

“Hat on Sideways, Gold in Your Mouth”

May 2010 - Issue # 18



The latest SOPA returns to the subject of **commodity investing**. Many of the SOPAS have covered this topic. SOPA # 6 (The Power of Price, Pricing Power, and the Price of Power) covered the basics of how commodities function over time including the impact of **government intervention**. This and all other SOPAs can be found on our web site at: https://www.wolfrisk.com/past_sopas.html.

This SOPA is specific to commodity investing dominated by an environment of global public policy **extremism and nationalism**. This environment appears in the form of wild **liquidity** variables, extreme levels of public **debt**, new **infrastructure** spending, competitive currency **devaluation**, and increased **regulation**. Commodities must be viewed as an important piece of the global policy chess game that will separate the economic winners from the losers. This puts us in the **price of power** phase. It is the last of the phases of the commodity super cycle and it can last a decade.

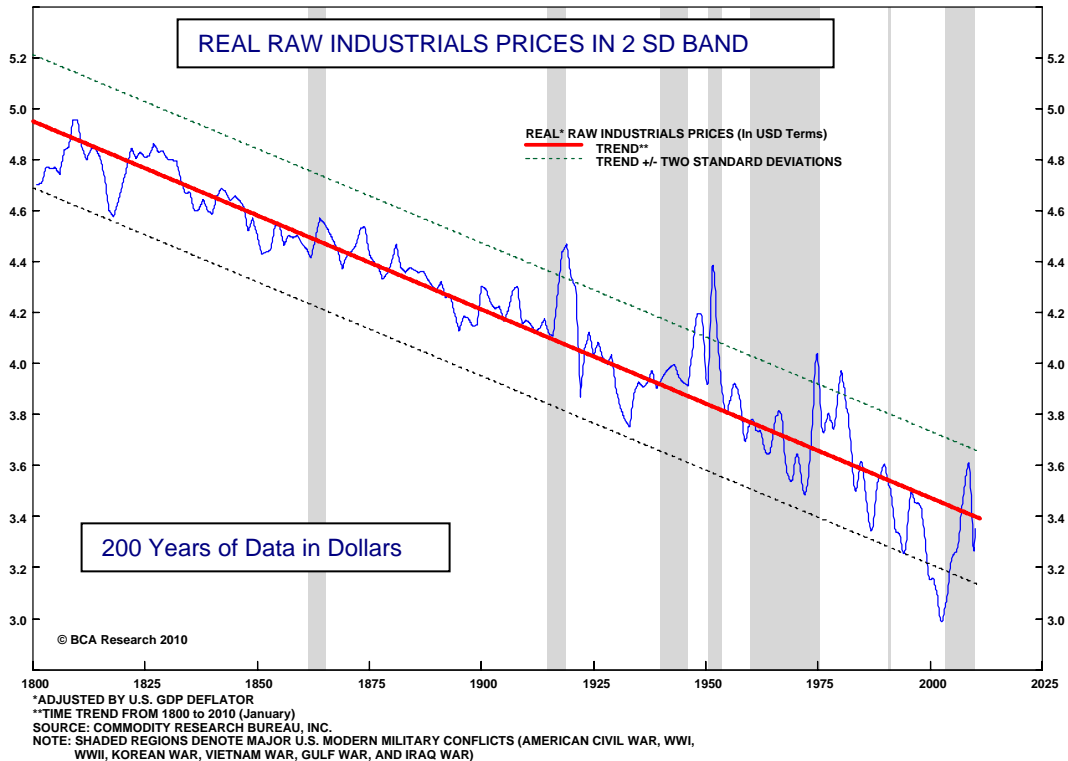
The coming “Teeny” decade to follow is a **commodity decade marked by rising prices in real terms and in every currency**. Prices will rise above their long term averages and create a global policy response. This will include nationalist solutions to reduce dependence on other governments. Commodities become extremely volatile in this phase. Everyone should care because commodities will dominate the investment stage while many **other investments lose value in real terms**. This SOPA is broad in scope. We have planned a series of SOPAs to help clarify some of the trends and better support the overall thesis.

I do not claim that we will have mass global inflation as measured by the traditional deflator. Rather some things will inflate quite a lot while others will deflate in real terms. On balance this means **inflation for most commodities while high cost raw labor and services suffer in real terms**. I start this discussion with simple history, the S and D, and then move to the more complex analysis.

Section One: Why will commodities become the **currency of choice** in the “Teeny” (2011-2020) decade?

- I. The perspective of most investors is that commodity prices have risen substantially and were already one of the main bubbles in the last “Naughty” decade. Therefore the first question I will address is **whether commodity prices are already high**.

Commodities **did rise 50%** from January 2000 to December 2009. However, as the chart below shows, raw industrials rose from **extremely depressed levels** on the back of the 1998 Asian crisis to their long term trend in **real terms**. This data points to the value that commodities still have and to the critical importance of Asia in the equation. The analysis holds across all commodities as they remain **well below** their long term deflated mean. The grey lines below are war periods.



