

**Kronos Worldwide, Inc. (KRO)**

Sell Short / Sell

Stock Price: \$25.68

as of May 23, 2018

Idea Generated from:

[Overearnings Model](#)

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**SUMMARY**

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Kronos is a leading producer of titanium dioxide (TiO<sub>2</sub>) pigment used in paints, plastics, paper and other industries. Margins go through dramatic boom and bust cycles. We believe they are at the peak of the current cycle. Prices have been pushed very high leading users and industry participants to react by resisting price increases, adding capacity and substituting away from TiO<sub>2</sub>. Feedstock prices are increasing as well due to demand pull-through. The stock price has barely begun to reflect the substantial downside risk to margins and earnings.

**We believe margins have reached TiO<sub>2</sub> cycle peaks and are prepared to turn down.** Kronos' sales have seen growth rates ranging from -20% to +40% during past TiO<sub>2</sub> boom-bust cycles. The most recent quarter had sales up +36%, substantially all of it from price increases. Margins are also near prior cycle peaks whether measured by EBITDA per ton or as a percent of sales.

- **TiO<sub>2</sub> Prices may be peaking.** *The cure for high [TiO<sub>2</sub>] prices is high prices.* Demand appears to be moderating. Price increases are slowing. Customers are balking at price increases and some product substitution is emerging. Some new capacity is coming on line in 2018 and 2019. Customer restocking is overstating current demand (and boosting prices). Unexpected new Chinese export volumes are hitting the market.
- **Feedstock prices are rising.** Demand for TiO<sub>2</sub> is starting to pull feedstock prices up. One European supplier of a key feedstock ore is running down a large stockpile. Kronos controls little of its all-important chloride-process TiO<sub>2</sub> feedstocks.

**Other expenses are rising as well.** Energy costs are rising. Plant capacity is at 100%; no more operating leverage can reasonably be expected. The company has increased SG&A/tonne over the last cycle.

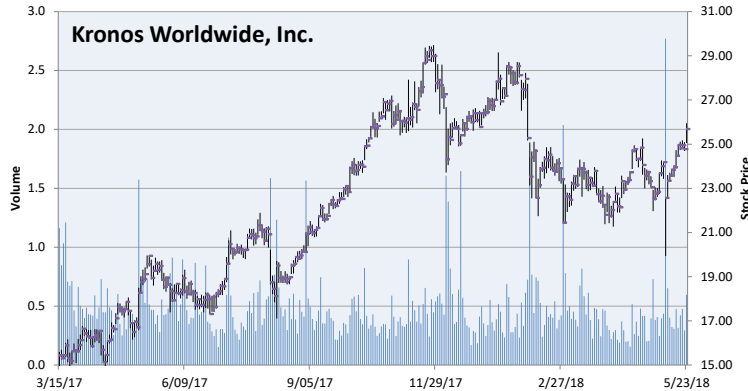
**Working capital is a drag on free cash flows.** Cash absorbed by increasingly expensive inventory (feedstock and work in process) and receivables partially offset the rise in EBITDA.

**The stock is expensive.** It has risen 400% since late 2015. Multiples on trailing and forward earnings are low. We argue, on the basis of our work on margin and cash flow cycles, that this is a good time to sell the stock short. EV/S multiples are less volatile (by ignoring the wild swings in margins) and show the stock is expensive too.

**Potential Catalysts:** Margin declines from feedstock price spikes, potential for TiO<sub>2</sub> price declines (buyer pushback, new capacity, substitution), nearing peak cyclical demand for pigment end-uses autos and homes.

**Risks:** M&A is unlikely due to high insider ownership, antitrust authorities skeptical of industry concentration and peak cycle margins, but M&A is always a risk. Seasonal strength for pigment demand in spring and summer months could provide some support for prices near term.

**We recommend selling KRO short (selling/avoiding for long managers).**


**Trading**

Date	5/23/18
Price	25.68
52 Wk H/L	29.49 / 17.11
Market Cap/Ent. Value (\$mns)	2,976 / 3,366
Avg Daily Volume (thou)	510.7
Shares Outstanding (mn)	115.9
Float (mn / %)	22.4 / 19.4%
Short Interest (mn / SISO%)	1.8 / 1.6%
Days to Cover	5.4

Source: Two Rivers Analytics; FactSet Research Systems

## COMPANY DESCRIPTION

Kronos Worldwide produces and sells **titanium dioxide (TiO<sub>2</sub>) pigments** and provides related technical services to customers in Europe (Germany, Belgium and Norway, ~55% of revenues) and North America (~45%). Its customers include domestic and international paint, plastics and paper manufacturers. The company has a 9% global market share and estimates it has an 18% market share in its served markets.

TiO<sub>2</sub> is a white inorganic pigment used in a wide range of products for its ability to impart whiteness, brightness and opacity. Its two key end market uses are for **paints and coatings (56%) and plastics (26%)**. It is also used in paper and printing.

The company buys its **raw materials, primarily rutile ore and ilmenite**, from Iluka Resources, Rio Tinto and other miners under yearlong **contracts that provide for volume, but not price, commitments**. The Iluka agreement expires in 2018. The Rio Tinto agreement expires in 2018 and 2019. Kronos also owns two ilmenite mines in Norway, which together with some iron-based chemicals and side products amount to 6% of sales and most of their (lower quality) sulfate process TiO<sub>2</sub>. They remain exposed on the more valuable chloride process feedstock.

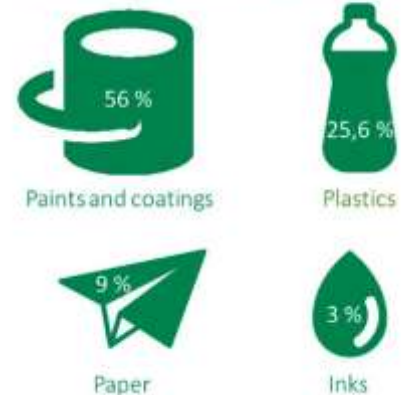
The company leases or **owns and operates 6 plants**, four in Europe, one each in Canada and the US. They are capable of producing TiO<sub>2</sub> from both the **chloride (74% of capacity)** and sulfate processes (26%). The chloride process is favored due to relative environmental attractiveness. See [Appendix](#) for more detail. They produced 576,000 metric tons of TiO<sub>2</sub> in 2017 at a plant capacity of 100%.

They have a direct sales force in Europe and North America and sales agents in other countries. Globally, they employ approximately 2500 people.

For more information on the titanium dioxide market [click here](#). The Appendix contains information on end uses, feedstocks and production, global producers, and global pricing.

### Titanium Dioxide

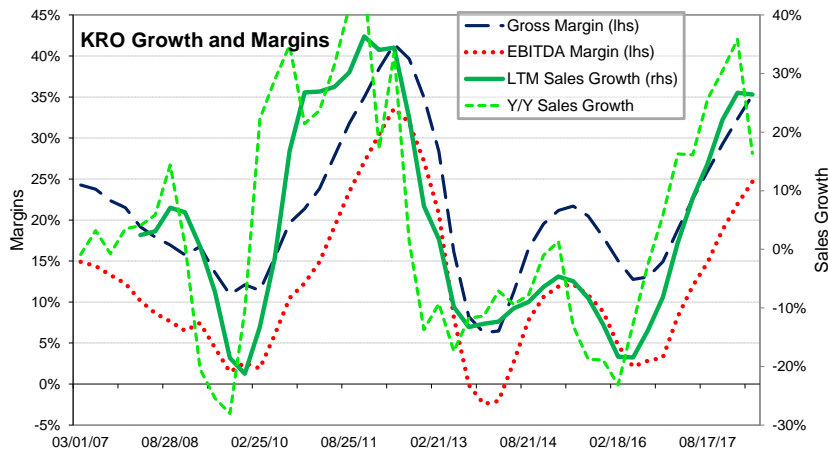
#### Global share of TiO<sub>2</sub> pigments



## BACKGROUND AND SHORT INVESTMENT THESIS

### KRO sales and margins have spiked. We believe they have peaked for this cycle.

Sales are highly volatile. Over the past decade, **growth has ranged from +40% to -20%**. Commodity cycles in TiO<sub>2</sub> push both sales and margins to violent extremes. Currently sales growth is slowing from +36% two quarters ago to the last quarterly report of +16%. Margins have ranged from -3% (EBITDA) to +30%. **The last quarterly report revealed a 25% margin. The prior peak was 32% in 2012.**



Source: Two Rivers Analytics; FactSet Research Systems

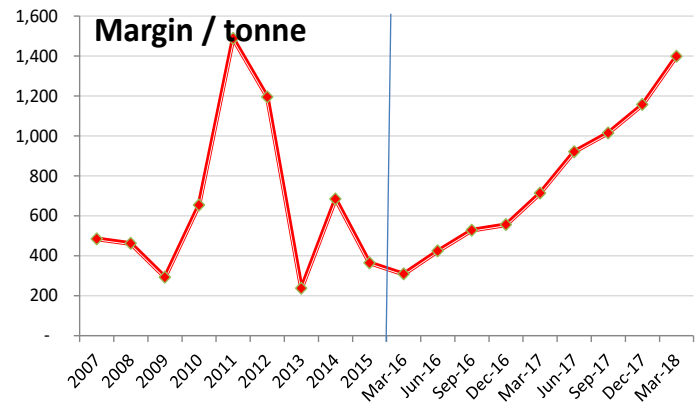
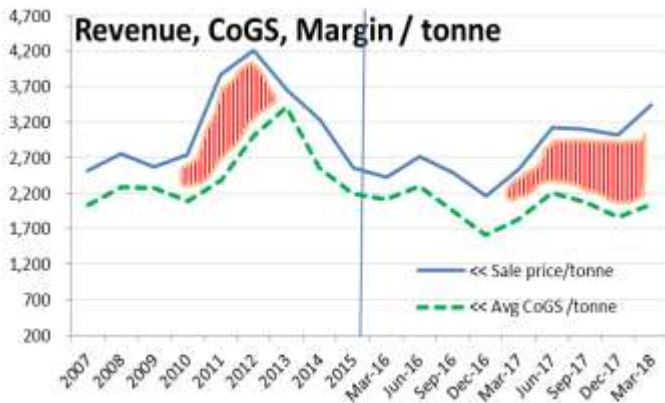
### Product pricing is likewise at extremes

Since 94% of KRO's sales were attributable to sales of TiO<sub>2</sub>, the market price of TiO<sub>2</sub> is one of the two most important factors for the company's profitability. Fiscal 2017 brought about a 27% increase in sales on the back of a **22% rise in TiO<sub>2</sub> prices** and only a 5% rise in volumes.

From Fitch, commenting on the **last cycle in 2012**: "The significant year-over-year price decline in titanium dioxide (TiO<sub>2</sub>) has prompted revisions in management strategies and ... **willingness to be exposed to the boom-and-bust cycle** that has occurred twice over the past several years, according to Fitch Ratings. Paint demand driven by the recent housing recovery in the U.S. had led to increased TiO<sub>2</sub> demand, but with the housing crash (in 2008), **TiO<sub>2</sub> demand bottomed**. TiO<sub>2</sub> **recovered quickly after a brief shakeout period, and Chinese demand and prices hit record highs last year before demand cratered in the second half of 2012.**

"In addition, pricing may affect customer inventory levels as customers may from time to time accelerate purchases of TiO<sub>2</sub> in advance of anticipated price increases or defer purchases of TiO<sub>2</sub> in advance of anticipated price decreases." – Kronos 10K.

