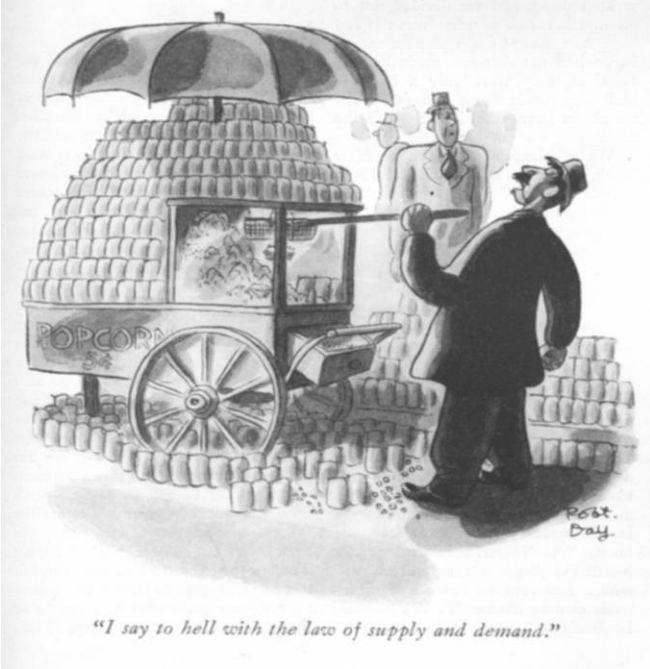


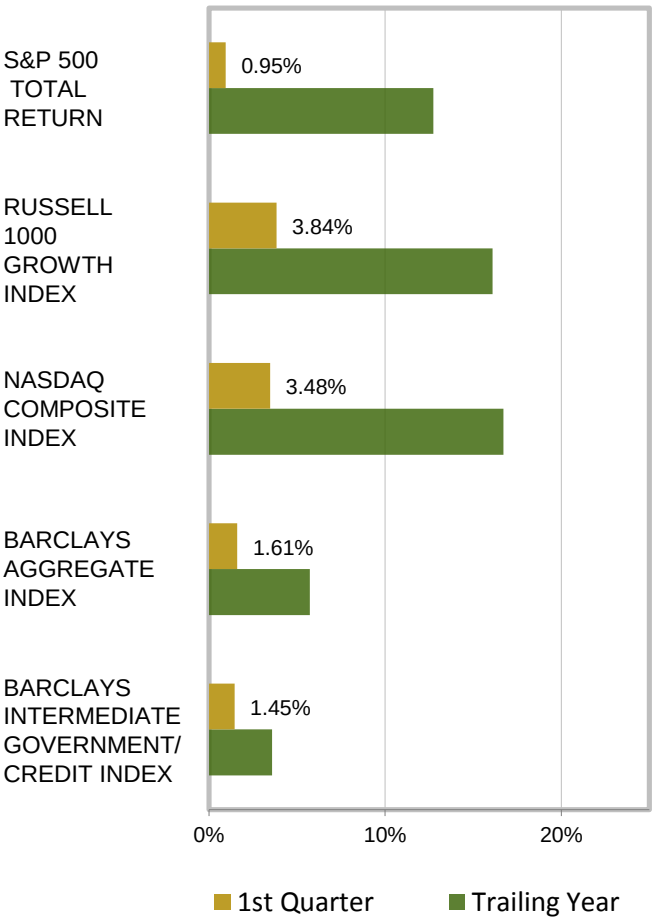
"I say to hell with the laws of supply and demand."

"The power of population is indefinitely greater than the power in the earth to produce subsistence for man."

-Thomas Malthus (British economist), 1798

"We are in a crisis in the evolution of human society. It's unique to both human and geologic history. It has never happened before and it can't possibly happen again. You can only use oil once. You can only use metals once. Soon all the oil is going to be burned and all the metals mined and scattered."

