China Satellite Manufacturing Index

Chinese Economic Data

It's no secret that investors are suspicious of official Chinese economic data. Quantitative measures of economic performance determine the success of local officials, who feel pressure to produce data that hits growth targets or caps housing costs.

The statistical agencies, which are understaffed and overworked compared to counterparts in other countries, race to complete statistical measurements in weeks that larger teams would have months to complete. As such, journalists, academics and money managers have turned to alternative indicators to take the pulse of the Chinese economy.

The Washington Post

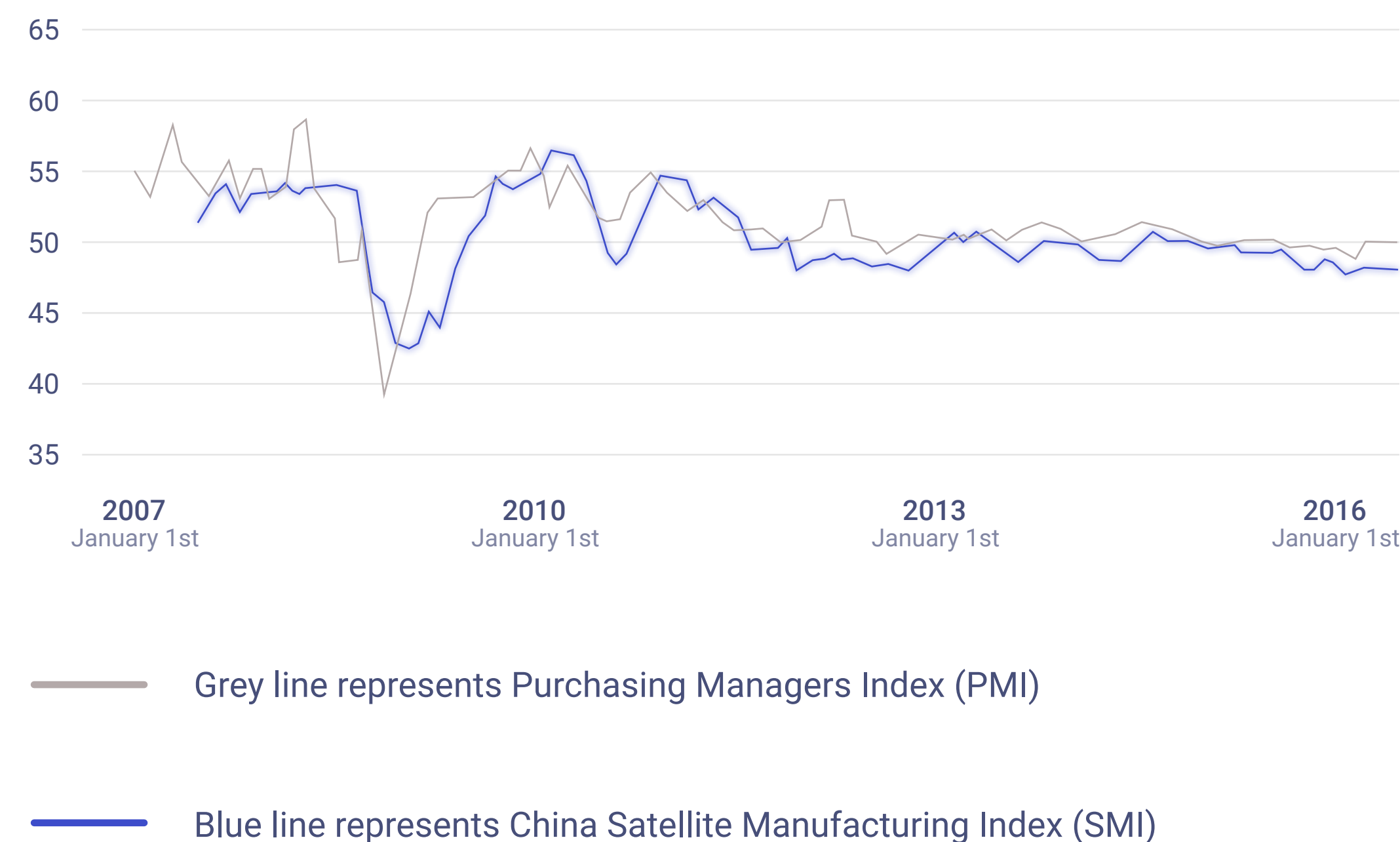*"Every time China releases new GDP statistics, observers debate their reliability."*

The Economist

"There is a crucial difference between smoothing data and fabricating it."