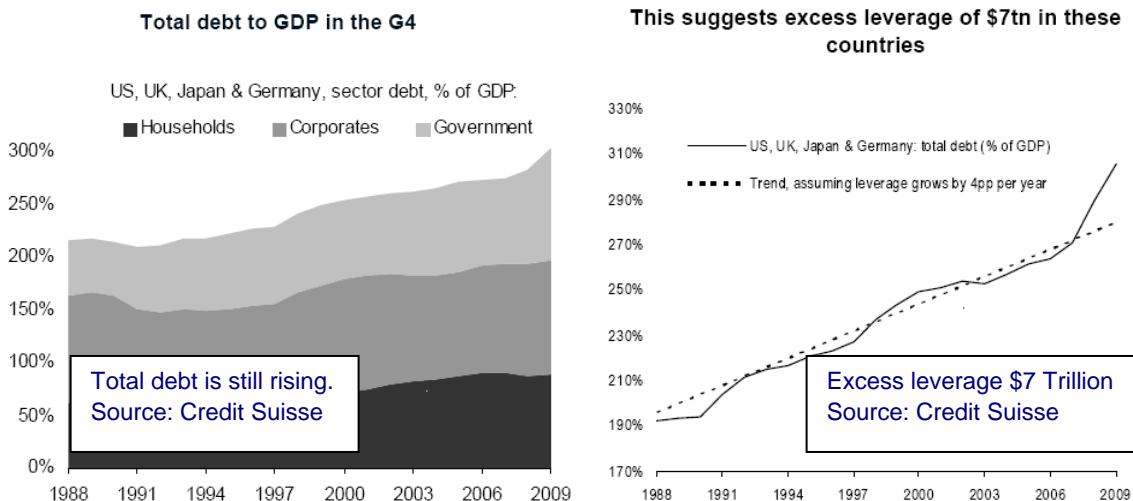
II. **What if we price commodities in other currencies?** Of course most **other currencies rose** against the dollar in the Naughty decade. Commodities became cheaper for those net buyers creating **rising demand**. The focus on the negative correlation of the dollar to commodities is somewhat overrated, especially now. This is because all commodities can become a currency. They are the **original currency**. Like any currency, they can develop a two way market where they rise or fall because the other side of the trade is less palatable. Thus you can hate dollars or commodities but still buy them because you **hate the alternatives more**. This has been of course happening with gold. No one really wants to be stockpiling gold in their basement. The perception that this only applies to precious metals is simply wrong. If people are afraid enough, **they stockpile everything, especially food**. On balance, these volatile extremes of downside fear and upside bubble inflation create the current

interest by most investment professionals in commodities. **It is a long volatility position with long term negative correlation designed to protect the portfolio.**

Why will this continue? Many of the world's largest banks in the Western hemisphere are still technically insolvent if they have to sell or mark their holdings. This is the dirty secret that will keep yield curves steep and rates too low for too long. A steep yield curve is the fastest way to **recapitalize the banks and help them earn their way out of the hole over the next five years.** It substitutes for nationalization. Western Banks are de-risking their portfolios by buying highly rated sovereign assets in a size that is financing government deficits and driving down borrowing costs.

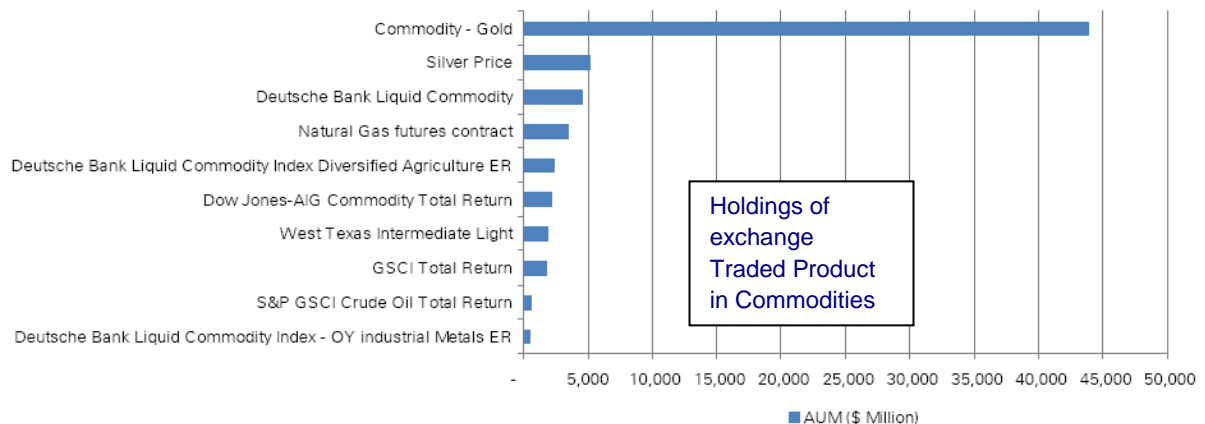
Plus, governments now overreact with spending to every piece of bad news. This deficit spending devalues the currency. It sets up a sovereign debt competition for devaluing since nearly every country is in deficit. Countries like Mexico, Canada and peripheral Europe are dragged along by their dependence on the debt driven economies. **Because China is also currently pegging** its currency to the dollar, it is dragging much of Asia along for the competitive devaluation ride. When China revalues, it will occur in a measured fashion to assure China's domestic growth.

The Chinese government is converting this growth to infrastructure spending on a scale never seen before and hoarding commodities. Thus, **China lit the fuse in early 2009 to convert commodities to a currency of choice.** Now China is tapping the breaks on loans while many other countries are jamming the infrastructure accelerator and many hedge funds are predicting a sovereign debt pile up on the Freeway. For investors looking for a way to exit the pileup into a liquid diversifying asset, there are few places to hide. Commodities (particularly precious metals) are the escape hatch.



Is there enough credit growth to debase currencies? Total debt and money in circulation globally is not declining. As the charts above show, **total credit growth in the anemic G4 is accelerating**. Most other countries are growing making total credit formation the highest ever in absolute terms. As the chart below shows, people already own gold through exchange traded funds to hedge this risk.

Figure 57: ETP AUM (\$ Million) by Underlying Index/Security – Commodity (Top 10)



Source: Deutsche Bank, Bloomberg.

Investors should and do see commodities as a **liquid diversifying asset class that is somewhat protected by its continued relative value, the expansion of Asia, and global governments that will now do anything to protect their banks and economies**. Commodities can remain the currency of choice for some time to come. The investment case is not a speculative one, it is an investment case based on the best choice of asset class. Next up is the global S and D picture.

Section Two: How can commodity prices rise with weak demand from weak economic growth? Most investors believe that global growth will be weak and jobless for a decade in the large Western economies plus Japan. In this environment, demand for commodities is assumed to be also weak. Wide output gaps are assumed to produce deflation. The argument is that western governments only have the **choice between Zimbabwe** (devaluation and hyperinflation- or the gold in your mouth case) and **Japan** (spending that produces deflation- the pants on the ground case).