-M. King Hubbert, (American geologist), 1976



1st Quarter 2015: Unexpected Abundance

For most of history, humans have lived in almost continuous fear of scarcity. Our most distant ancestors worried that they would not be able to hunt enough wild game or gather enough roots and berries to sustain their tribe. Even after the eventual advent of agriculture, communities often struggled to store enough foodstuffs to survive the cold winter months. Until quite recently, famines, droughts, and disease have been ever-present persistent hobgoblins to the vast majority of the world's population.

Over the past couple of centuries – a mere blink in the span of time – radical technological advances in food production and medicine have reduced or eliminated the existential risk of food scarcity for the majority of people in the world. To be sure, there is no denying there remain many, many millions of individuals around the globe who continue to suffer from substandard nutrition, shelter, or medical care. But most of us recognize that these are unjust conditions that we can and should work to correct, rather than normal or acceptable states of existence.

And yet, even in modern times we remain "hard wired" to anticipate shortages of vital resources. This is a function of both the unavoidable legacy of thousands of generations of human evolution and our own continued inability to foresee the benefits of advancements in technology. When Thomas Malthus wrote An Essay on the Principle of Population in 1798, the world's population was comprised of approximately 1 billion people. Malthus believed that continued population growth at the same pace that he had observed in the late 1700's would soon outstrip global food supplies. Today, more than two centuries later, there are approximately 7 billion people alive on Earth. Although we live in a far-from-perfect world in terms of access to affordable nutrition, stratospheric advances in agriculture and animal husbandry have resulted in global food production that has far surpassed anything Malthus could have imagined.

Much more recently, the concept of Peak Oil grew to prominence in the mid-2000's. First postulated by M. King Hubbert in 1956, the Peak Oil theory is defined by Wikipedia as "…the point in time when the maximum rate of extraction of petroleum is reached, after which the rate of production is expected to enter terminal decline." Or, in layman's terms, "the point in time at which we begin to run out of oil." For several decades, it appeared that Hubbert's theory might be correct. U.S. production of crude oil rose steadily throughout most of the 20th century, before peaking in November 1970 at more than 10 million barrels per day (Chart 1). The subsequent three-decade decline in production seemed to validate the projections Hubbert had crafted in the late 1950's. Further buttressing the perception of an impending shortage of oil supplies, the price of West Texas Intermediate (WTI) had skyrocketed to over $145/barrel (Chart 2) by the summer of 2008 – adding up to a more than ten-fold increase from oil prices in the preceding 10 years. Around the same time, after decades of steady declines, U.S. oil production dropped under 4 million barrels per day – a rate last seen in the early 1950's. Politicians, who tend to be late to every party, jumped on the bandwagon (puns intended). "Drill Baby Drill" became a rallying cry at the 2008 GOP convention, and politicians of all stripes rushed to demand that we increase domestic production of oil. Conventional political wisdom held that Middle Eastern oligarchs were driving up the price of oil and leaving us completely dependent upon foreign sources of petroleum products.

