical Data for Copper as published on the LME website to: 16 February 2017

The last actual Cu3M price is $6036 with the modelled price at $6058 . The actual Cu3M minus modelled price difference is $-22 or -0.27 standard deviations (SD) , (where 1SD = $92). When the SD is over 2 or under - 2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $6248 and support at $5827.
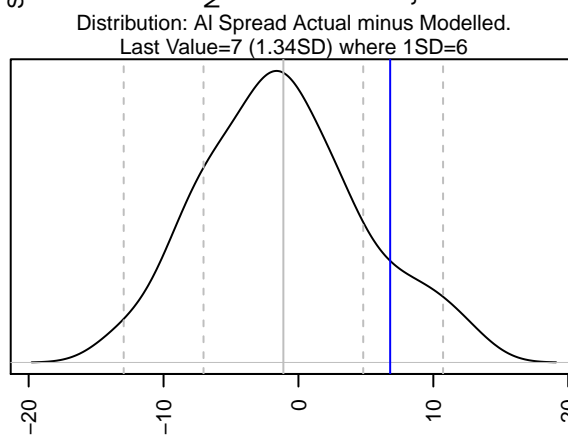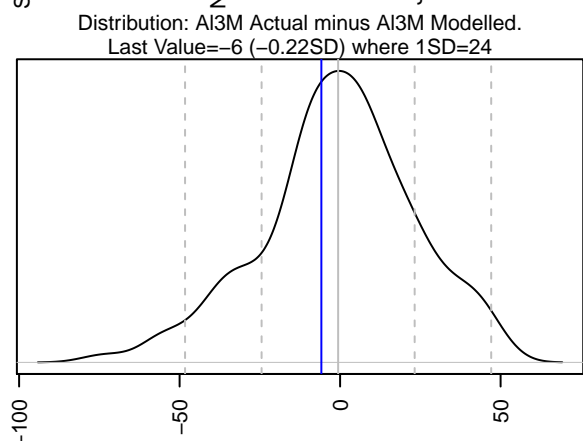
The last actual Cu3M minus Cu Cash Spread value is $21 with the modelled value at $12 . The actual Spread actual minus modelled difference is $9 or 1.48 standard deviations (SD) , (where 1SD = $6). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $27 and support at $5.
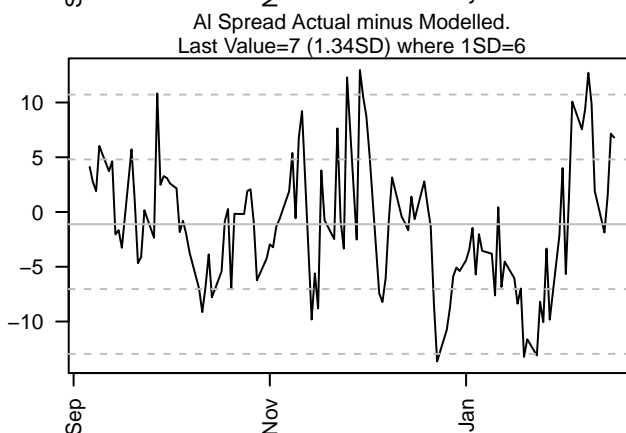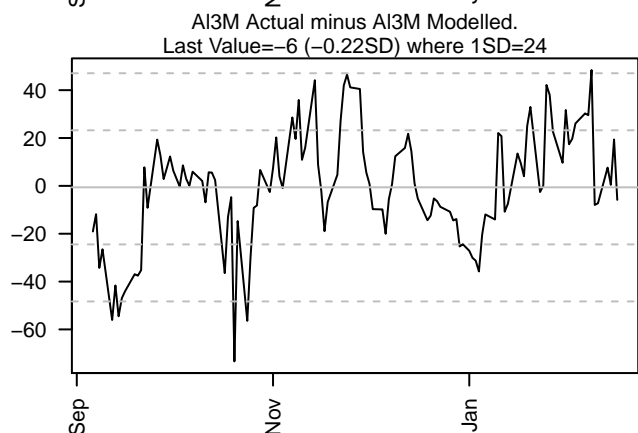

Cu3M Act. (black) & Modelled (Red) RSQ = 0.96
Last Value: Actual: 6036 Modelled: 6058

Cu3M minus Cu Cash Spread, Actual (black) & Modelled (red).
Last Value: Actual: 21 Modelled: 12

Cu3M Actual minus Cu3M Modelled.
Last Value=−22 (−0.27SD) where 1SD=92

Cu Spread Actual minus Modelled.
Last Value=9 (1.48SD) where 1SD=6

Distribution: Cu3M Actual minus Cu3M Modelled.
Last Value=−22 (−0.27SD) where 1SD=92

Distribution: Cu Spread Actual minus Modelled.
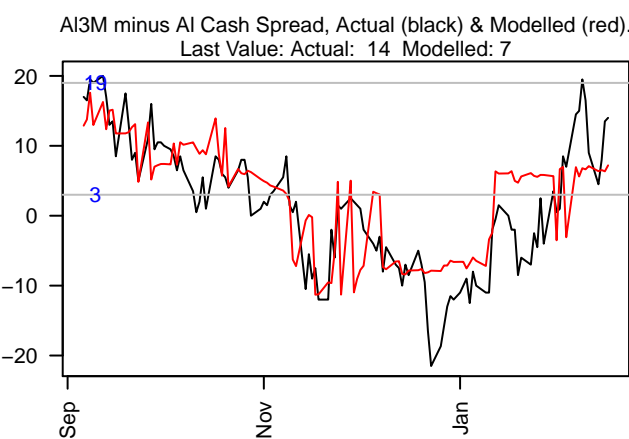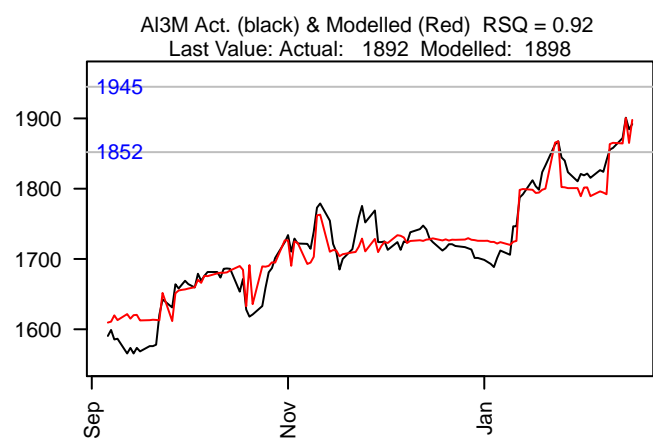Last Value=9 (1.48SD) where 1SD=6

