

The Disruptive Discoveries Journal

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Is There a Way Forward in the Mining Sector?

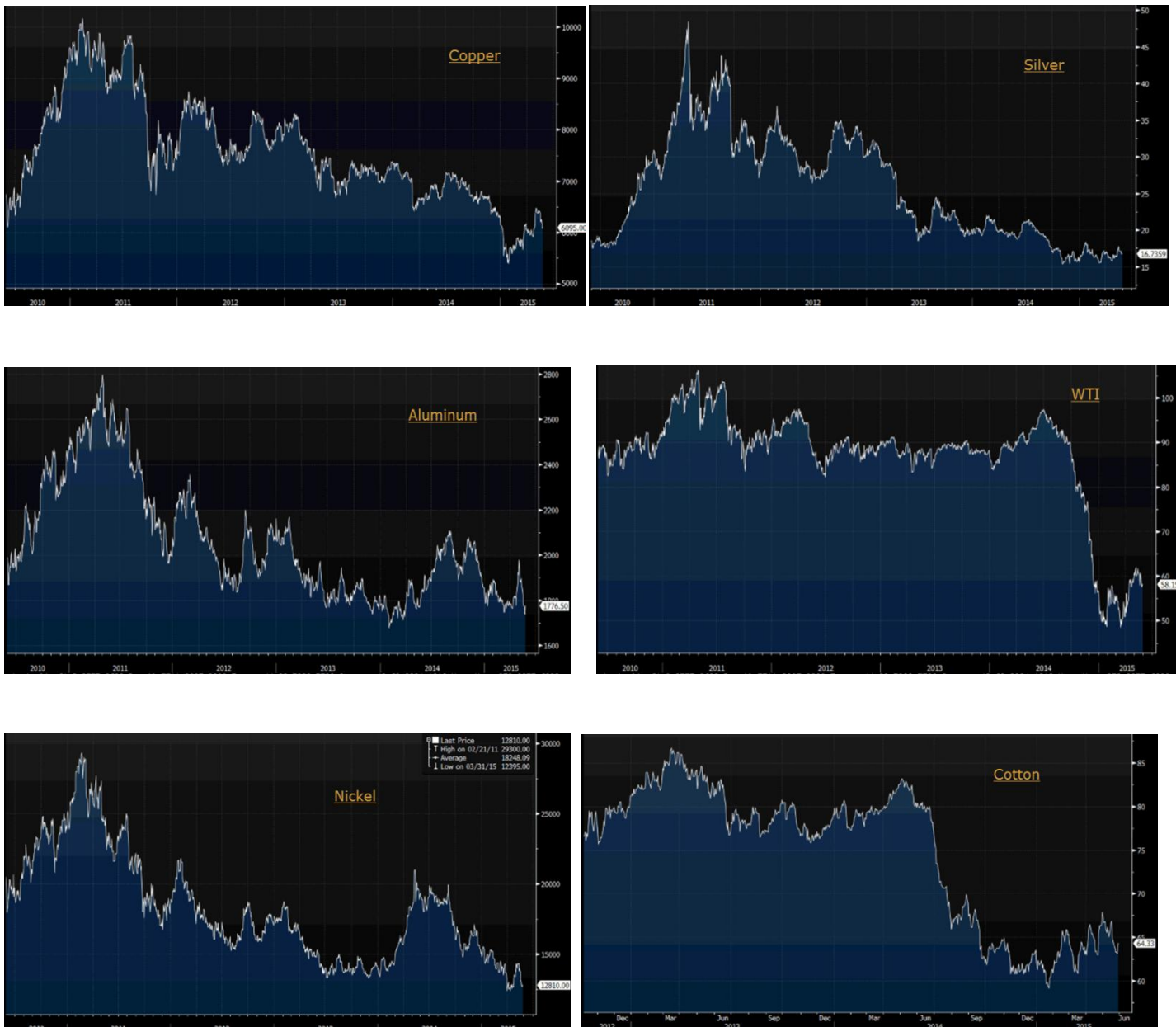
- The mining sector remains challenged by multiple headwinds including a lack of investment, currency headwinds, slower productivity, excess capacity, and deficient global demand.
- Debt overhangs and slowing emerging markets – specifically China – appear to be the culprits behind slack demand. These forces must be reckoned with.
- Longer-term, however, innovation, sustainability, and urbanization are legitimate drivers of growth and help promulgate “good” deflation which enhances productivity and can drive returns.
- This note examines these phenomena and which sector(s) of the mining industry may benefit.