Chart 1

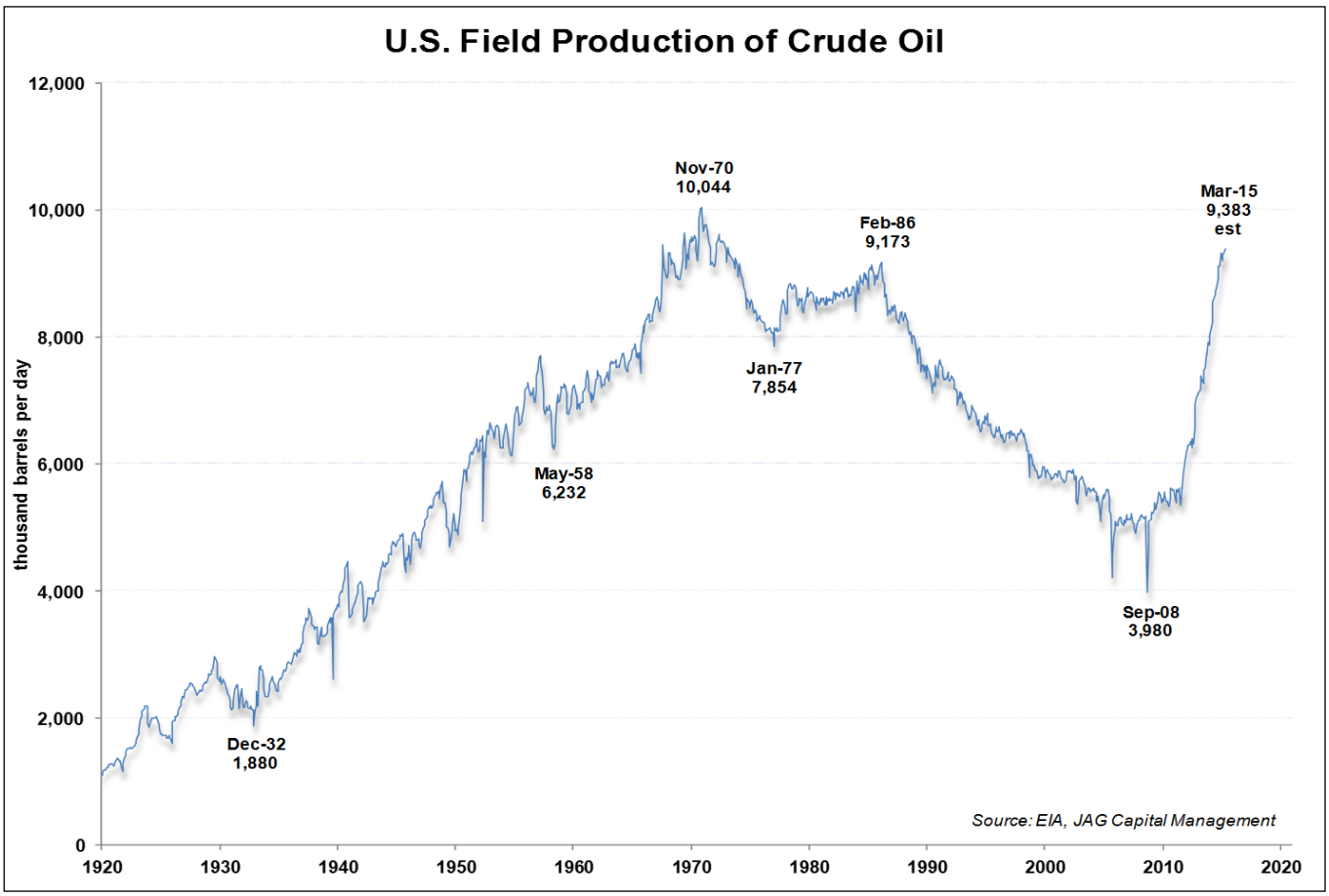