MPA's Daily LME Metals Price & Spreads Report

Historical Data for Aluminium as published on the LME website to: 16 February 2017

The last actual Al3M price is $1892 with the modelled price at $1899 . The actual Al3M minus modelled price difference is $-7 or -0.26 standard deviations (SD) , (where 1SD = $24). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $1945 and support at $1852.
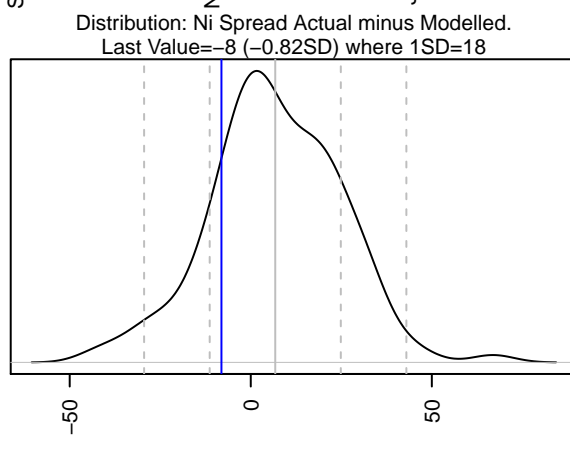
The last actual Al3M minus Al Cash Spread value is $14 with the modelled value at $7 . The actual Spread actual minus modelled difference is $7 or 1.31 standard deviations (SD) , (where 1SD = $6). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $19 and support at $3.
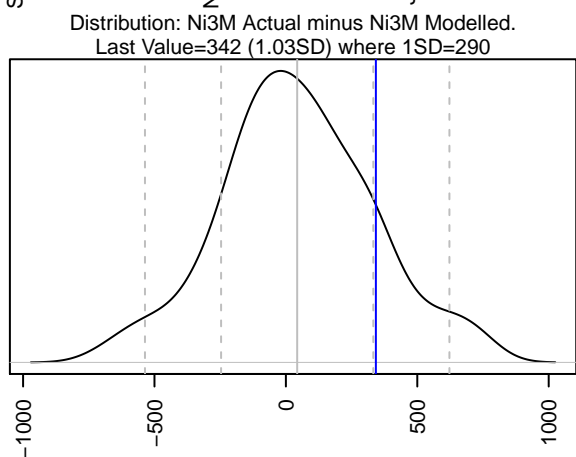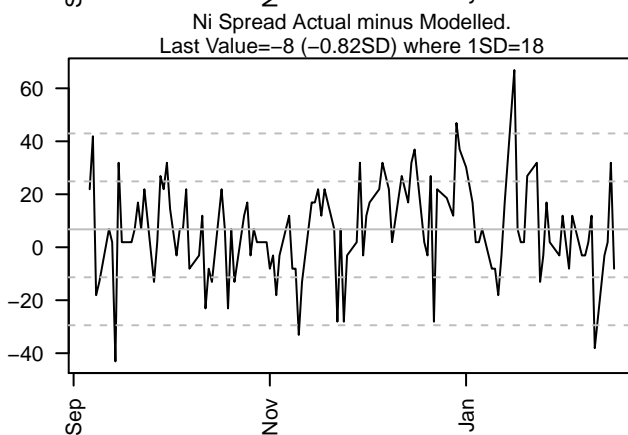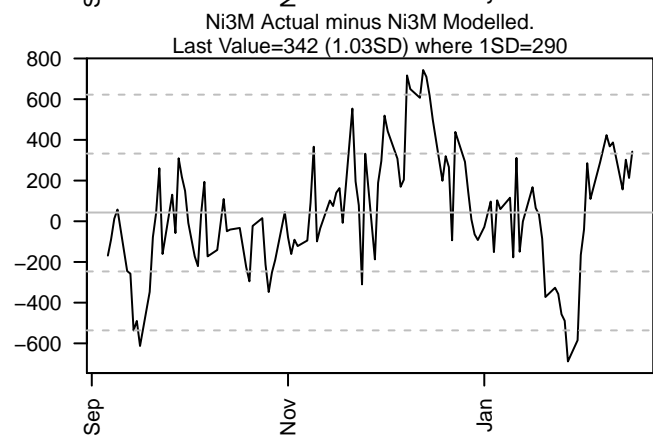

Al3M Act. (black) & Modelled (Red) RSQ = 0.92
Last Value: Actual: 1892 Modelled: 1898

Al3M minus Al Cash Spread, Actual (black) & Modelled (red).
Last Value: Actual: 14 Modelled: 7

Al3M Actual minus Al3M Modelled.
Last Value=–6 (–0.22SD) where 1SD=24

Al Spread Actual minus Modelled.
Last Value=7 (1.34SD) where 1SD=6

Distribution: Al3M Actual minus Al3M Modelled.
Last Value=–6 (–0.22SD) where 1SD=24

Distribution: Al Spread Actual minus Modelled.
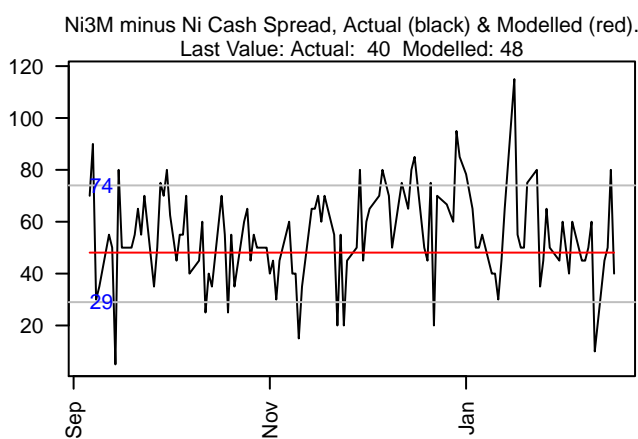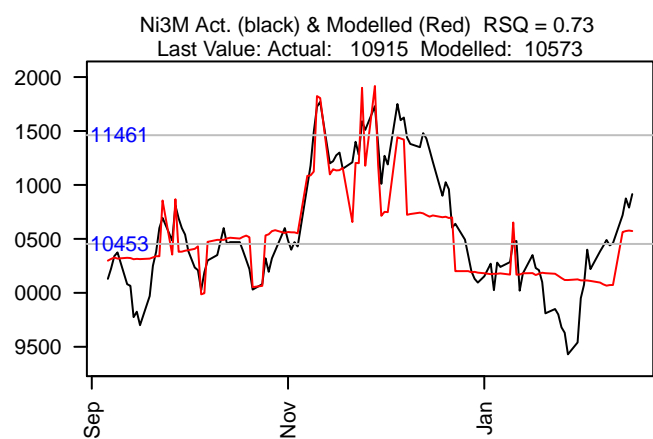Last Value=7 (1.34SD) where 1SD=6