This section focuses on why the outcome will be in the direction of inflation, especially for commodities, due to the size and type of spending. **Is government spending correlated to commodity price inflation?** Certainly the chart on page 2 suggests it is correlated to periods of war. These are periods of large government outlays and deficits with generally poor economic conditions. In particular, they are periods of shortages from the construction of war machinery and hoarding. Does this current period of global government spending and deficit produce the same result or is it just a bad offset to the collapse of private spending? My

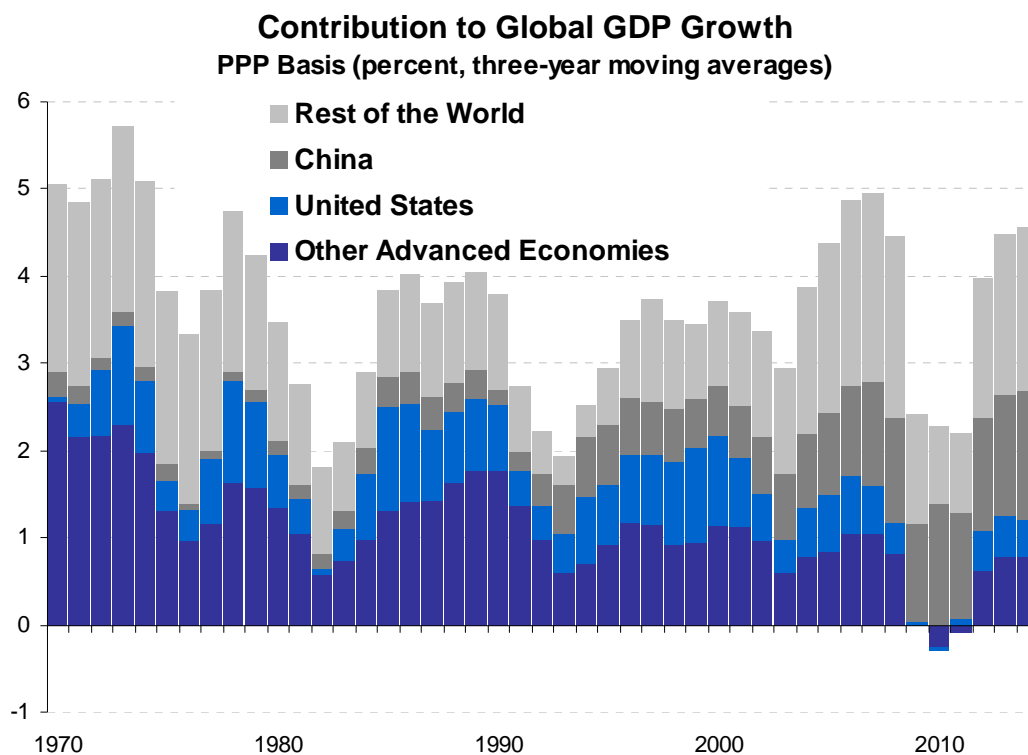
answer is that the current round of spending is **equivalent to a war spending period**. The decade has shifted **from consumer financial weapons of mass destruction to government commodity weapons of mass construction**. **Shortages will follow. Belt tightening will be too far into the future to prevent the commodity mania to come.**

I. **Why does the total global economic and spending picture support a commodity mania?** Most available data focuses on incremental GDP or spending. For this analysis, I focus on the absolute numbers in PPP (purchasing power) terms. They are less confusing in the sea of conflicting inputs. This data is **compared to 2007 when the world was thought to be running out of commodities**, oil moved above \$140, and inflation was an issue that demanded higher interest rates everywhere. (All sources are the CIA world fact book and World Bank/IMF, OECD, Central Banks, BIS).

a. **GDP growth and per capita income globally fell in 2009** for the first time in the postwar period. It fell however on the back of 5% growth in 2007 and 3% in 2008 giving us a high start point in 2009. **Global GDP is now \$70.4 trillion**. If the world grows above 4% as expected this year, GDP will end 2010 above \$73.216 trillion. This is \$4.4 trillion higher than the year 2007 or 6.5% higher. (It is also higher than 2008-9). This means, **aggregate demand is up since 2007-8**. The dollar exchange rate is about where it was at the end of 2007. During the three years ending 2009, 240 million new people joined the labor force putting it at 3.2 billion workers. These people are largely new industrial labor.

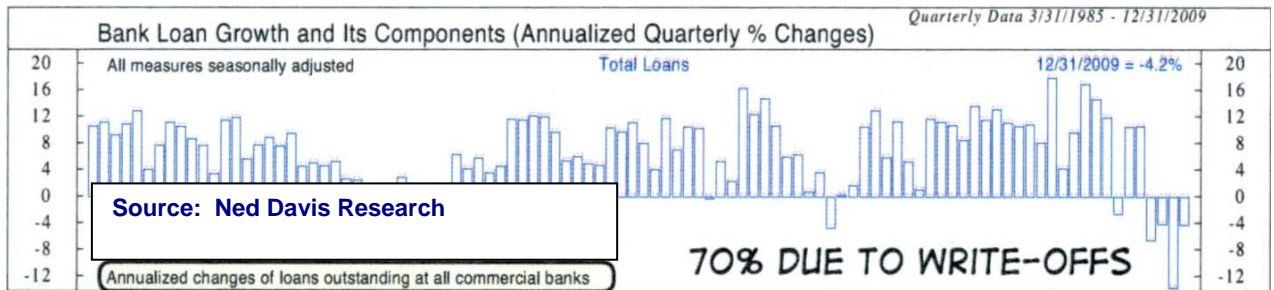
While industrialization is an old story, it bears repeating. 38% of the world's labor is agricultural and it produces 6% of GDP or a ratio of 16%. Industry produces 31% of world GDP but is only 22% of the labor force for a ratio of 138%. If all agriculture moved to an average of world labor productivity, it would produce another \$22.8 trillion of GDP. If it moves to industrialization only, **it produces another \$33 trillion** of GDP. The numbers for services are even higher. The moves by emerging economies to industrialize have dramatic impacts on global GDP. **Global GDP will grow nearly 20% over the five years** that includes the crisis.