The company has seen **margins per tonne range from lows of \$200 to peaks of \$1488, very nearly where they are now (\$1400).** We also note that **wide gaps between feedstock prices and TiO2 prices quickly collapsed last cycle.**



Source: Two Rivers Analytics; FactSet Research Systems

### TiO2 Prices should stabilize and begin rolling over

What drove the price increases in this cycle? Have they peaked?

Two phenomena are credited for the spike in the price of TiO2. The first is that demand for the pigment is increasing from a number of cyclical and some secular trends.

- The **housing cycle** continues to drive sales of new and used homes. Painting demand from home sales is driven by builders' needs to paint new homes and buyers' desires to repaint previously owned homes.
- **Automotive demand** drives the need for paint and pigments. We believe the auto cycle is peaking.
- Increasing incomes, primarily in **emerging economies**, raise the bar on product quality and appearance. Both favor trends in paint, colorants and bright colors especially in homes and packaged goods.
- The increased **use of plastics** favors TiO2 for its coloring and opacity properties.

While increases in demand are fair enough, TiO2 buyers and distributors are restocking from the last cycle in anticipation of the rising prices we have seen over the past two years. Industry analyst TZMI says,

“... the underlying demand for pigment is at least moderate but certainly not as strong as TiO2 sales would indicate...sees **much of the current trading as restocking**, following the destock event that it believes occurred” - TZMI

The second phenomenon that drove the current TiO2 price increase was an **environmental crackdown in China**. Chinese authorities have significantly increased their oversight of a host of polluting industries, pigment production among them. Within the pigment market, **Chinese authorities particularly targeted sulfate-process TiO2** as opposed to chloride-process, which is more benign. The new regulatory regime had the effect of lowering operating rates from 70% to ~50% by late 2017, **pulling supply off the market, and leading to the current price spike**. Some capacity may come back and some producers may adopt the cleaner chloride process. But industry observers feel that much of that capacity will remain shuttered, with replacement capacity coming on more slowly. While it is still early days, it is beginning to do so now.

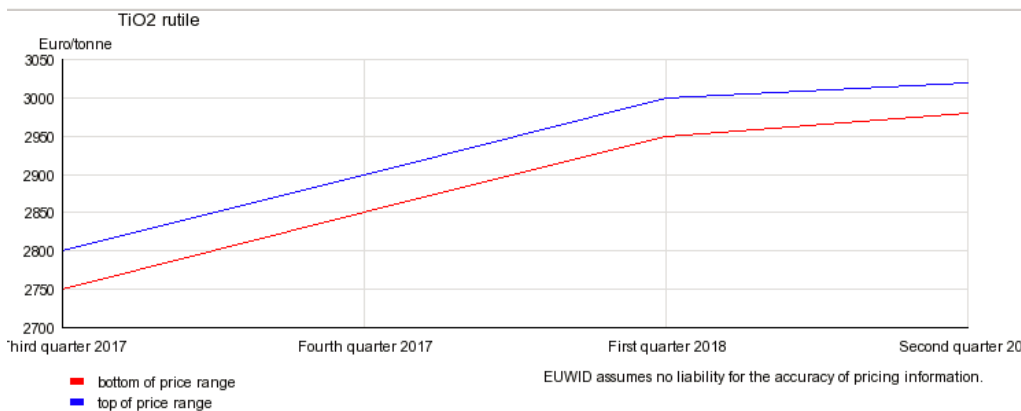
## But have we peaked?

“a market that has historically reflected oversupply and thin margins even during peak demand from its principal downstream paint and coatings sector, the tide may begin to turn this year.” – TMZI

Price increases are stalling

The price spike seen through much of 2017 appears to be slowing.

“The upward spiral in titanium dioxide (TiO<sub>2</sub>) contract prices that has lasted since the second quarter of 2016 has slowed, as anticipated”. – [PolyesterTime.com](http://PolyesterTime.com)



Buyers are balking at price increases

The rise in prices has caused several large TiO<sub>2</sub> pigment purchasers to balk. They have successfully resisted the price increase demanded by the suppliers when price talk began this latest quarterly round. Several key TiO<sub>2</sub> suppliers began the price round with demands of \$80-110/tonne higher prices. The buyers responded that **these raises were “out of the question” given that supply conditions were improving** (see below). The final increases averaged \$66/tonne.

**US paint maker PPG** grew revenue in Q1 2018 by raising the price of its paints to cover rising TiO<sub>2</sub> prices. However, they **claim to be done with price increases**. The president and chief executive officer, Michael McGarry, said that [the company would resist further price increases for TiO<sub>2</sub>](#). McGarry believes the supply and demand for TiO<sub>2</sub> has stabilized.

"Supply and demand are what drive TiO<sub>2</sub> pricing. When people report all their earnings across Europe and in other places, you'll see that demand will be weak, in our opinion," he said. "We're going to be fighting for rollover-type pricing in TiO<sub>2</sub> because we think that is reflective of supply and demand."

**Sherwin Williams** was reeling from increases in pigment prices and hydrocarbon prices at the same time. "... as you can imagine, when they go up that quick, it's very hard for us to react and put another price increase into the market," Allen Mistysyn, SVP/CFO said. "That being said, we do have pricing implemented, and we'll monitor that situation as we always do on a month-by-month basis, and if we see another increase that warrants a price adjustment, we'll do that." **Sherwin Williams would, "push back on our vendors," to avoid further price increases** for its customers.

Price is driving some substitution

Without overstating this effect, **pigment buyers are trying to find way to use less TiO<sub>2</sub>**. Substitutes are generally inferior in that they require more volume to achieve the same level of whiteness and opacity, but some buyers are finding ways to **reduce TiO<sub>2</sub> usage by 5% to 20%** depending on the application. The US Government recognizes that ground calcium carbonate, precipitated calcium carbonate, kaolin and talc can be used as TiO<sub>2</sub> extenders.



For example, Imerys Kaolin, a pigment supplier for paper, is advocating a 20% substitution by kaolin compounds for coatings, packaging, plastics and paper. Certain natural dyes and pigments are coming into favor as well.

**Wildcards:** TiO<sub>2</sub> is starting to be attacked by environmental and health groups; EU is studying TiO<sub>2</sub> for cancer risk

TiO<sub>2</sub> is well accepted globally, but **France and the EU appear concerned about health risks**. The French Agency for Food, Environmental, and Occupational Health and Safety (ANSES) submitted a dossier questioning the compound's safety. It was rebuffed by the European Food Safety Association, but concerns have not disappeared.

In June 2017, the European Chemical Agency concluded that TiO<sub>2</sub> is a substance suspected of causing cancer through inhalation. There is an extensive discussion and comment period to follow before any regulation would be seen, if any, but this is an overhang for the industry and TiO<sub>2</sub> demand.

### The supply picture is improving

There are multiple reasons that the **supply of TiO<sub>2</sub> will increase** over the coming months and years.

**Plants are now full and operating at capacity**

Producers have [reported](#) that North American and European facilities are running with very few disruptions and are at full capacity. This has eased the supply situation in place at the end of 2017.

**One plant that had gone offline**, exacerbating the supply squeeze in 2017, was the Venator (Huntsman spinoff) plant in Pori, Finland. The Pori plant had suffered a fire which shut it down from January 2017. Since the end of the first quarter, the **plant is back up to 40% of its original capacity** of 130,000 tonnes per year (as compared to 6mn globally), on their way back to full capacity.

**New capacity is coming on line this year and next**

In addition to the recovering Venator Pori plant, greenfield plants are being added to global capacity.

**Chemours' Altamira plant** is expected to **add 200,000mt per year beginning in 2018**. The plant is located in the Mexican state of Tamaulipas. Chemours has a current capacity of 1.25mn tonnes.

**Lomon Billions is adding 200,000 tonnes of high grade chloride TiO<sub>2</sub>** to come online during 2019. All external approvals are in place. Lomon Billions was formed from the merger of Henan Billions and Sichuan Lomon in 2016. The company has a market value of \$5.8bn. The company manufactures chloride and sulfate TiO<sub>2</sub> pigments with an annual capacity of 700,000mt making it the largest TiO<sub>2</sub> producer in and exporter from, Asia. They are completely self-sufficient, from a feedstock perspective, for sulfate TiO<sub>2</sub>.

**Shandong Doguide** is in trial production on a 60,000 sulfate-process TiO<sub>2</sub> plant. They expect to ramp up towards nameplate capacity from here, depending on environmental regulation intensity.

**Other projects include** a 100,000mt sulfate-process TiO<sub>2</sub> project starting production in H2 2018, and another 60,000 t/a chloride-process TiO<sub>2</sub> project, to be finished in early 2019.

**Exports from China are rising**

**Chinese TiO<sub>2</sub> producers unexpectedly exported record levels of TiO<sub>2</sub>** in March. The increase of 51% from the prior year and +48% sequentially, from February, caught industry participants off guard. European buyers reported that Chinese supply had increased due to the easing of cold-weather environmental restrictions.

An industry source said, in late 2016, **“If they let the recent gains turn into a feeding frenzy, they could lose all that they have gained. And if they push pricing too high, they [domestic producers] will be fighting off lower cost TiO2 from Asia once again,”** It appears the [source had it right](#). High prices embed the cure for high prices.

The environmental crackdown in China should see **further seasonal easing**

The broad crackdown on environmental offenders and inefficient industry has pulled capacity off the market, in particular from the smaller producers. Further, China demands that energy be rationed during the winter to make sure residential heating needs are met first. As the **warm weather comes, the energy restrictions are eased**, allowing higher capacity, in this case, for TiO2 producers. This should not be read as easing on environmental standards, which, by all counts, are here to stay, but more of a seasonal relaxation.

**Costs and Expenses are rising**

**Feedstock prices are rising**

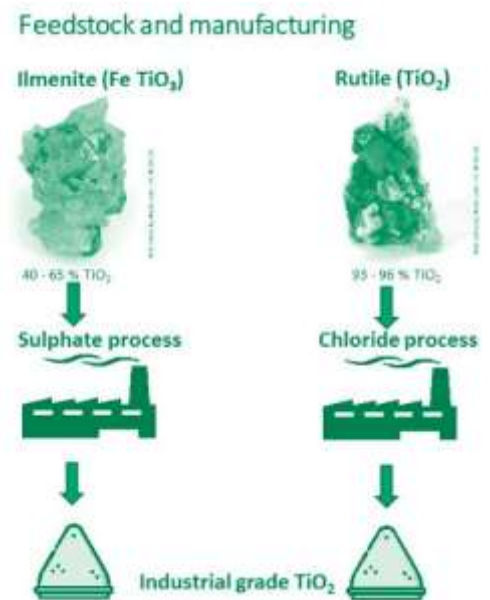
TiO2 feedstocks are coming under supply constraints. This is true of rutile, ilmenite and titanium slag. This can be expected to push prices higher.

TiO2 can be made from several feedstocks: rutile, ilmenite and leucosene. The first two are the most used. In addition, titanium-containing slag is used to extract TiO2. It is a byproduct of steel production and is used in the chloride process.

Feedstock prices have begun to rise already. [TZMI](#), a global engineering and consulting firm serving mineral, metal, mining and chemical clients is **forecasting higher prices for TiO2 ores**.