MPA's Daily LME Metals Price & Spreads Report

Historical Data for Nickel as published on the LME website to: 16 February 2017

The last actual Ni3M price is $10915 with the modelled price at $10573 . The actual Ni3M minus modelled price difference is $342 or 1.03 standard deviations (SD) , (where 1SD = $290). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $11461 and support at $10453.

The last actual Ni3M minus Ni Cash Spread value is $40 with the modelled value at $48 . The actual Spread actual minus modelled difference is $-8 or -0.82 standard deviations (SD) , (where 1SD = $18). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $74 and support at $29.
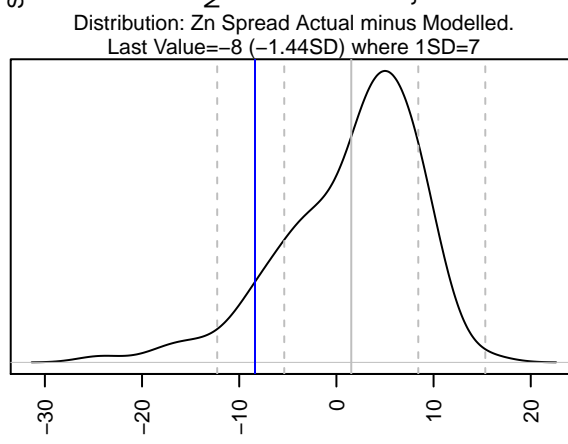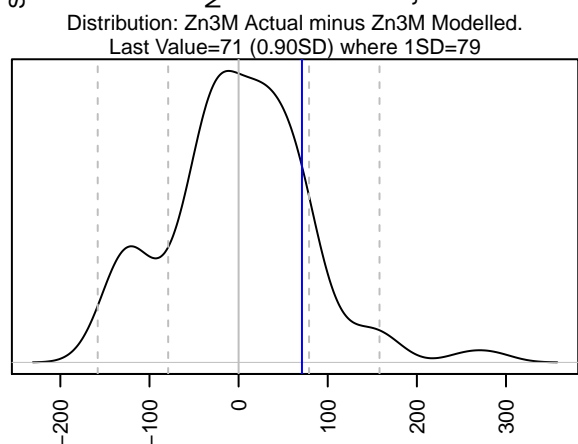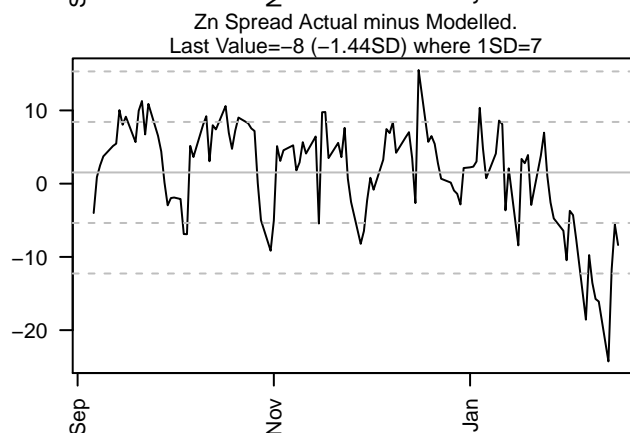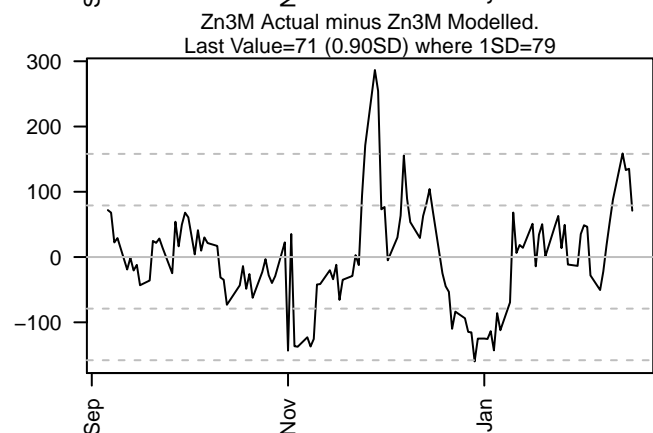

Ni3M Act. (black) & Modelled (Red) RSQ = 0.73
Last Value: Actual: 10915 Modelled: 10573

Ni3M minus Ni Cash Spread, Actual (black) & Modelled (red).
Last Value: Actual: 40 Modelled: 48

Ni3M Actual minus Ni3M Modelled.
Last Value=342 (1.03SD) where 1SD=290

Ni Spread Actual minus Modelled.
Last Value=−8 (−0.82SD) where 1SD=18

Distribution: Ni3M Actual minus Ni3M Modelled.
Last Value=342 (1.03SD) where 1SD=290