These data explain why **75% of GDP growth is now coming from non-“advanced” economies**. See the chart below. It is dangerous to become too bearish on global growth prospects until this industrialization wanes. The Emerging Country source of GDP also implies **high volatility** now that the securitization boom is over. Next I tackle the elusive money supply picture.

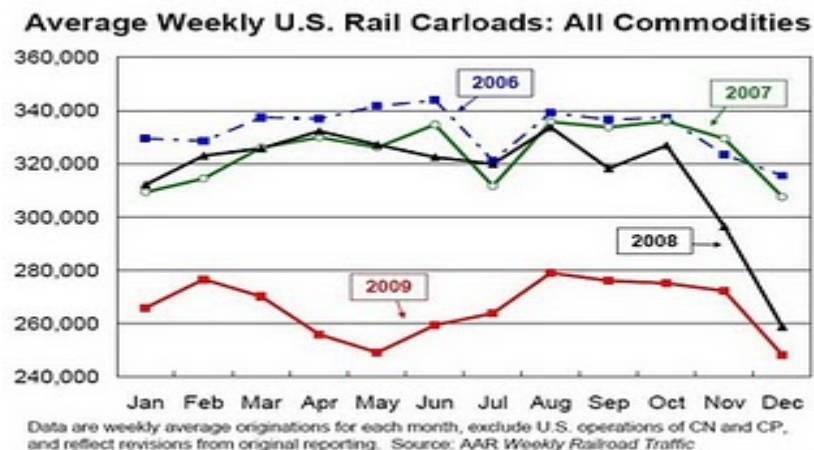


b. Monetary growth and velocity for the world are hard to measure, inconsistent, and the data is late for most Emerging countries. Therefore we can pin down the largest blocks (China, EU, US, and Japan) and then assume the other countries are unchanged. These other countries represent about 20% of M2 so my analysis includes 80% of the data. At the end of 2007 the world's money supply (M2) was \$27.3 trillion. By the end of 2009 it grew to \$30.7 trillion. These **7% growth** rates are well above long term trends. M1 grew by an even larger amount principally due to surging growth in China. In order for this monetary growth to be inflationary, it has to result in a multiplier through loan growth and a surge in real economic activity. Is this happening globally? **The answer is yes.**

Private debt. Banking activity in the west is masked by write downs. If you make \$10 of loans and write them off by 30% then you show \$7 of loans and declining loan growth. If you also make 1 dollar of new loans, you now have \$8 of loans and still have declining loan growth. This is what is happening in the western banking system. The chart below from Ned Davis shows the data in the US where **70% of the negative loan growth is due to write offs.** Globally loan activity is growing. The well advertised Chinese loan growth is off the chart.



- c. **Fiscal debt** rose in 95% of the world's countries in 2009. Total cumulative fiscal debt is now 53.6% of GDP or \$37.73 trillion. Fiscal expenditures are **\$4.9 trillion higher in 2009** versus 2007. Combined global fiscal and private debt is in the midst of the largest increase in recent history. This can be seen even in the anemic economies on the bottom left chart on page 3.
- d. **World trade dropped 25% in 2009**, the largest single drop since WWII. This shows the large decline in spot demand for everything. Many commodities however had a brief demand interlude. Commodity demand began to decline in the summer of 2008 as reflected in the US weekly rail car loadings below. The large collapse of demand did not occur until October of 2008. China announced their fiscal package and attending commodity buying spree only a month later.



- e. **Libor interest rates declined 2.5 %** from 2007 to 2010 in real terms or by half. The tightening cycle has begun but will take 2 or more years to return to the levels of 2007. These rates have and will fuel a global debt expansion that will be hard to stop, even at higher interest rates.
- f. **Market cap or the wealth effect is the single largest wildcard.** Listed tradable market cap peaked at \$65 trillion in 2007 and is \$49 trillion at the end of 2009. This \$16 trillion loss in wealth has a large impact on willingness to spend or invest. This is the **one factor in the list provided that is very negative.** Earnings have not

rebounded to the 2007 actual levels, even though all other measures suggest they should. At the peak, financials contributed 35% to S and P earnings. This percentage will be difficult to repeat in this decade. Emerging Country market cap cannot immediately take up the slack due to lower multiples and smaller market cap. Therefore the wealth effect will take some time to return to prior levels.

Real estate wealth effects are similarly negative in the west. Global real estate peaked at about \$150 trillion in 2007 and over half of this is in advanced economies. This value declined about \$15 trillion. Higher overall valuations in the Emerging countries also do not fill the gap. The **lowered global wealth effect is about \$10 trillion.**

Bonds however are the opposite story. Record inflows to bonds have pushed spreads back to normal levels in all but mortgages. With lower interest rates, the combined interest and price effect is positive globally. The total value has grown from about \$45 trillion to \$51 trillion. The real effect is about **\$5 trillion positive.** However the real story is credit derivatives, **the single most difficult factor to measure in the economic pie.** At \$50 trillion they are enormous and are effectively creating leverage in the system. I don't see evidence that this is declining. Total derivative contracts outstanding are above end 2007 levels even with the new attempts to offset risk. Gross credit exposure is \$500 billion above 2007 levels as measured by the BIS. This is 15% growth.