“Many expected [feedstock] price increases to come into effect in 2018 as demand remained strong particularly for higher grade feedstocks. TZMI maintains its forecast for **feedstock demand growth to outperform supply growth during the next few years** unless new supply becomes available from new projects.... global demand for titanium feedstocks is estimated at 7.19 million TiO2 units in 2017, **close to the peak demand level in 2011.**”

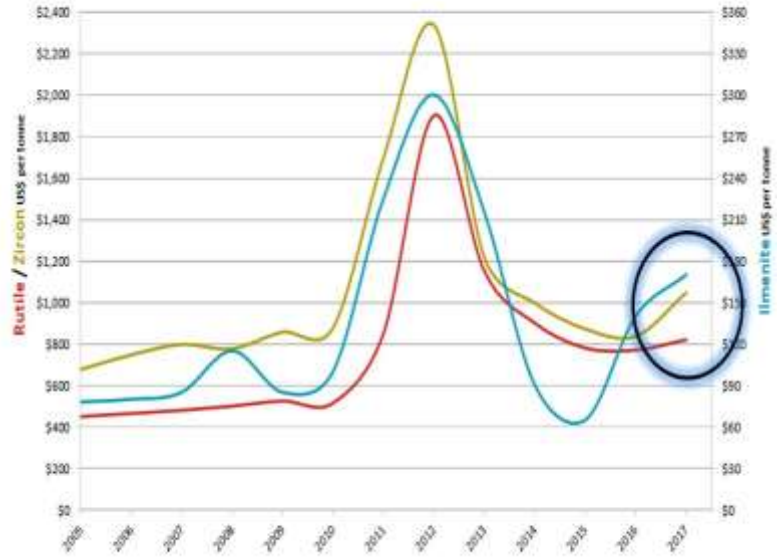
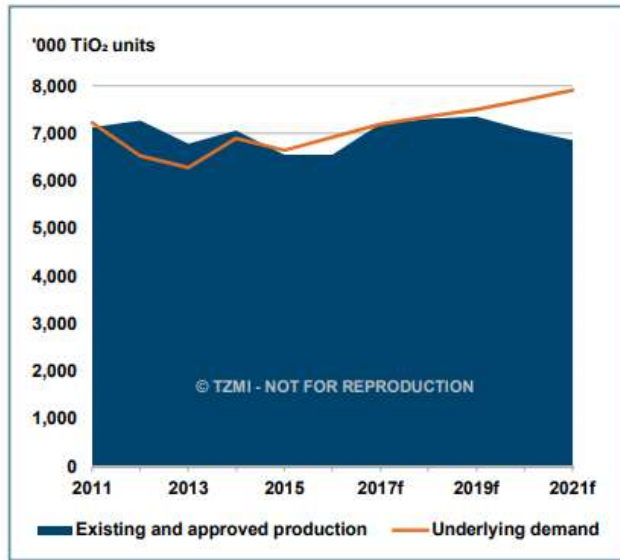
**“Pricing momentum is building for high-grade chloride feedstocks driven by the emerging supply deficit” - TZMI**



(Recall that ilmenite is primarily used in the sulfate process while rutile is used in the chloride process.) TZMI notes that China’s domestic ilmenite prices have risen 50% from Q1 to Q4 2017. To alleviate the growing supply constraints, Chinese TiO2 producers have begun to import more ilmenite, causing feedstock prices to rise. Rutile is likewise under supply constraint and will almost certainly see price rises as well. **Supplies of rutile are already limited. More immediately, Iluka Resources had been running down its ore stockpiles.** As they do, the supply constraints will begin to bite. Scarcity in rutile is likely to lift all feedstock prices for chloride process TiO2.

“The market for titanium dioxide (TiO2) is looking at a **major chloride slag shortfall** if production is not ramped up in the next few years... a particular bottleneck was seen in the production of titanium slag, the high-purity feedstock which is likely to be increasingly favored for chloride-route TiO2 production.” – TZMI comments to Industrial Minerals magazine

GLOBAL FEEDSTOCK SUPPLY/DEMAND BALANCES AND OUTLOOK TO 2021



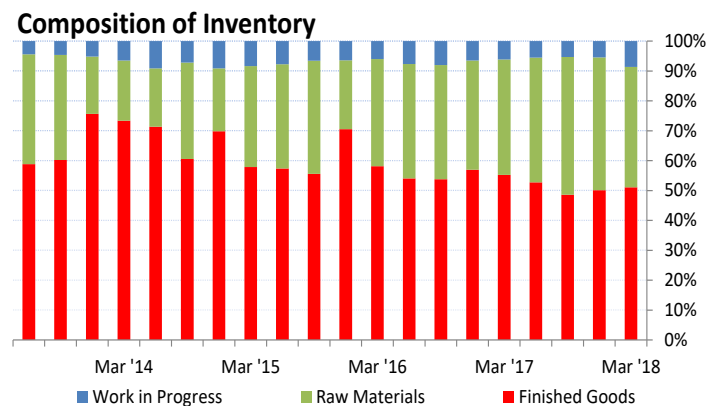
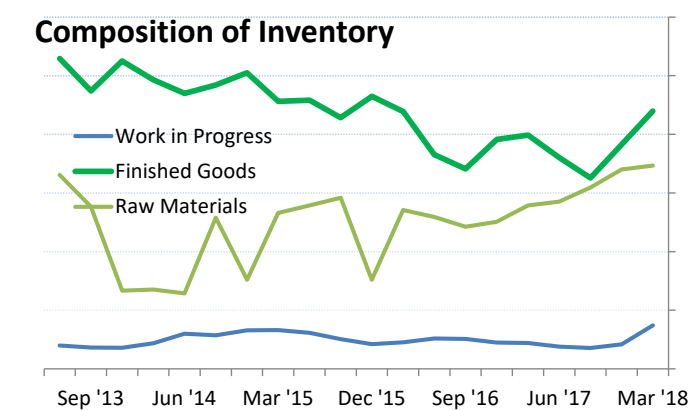
© TZMI 2017

**KRO is disadvantaged. It owns only ~21% of its own feedstock supplies**

Kronos owns two ilmenite mines capable of producing sulfate TiO<sub>2</sub>. In addition, they enter into supply contracts for ore for all of their (more desirable) chloride process TiO<sub>2</sub> for 76% of capacity and their Canadian sulfate process capacity for 3%. However, the **contracts specify volumes, not pricing, which is negotiated quarterly**. **KRO effectively has little price protection further out than a quarter at a time**. While short contract terms are an industry-wide phenomenon, Kronos' competitors are more vertically integrated. They have their own supplies in house.

KRO's feedstock contracts expire in 2018 and 2019. If, as we expect, feedstock supply will be an issue in 2018 and 2019, there is the possibility that KRO will face some volume allocation as well, thereby being exposed on both the volume and price sides.

One last way to understand the problem of rising feedstock prices is to notice the rise of raw material inventory within total inventory. That can be seen clearly below.



Source: Two Rivers Analytics; FactSet Research Systems



Other expenses are rising as well

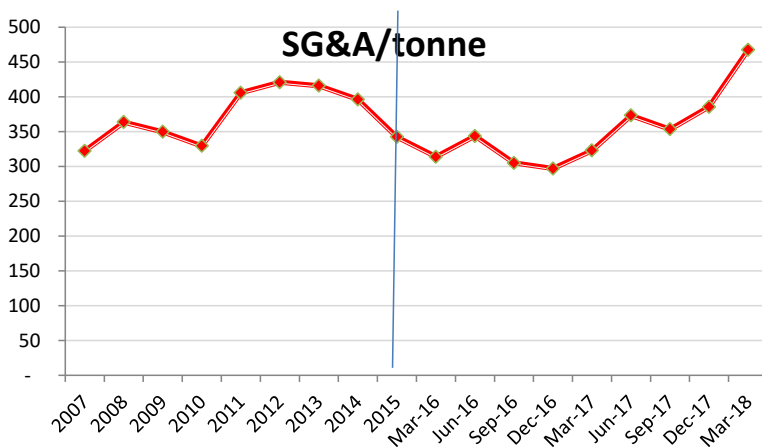
We cannot expect other key expense items to help KRO to overcome rising feedstock prices. Normally, manufacturing efficiencies and operating leverage would serve to benefit earnings. Yet, already, **KRO is operating at 100% capacity** and has operated between 98% and 100% for six quarters. **There is little room for additional manufacturing efficiencies.** The company continues to work on debottlenecking programs to eke out further production. These may help at the margins, but are no comparison with increasing plant utilization from, say, 70 to 90% when the industry came out of the last cycle.

Energy prices are a key component of KRO's manufacturing process. **Energy prices are rising**, primarily oil but also natural gas, since early 2016.



Source: FinViz

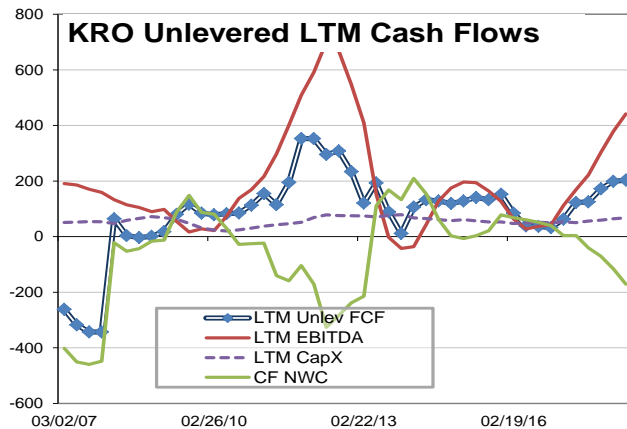
Lastly, **administrative expenses are 50% higher**, in dollar terms, than they were in early 2016. Oddly, they are also at the highest per-tonne level since 2007 despite the increase in volume and demand for TiO2 pigment.



Source: Two Rivers Analytics; FactSet Research Systems

## Cash flows and working capital will not keep up with sales and EBITDA

Despite KRO's rising revenues and EBITDA, the company produced **no increase in free cash flow over the past two quarters**. **Working capital is increasing and absorbing cash at a rising rate**. This parallels, exactly, the pattern seen in 2011 and 2012 when prices spiked.



Source: Two Rivers Analytics; FactSet Research Systems

The volatility of cash flows makes it more difficult to gauge the company's leverage risk. Net debt to EBITDA has ranged from 1x to 20x and net debt to total market cap from 12% to 70%. Currently those metrics sit at a non-alarming 1x and 12% net debt to total market cap. However, if EBITDA margin were to decline substantially, the picture could be very different. Based on a ten year average dollar EBITDA, current leverage is worth 2.1x EBITDA. We argue that we're at the top of the cycle and leverage will look much worse as and when margins roll over.

## Estimates still call for sustainable margins

Despite reasonable trading volume, the stock has little coverage on Wall Street because it is closely held. The company's MD&A foresees more TiO2 price increases and some feedstock price increases. Estimates foresee continued growth of 20% for next quarter, slowing to +5% within the following two quarters. Forecasts also call for flat margins. We view margins as preparing for a decline, on feedstock prices, even if sales prices do not fall.

