Executive Summary

Marex Global Smelter Tracker [MGST], developed by Earth-i [as SAVANT] in partnership with Marex, provides daily smelter activity information of Copper and Nickel. Data is generated from several different Earth Observation satellites, and the data of smelter activity levels and regional indices are updated daily to give consistent,insightful and dependable results. In addition to the dataset, subscribers will get access to Marex's commodity experts' analysis of the data through regular reports and presentations.

QUALITY SCORE
82

Quality Score Details[1]

Attribute	Score (1-5)	Comment
Length of History	4	From March 1, 2016
Data Frequency	4	Daily, Sunday-Saturday
Data Reporting Lag	4	Next business day delivery (1-day lag)
Data Quality	5	Very good
Documentation Quality	5	Excellent
Coverage within Relevant Range	4	Covers 88% of global copper smelter capacity & 96% of global nickel smelter capacity
Liquidity of Underlying Assets	4	Copper & Nickel futures are both highly liquid
Uniqueness	3	There are other satellite data providers but none with the commodity expertise of Marex and the geospatial expertise of earth-i
Market Awareness	3	Market is aware of other satellite data providers
Hedge Fund Usage	5	Limited so far

[1] [1] See Key to Quality Score on page 8 for further details.

Data Coverage

The MGST Copper data includes:

- 94 total smelters
- 97% of China capacity
- 88% of Global capacity
- 82% Rest of World (RoW) excluding China

The MGST Nickel data includes:

- 73 total smelters
- 98% of China capacity
- 96% of Global capacity
- 95% Rest of World (RoW) excluding China
- 94% of Indonesia capacity

Two types of indices are provided:

(i) Activity dispersion: shows smelter activity levels

(ii) Inactive capacity: shows the percentage of smelter capacity that is inactive

The data is further broken down to provide more granular detail, including information on the activity of each smelter. MGST also offers detailed smelter history going back to March 2016, allowing a comparison between empirical data and public announcements relating to smelter shutdown periods.

Data dictionary

Savant contains two tables. The first MAREX/GSA contains the smelter level data. The second MAREX/GSX contains aggregated index data [country, regional and global level] on the state of smelters.

NB: Most, but not all of the smelters are included in the calculation of the relevant index. The non- index smelters are those that are either not-yet fully operating, decommissioned, no longer operating, or do not have consistent data potentially due to the smelter methodology at the site.

MAREX/GSA Global Smelter Activity

COLUMN	PRIMARY KEY	DESCRIPTION	TYPE	EXAMPLE
date	✅	Date of data entry.	Date	2016-03-01
days_since_capture		The age in days of the associated satellite data used to calculate the raw index score and activity dispersion.	Integer	7
name		Smelter name.	String	Altonorte
metal_type		Type of metal the smelter location smelts, either copper or nickel.	String	Copper
smelter_id	✅	Identification number of smelter.	Integer	686
indexed_smelter		Specifies whether the smelter is a part of a regional index.	String	indexed
lat		Latitude coordinates.	Double	-23.83
lon		Longitude coordinates.	Double	-70.32
company		The smelter owner and/or operator.	String	Glencore plc
country		The country of location.	String	Chile

capacity		The capacity of the smelter in kilotonnes per annum. Note that this may change based on the date, since the capacities are kept up to date with published data.	Integer	310
region		Region this smelter belongs to.	String	South America
status		The smelter activity status, either active or inactive.	String	active
activity_dispersion		Shows the dispersion around the average activity level at the smelter. It provides a measure of how active the smelter is, and is centered around an average level of 50 to show peaks and troughs in activity (the 50 value reflects a mean level of activity, not that the smelter is operating at 50% capacity).	Integer	27
hotspots		The number of hotspots detected.	Integer	1
high_hotspots		The number of hotspots that are classified as “high”.	Integer	1
medium_hotspots		The number of hotspots that are classified as “medium”.	Integer	0
low_hotspots		The number of hotspots that are classified as “low”.	Integer	0
cloud_pct		A percentage value between 0 and 1, giving the number of invalid pixels in a captured satellite reading. It largely relates to clouds, with 1 indicating full cloud and 0 no clouds. A low value shows more confidence that all hotspots are detected.	Double	0.794

raw_activity_level		Intermediate variable derived in the calculation of the Activity Dispersion. Unlike the status values or the activity dispersion values of a smelter, they cannot be aggregated into indices and are only valid as a variable related to a specific smelter.	Integer	298
knowledge_timestamp		When the data is posted on Quandl, the timestamp is in UTC timezone.	Datetime	2021-08-24 14:48:42.666166