BBC

"China, though, has more reasons than mere international prestige for possibly inflating its data."

Forbes

"And more often than not, provincial data (reported by eager local officials seeking promotion) adds up to more than the same data reported at the national level."

65
60
55
50
45
40
35

2007
January 1st

2010
January 1st

2013
January 1st

2016
January 1st

——— Grey line represents Purchasing Managers Index (PMI)

——— Blue line represents China Satellite Manufacturing Index (SMI)

Satellites bring transparency

Satellite imagery, a promising solution, bypasses the challenges faced by data collectors in China.

For example, we propose the Satellite Manufacturing Index (SMI) as an upgrade to the Purchasing Managers Index (PMI) which is compiled by data collected from the National Bureau of Statistics. The PMI release captures the attention of equities, currency, and commodities markets global because it is regarded as the best, first look at China's economic activity. Not only is the SMI an independent measure, it also publishes every Monday, Wednesday, and Friday – making it the fastest, and most reliable, gauge of Chinese industrial activity.

Originally developed to monitor agricultural fields

The SMI advances a practice in satellite image processing originally developed to monitor agricultural yields. Early researchers exploited the light absorption properties of plants to develop the Normalized Difference Vegetation Index (NDVI) which catalogs the amount of vegetation on any area of the earth's surface, characterized on a scale of -1 to 1.

Vegetation absorbs light in the visible spectrum for photosynthesis, but reflects near-infrared light to prevent overheating. Soil, on the other hand, absorbs comparatively less light in the visible spectrum and reflects more near-infrared light. To produce the NDVI, take the normalized ratio of the reflectance measure from each wavelength.

$$NDVI = \frac{NIR-VIS}{NIR+VIS}$$

SMI extends the NDVI methodology to industrial activity. Cement and steel on the ground uniquely reflect light of differing wavelengths, which, when adjusted for atmospheric and meteorological effects, allows us to calculate their respective surface coverage. SMI tracks satellite imagery over 6,000 sites and produces an index that informs investors when industrial activity is picking up or slowing down in China.