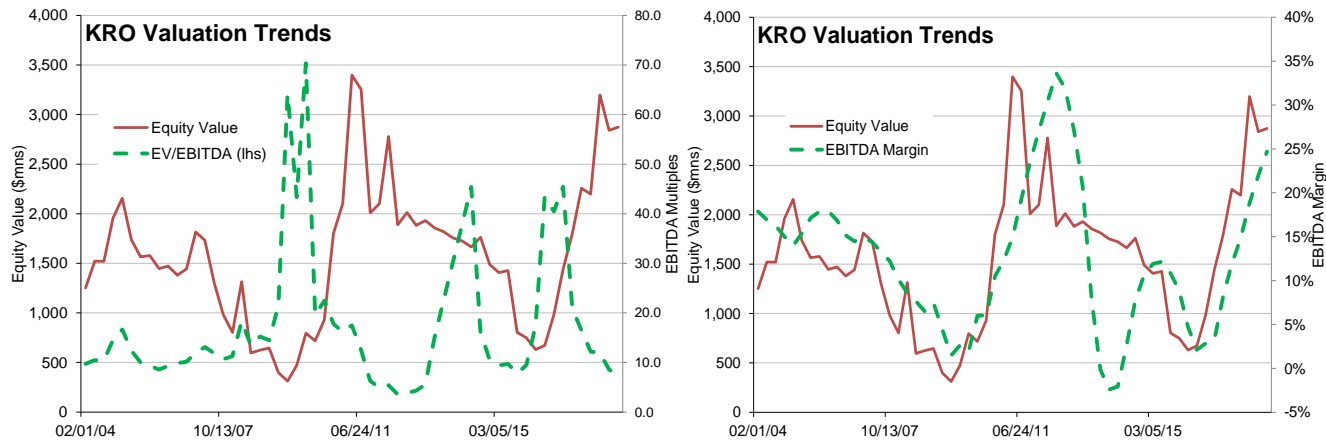
The last earnings report showed a **significant "miss" up and down the income statement**. Sales were shy of estimates by 9%, adjusted EBITDA by 9% and adjusted EPS by 12.9%.

## Valuation comments

The stock is up 31% over the past year, and up ~ 400% from late 2015. We believe the stock is preparing to make a roundtrip back down.

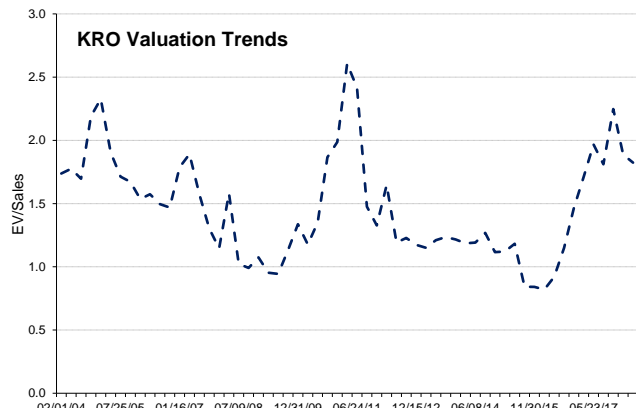
At first blush, KRO's multiples make it appear that the stock is cheap. As is the case with companies subject to deep cycles, that can be deceptive. KRO trades at 8.6x trailing EBITDA. Judging by historical trends, it **appears the best time to short KRO would have come when multiples are very low and the best time to buy is when multiples are very high**.

Further, what becomes apparent when comparing margin cycles with multiple cycles, is that investors seem to underappreciate cycles. **Equity values start to roll over and plunge barely ahead of the peaks of the commodity cycles.**



Source: Two Rivers Analytics; FactSet Research Systems

EV/Sales ratios, which are not related directly to spikes and plunges in margin cycles, **say the stock is expensive too.**



Source: Two Rivers Analytics; FactSet Research Systems

**Other**

**Insider ownership is high; but the stock is liquid**

Trading volume for the stock is reasonable, at \$12mn per day. Insiders own approximately 80% of the outstanding shares.

The stock of Kronos is controlled by two families, those of Lisa K. Simmons (59) and Serena Simmons Connelly (45), through a private and two public entities. The two sisters were bequeathed the business interests of their father, Harold Simmons in 2013. They control Contran Corporation, who owns 80.5% of Kronos through interests in Valhi (VHI) and NL Industries (NL). There is very little (<\$2mn/day) trading volume in those stocks.

## M&A risk is low

Given the ownership stakes, no one can acquire Kronos without the agreement of representatives of the Simmons sisters. Currently, they are very involved in philanthropic activities. The Simmons family funds had been important donors to Republican causes while their father was alive. Now the sisters' philanthropic bent leans towards Democratic causes. We cannot foresee what would make them sell, but one could envision a scenario where the sisters seek to divest themselves of a chemical business from environment concerns or to fund other causes in general.

However, **the logical strategic buyers from Kronos could be off limits as buyers due to antitrust concerns.** Competitor Tronox is attempting to acquire Cristal, of South Africa. While the European Commission appears prepared to offer a conditional approval subject to remedies (some of which will likely include divestiture of some operations), **the US FTC is not lifting its challenge.** Tronox has a 7% market share and Cristal has a 13% market share. Kronos has a 9% share. Almost any combination among strategic players would put Kronos in the same anti-trust box as Tronox acquiring Cristal.

# FTC Won't Pause Challenge To \$2.4B Tronox-Cristal Deal

By [Chuck Stanley](#)

Law360 (May 17, 2018, 8:18 PM EDT) -- The Federal Trade Commission on Wednesday rejected a bid to pause a challenge to Tronox Ltd.'s proposed \$2.4 billion purchase of the Saudi-owned chemical mining company Cristal to allow for settlement negotiations, saying commission rules require a "specific settlement proposal" to stay a proceeding.

Tronox had sought to pause a review of its proposed acquisition of Cristal, the National Titanium Dioxide Company of the Kingdom of Saudi Arabia, scheduled to begin Friday, and temporarily withdraw the matter to a give the companies a chance to make...

## POTENTIAL CATALYSTS TO A SHORT CALL

- We believe that margin declines from a rise in feedstock prices is the most imminent catalyst for a stock price decline.
- Secondly, slowing demand for TiO<sub>2</sub> and rising supply could cause a stall or decline in the price of TiO<sub>2</sub> itself.
- Finally, any weakness in the business cycle would severely curtail demand for pigments for autos, homes and industrial uses, weakening prices, KRO's sales and earnings.

## RISKS TO A SHORT CALL INCLUDE

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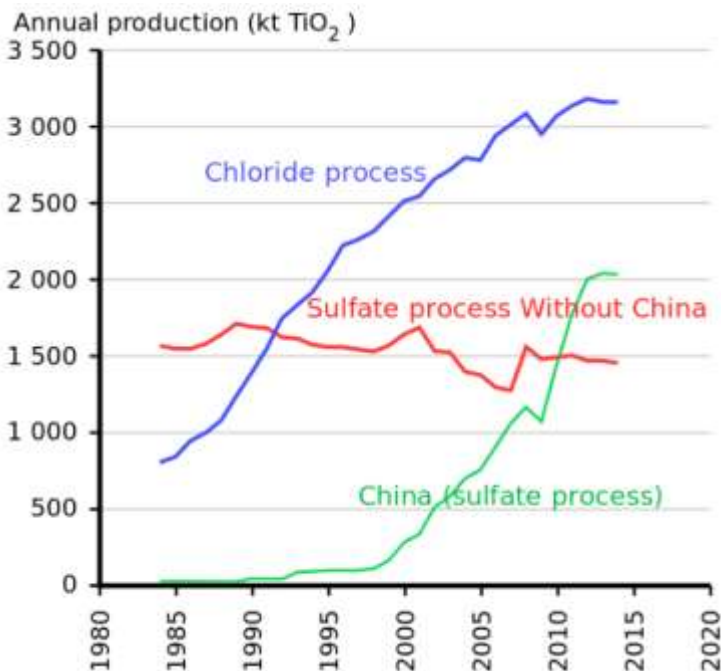
- A modest volume dip due to the implementation of a new ERP system could create an easier compare leading investors to believe growth is higher than it really is.
- We do not think M&A is a risk here. Any industry buyer would bring the combination close to concentration levels objected to by the FTC. Further, several of the large competitors are highly levered and could have difficulty making the acquisition. Financial buyers would likely be wary of both the industry's historic volatility and the timing in the current cycle.
- The upcoming spring and summer months usually favor demand for pigments (primarily housing), while most of that demand is already baked into the supply chain, (orders placed and delivered before spring) there is some chance that a stronger season could push TiO<sub>2</sub> prices further.



## APPENDIX / GLOSSARY

### Feedstocks and production

TiO<sub>2</sub> feedstocks generally comes from mineral sands (2/3rds) with the balance from blast furnace slag from steel-making titanium bearing ores. There are two pigment production routes, chloride and sulfate. Chloride is “greener” and requires higher grade feedstocks. The majority of Chinese capacity is for sulfate process pigment, although they are shifting towards chloride for product quality and environmental reasons. According to USGS, China represented 40% of installed pigment production, the US had 18%, Australia had 4% and others held the balance.



TZMI estimates that pigment demand grows at GDP growth, or approximately 3%. They forecast a deficit in pigment product by 2020.

Pricing is opaque, and is fixed between producer and buyer. Until 2010, prices were fixed under long term contracts. More recently, changes in markets led to contracts being negotiated quarterly or semi-annually.

“A recent feature of pricing was a sharp decrease in prices in 2013, which continued into 2016 – this followed slowing in demand during 2012, largely due to weakening global economic conditions. • There were also significant price increases in feedstocks starting in 2010 - this was as a result of supply constraints enabling producers to renegotiate prices away from long term contracts, which were a disincentive on bringing on new production, with feedstock prices feeding into pigment prices.” – TZMI

Some of the key producers are The Chemours Company, Huntsman Corporation spinoff Venator, The National Titanium Dioxide Company, Ltd. (Cristal), KRONOS Worldwide, Inc., Tronox Limited, Tayca Corporation, Cabot Corp, Evonik Industries AG, Cinkarna Celje), Lomon Billions, and Ishihara Sangyo Kaishal Ltd.

China has become the world's large TiO<sub>2</sub> producer, exporter and consumer. They have shifted their main export destinations for Europe and North America to Asia Pac, the middle east and South America.