Distribution: Ni Spread Actual minus Modelled.
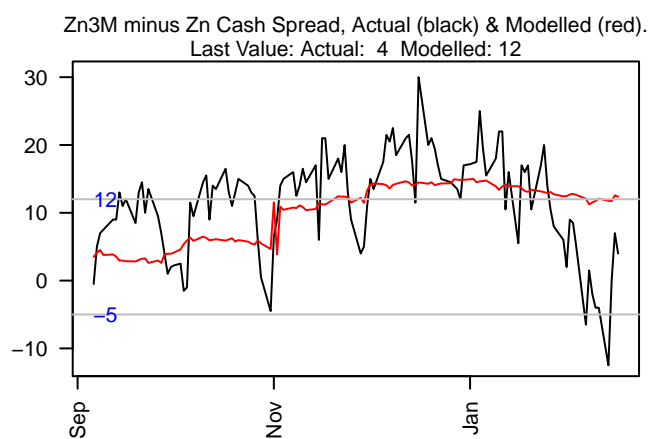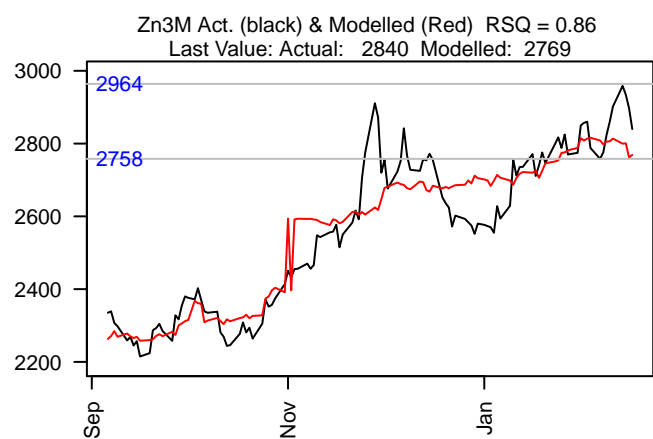Last Value=−8 (−0.82SD) where 1SD=18

MPA's Daily LME Metals Price & Spreads Report

Historical Data for Zinc as published on the LME website to: 16 February 2017

The last actual Zn3M price is $2840 with the modelled price at $2769 . The actual Zn3M minus modelled price difference is $71 or 0.90 standard deviations (SD) , (where 1SD = $79). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $2964 and support at $2758.

The last actual Zn3M minus Zn Cash Spread value is $4 with the modelled value at $12 . The actual Spread actual minus modelled difference is $-8 or -1.44 standard deviations (SD) , (where 1SD = $7). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $12 and support at $-5.
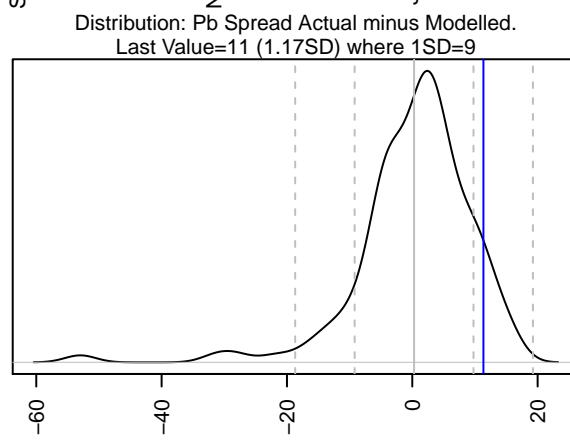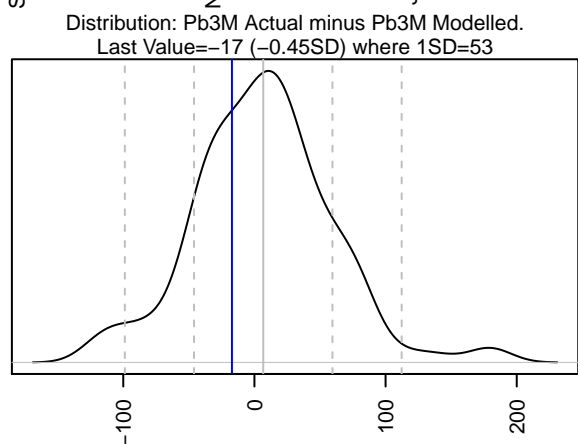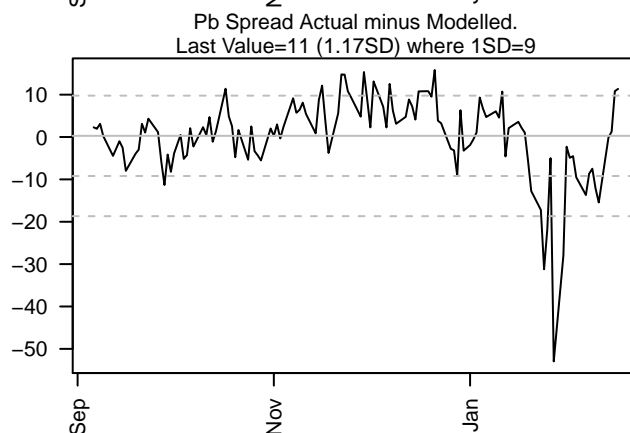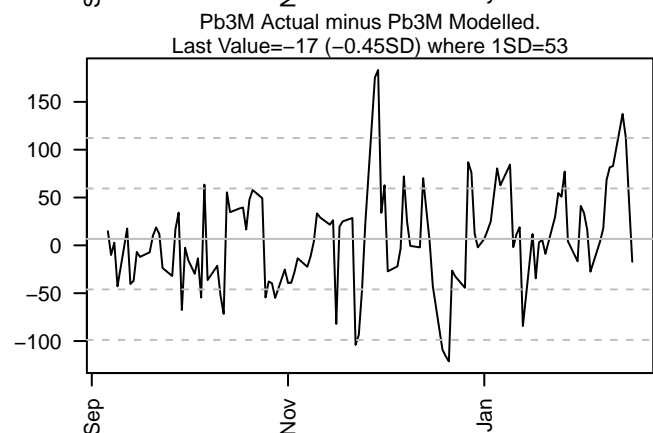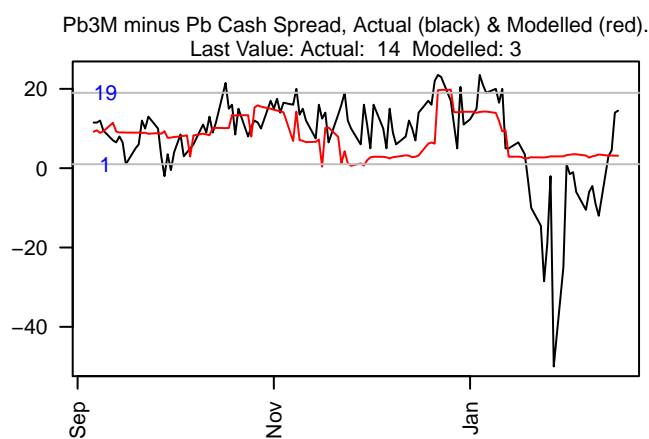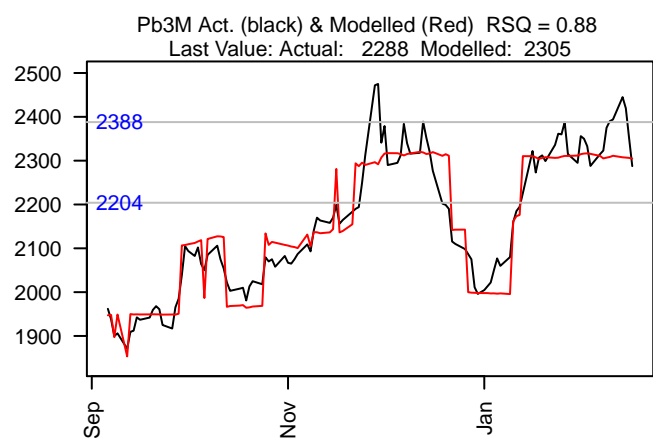