- g. Fixed Investment** fell about \$800 billion 2009 to \$16 trillion. Fixed investment is expected to rebound in 2010 putting it at \$16.4 trillion. **This is \$1 trillion above the 2007 levels globally.**
- h. Consumer price inflation** rose in 2009 by .1% in advanced economies and by 5.5% in developing economies. This combined with the picture above, does not suggest global deflation. Commodities are largely a global market where both supply and demand are **intertwined with Emerging Country inflation.**

To summarize, since the end of 2007 when the financial crisis began, global GDP grew \$4.4 trillion, money supply grew \$3.4 trillion, fiscal debt is up \$4.9 trillion, and fixed investment grew \$1 trillion. These are offset by the declining wealth effect of -\$21 trillion through the end of 2009. We **cannot simply add these numbers up** but looking at the overall numbers suggest a **strong global recovery period** with attending catch up by the equity and real estate markets. Since much of the economic boost comes from fiscal spending, most people question the sustainability of the expansion. The overall picture is **not weak, it is vulnerable to bad government decision making.** Given the lack of immediate fiscal and monetary **belt tightening**, this picture is what has some people worried about serious inflation around the corner.

II. **What is government spending globally being used for?** Critical to this demand analysis is the simple question whether this **money is being well spent** to stimulate demand. Second is the question of how much is being spent on commodity related demand. The IMF has produced large volumes of information on both stimulus and core budget spending. It is important to include both. All numbers are global.

- a. Fiscal spending is up \$4.9 trillion so far since 2007. (This does not include 5 trillion of guarantees and other off balance sheet support). This rate of spending must decline but it will not be negative anytime soon. Spending on financial bailouts can be excluded as it does not directly support demand for commodities. Financial aid has been **60% lower than originally targeted** and has left some room for money being siphoned off into other support programs. Net of this financial support, spending is expected to be **higher in 2010 than in 2009 and is of course way higher than 2007**. Money for consumption and transfers has largely found its way into the world economy. However, money for investment (infrastructure) has been slow to bleed into nearly every economy except China. **This money directly affects commodities**. I have included a chart of the detail breakdown of country support for fiscal stimulus at the end of this section.

To summarize, about half of the tax cuts globally are permanent. About half of all emerging country stimulus is for infrastructure while only 1/5th of advanced country stimulus is infrastructure. The IMF lays out a clear picture of impacts of rising interest rates given **higher deficits nearly everywhere**. The message is that governments cannot raise interest rates much due to high levels of indebtedness already. This leaves them with the hard choices of fiscal responsibility or the easy choices of inflation of the economy. This means governments will choose to inflate their way out of the mess or deflate their currencies or both.

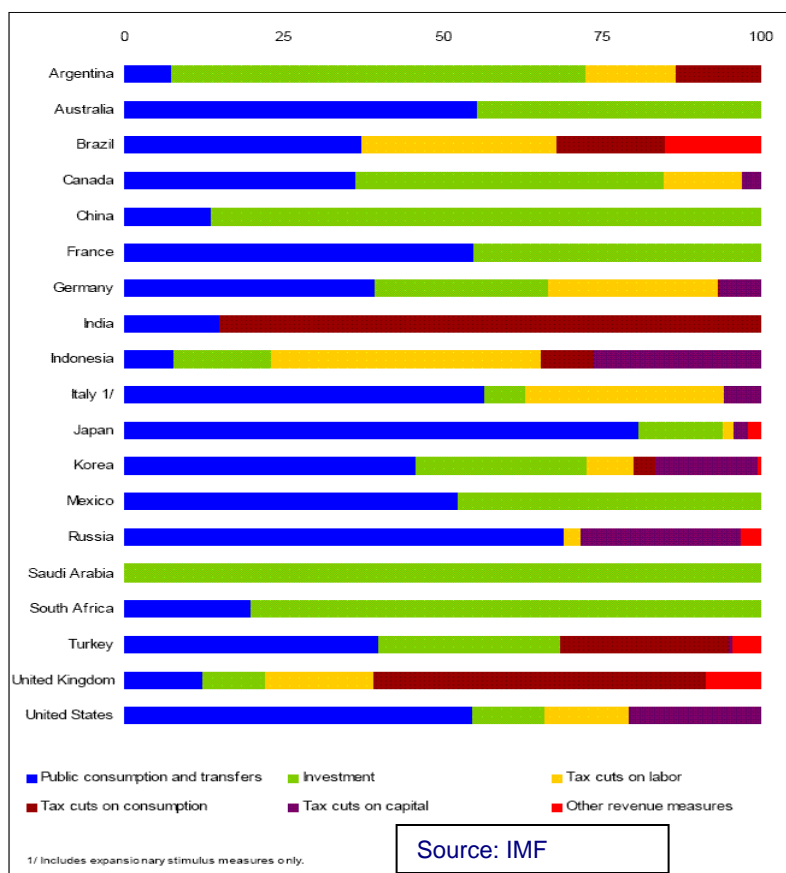
Only global industrialization can bail out cumulative global government debt. It is the path governments will choose through this decade. **Only those forced to cut spending will actually cut spending**. This sets up a decade of country selection trades. Because the individual country currencies can be dramatically impacted, it will impact the commodity supply demand of those countries.

Of the \$4.9 trillion and counting of new fiscal spending, \$4 trillion globally is non financial. Removing transfer payments **leaves us with \$3 trillion** that is available for some form of spending that can stimulate commodity demand immediately. Much of this is infrastructure. This is why the OECD has announced a new study on global transcontinental infrastructure spending needs. Governments are asking for it. Some of their objectives include:

- Fill the air transport gap for **1 billion new passengers** by 2020 (airports and roads).

- Determine how to add a **40% increase in container traffic** by 2015 (ports, rail transport to the ports, and roads).
- Provide alternate trade routes via **long haul transcontinental rail**. Supplement current domestic rail routes. Prepare for movements across much longer distances to growing population centers and from remote supply regions (rail track, cars, and hubs).
- Add **\$8 trillion to upstream oil and gas** investments (pipelines, alternate energy, and flexible energy). We plan a SOPA on the flexible energy grid concept and another on the conversion to flex autos. We will also do a SOPA when the OECD report is ready.