MAREX/GSX Global Smelter Index

COLUMN	PRIMARY KEY	DESCRIPTION	TYPE	EXAMPLE
date	✅	The date for which regional smelter activity is estimated.	Date	2016-03-01
metal_type	✅	Type of metal the smelter location smelts, either copper or nickel.	String	copper
index_type	✅	Either the geographic region the activity data is referring to (copper or nickel), or the metal grade (nickel only), or the source of raw materials for smelting (copper only). See the table below of all possible values to filter on.	String	china
inactive_capacity		The percentage of smelter capacity that is inactive. It is calculated as inactive capacity = 100 - Σ smelter_i status * (smelter_i capacity / capacity of all smelters in index * 100), the smelter status value is either 1 for active or 0 for inactive.	Double	10.2
activity_dispersion		The weighted average of smelter activity dispersion that is centered around an average activity level of 50. It is calculated as activity dispersion = Σ smelter_i activity dispersion * (smelter_i capacity / capacity of all smelters in index).	Double	52.9
knowledge_timestamp		When the data is posted on Quandl, the timestamp is in UTC timezone.	Datetime	2021-08-24 09:50:57.966134

index_type possible values:

Metal Type	Regions	Countries	Country Regions	Raw Material Source	Metal Grade
copper	global, globalexchina, asiaoceania [includes Russia & excludes China], china, europeafrica	australia, belgium, brazil, bulgaria, canada, chile, china, drc, finland, germany, india, iran, japan, kazakhstan, mexico, namibia, northkorea, peru,	northchina, northeastchina, eastchina, southcentralchina, southwestchina, northwestchina	captive [the company's own mine], custom [purchases	N/A
	[excludes Russia], namerica, samerica	philippines, poland, russia, serbia, slovakia, southafrica, southkorea, spain, sweden, turkey, unitedstates, uzbekistan, zambia		raw material to smelt]	
	global, chinanpi				ni [Nickel], feni [ferronickel], npi [Nickel Pig Iron]

	[includes NPI],	australia, austria, brazil,			
	indonesianpi	canada, china, colombia,			
	[includes NPI],	cuba, dominicanrepublic,			
	asiaoceania [includes	finland, greece, guatemala,			
	Russia & excludes	indonesia, japan, kosovo,			
nickel	China and Indonesia],	madagascar, newcaledonia,	N/A	N/A	
	europeafrica	northmacedonia, russia,			
	[excludes Russia],	southafrica, southkorea,			
	americas, chinaexnpi	ukraine			
	[excludes NPI],				
	indonesiaexnpi				
	[excludes NPI]				

Data Partner Background

Marex is an essential tech-enabled liquidity hub, connecting clients to global energy, metals, agriculture, and financial markets. Across their businesses they provide critical high value-add services in Market Making, Commercial Hedging, Price Discovery and Data & Advisory.

Earth-i is a Geo-spatial Information provider of Earth Observation (EO) data including satellite video and imagery. They use advanced analytics to provide near real time insights across multiple domains.

Methodology

Smelter images are taken from several different constellations of earth observation satellites. Data is included from infra-red and visible band technologies. Data and indices are analyzed and constructed using advanced algorithms derived from Artificial Intelligence and Machine Learning techniques.

Usage

MGST can be used to estimate global Copper and Nickel supply as well as how much supply is currently idle. These insights, combined with other data sources speaking to demand can be used in trading commodity futures, options, and commodity related equities.

Data Delivery

Data is updated at 2:30 pm UTC every business day with a lag of 1 business day, so the data for Fridays and the weekends are updated on Mondays. Data is not updated on UK Bank Holidays.

Key to quality score

Attribute	Score = 1	Score = 2	Score = 3	Score = 4	Score = 5
Length of History	< 1 year	1-3 years	3-5 years	5-10 years	> 10 years
Data Frequency	Quarterly	Monthly	Weekly	Daily	Intraday
Data Reporting Lag	1 Quarter or more	1-2 Months	1-2 Weeks	1-2 Days	Intraday
Data Quality	Poor: major gaps,obvious mistakes, irretrievable errors	Mediocre: missing data, bad data or bad methodology	Average: mostly good data with afew errors	Good: consistent, complete data and robust processes	Excellent: very close to zero errors in the data
Documentation Quality	Poor: not sufficient to domeaningful analysis	Mediocre: workable but not easy to work with	Average: includes most relevant infobut a few gaps remain	Good: well-documented, only a few edge cases missing	Excellent: clear, unambiguo us, comprehen sive
Coverage within Relevant Range	Sparse: coverageis sparse and idiosyncratic	Minority: covers only a minority of relevant names	Half: covers halfthe relevant names	Majority: covers majority of names by count or importance	Complete: coversall names within index, sector or asset class

Liquidity of Underlying Assets	Hard to trade	Illiquid but tradeable	Moderately liquid	Liquid and easy to trade	Extremely liquid: benchmarks & large caps
Uniqueness	Not unique, already used by many participants	Not unique, but not yet widely available or used by market	Unique, but substitutes orproxies exist	Unique, replicable only at a very high cost, hence wide moat	Perfectly unique and impossible to replicate
Market Awareness	Widespread knowledge of data, sources, usecases	Widening awareness: beyond specialists and early adopters; press coverage.	Moderate awareness: knownto industry specialists	Narrow awareness: known only to a few select entities	Exclusive awareness: treated as proprietary secretby owners/users
Hedge Fund Usage	> 50 funds	> 25 funds	10-25 funds	5-10 funds	< 5 funds

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