Zn3M Act. (black) & Modelled (Red) RSQ = 0.86
Last Value: Actual: 2840 Modelled: 2769

Zn3M minus Zn Cash Spread, Actual (black) & Modelled (red).
Last Value: Actual: 4 Modelled: 12

Zn3M Actual minus Zn3M Modelled.
Last Value=71 (0.90SD) where 1SD=79

Zn Spread Actual minus Modelled.
Last Value=−8 (−1.44SD) where 1SD=7

Distribution: Zn3M Actual minus Zn3M Modelled.
Last Value=71 (0.90SD) where 1SD=79

Distribution: Zn Spread Actual minus Modelled.
Last Value=−8 (−1.44SD) where 1SD=7

MPA's Daily LME Metals Price & Spreads Report

The last actual Pb3M price is $2288 with the modelled price at $2305 . The actual Pb3M minus modelled price difference is $-17 or -0.45 standard deviations (SD) , (where 1SD = $53). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $2388 and support at $2204.

The last actual Pb3M minus Pb Cash Spread value is $14 with the modelled value at $3 . The actual Spread actual minus modelled difference is $11 or 1.17 standard deviations (SD) , (where 1SD = $9). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $19 and support at $1.
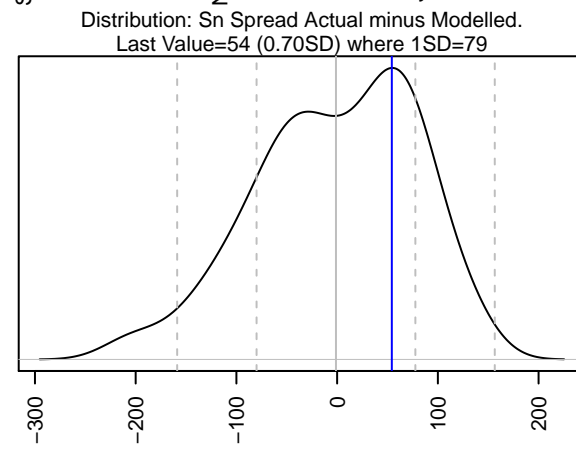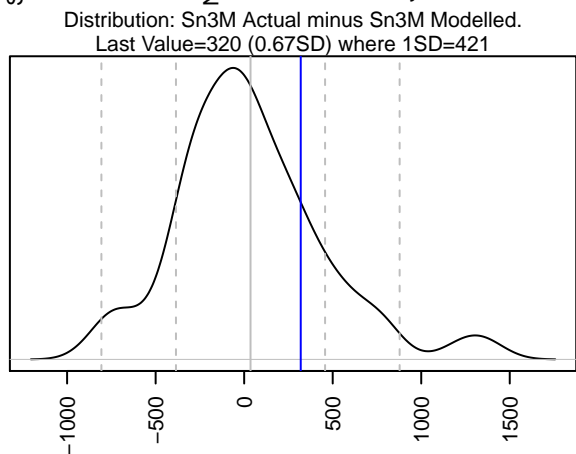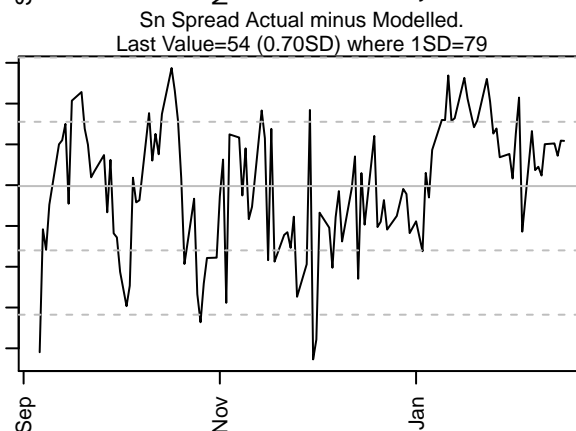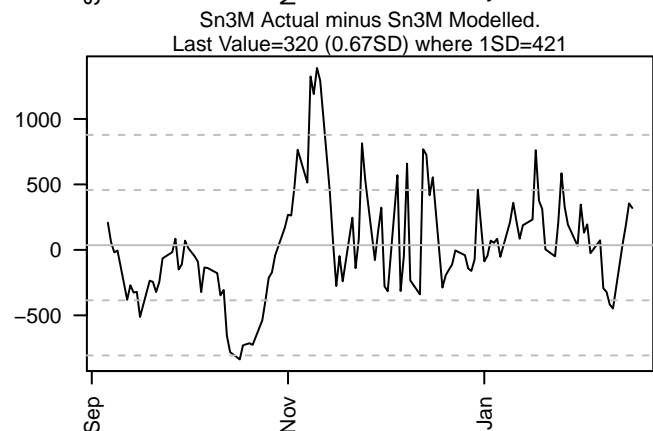

Pb3M Act. (black) & Modelled (Red) RSQ = 0.88
Last Value: Actual: 2288 Modelled: 2305

Pb3M minus Pb Cash Spread, Actual (black) & Modelled (red).
Last Value: Actual: 14 Modelled: 3