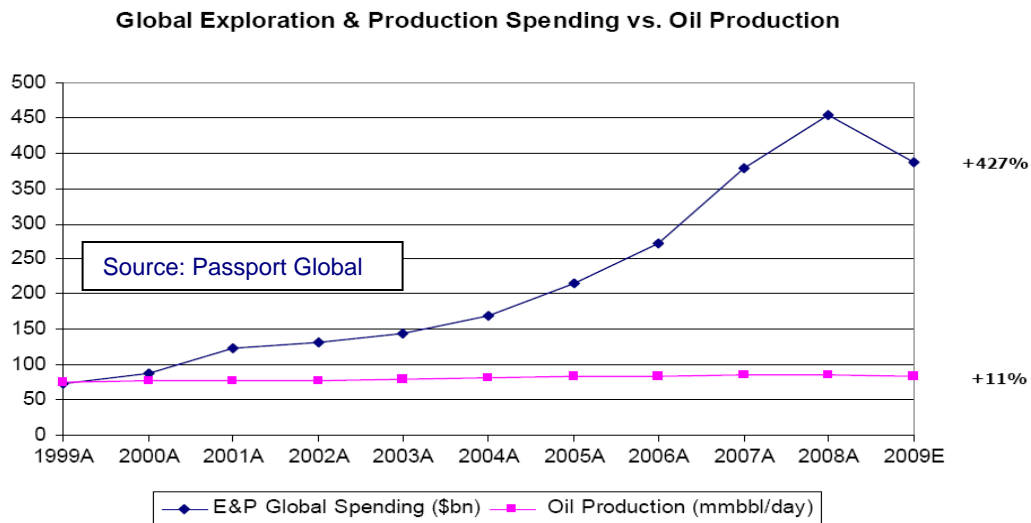
Figure 1. G-20 Countries: Composition of Fiscal Stimulus Measures
(Share of total stimulus planned in 2009)



Many economists are using numbers of **\$10 trillion per decade** in infrastructure spending. This will be well spent if we get our \$33 trillion per year of new GDP from industrialization and new services. The rub is that it takes a massive investment in commodity production from ever more remote regions.

b. **What does this mean for demand in key commodities?** Energy intensity is about 40% in the production of infrastructure **and** the production of commodities. Longer term, how much incremental energy is \$4 trillion of energy each decade? The world uses \$3 trillion of oil per year. It's a lot of incremental energy usage. World oil production has been **flat since 2005**. Demand is also **somewhat inelastic** since the growth is coming from countries that do not already have high levels of energy usage relative to GDP. Emerging countries now account for 52% of energy use.

Even if supplies are available, they are likely to be costly to produce and transport. The chart below shows that incremental oil production has come at a high cost in recent years. This picture of **small increases in oil demand creating large growth rates in spending on exploration, energy services, and alternative energy is at the core of the energy opportunity. High input costs plus high transport costs plus infrastructure demand** points to a long term scenario where even if global growth weakens from here, oil prices will not.



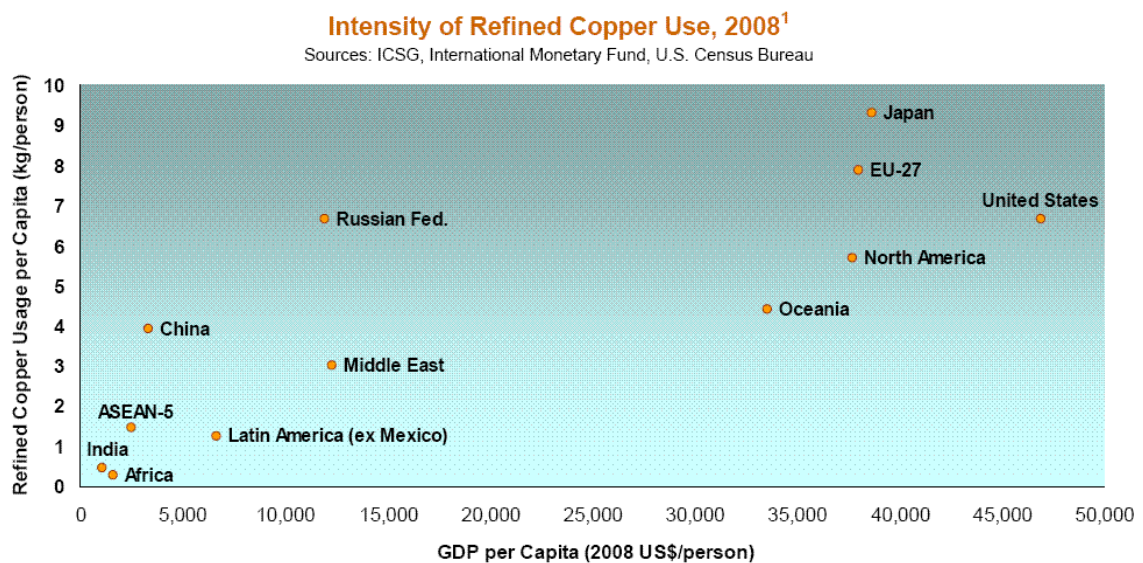
What about immediate demand for metals? Everything in infrastructure uses metals **especially iron ore (steel)**. There is no shortage of supply of iron ore as 5% of the earth's surface is iron. Planet Mars is covered with it. It is also endlessly recyclable. The real issue is the **timing and cost of extraction** or transport against high spot demand. Iron ore is a \$200 billion annual market. Using our \$10 trillion infrastructure spending and assuming 1/10th for iron ore, the demand is \$1 trillion or **a 50% increase** just from the infrastructure build out.

Autos use increasing amounts of specialty steel. The need for lower weight and cleaner **better fuel efficiency will drive a replenishment of the world's autos.**

Plus, industrialization means people who never had cars want them. China is well advertised now as the world's largest producer of cars. Growth of steel usage is projected at 5% from autos but it is likely to be much higher **due to growth and replacement vehicles** triggered by government requirements.