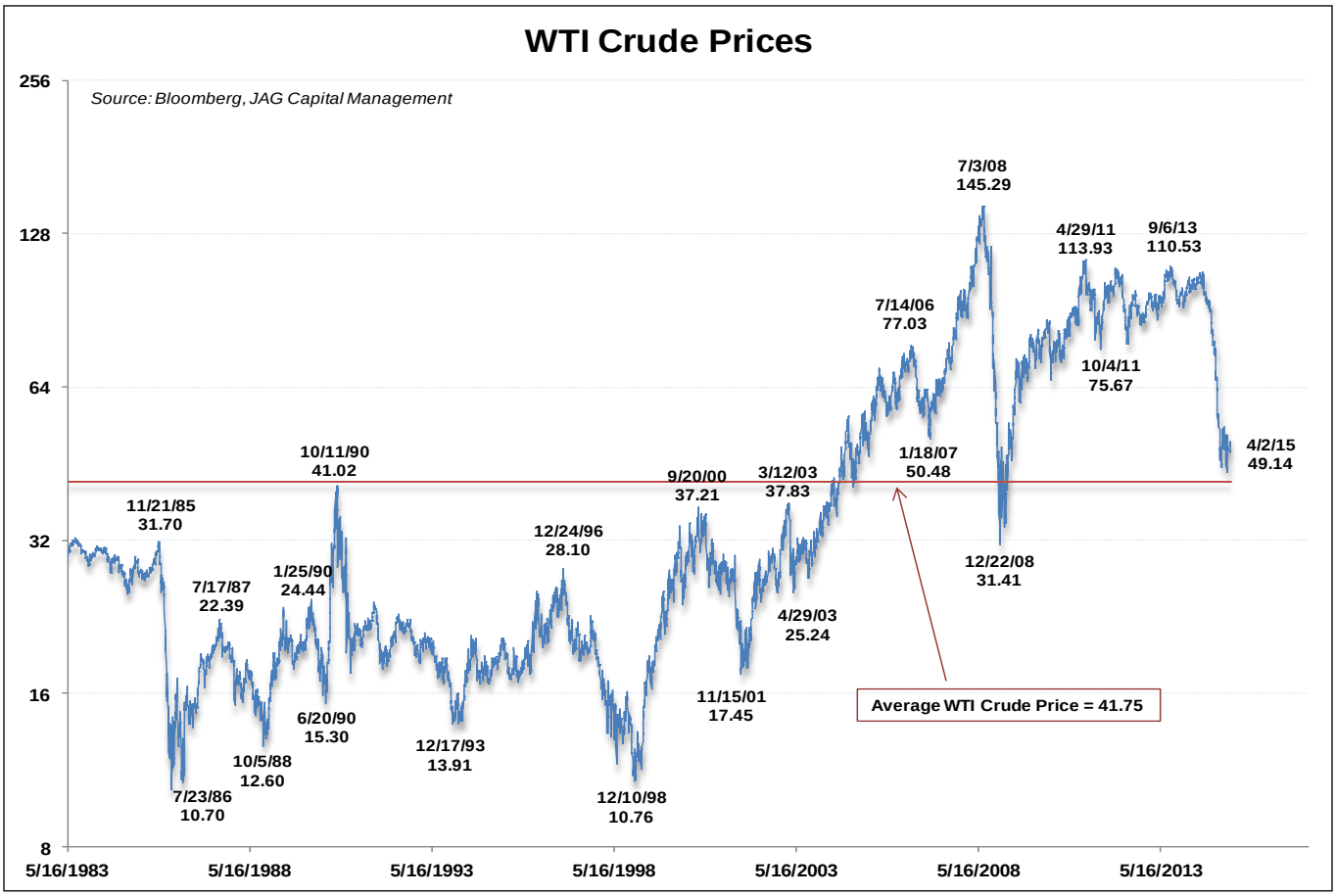