Pb3M Actual minus Pb3M Modelled.
Last Value=−17 (−0.45SD) where 1SD=53

Pb Spread Actual minus Modelled.
Last Value=11 (1.17SD) where 1SD=9

Distribution: Pb3M Actual minus Pb3M Modelled.
Last Value=−17 (−0.45SD) where 1SD=53

Distribution: Pb Spread Actual minus Modelled.
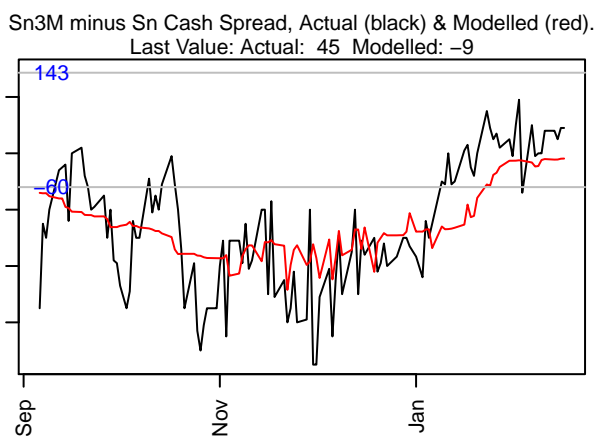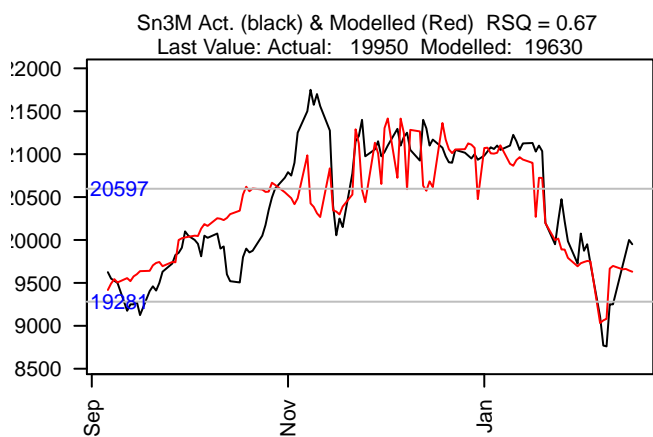Last Value=11 (1.17SD) where 1SD=9

MPA's Daily LME Metals Price & Spreads Report

Historical Data for Tin as published on the LME website to: 16 February 2017

The last actual Sn3M price is $19950 with the modelled price at $19630 . The actual Sn3M minus modelled price difference is $320 or 0.67 standard deviations (SD) , (where 1SD = $421). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $20597 and support at $19281.

The last actual Sn3M minus Sn Cash Spread value is $45 with the modelled value at $-9 . The actual Spread actual minus modelled difference is $54 or 0.70 standard deviations (SD) , (where 1SD = $79). When the SD is over 2 or under -2, mean reversion towards the modelled price is generally expected but it may also be an indication of the beginnings of a regime change, where certain drivers are starting to behave differently. Over the next five days, resistance is seen at $143 and support at $-60.


Sn3M Act. (black) & Modelled (Red) RSQ = 0.67
Last Value: Actual: 19950 Modelled: 19630

Sn3M minus Sn Cash Spread, Actual (black) & Modelled (red).
Last Value: Actual: 45 Modelled: −9

Sn3M Actual minus Sn3M Modelled.
Last Value=320 (0.67SD) where 1SD=421

Sn Spread Actual minus Modelled.
Last Value=54 (0.70SD) where 1SD=79

Distribution: Sn3M Actual minus Sn3M Modelled.
Last Value=320 (0.67SD) where 1SD=421

Distribution: Sn Spread Actual minus Modelled.
Last Value=54 (0.70SD) where 1SD=79

MPA's Daily LME Metals Price & Spreads Report

**Historical Data as published on the LME website to: 16 February 2017**

The charts below show the 3M price and LME opening stocks for Copper, Aluminium, Nickel, Zinc, Lead and Tin. For ease of comparison the LME price and stock level are plotted on the same chart. LME Price (LHS y axis, black line) and LME Stock (RHS inverted y axis, blue line).

The 120 day correlation and 60 day correlation are also shown to monitor if the LME stock contibution is increasing in importance. One would expect that the price would have an inverse relationship to LME stocks but at different times other drivers play an important role.
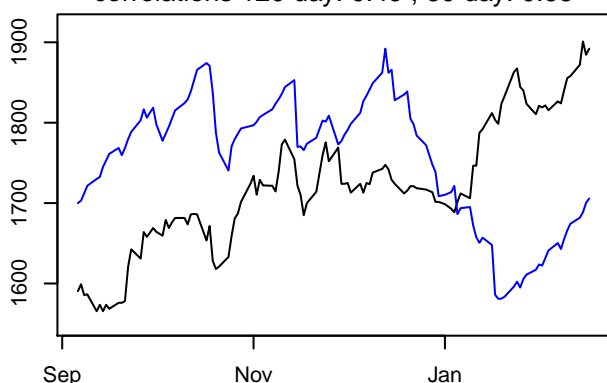