### Worldwide production capacity - 2017

Chemours	18%
Cristal	13%
Venator	10%
Lomon Billions	9%
Kronos	9%
Tronox	7%
Other	34%

Source: FactSet Research Systems

Company Data: Kronos Worldwide, Inc. (KRO)
*Trading*

Date	5/23/18
Price	25.68
52 Wk H/L	29.49 / 17.11
Market Cap/Ent. Value (\$mns)	2,976 / 3,366
Avg Daily Volume (thou)	510.7
Shares Outstanding (mn)	115.9
Float (mn / %)	22.4 / 19.4%
Short Interest (mn / SISO%)	1.8 / 1.6%
Days to Cover	5.4

*Balance Sheet*

	<u>Mar-18</u>
Cash & Eqv.	366
Total Debt	756
Net Debt	390
Net Debt / Capital (@mkt)	12%
Net Debt / EBITDA	0.9x

*Earnings and Cash Flow*

	LTM				Forecasts		
	<u>Dec-15</u>	<u>Dec-16</u>	<u>Dec-17</u>	<u>Mar-18</u>	<u>Dec-18</u>	<u>Dec-19</u>	<u>Dec-20</u>
Revenue	1,348.8	1,364.3	1,729.0	1,789.6	1,975.3	2,015.4	2,013.8
EBITDA	63.6	112.2	379.5	441.7	550.5	522.2	555.9
Interest Expense	-19.1	-17.0	-16.9	-17.9	-19.0	-19.0	-19.0
Cap Exp.	-47.1	-53.0	-64.3	-67.6	-67.0	-70.0	-73.0
Subtotal	-2.6	42.2	298.3	356.2	464.5	433.2	463.9
Net Income	-173.6	43.3	354.5	388.4	345.9	325.2	352.9
EPS	-1.29	0.31	3.10	3.42	3.01	3.05	3.05

*Valuation*

	LTM		Forecasts		
	<u>Mar-18</u>		<u>Dec-18</u>	<u>Dec-19</u>	<u>Dec-20</u>
EV/EBITDA	7.6x		6.1x	6.4x	6.1x
EV/Sales	1.9x		1.7x	1.7x	1.7x
FCF Yield	12%		16%	15%	16%
PE	8.3x		8.5x	8.4x	8.4x

Source: Two Rivers Analytics

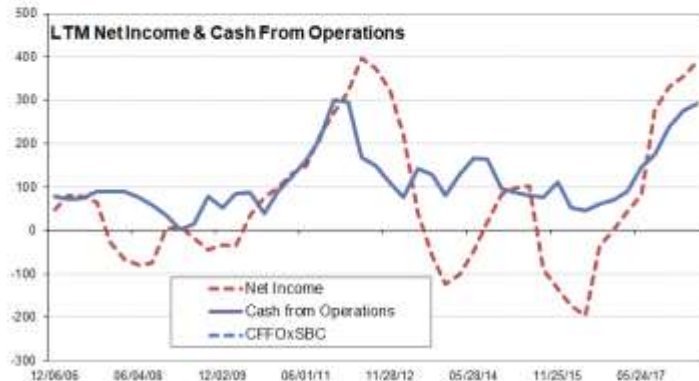
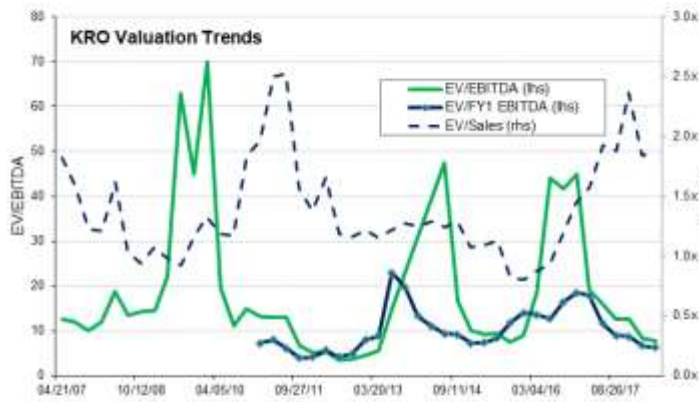
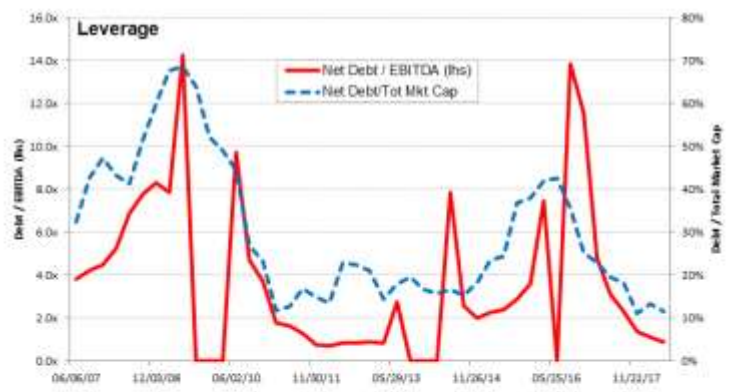
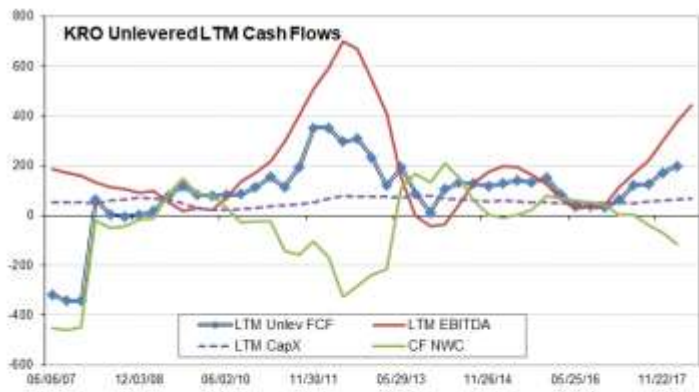
Below, please find:

- [Time series data on key company metrics](#)
- [Comparable companies analysis](#)
- [Time series charts on the company vs. its comps](#)
- [Scatter plots of forecast growth and valuation multiples](#)
- [Revisions trend vs. its comparables](#)
- [Correlations of stock price to various estimate revisions](#)

**Kronos Worldwide, Inc. (KRO)**

updated 5/23/2018

**Historical Metrics: Sales, Margins, Cash Flow, Leverage, Valuation, Estimates & Short Interest**



\* As per GAAP financial statements. Unadjusted.



### Comp Companies Analysis: Kronos Worldwide, Inc. (KRO)

Pricing date: 5/23/2018

All financials in USD millions

Tickers	KRO			comp 10%									
	Kronos Worldwide, Inc.	Ev / Mfr	Mean	Median	CC-US Chemours Co.	TROX-US Tronox Ltd. Class A	HUN-US Huntsman Corporation	002601-CN Lomon Billions Group Co Ltd. Class A	4027-JP Tayca Corporation	CBT-US Cabot Corporation	EVK-DE Evonik Industries AG	CIGC-SI Cinkarna Celje dd	4028-JP Ishihara Sangyo Kaisha, Ltd.
<b>Price Performance</b>													
Price (latest, USD)	25.66		57.22	32.07	51.53	18.42	32.07	2.34	24.48	59.01	36.73	278.56	11.81
Price (latest, local curr.)	—		—	—	—	—	—	14.97	2,692.00	—	32.38	238.00	1,299.00
1 day % change	0.0%	F	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1 week % change	8.9%	F	-2.0%	1.5%	1.5%	8.2%	1.5%	-18.7%	-15.3%	-4.0%	0.3%	5.3%	3.8%
1 month % change	13.6%	F	3.4%	5.8%	5.8%	-0.1%	9.6%	-18.7%	-1.8%	5.9%	9.8%	18.4%	2.3%
YTD % change	-0.3%	-	-7.7%	-4.2%	2.9%	-10.2%	-3.7%	-6.6%	-18.5%	-4.2%	0.0%	9.7%	-39.0%
1 year % change	31.8%	F	17.7%	19.4%	19.4%	3.5%	27.2%	4.4%	41.1%	15.4%	0.1%	22.1%	25.9%
52w High/Low	29.49 / 17.11		—	—	58.08 / 34.84	28.40 / 12.88	36.09 / 23.12	3.10 / 2.00	31.53 / 16.39	68.63 / 50.56	40.76 / 31.55	286.71 / 180.38	20.60 / 9.31
% of H/L Range	69.2%	-	53.2%	53.5%	71.8%	35.7%	69.0%	31.5%	53.5%	46.8%	56.2%	92.3%	22.2%
Consensus Price Target	26.33		75.07	40.39	62.85	24.88	39.96	3.60	32.74	73.83	40.83	321.86	nm
% to Price Target	2.5%		27.6%	24.9%	22.0%	35.0%	24.6%	53.6%	33.7%	25.1%	11.2%	15.5%	nm
Volume (shrs, mn)	0.5		—	—	1.7	1.1	3.1	8.3	0.1	0.5	0.7	0.0	0.2
Short Intra/Float	8.1%		2.9%	2.8%	1.8%	3.2%	4.2%	nm	nm	2.5%	nm	nm	nm
Days to Cover	5.43		3.57	3.38	2.72	3.80	2.96	nm	nm	4.82	nm	nm	nm
<b>Size</b>													
Market Value	2,976	-	5,096	3,648	9,168	2,260	7,671	4,727	576	3,648	17,115	226	472
Enterprise Value	3,484	-	7,240	4,557	12,248	4,062	10,425	5,173	522	4,557	27,243	206	722
Date of Financials	03/31/18				03/31/18	03/31/18	03/31/18	03/31/18	03/31/18	03/31/18	03/31/18	12/31/17	12/31/17
LTM Sales	1,790	-	4,352	1,572	6,476	1,571	8,184	1,572	384	2,966	16,659	213	943
LTM EBITDA	442	-	850	420	1,523	334	1,280	nm	72	505	2,894	54	139
LTM Capex	68	-	285	155	444	99	286	27	19	211	1,176	18	nm
EBITDA-CapX	374	-	630	294	1,079	235	994	nm	53	294	1,718	37	nm
Assets	1,939	-	6,317	3,389	7,484	4,858	10,703	3,389	557	3,117	25,035	264	1,448
Employees	2,245	-	8,870	5,750	7,000	3,400	10,000	7,060	nm	4,500	36,523	893	1,581
Shares	115.9	-	346.7	94.0	177.9	94.0	239.2	2,032.1	25.7	61.8	466.0	0.8	40.4
<b>Profitability / Productivity</b>													
LTM Sales/Tot Assets	92%	F	65%	65%	87%	32%	76%	46%	69%	95%	67%	81%	65%
LTM Sales/Employee	797,149	F	647,998	629,343	925,143	462,069	818,400	222,708	nm	669,111	461,588	238,350	596,627
LTM Gross Margin (-3Q)	26.0%	-	25.4%	25.9%	25.9%	15.9%	18.2%	39.1%	28.8%	25.1%	31.7%	11.6%	31.9%
LTM Gross Margin (-2Q)	29.3%	-	26.6%	27.2%	27.2%	18.3%	20.0%	42.6%	29.0%	24.1%	31.4%	13.8%	33.1%
LTM Gross Margin (-1Q)	32.3%	-	27.9%	28.3%	29.1%	21.3%	21.7%	44.1%	28.3%	23.9%	31.1%	18.4%	33.5%
LTM Gross Margin (0Q)	35.2%	-	29.2%	28.2%	30.6%	24.6%	23.0%	44.8%	28.2%	23.1%	31.5%	22.4%	34.5%
LTM EBITDA Margin (-3Q)	14.8%	-	18.7%	18.4%	18.4%	16.7%	11.3%	37.0%	20.3%	19.4%	14.3%	18.4%	12.9%
LTM EBITDA Margin (-2Q)	18.8%	-	19.5%	18.2%	19.7%	17.3%	12.7%	38.2%	20.6%	18.2%	14.4%	20.6%	13.5%
LTM EBITDA Margin (-1Q)	21.5%	-	21.0%	19.1%	21.8%	19.1%	14.3%	39.9%	20.1%	18.0%	16.7%	24.7%	14.7%
LTM EBITDA Margin (0Q)	24.7%	F	19.2%	18.0%	23.5%	21.3%	15.6%	nm	18.9%	17.0%	17.2%	25.5%	14.8%
LTM EBIT Margin	22.3%	F	15.5%	12.0%	19.3%	10.2%	12.0%	31.3%	14.2%	11.7%	11.5%	19.0%	10.4%
LTM Pretax Margin	20.0%	-	11.2%	10.0%	17.3%	-5.5%	10.0%	29.6%	12.9%	2.9%	8.3%	18.3%	7.7%
LTM Net Margin	21.7%	F	7.5%	6.9%	13.8%	-6.9%	6.9%	24.1%	8.5%	-6.2%	5.9%	15.2%	6.5%
LTM Capex / Sales	3.8%	-	5.7%	6.6%	6.9%	6.3%	3.5%	1.7%	5.0%	7.1%	7.0%	8.3%	nm
RDA	24.2%	F	5.8%	5.6%	13.0%	-2.2%	5.8%	12.5%	6.4%	-5.9%	4.2%	14.2%	4.2%
ROE	62.4%	F	22.2%	11.4%	132.3%	-12.0%	25.7%	18.7%	8.9%	-14.4%	11.4%	18.4%	10.3%
<b>Growth</b>													
LTM Sales (-3Q)	14.6%	-	25.2%	6.1%	3.9%	7.1%	-0.3%	178.1%	14.3%	6.1%	3.9%	4.3%	9.5%
LTM Sales (-2Q)	22.1%	-	28.6%	9.0%	9.0%	-14.3%	-10.9%	228.8%	11.5%	12.7%	10.7%	4.9%	5.0%
LTM Sales (-1Q)	26.7%	-	19.8%	10.5%	14.5%	-18.9%	-13.5%	142.4%	10.5%	16.8%	15.5%	8.6%	1.9%
LTM Sales (0Q)	26.4%	-	12.5%	13.3%	16.9%	-28.2%	-16.2%	81.9%	8.6%	17.3%	15.6%	13.3%	3.0%
LTM Gross Profit (0Q)	97.0%	F	34.1%	13.7%	51.2%	34.0%	9.1%	142.1%	4.8%	3.9%	13.8%	nm	13.6%
LTM EBITDA	161.1%	F	29.3%	15.6%	70.2%	3.4%	17.5%	nm	-0.7%	-1.8%	35.3%	96.7%	13.6%
LTM EBIT	nm	-	75.2%	51.3%	106.4%	100.0%	51.3%	150.3%	0.9%	-3.3%	44.8%	198.0%	28.3%
LTM Asset	52.8%	F	14.2%	14.9%	19.1%	-1.3%	12.8%	23.2%	14.9%	1.2%	17.7%	34.5%	6.0%
Employees YoY	-0.7%	-	-4.4%	-0.6%	0.0%	-20.9%	-33.3%	10.8%	na	4.7%	6.3%	-1.1%	-1.4%
LTM Capex	33.6%	-	27.4%	24.3%	39.6%	-26.3%	-33.6%	7.0%	40.0%	101.0%	9.1%	82.4%	na
LTM EPS (recur)	nm	-	63.2%	80.2%	82.0%	nm	81.7%	80.2%	2.4%	nm	40.4%	164.5%	-8.7%
LTM EPS (basic)	nm	-	24.4%	13.6%	nm	nm	nm	76.6%	-6.2%	nm	27.3%	nm	-0.1%
LTM EPS (diluted)	nm	-	24.4%	13.6%	nm	nm	nm	76.6%	-6.2%	nm	27.3%	nm	-0.1%
Forecast LTG	13.8%	F	9.1%	8.8%	nm	10.0%	7.7%	nm	nm	11.1%	7.7%	nm	nm
EPS FY1 v FY0	-1.5%		29.7%	32.8%	50.5%	nm	20.7%	25.1%	40.5%	6.9%	55.1%	-5.0%	44.1%
EPS FY2 v FY1	1.3%	-	14.0%	11.3%	12.4%	97.7%	5.4%	12.7%	11.3%	12.3%	4.6%	-35.5%	5.3%
EPS FY3 v FY2	-0.2%		8.8%	7.7%	9.8%	1.1%	9.8%	20.7%	nm	7.6%	7.7%	nm	5.1%