Groundhog Day

After three-plus years of a dismal mining investment environment and the potential for it to continue for some time, a number of questions arise from the soul searching many of us have done to try and make sense of this. According to Bloomberg, the value of the TSXV has fallen from its peak by almost 72%. This market environment necessitates a different method of thinking and evaluation about publicly traded mining companies. The good news is that it appears that many metals prices have bottomed, though this doesn't mean that the cycle has definitively turned. The bad news is that the global economy still appears to be struggling with excess capacity AND muted demand. China, the seemingly endless engine of metals demand is unquestionably altering its paradigm for economic growth from one of infrastructure build out and exports to one more focused on internal consumption. With China's debt to GDP ratio of 282% according to McKinsey, this move to a new growth model is absolutely necessary to maintain a sustainable growth rate, but there is no overnight fix to achieve

this type of change. The success of this transition won't be known for years, though the effects are already being felt.

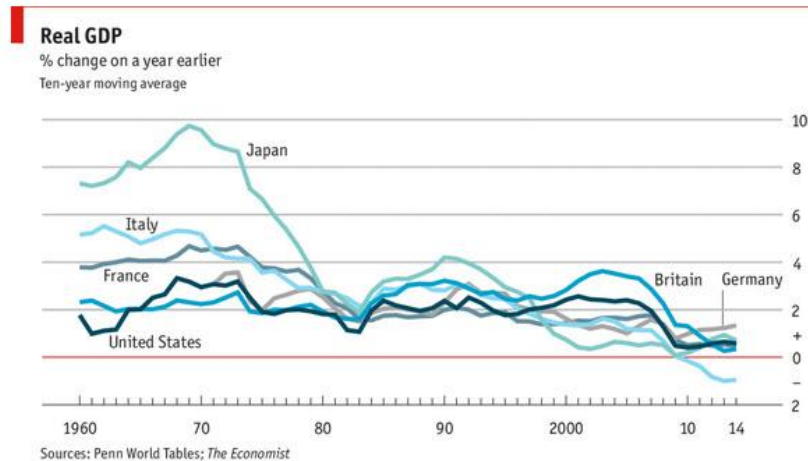
The excess capacity in the metals sector is all but obvious when you look at 5-year charts of select hard and soft commodities (see below). China's slowdown is only part of the reason here as a "growth at all costs" mentality, which was pervasive during the most recent iteration of the commodity supercycle has come home to roost. The write offs and unceremonious firings of almost two dozen CEOs of major mining companies in recent years are testament to this.



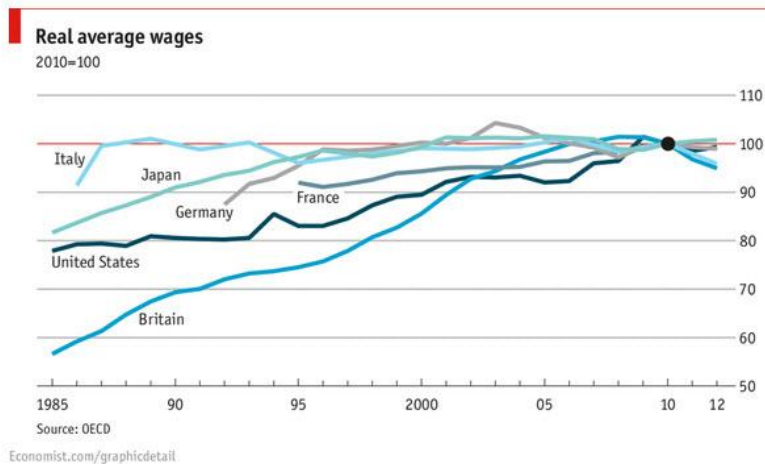
Source: Bloomberg

The Reasons Behind Slow Growth

The twin headwinds of slack demand and excess supply have popularized the notion of Secular Stagnation [discussed most notably by Harvard President Dr. Larry Summers](#). Initially discussed as far back as the 1930's, Secular Stagnation is an economic condition which is characterized by low (or no) economic growth. This lack of growth stems from the inability of investors to find opportunities to invest in which offer a suitable rate of return. The lack of investment impedes growth, which in turn harms wage growth and perpetuates a low-growth macro environment. As the following charts on GDP growth and bond yields in the developed world from The Economist show, the Secular Stagnation thesis has some validity with GDP in the developed world slowing.....



...and real average wages flattening out.



Ultimately, slow economic growth is a drag on productivity, or output per worker. Again, a look at the spotty growth in nonfarm U.S. labor productivity would appear to lend credibility to this thesis.