Over 6,000 industrial sites in China
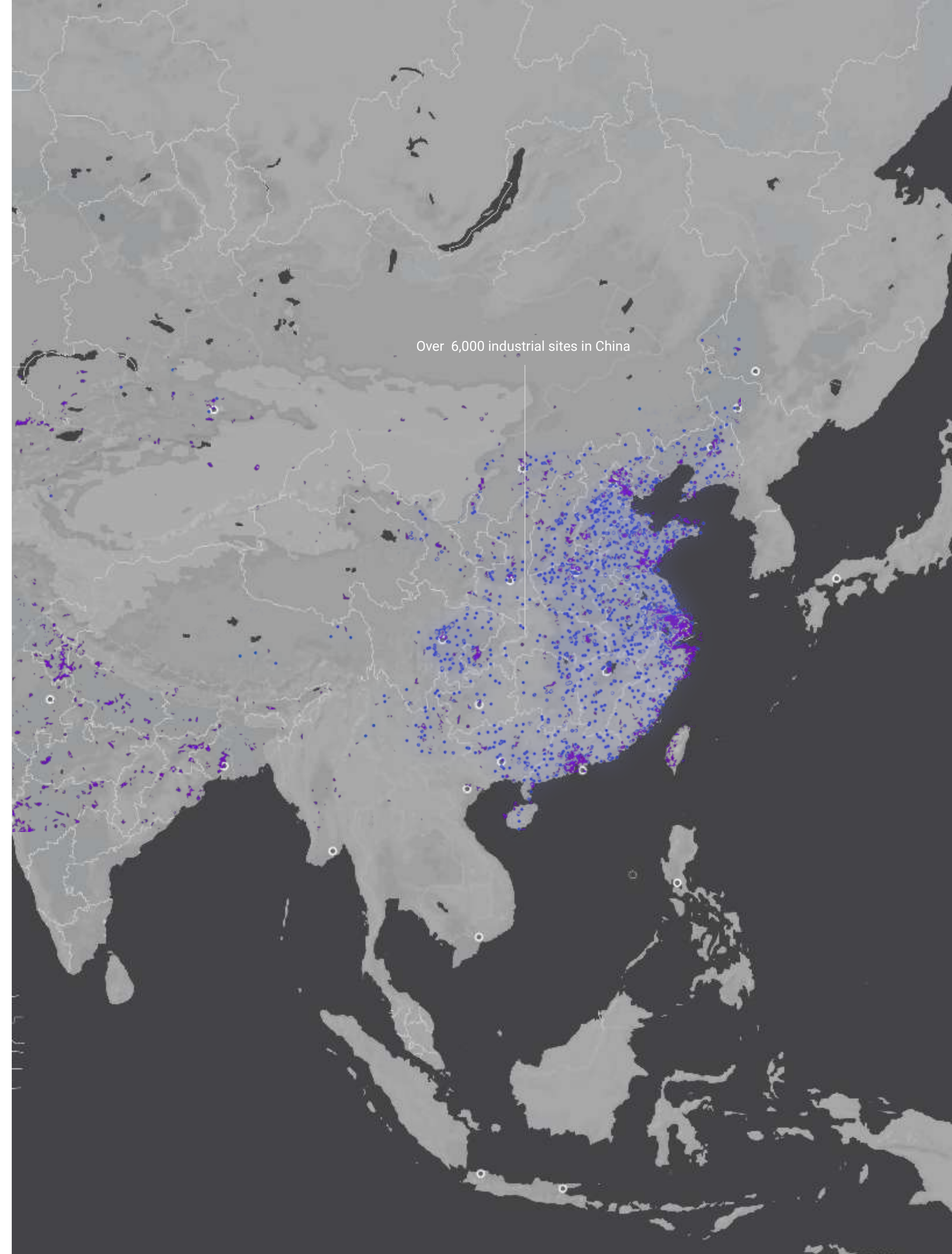
Economic Time Series	SMI	PMI	Difference
Producer Price Index	0.58	0.32	0.26
New Real Estate Starts	0.50	0.35	0.15
Freight Traffic	0.49	0.35	0.14
Ferrous Metals Production	0.65	0.52	0.13
Electricity Production	0.62	0.63	-0.01
Coal Production	0.66	0.68	-0.02
Industrial Production	0.64	0.66	-0.02

Trade Month	SMI	PMI	Difference
Current	0.68	0.49	0.19
One Month Later	0.61	0.37	0.24
Two Months Later	0.46	0.29	0.17

Cross Currency Pair	Return Horizon	SMI	PMI	Difference
AUDCNY	60 Day	-0.24	0.13	-0.37
AUDCNY	120 Day	-0.36	-0.07	-0.29
USDCNY	60 Day	-0.41	-0.38	-0.03
USDCNY	120 Day	-0.46	-0.48	0.02

Economic statistics

Not only is SMI published at a higher frequency than PMI, but it also exhibits higher correlations than PMI with other key economic statistics that are released later in the month.

Trade statistics

Trade statistics are considered a more trustworthy, though lagging, indicator of China's economic growth. SMI also outperforms PMI in modelling the current and future growth in trade volume.

Returns of the RMB

Finally, SMI also outperforms PMI in correlation tests with the 60 and 120 day returns of the RMB.

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We're SpaceKnow and we're on a mission to redefine your perspective on the world. To give you unprecedented access and transparency to how our world is being shaped, through our AI-powered satellite image analysis tools.

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