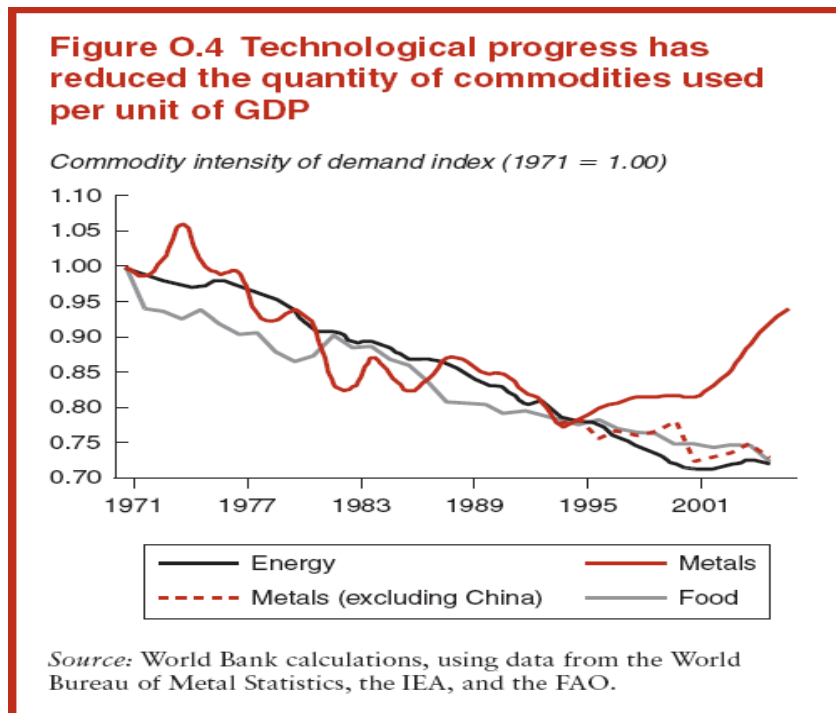
The highest growth in metals comes from the simple increase in intensity of use relative to GDP. As the global industrialization accelerates and GDP passes certain benchmarks, intensity of usage is not linear but rises exponentially. Many Emerging Countries are now reaching these thresholds. Copper is shown below. It shows China's high usage per GDP due to its focus on building. **Asean, India, Africa, and Latin America are far behind** and growing rapidly. Each commodity's intensity picture is different.

Emerging countries now account for 60% of aluminum and copper use. Their intensity is extremely low and the demand is therefore somewhat inelastic like that of energy. When **GDP growth is above 6%** changes in intensity of usage causes large shifts upward in demand.



III. What about the world's most important buyer, China? It buys 1/3 of commodities in the world and constitutes much of the increased demand. Simply stated, I do not see this derailing completely due to their oversupply of housing and offices in major cities. Unlike the West's housing problem, China's is not based on complex derivatives that have inherent leverage of 5 times on top of the mortgage leverage with no down payment and therefore infinite leverage. **One problem is physical and the other is financial.** China is in the **midst of a major housing and lending correction.** Its growth must slow from 12-13% and I believe China's track record is good at controlling a slow down. China's growth at 8-9% is plenty to underpin commodities.

What is critically important is how China's rapid expansion is creating a demand shock. When this occurs, the intensity of demand **per unit of GDP** rises. Its impact on metals due to construction is shown below. **Large increases in intensity of usage over short periods of time cause supply shortages.** This is because the sharp increase in demand cannot be accompanied by a sharp increase in productivity over such a short period of time. This in combination with the penchant for precious metals causes me to label this, the "**Decade of Metals**".



Overall the demand picture for commodities is strong. This will remain so as the infrastructure build out and industrialization continues. It also promises to be a **volatile demand stream** dependent upon China and the hit or miss decisions of governments pushing the \$10 trillion per decade spend. This is not *only* a long term story. US leading indicators with revisions in March were the strongest in 25 years and infrastructure demand is just beginning to hit. OECD leading indicators were the best since 1979. The **combination of easy money and construction** is now filtering through to a growing realization that the world economy is growing 4-5% for the foreseeable future. Next will be the realization of overheating in some sectors while unemployment remains elevated. Later stage cycles in commodities are normally fraught with supply shortages and so next up is the marginal supply.

IV. Where is the marginal supply coming from? All supply is important but in a backdrop of strong rising demand, the marginal supply becomes a critical factor in price. Unlike the Naughty decade, the Teeny decade faces a tougher borrowing and capital environment for the marginal producers and especially for the smaller exploration and production companies. Seven countries dominate marginal supply of available commodities for export. In order these are **Russia, Saudi Arabia, Australia, Canada, Norway, Brazil and South Africa.**

a. Russia's industrial production collapsed 40% at the trough of the 2008 financial crisis. The overall drop in growth and investment in Russia was the **highest in the world** and only now is recovering. Private money is scarce to build out additional sources since much of it is now state owned. As a leading exporter of oil, gas, coal, and metals, the world must have access to Russian reserves. These reserves include the five largest gas fields that are already 50% depleted.