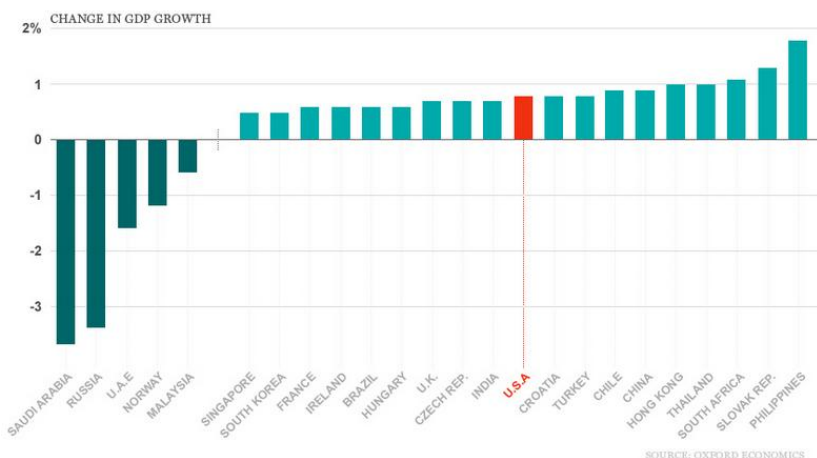


Lower productivity translates into lower wages and ultimately slower growth. This is alarming for those of us in the mining sector in that this could imply lower metals demand, though that is unlikely over the long-term for reasons I'll address below.

Despite the doom and gloom, opportunities are present. While nobody can control the cyclical nature of the commodity sector per se, making adjustments is feasible. It is important to bear in mind several facts:

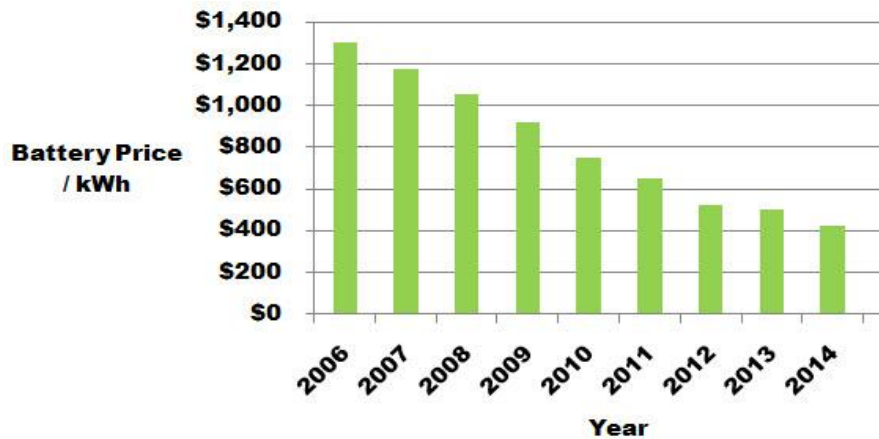
One of the central underpinnings of the commodity supercycle, urbanization, still has room to run. As an example, the World Bank considers China only 53% urbanized as of 2014. Economists and demographers believe that 75% is the number widely considered to demonstrate that a country is fully urbanized. As an example, the World Bank shows Canada and the United States at 81% each. These numbers imply that an additional 250 million Chinese citizens have yet to join the middle class. Another of the vaunted BRIC economies, India, has an urbanization rate of 32%. Add to this the fact that approximately 600 million citizens in Africa lack access to reliable electricity and you can start to see how the current economic malaise could be more of a blip in a longer-term secular uptrend. While there is no guarantee that all or most of these individuals will ultimately aspire to a higher quality of life, based on this data, there is clearly pent up demand.

While the markets fluctuate, one thing remains constant – the need for cheap energy to build a strong and sustainable economy. While the collapse in the price of oil has delineated clear winners and losers, it should be a net positive for growth in economies which aren't excessively dependent on high oil prices to balance budgets. What consumers do in those economies that benefit from the "oil dividend" is worth watching.