Source: Two Rivers Analytics, FactSet Research Systems \* As per GAAP financial statements.

### Comp Companies Analysis: Kronos Worldwide, Inc. (KRO)

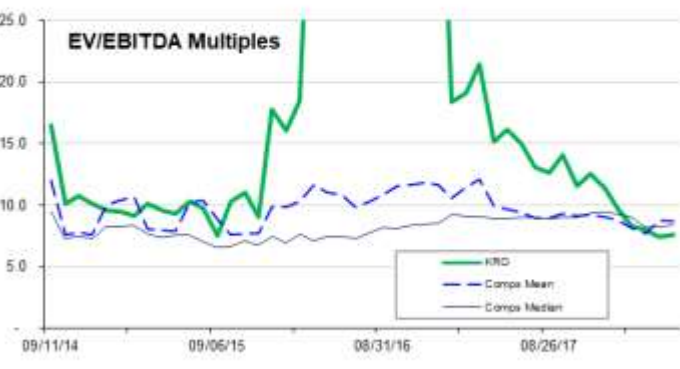
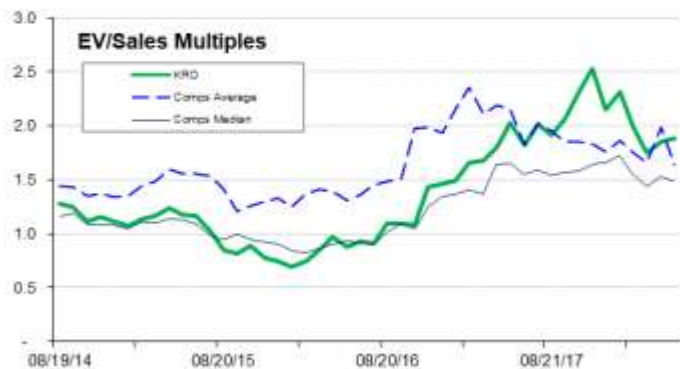
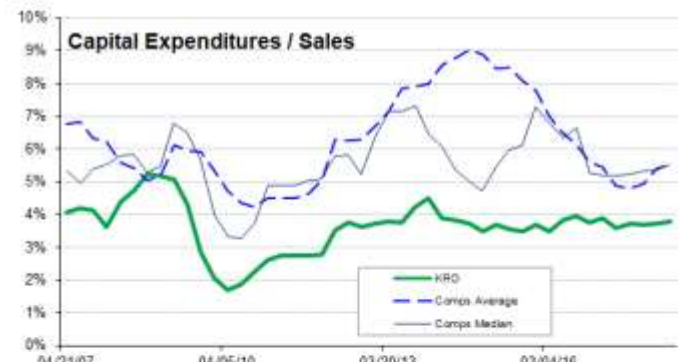
Pricing date: 5/23/2018