Cu3M and LME Copper Stock.
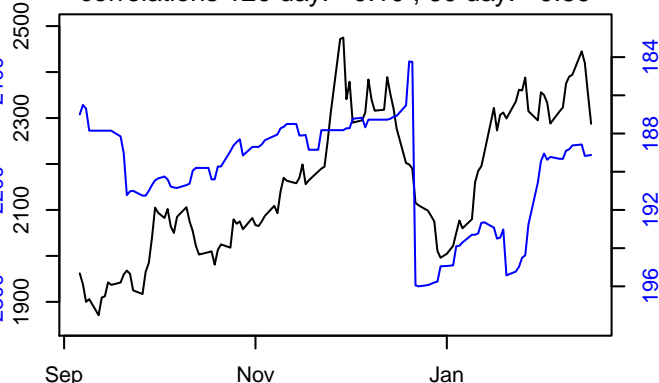correlations 120 day: −0.85 , 60 day: −0.83
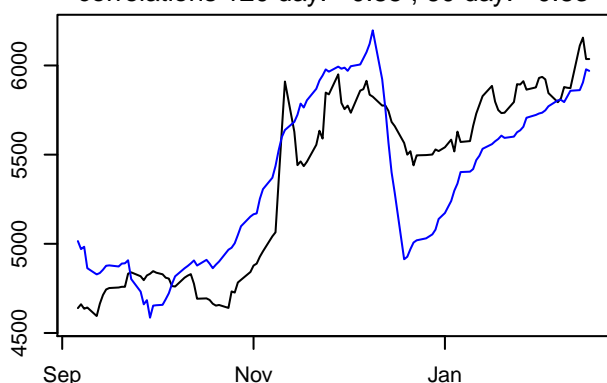
Zn3M and LME Zinc Stock.
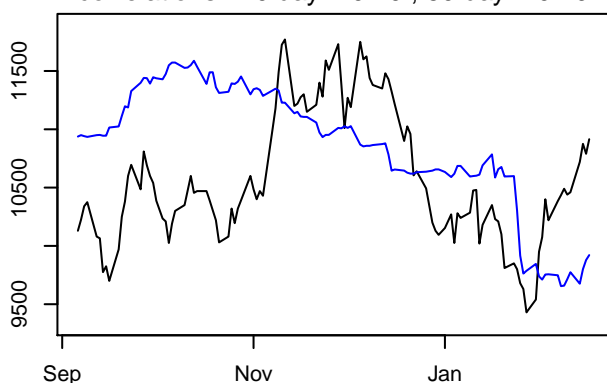correlations 120 day: −0.76 , 60 day: −0.54
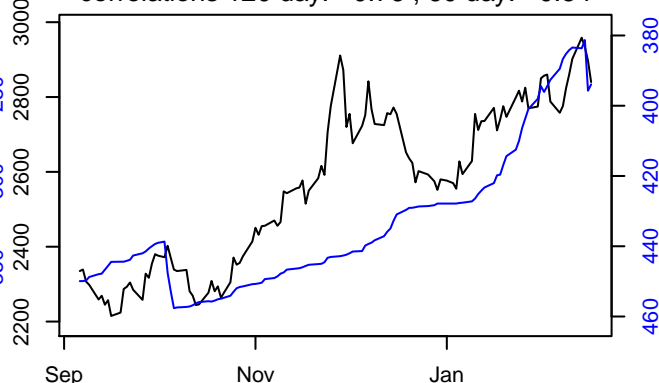
Al3M and LME Aluminium Stock.
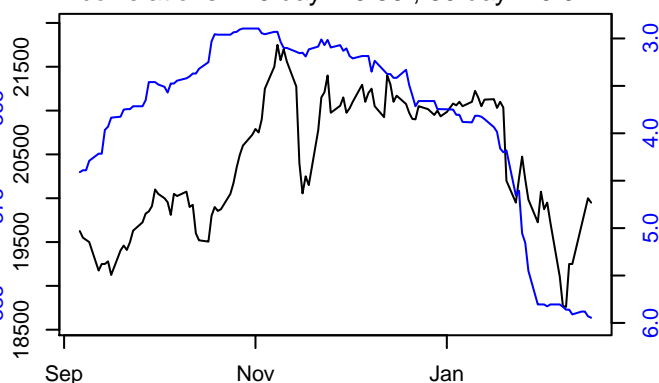correlations 120 day: 0.49 , 60 day: 0.65

Pb3M and LME Lead Stock.
correlations 120 day: −0.10 , 60 day: −0.59

Ni3M and LME Nickel Stock.
correlations 120 day: −0.20 , 60 day: −0.49

Sn3M and LME Tin Stock.
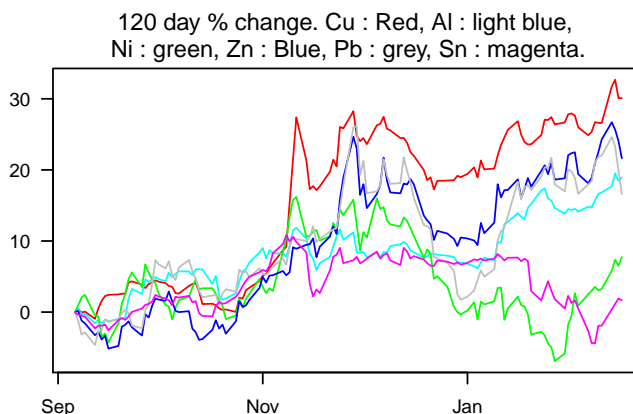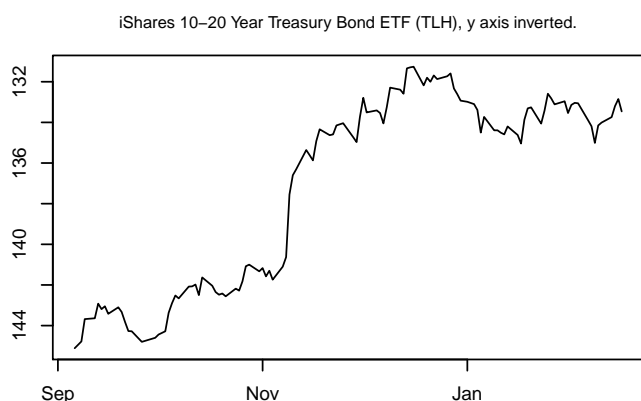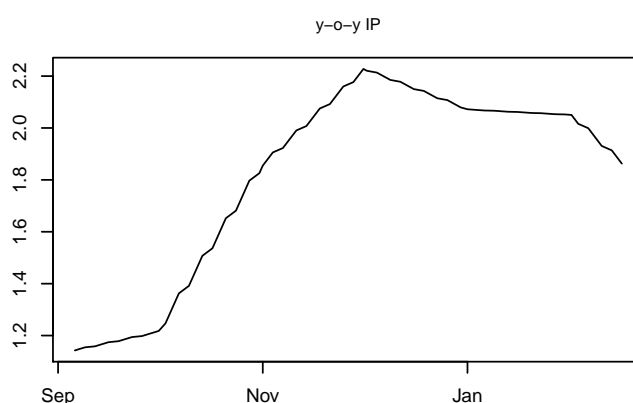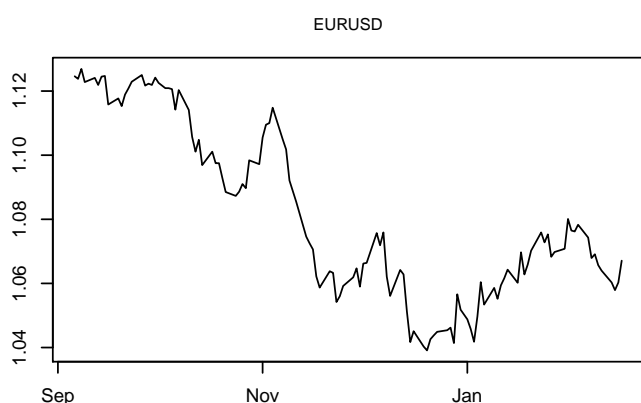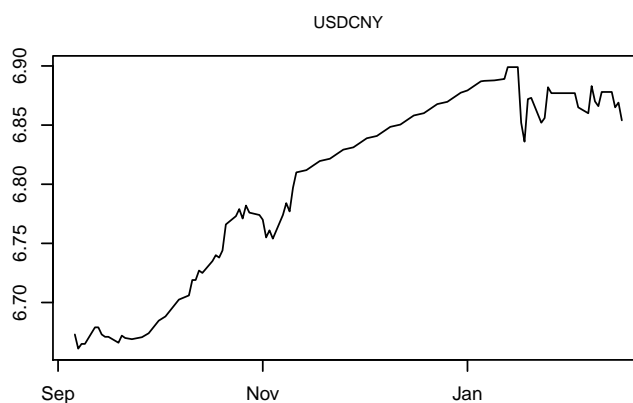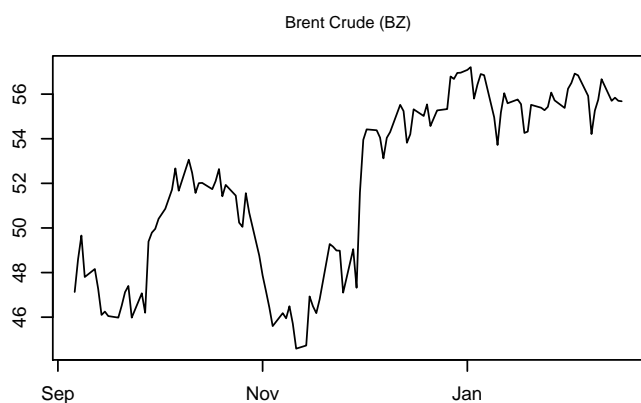correlations 120 day: −0.50 , 60 day: −0.91