Further to this (and to my second point),

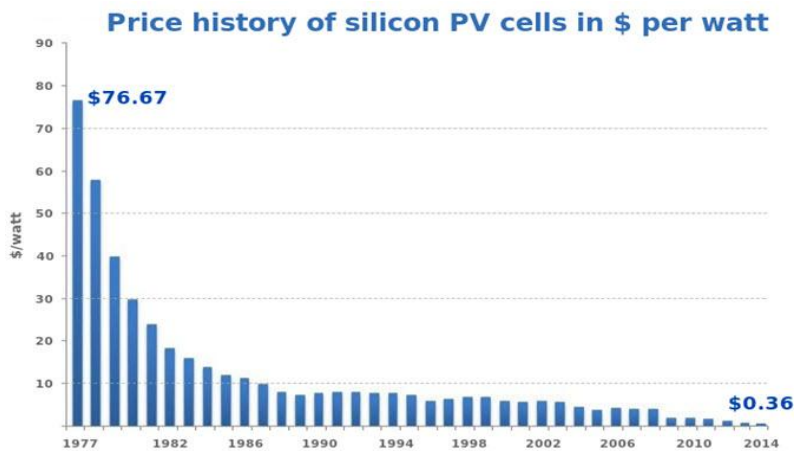
the price of technology on a per unit basis continues to crash. This has a great deal to do with scale and innovation combining at the right time. As an example, look at the cost per kWh of a lithium ion battery.



Source: Navigant; Industry Sources

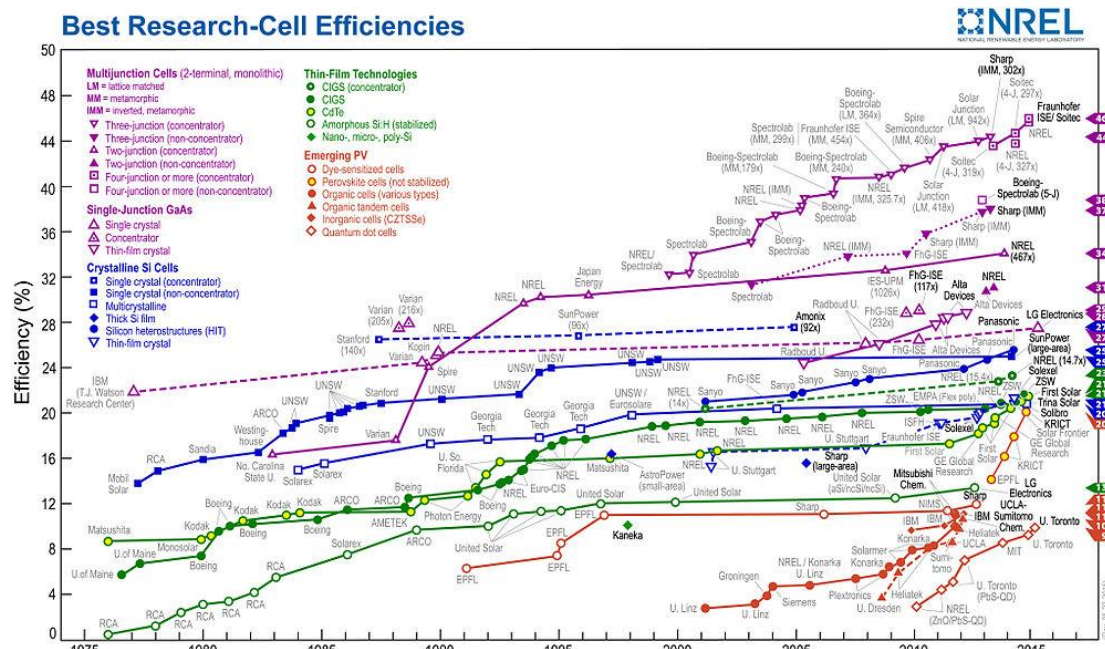
While this decrease in price isn't an exact Moore's Law phenomena, recent declines of 14% per year (CAGR) have many investors excited that this technology will become ubiquitous and increased demand for the metals used in batteries may follow. With respect to electric vehicles, it is widely believed that a per kilowatt-hour cost of \$175 would equilibrate to a traditional internal combustion engine. So while there is still ground to be made up, the trend is very encouraging.

Another example is the falling cost of solar panels.



Source: Bloomberg, New Energy Finance & pv.energytrend.com

Solar cell technology is not new (it was first "discovered" in 1839 and utilized by Bell Labs in the 1950s). The key factor in solar panel adoption by consumers and utilities is solar cell efficiency, or the percentage of solar energy which is converted to electrical energy. The efficiency of a cell directly affects the overall economics and renders solar generated electricity competitive with other sources or not. While the rate of increase in cell efficiency has been impressive (see the chart below), there is still a gap between these prices and those of electricity from fossil fuel sources in parts of the world, though this is narrowing.