All financials in USD millions

Tickers	KRO				comp 10%									
	Kronos Worldwide, Inc.	Y Unif	Mean	Median	CC-US	TROX-US	HUN-US	002601-CN	4027-JP	CBT-US	EVK-DE	CICG-SI	4028-JP	
Names					Chemours Co.	Tronox Ltd. Class A	Huntsman Corporation	Lomon Billions Group Co Ltd. Class A	Tayca Corporation	Cabot Corporation	Evonik Industries AG	Cirkarna Celja d.d	Ishihara Sangyo Kaisha, Ltd.	
<b>Sales Estimates &amp; Expected Growth</b>														
Sales FY0	1,729	--	--	--	6,183	1,698	8,350	1,510	384	2,717	16,264	213	938	
Sales LTM	1,790	--	--	--	6,476	1,571	8,184	1,572	384	2,966	16,859	213	943	
Sales NTM	nd	--	--	--	7,165	2,552	9,097	nd	nd	nd	nd	nd	nd	
Sales FY1	1,975	--	--	--	7,051	1,994	9,006	1,807	411	3,113	17,336	219	973	
Sales FY2	2,015	--	--	--	7,477	3,045	9,379	2,030	432	3,268	17,782	213	982	
Sales FY3	2,014	--	--	--	7,881	3,020	9,608	2,409	nd	3,341	18,340	nd	991	
#Estimates	2		3	3	5	4	7	na	na	3	3	1	1	
Growth: FY1 v FY0	14.2%	-	10.4%	7.8%	14.0%	17.4%	7.8%	19.7%	7.1%	14.6%	6.6%	3.0%	3.7%	
Growth: FY2 v FY1	2.0%	-	9.5%	5.0%	6.0%	52.8%	4.1%	12.3%	5.1%	5.0%	2.6%	-3.0%	0.9%	
Growth: FY3 v FY2	-0.1%	-	4.6%	2.4%	5.4%	-0.8%	2.4%	18.7%	nm	2.2%	3.1%	nm	0.9%	
CAGR (FY3 v FY0)	5.2%	-	9.2%	7.1%	8.4%	21.2%	4.8%	16.9%	nd	7.1%	4.1%	nd	1.8%	
<b>EPS Estimates &amp; Expected Growth</b>														
EPS FY0	3.06	--	--	--	3.92	-0.44	2.62	0.16	1.46	3.62	1.74	39.93	1.18	
EPS FY1	3.01	--	--	--	5.88	0.93	3.15	0.23	2.05	4.08	2.69	37.92	1.71	
EPS FY2	3.05	--	--	--	6.61	1.84	3.32	0.26	2.28	4.58	2.82	24.46	1.80	
EPS FY3	3.05	--	--	--	7.26	1.80	3.65	0.31	nd	4.92	3.03	nd	1.89	
#Estimates	3		8	7	9	6	11	na	na	7	5	na	na	
Growth: FY1 v FY0	-1.5%	F	29.7%	32.8%	50.5%	nm	20.7%	25.1%	40.5%	6.9%	55.1%	-5.0%	44.1%	
Growth: FY2 v FY1	1.3%	-	14.0%	11.3%	12.4%	97.7%	5.4%	12.7%	11.3%	12.3%	4.6%	-36.5%	5.3%	
Growth: FY3 v FY2	-0.2%	F	8.6%	7.7%	9.8%	1.1%	9.8%	20.7%	nm	7.6%	7.7%	nm	5.1%	
CAGR (FY3 v FY0)	-0.2%	F	26.4%	19.4%	22.9%	84.4%	11.8%	19.4%	nd	8.9%	20.4%	nd	16.8%	
<b>Revisions, 3M Chg in:</b>														
FY1 EPS	22.7%	F	5.2%	0.2%	9.3%	26.8%	15.0%	-5.3%	0.0%	0.2%	1.2%	0.0%	0.0%	
FY2 EPS	na	-	6.2%	0.2%	7.2%	39.9%	10.5%	-7.3%	0.0%	0.4%	-1.1%	na	0.0%	
FY3 EPS	na	-	2.4%	0.0%	8.8%	na	8.6%	na	na	-3.1%	-2.2%	na	0.0%	
Target Price	9.7%	F	1.0%	-0.3%	3.8%	-1.1%	-0.7%	-4.2%	0.0%	-0.7%	0.3%	10.9%	na	
<b>Leverage</b>														
Net Debt / Book Capital	38.3%	-	34.2%	42.8%	75.5%	68.5%	48.6%	16.8%	-15.4%	42.8%	53.2%	-11.0%	28.6%	
Net Debt / Mkt Capital	14.6%	-	19.6%	25.1%	25.1%	44.4%	26.4%	8.6%	-10.3%	19.9%	37.2%	-9.6%	34.6%	
Net Debt / EBITDA	1.1x	F	2.8x	2.1x	2.0x	5.4x	2.2x	nm	nm	1.8x	3.5x	nm	1.8x	
Total Debt	756	--	--	--	4,509	3,327	2,346	742	49	961	11,418	34	516	
Minority Interest	0	--	--	--	5	204	859	59	3	127	103	0	0	
Preferred	0	--	--	--	0	0	0	0	0	0	0	0	0	
Cash	366	--	--	--	1,434	1,729	453	355	105	175	1,393	53	266	
Net Debt	508	--	--	--	3,980	1,802	2,754	446	-54	909	10,128	-20	250	
Net Cash/Share (# >0)	na	--	--	--	na	na	na	na	\$2.00	na	na	\$24.34	na	
as % of share price	nm	-	8.6%	8.6%	nm	nm	nm	nm	8.5%	nm	nm	8.7%	nm	
<b>Working Capital</b>														
A/R DSO	76.1	-	76.7	76.4	57.3	76.4	62.8	79.7	119.7	76.4	49.0	67.1	99.8	
Inventory (days)	135.4	-	112.0	101.4	80.6	144.8	69.7	101.4	107.6	79.7	83.1	109.6	231.0	
Accounts Payable (days)	26.7	F	46.4	44.3	61.7	33.9	44.3	34.9	46.8	62.1	36.5	29.9	67.4	
Cash Cycle (days)	184.8	-	142.2	146.2	76.2	187.3	88.2	145.2	180.4	95.9	95.6	146.8	263.4	
<b>Valuation</b>														
EV/LTM Sales	1.9x	-	1.7x	1.5x	1.9x	2.6x	1.3x	3.3x	1.4x	1.5x	1.6x	1.0x	0.8x	
EV/LQA Sales	2.0x	-	1.8x	1.4x	1.8x	2.3x	1.1x	3.2x	1.3x	1.4x	1.5x	1.0x	0.8x	
EV/FY1 Sales	1.8x	-	1.5x	1.5x	1.7x	2.0x	1.2x	2.9x	1.3x	1.5x	1.6x	0.9x	0.7x	
EV/NTM Sales	nm	-	1.5x	1.6x	1.7x	1.8x	1.1x	nm	nm	nm	nm	nm	nm	
EV/FY2 Sales	1.7x	-	1.4x	1.3x	1.6x	1.3x	1.1x	2.5x	1.2x	1.4x	1.5x	1.0x	0.7x	
EV/FY3 Sales	1.7x	-	1.4x	1.4x	1.6x	1.3x	1.1x	2.1x	nm	1.4x	1.5x	nm	0.7x	
EV/LTM EBITDA	7.9x	-	7.9x	8.1x	8.0x	12.2x	8.1x	nm	7.2x	9.0x	9.4x	3.8x	5.2x	
EV/LQA EBITDA	7.0x	-	8.1x	7.9x	6.9x	11.5x	6.6x	nm	7.8x	9.0x	8.0x	5.3x	9.1x	
EV/FY1 EBITDA	6.3x	-	7.0x	7.2x	6.5x	7.2x	7.2x	7.1x	nm	8.1x	9.4x	3.8x	nm	
EV/NTM EBITDA	nm	-	6.8x	6.8x	6.5x	nm	7.2x	nm	nm	nm	nm	nm	nm	
EV/FY2 EBITDA	6.7x	-	6.6x	6.3x	6.1x	4.9x	6.9x	6.3x	nm	7.6x	9.0x	5.1x	nm	
EV/FY3 EBITDA	6.3x	-	6.3x	6.1x	5.7x	4.8x	6.5x	4.9x	nm	7.3x	8.6x	nm	nm	
EV/EBIT	8.7x	-	11.7x	10.5x	9.8x	25.4x	10.6x	10.5x	9.6x	13.1x	14.1x	5.1x	7.4x	
EV/(EBITDA-CapX)	9.3x	-	12.3x	11.4x	11.4x	17.3x	10.5x	nm	9.8x	15.5x	15.9x	5.7x	nm	
EBITDA Yld LTM	12.7%	-	14.3%	12.4%	12.4%	8.2%	12.3%	na	13.9%	11.1%	10.6%	26.3%	19.3%	
EBITDA Yld FY1	15.8%	-	15.2%	13.9%	15.3%	13.9%	13.9%	14.2%	nm	12.4%	10.7%	26.0%	nm	
EBITDA-CapX Yld	10.7%	-	9.3%	8.8%	8.8%	5.8%	9.5%	nm	10.2%	6.5%	6.3%	17.7%	nm	
NI+D&A-CpX Yld	12.2%	F	4.4%	5.4%	7.9%	-1.0%	7.7%	nm	5.4%	-6.5%	4.6%	12.6%	nm	
NI <sup>+</sup> +D&A-CpX Yld	10.5%	F	4.1%	5.7%	6.9%	-0.5%	5.7%	na	6.0%	-5.2%	2.9%	13.9%	nm	
LTM PE	nm	-	68.9x	68.9x	nm	nm	nm	3.1x	nm	nm	134.7x	nm	nm	
FY1 PE	8.5x	-	11.5x	10.3x	8.8x	19.8x	10.2x	10.3x	11.9x	14.5x	13.6x	7.3x	6.9x	
FY2 PE	8.4x	-	10.1x	10.0x	7.8x	10.0x	9.7x	9.1x	10.7x	12.9x	13.0x	11.4x	6.6x	
FY3 PE	8.4x	-	9.1x	8.8x	7.1x	9.9x	8.8x	7.6x	nm	12.0x	12.1x	nm	6.3x	
PEG (FY1 PE/LTG)	0.6x	F	1.6x	1.6x	nm	2.0x	1.3x	nm	nm	1.3x	1.8x	nm	nm	
Price / Book	3.6x	-	2.8x	2.2x	9.2x	2.7x	2.6x	2.2x	1.4x	3.0x	1.9x	1.1x	0.8x	
Price / CPFS	19.4x	-	24.7x	22.8x	32.1x	22.8x	8.8x	neg	neg	45.0x	neg	14.9x	neg	
Dividend Yield	2.6%	-	3.3%	2.0%	1.3%	1.0%	2.0%	7.0%	1.2%	2.2%	3.7%	11.1%	0.0%	

**Kronos Worldwide, Inc. (KRO) and its comparable companies**  
Growth, Margins, Capex, Leverage, & Valuation

updated 5/23/2018



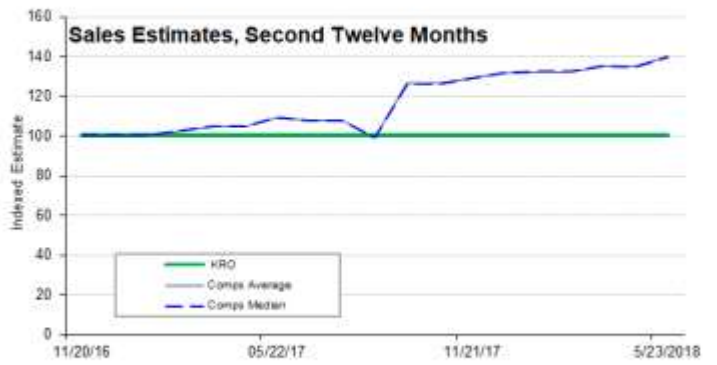
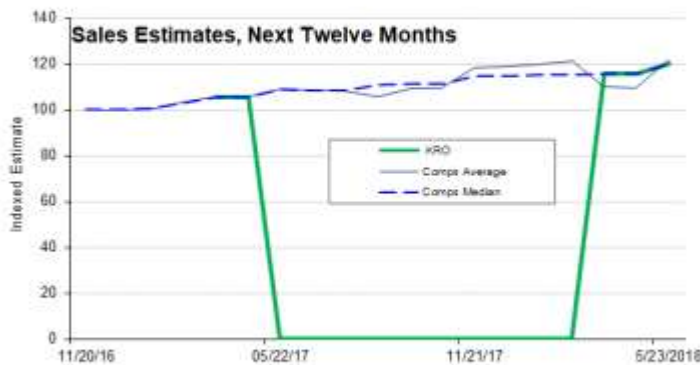
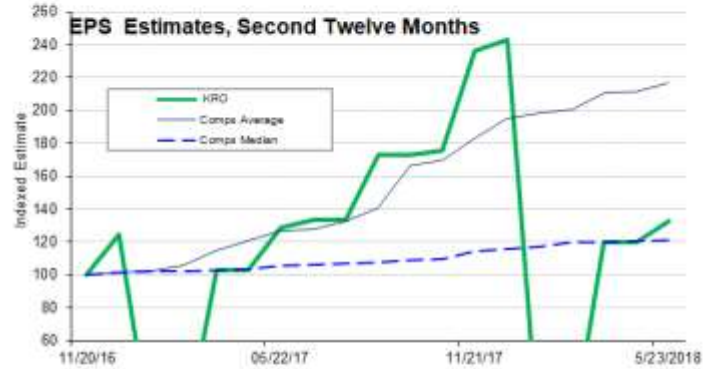
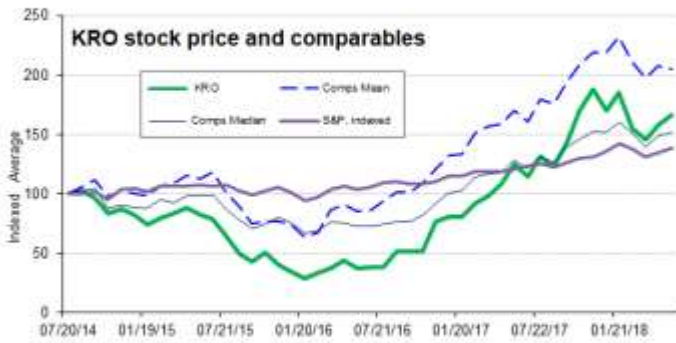
Comparable companies: Chemours Co. (CC), Tranox Ltd. Class A (TRDX), Huntsman Corporation (HUN), Loman Billions Group Co Ltd. Class A (BQ2601-CN), Tayco Corporation (4027-JP), Cabot Corporation (CBT), Evonik Industries AG (EVK-DE), Cinkama Ceje d.d (CICG-SI), Ishihara Sangyo Kaisha, Ltd. (4028-JP).