MPA's Daily LME Metals Price & Spreads Report

Historical Data to: 16 February 2017

The LME base metal prices are expected to be supported by low exchange stocks, high y-o-y global industrial production growth, a weak American dollar, high energy prices. The weakness of the iShares 10-20 Year Treasury Bond price ETF (a proxy for Treasury Bond price strength) and the Chinese Yuan may also play a contributing factor. Charts of drivers considered are shown below.

A chart comparing the 120 day % change of all six of the LME base metals 3M prices is also shown below (Copper : red, Aluminium : light blue, Nickel : green, Zinc : blue, Lead : grey and Tin : magenta). This helps to show the relative performance of the metals as well as possible leading effects, where a movement in one metal may be followed by others.

Brent Crude (BZ)

USDCNY

EURUSD

y–o–y IP

iShares 10–20 Year Treasury Bond ETF (TLH), y axis inverted.

120 day % change. Cu : Red, Al : light blue, Ni : green, Zn : Blue, Pb : grey, Sn : magenta.

MPA's Daily LME Metals Price & Spreads Report

Methodology used in the daily models.

The LME metal prices are influenced by a number of fundamental drivers. The Price Drivers considered by MPA for the daily models are (i) LME exchange stocks (ii) the rate of global Industrial Production growth (source CHR's "Global IP Watch". This may be modified to take into account the BME view.), (iii) Euro to Dollar exchange rate (EURUSD), for the strength / weakness of the dollar,(iv) the price of Brent Crude oil (BZ), energy being a significant input cost in the supply curve, (v) the iShares 10-20 Year Treasury Bond price ETF, as a proxy for Treasury Bond strength and (vi) the Dollar to Chinese Yuan Exchange Rate (EURUSD).

Exploratory models may be built by Machine Learning techniques like Random Forests, Boosting, Bagging and Deep Learning Neural Nets. These are increasingly popular ways of creating prediction models of this type. However, these methods act like black boxes so the internal logic of these models cannot be evaluated. For this reason MPA still prefers to use mathematical methods for the creation of its final daily and monthly models.

MPA scans the historical data set for meaningful price: driver relationships and also regime changes, where price driver relationships change through time. To avoid spurious and incorrect relationships, MPA sets constraints on the model coefficients, where applicable, so that those drivers influence price in the correct direction. Ridge regression is used to minimise errors due to colinearity.

Methodology used in the monthly models.

The methodology of the monthly models is similar to the daily models. The price drivers used in the monthly models are: (i) Total exchange stocks (ii) the rate of global Industrial Production growth (source CHR's "Global IP Watch". This may be modified to take into account the BME view.), (iii) Euro to Dollar Exchange Rate (EURUSD), (iv) the price of Brent Crude oil (BZ) the USA Ten Year Note price and (vi) the Dollar to Chinese Yuan Exchange Rate (EURUSD).

The monthly models predict out to December 2018, with the predictions based on forecast driver assumptions.

MPA's Interactive Model

Metal Price Analytics Ltd (MPA) has made available for third party licensing its innovative Interactive Models of the LME 3M copper price, Freeport and Antofagasta share price forecasting to December 2018. These are available on request to potential bona fide corporate customers for a 14 day Trial period.

The models take into account regime changes, such as the greater oil driver weightings on Freeport following the acquisitions of Plains Exploration and McMoRan Exploration in early 2013.

Over the forecast period, base case scenarios for the drivers are provided by Bloomsbury Minerals Economics.

A forecast based on the EURUSD and BZ forward curve is also provided. At times, the base case scenarios may be in agreement with the forward curve.

The driver scenarios are also customisable allowing for different assumptions to be entered by the model user.

The interactive model is delivered as an Excel workbook by e mail and is updated each month. The model is recalculated to incorporate the new data and forecasts are updated for the drivers for the base case and forward curve.

Disclaimer:

Care has been taken to present accurate information. The model outputs are mathematically generated from the relationships between the metal and selected drivers which have an influence on the price. They are not trading or investment advice. Neither MPA nor its staff can accept any liability for modelling uncertainty or error.

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