Source: NREL

Through research and development and economies of scale, many believe solar power will continue to compete with and eventually beat fossil fuel generated electricity. This has profound implications for the raw materials used in solar cell fabrication and associated supply chains. This ubiquity of technology continues to create new and previously unthought-of uses for metals, effectively acting as a floor. It should be no surprise that the main demand drivers for niche or “energy” related metals are all related to current and next generation technologies – in this case batteries. As demand for energy continues to increase, sustainable growth and new business models will become imperative.

Time to “Think Different”

The whole point of this note concerns thinking differently about the mining sector and how to approach it given some of the aforementioned issues. It appears almost beyond dispute that many metals are suffering from excess capacity (as are labor and capital) and should economic growth continue to underperform, it may be several years before the “tipping point” emerges and we start the cycle anew. Given this reality, how should one approach this sector? Focus on producers? Dividend paying stocks? Royalties? Near-term producers? Juniors? ETFs? Specific commodities?

There is no clear answer here and the point of this note isn’t to recommend a specific course of action. That said, an area of focus which holds the potential for outsized performance is the Energy Metals. I loosely define the Energy Metals as any metal or mineral used in the generation or storage of energy. This could be a sizable list, so a few examples would include lithium, uranium, cobalt, vanadium, graphite, REEs, copper, and silver.

	2014 Mine Production (t)
Copper	18,700,000
Manganese	18,000,000
Lead	5,460,000
Nickel	2,400,000
Natural Graphite	1,170,000
Cobalt	112,000
REEs	110,000
Vanadium	78,000
Lithium	36,000
Silver	26,100

Source: USGS

It is important to remember that mined supply can be a somewhat misleading metric and the dollar value of these markets can vary significantly. Though “only” 26,100 tonnes of silver was mined in 2014, this is a much larger dollar value when compared to rare earth elements even though four times as many rare earths were mined (on a per tonne basis) relative to silver in 2014.

While these metals and minerals are used in numerous end products, their necessity in various modern day products (most notably batteries) underpins the fact that demand for a select number of these metals is easily outpacing global GDP growth. An example would be lithium growing at a CAGR anywhere from 8 to 10% per year compared to approximate 3% global GDP growth. More granularly, over one third of lithium demand originates with the lithium ion battery business and this subsector is far and away the main driver of lithium demand growth.

Many of these metals represent small markets (relative to other base or industrial metals). For the sake of perspective, if we compound 160,000 tonnes of lithium carbonate equivalent production in 2014 at 8% out to 2025, the total market would be slightly over 400,000 tonnes, still smaller than many other metals, but growing quickly and off a low base. That said, their small size is somewhat misleading given their criticality to emerging technology. This, coupled with a dearth of financing choices, leads me to believe you’ll see higher prices for select Energy Metals which could indirectly benefit those companies involved in raw material supply chains. It is safe to assume that with the appetite for early stage exploration non-existent, those companies further up the value chain are better poised to benefit.

Of course, the question which arises is “when”? When will this inflection point occur and the sentiment in the mining sector turn? These are likely separate questions, and it is important not to lump all metals together despite the cyclical nature of the commodities business. In fact, given some of the challenges surrounding slack demand and excess supply, an optimal decision would likely be to view each metal as a specific case study. It should be all but obvious to even a casual observer that the turn in the iron ore sector is much further off than it is for cobalt, for example. There are several reasons for this including over production of iron ore to maintain market share and an aggressively growing lithium ion battery business which requires cobalt in existing chemistries. Given this demand divergence, it could be that any turn in the metals markets will happen first for the Energy Metals, to the possible benefit of those mining and exploration companies.

Conclusion

Despite the manifold challenges that the mining industry continues to face, there are longer-term reasons for optimism. As living standards in various societies continue to slowly converge due to globalization, urbanization, and technological boundaries being shattered, efficiency and sustainability are going to become more pronounced. Growth for growth's sake is over, whether the Chinese realize it or not. Again, this will affect various commodities differently. The key will be determining exactly how productivity is to be reignited. I believe Energy Metals will play a pronounced role in answering this question. Given the relative small size of the Energy Metals sector, demand growth mostly above global gdp, and the imperative of sustainable, "cleaner" growth, it would appear that these niche metals are poised to outperform their peers. New business models around energy infrastructure are already emerging (think solar and batteries), but these supply chains depend on a reliable stream of raw materials to solidify them. A focus on future sources of these materials is clearly warranted. Supply and demand for these and other metals will eventually equilibrate and there is little we can do to make this happen. The winners over the long-term realize this and are positioning now across the mining supply chain.

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