Source: Two Rivers Analytics;



**Kronos Worldwide, Inc. (KRO) and its comparable companies**  
Stock Price, forecast growth, target prices, estimates and short interest

updated 5/23/2018

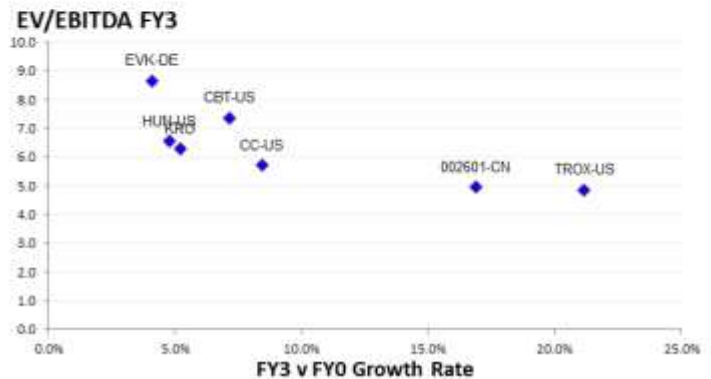
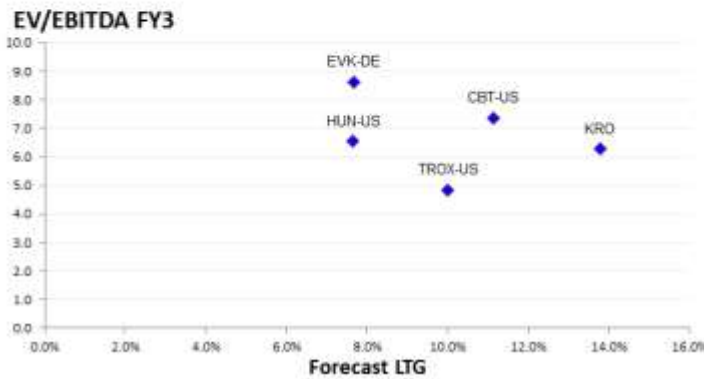
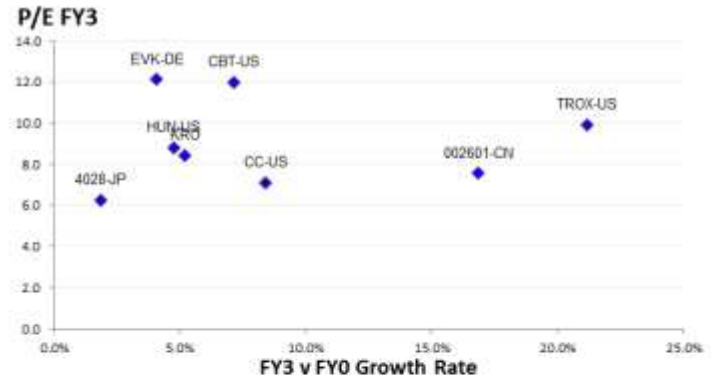
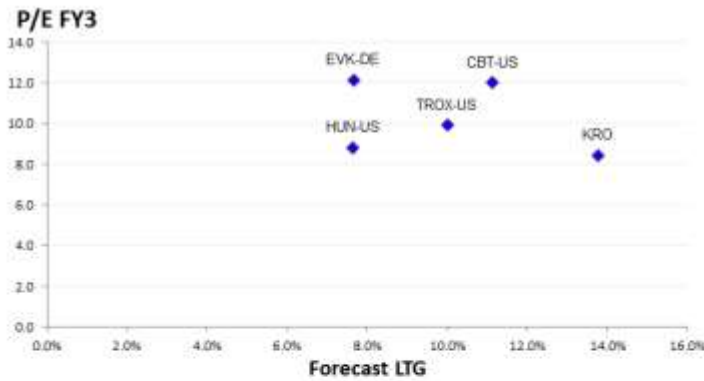
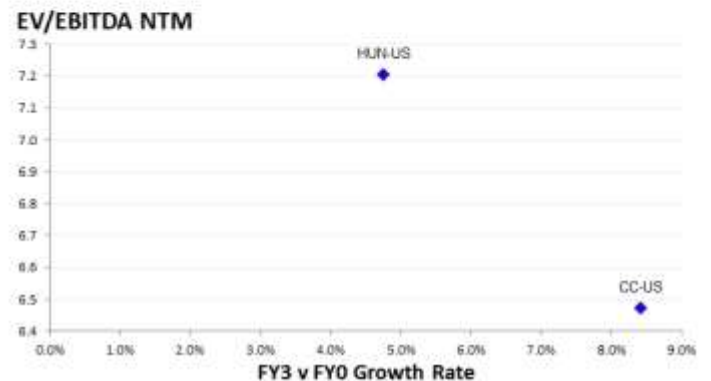
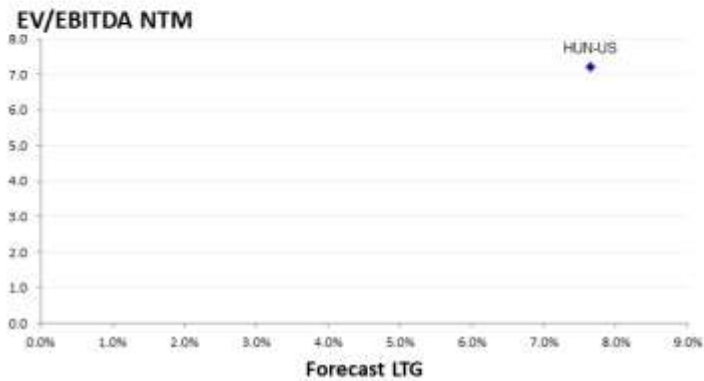
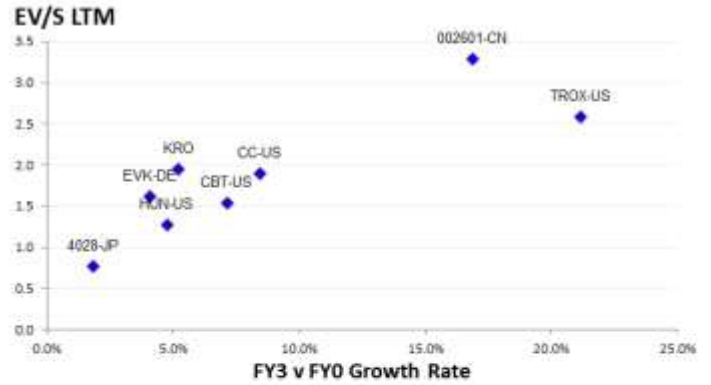
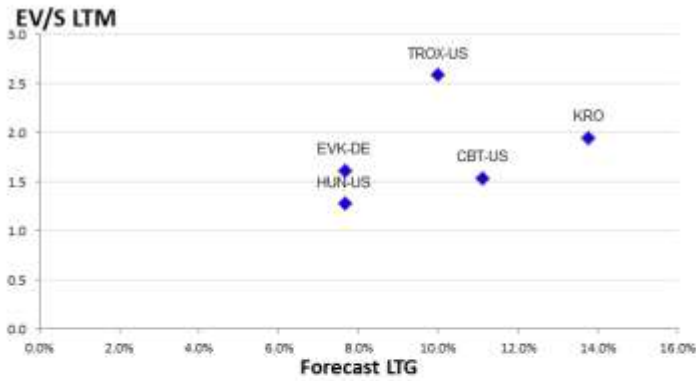


Comparable companies: Chemours Co. (CC), Tronox Ltd. Class A (TROW), Huntsman Corporation (HUN), Lomon Biliions Group Co Ltd. Class A (002601-CN), Tayco Corporation (4027-JP), Cabot Corporation (CBT), Evonik Industries AG (EVI-DE), Cinkama Cejje dd (CICG-SI), Ishihara Sangyo Kaisha, Ltd. (4028-JP).

Source: Two Rivers Analytics;

**Forecast Growth Rates vs. Valuations: Kronos Worldwide, Inc. (KRO) and its comparables**

5/23/2018



Source: Two Rivers Analytics;

Comparable companies: Chemours Co. (CC), Tronox Ltd. Class A (TROX), Huntsman Corporation (HUN), Lomon Billions Group Co Ltd. Class A (002601-CN), Toyco Corporation (4028-JP), Cabot Corporation (CBT), Evonik Industries AG (EVK-DE), Cinkama Čeje d.d (CXCJ-SI), Ishihara Sangyo Kaisha, Ltd. (4028-JP).

Stock prices and Estimate Revisions

02/23/18



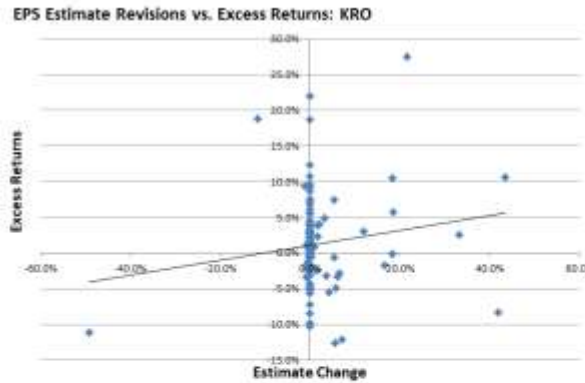
Source: Two Rivers Analytics, FactSet Research System Key  
 NTM EPS: The time weighted annual real basic months consensus mean EPS. (FY1 EPS \* % of year remaining in FY1 + FY2 EPS \* (1 - % of year remaining in FY1))  
 Breadth: The percent of analysts increases minus percent decreases over the past 45 days. The total is accumulated to create the time series. (If this period, more analysts cut than raise, the net % is subtracted from the prior period's total.)  
 Stock Price: Only the stock price is scaled on the chart. The other metrics are to be viewed for their trends.



**Kronos Worldwide, Inc. (KRO)**

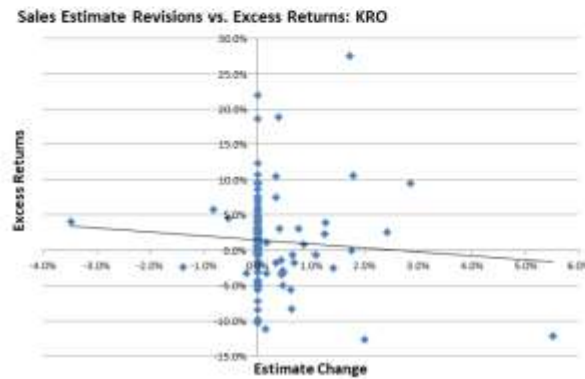
updated 5/23/2018

**Correlations with Wall Street Analysts Estimates**



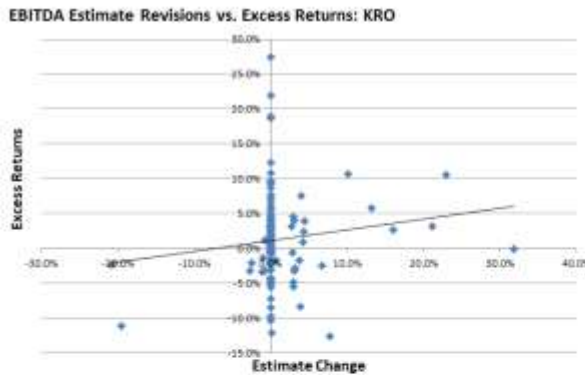
2 Yr. Correl. nm  
6 Mon. Correl. nm  
3 Mon. Correl. nm

**Economic Significance:** nm  
**Slope:** nm  
"a 1% increase in estimates = an x% increase in stock price"  
R-squared nm



2 Yr. Correl. nm  
6 Mon. Correl. nm  
3 Mon. Correl. nm

**Economic Significance:** nm  
**Slope:** nm  
"a 1% increase in estimates = an x% increase in stock price"  
R-squared nm



2 Yr. Correl. nm  
6 Mon. Correl. nm  
3 Mon. Correl. nm

**Economic Significance:** nm  
**Slope:** nm  
"a 1% increase in estimates = an x% increase in stock price"  
R-squared nm



2 Yr. Correl. 14.1%  
6 Mon. Correl. 5.4%  
3 Mon. Correl. 5.1%

**Economic Significance:** 0.17  
**Slope:** 0.17  
"a 1% increase in target price = an x% increase in stock price"  
R-squared 0.02

Source: Two Rivers Analytics; data from FactSet Research Systems  
Outliers cut off at +70% and -70%

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