Chart 2



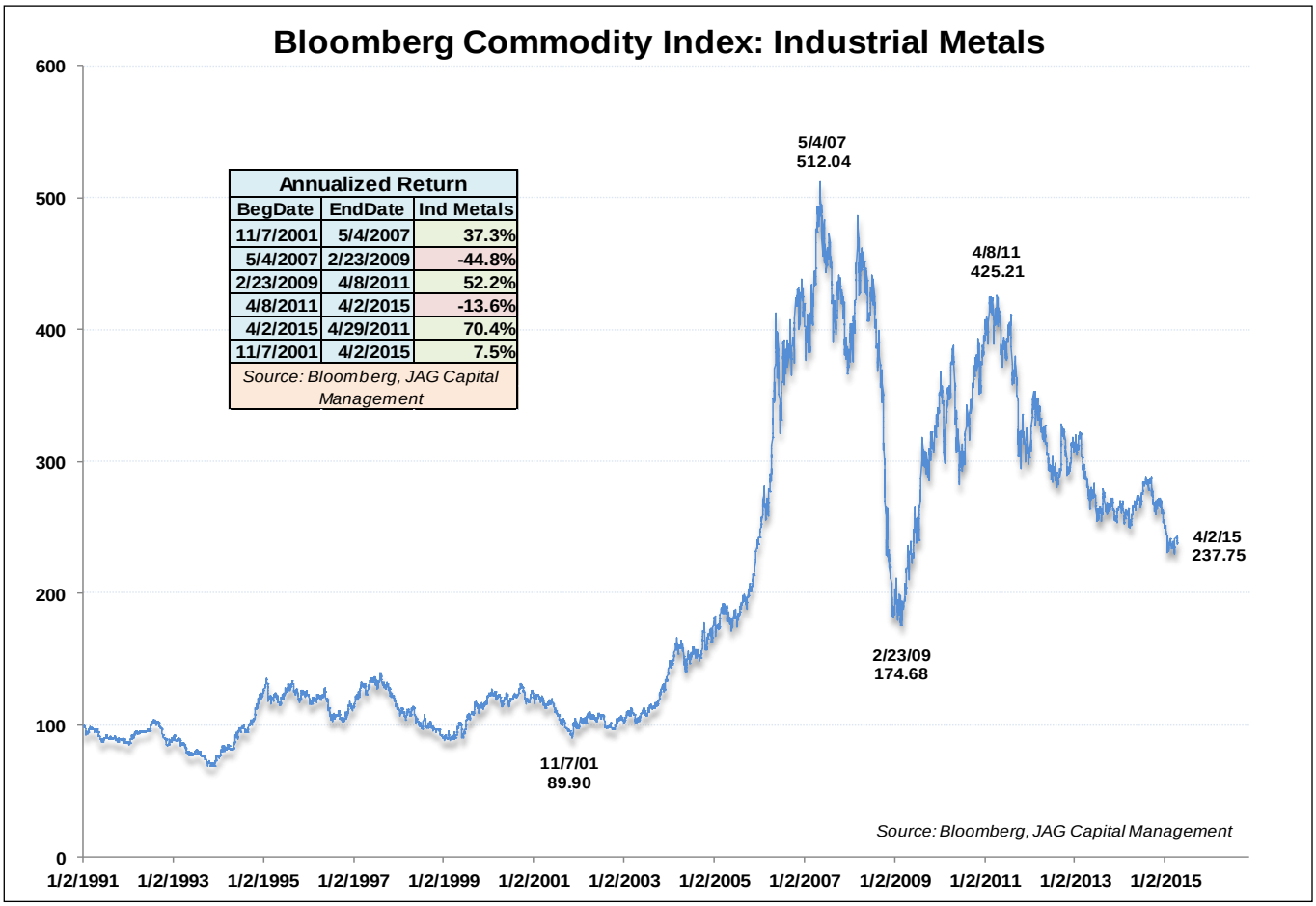
But a funny thing happened on the way to a catastrophic and destabilizing shortage of "black gold." As its price moved above $50/barrel and ultimately above $100/barrel, oil producers sensed an opportunity. Hydraulic fracturing (also known as *fracking*), a technology that had been invented in 1947 and successfully demonstrated commercially way back in 1950, was suddenly thrust into prominence. Why? Most of the blame (or credit, depending upon one's stance on the very real environmental risks of fracking) lies with tried and true laws of supply and demand. Remember that in the short term, global demand for petroleum is relatively inelastic. This is a fancy way of saying that it is not easy for any of us to stop driving, or heating our houses, or buying goods that are derived from fossil fuels – no matter the direction of oil prices. Therefore, changes in demand for oil tend to develop slowly and only over long periods of time.

According to Hubbert's theory, the supply of oil was also relatively inelastic in both the short- and long-term. He believed that the *traditional* methods of producing oil (i.e. drilling a hole in the ground or ocean floor to tap into a big underground reserve of crude oil, then pumping it up to the surface) were the only economically feasible means of drilling oil. Hubbert crunched the numbers for the long-term trend of global oil demand, and compared that data to what he knew about global reserves of oil in the ground. As a truly great number-cruncher, he correctly foresaw that the supply of "old fashioned" sources of oil would begin to be depleted around 1970. So far, so good. But like Malthus and his projections of population growth and food supplies, Hubbert could not imagine the truly revolutionary impact that fracking technology would have on the supply of oil. As it turns out, domestic production of oil exploded in the late 2000's (see Chart 1 again), concurrent with the broad-based adoption of fracking technology in the United States. Some of us who took Economics courses might remember what happens to price when a steady demand curve meets with a rising supply curve. A hint: in this scenario, the price must fall.

The explosion of fracking is far from the only reason we find ourselves awash in cheaper oil. There have also been dramatic improvements in vehicle fuel efficiency over the years. Today's passenger cars get an average of 24 miles per gallon of gasoline (mpg), compared with only 13 mpg in 1975. Similar efficiency gains have been achieved in light- and heavy-duty trucks. Modern passenger jets still guzzle enormous amounts of jet fuel, but it turns out that packing us passengers together like sardines means that jets can transport many more people per mile for a given amount of fuel. When combined with better flight routing, lighter aircraft construction materials, and highly efficient engine designs, the airline industry has also achieved big gains in fuel efficiency over the past several decades. Over time, these changes and others have slowly but surely lowered the growth rate of our economy's demand for oil. This downward pressure on demand exacerbates the effects of higher supply.

Looking beyond the economics of the oil market, we see similar dynamics at play in the historical price trajectories of other commodities. Consider industrial metals – rather boring materials like copper, zinc, aluminum, nickel, and lead. These sorts of metals are used in all manner of manufactured goods, from electronics to washing machines to cars and airplanes. Although these resources are vital to the global economy, we consumers rarely experience their price fluctuations firsthand (when is the last time you bought an ingot of zinc at the corner store?). Prior to the year 2000, the prices for these metals were relatively steady. Up to that point, decades of generally flat metal prices had led to a decline in the number of new mining operations. This makes intuitive sense- why would any company spend the massive amounts of capital required to find, build, and maintain a new copper or lead mine if they could not expect to earn a profit doing so? But in the early 2000's, China's economy revved into high gear, and Chinese industry developed a voracious appetite for metal to build homes, factories, and infrastructure. This sharp increase in demand caused metal prices to soar, driving the Bloomberg Index for Industrial Metals (Chart 3) up more than fivefold in less than six years between late 2001 and early 2007.

Chart 3



Higher metal prices provided all the profit incentive that mining companies needed to ramp up their investments. Exploration and mining activities ramped up significantly in the 2000's, funded in large part by debt (i.e. bond issuance). Although there is no technological equivalent to "fracking" in the metal mining industry (at least not yet), miners have gotten steadily better at extracting metal from the ground. Therefore, improved mining productivity – along with new mines and new discoveries – have helped expand global supplies. But when China's growth rate began to slow post-2011, demand for industrial metals leveled off. Remember what happens to a commodity's price when there is ample supply compared to existing demand? Similar to what we have observed in the oil markets since last summer, the price of the commodity must fall (as one can see easily in Chart 3). Although many have worried that we would soon run out of metals (interesting fact: the first prominent Peak Copper theory was put forth in 1924), it appears that – like oil - this won't be happening anytime soon.

There are too many investment implications of this discussion to cover fully in the space we have available. However, there are at least two important lessons we can touch on. First of all, our human tendency to fear scarcity can make us susceptible to very poor investment decisions. In the latter half of the 2000's, investors large and small plowed hundreds of billions of dollars into commodity linked investments. Many of these investors had very little prior experience with commodities, but they were motivated to invest in the rising price trends of assets that they incorrectly believed were likely to become scarce.

Secondly, and perhaps more importantly, many of us tend to forget the amazing potential of human ingenuity to solve seemingly intractable long-term challenges. Always remember that we humans are problem solvers. As noted author and scientist Peter Diamandis has written, *"Every generation feels it has the problems that will destroy it. That's because we perceive them a long time before we have the ability to fix them."* Of course, we will never have a shortage of problems that require fixing. But at the same time, we should never bet against our collective ability to rise to the occasion. From an investment perspective, individuals and companies that demonstrate an ability to innovate and produce value-added products and services will *always* be in demand.

Have a wonderful spring, and Go Cards!

Norm Conley
CEO & CIO