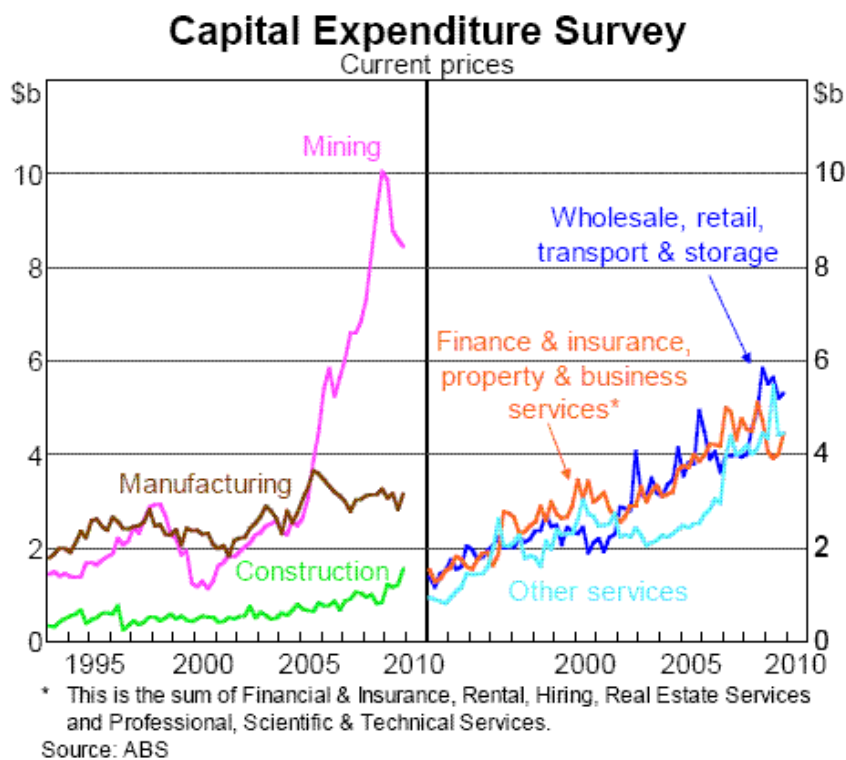
Russia's ability to create new exports has generally been strong showing a 5.5% annual growth rate in the last decade. Their production however only grew at a 4.7% rate. Given their internal demand was also up, one wonders if they are putting air in their gas pipelines. The numbers if true show that even in a perfect environment for expansion like the last decade, **Russia struggled to create production** equal to the growth rate of its exports. Given the 25% decline in government currency reserves, the country is not in great shape to keep up with the prior decade's growth in exports.

b. Saudi Arabia holds the key to marginal oil supply in the short run. The market assumes they can turn on an **additional 5 million barrels** of supply at any time. Data from various sources is a subject of debate and the Saudi government is notoriously secretive about reserves. **Saudi exports and production of oil and gas peaked in 2005.** One must wonder why they did not increase production as oil prices tripled into 2008. This seems like more than OPEC discipline which would demand more oil flooding the market to keep prices in line so oil stays competitive. Saudi exports of oil and gas measured in barrels of oil **grew a dismal .4%** over the Naughty decade. Production growth was slightly less. The facts do not smell like a situation with huge reserves that can or will be easily made available as prices rise.

c. Australia is the **world's best hope** for finding new supplies of coal and metals. In 2008 the government announced the infrastructure Australia Act. It establishes a blueprint for expansion of facilities that will help alleviate some of the logjams and allow higher exports. Coal is a key export and comprises 20% of commodity exports. It powers Japan, Korea, Taiwan, China and India. Australia's iron ore exports are currently 30% above the year end 2007 peak levels and are setting new all time highs. The country managed to nearly triple its production of iron ore in

the Naughty decade. **Vast growth potential remains down under.** During this same decade that mining production was growing 100%, capital expenditures for mining grew 200%. This shows again how each incremental dollar of spending is producing much less output.

More recently Australia has proposed a mining tax. This is a microcosm of what is going to happen globally. Half the tax proceeds are slated for new infrastructure build. The companies being taxed have less money for investment. It increases demand and reduces supply. Public policy of this type will begin to proliferate as governments look for ways to cover shortfalls while providing employment.



- d. **Canada** supplies chemicals, fertilizer, gas, oil, aluminum, and timber. It holds the one of world's largest supplies of **fresh water**. The United States seems sanguine about its long term commodity short. This is because the US has surplus food and its short in gas, iron, and water are nearby. Fuel can be covered at the price it takes to remove oil from sand just north of its border. Canada has proven over the Naughty decade that it **can increase its production and exports of energy by 15%**. Its government and currency is in a strong position to attract capital for rapid expansion.

- e. **Norway's** economy since 2000 has benefitted from exploding exports now representing 42% of its economy. Unemployment is just above 3%. The combined trade surplus, net reserves, and government surplus makes we Americans pine for a passport to Norway. Oil and gas, energy services, transport, and shipping (read all energy) dominate the picture. Norway doubled its exports in the Naughty decade even though its oil production fell 30%. Europe's industrial north and the UK are **highly dependent on Norway**. Money will be readily available for commodity expansion.
- f. **Brazil** finally brings us to the topic of food and feed. Agriculture represents over 40% of Brazil's exports. The world's dependence on food makes the country somewhat recession proof and Brazil nearly finished 2009 with economic growth. During the Naughty decade, mining activity grew 50% and production of crops grew over 50% making this the last of the featured countries with a track record in **superior expansion of commodity production combined with a relatively stable financial backdrop**.
- g. **South Africa** (and all of Africa) is critical in the supply commodities. Africa is growing at a blistering pace in the last decade and has nearly a billion people. Still it is not high on anyone's list of locations for providing debt for expansion.

As we look at the combined picture of marginal supply globally, supply **growth rates over the last decade are weak at best** in context of readily available capital, huge demand and expanding margins. Now with capital more constrained for the private sector, the innovation needed to goose the supply is harder to finance. Transportation distances have grown about 20%, boosting input costs. Supply costs are underpinned by the simple fact that inflation in countries that provide most commodities is over 5%. Critical suppliers such as Russia and the Middle East are more unstable. I repeat a critical fact: small increments of growth in demand for commodities result in **large increments of needed growth in spending**. The suppliers will be hard pressed to keep up.

Putting the demand and supply picture together causes economists to predict higher prices. The financial crisis has not improved the situation, it has made it worse. Old trends of **industrialization are still in place and are being accelerated by new trends in government expenditures. New trends in rationing of available capital and regulation make the supply chain more expensive**. The question is **when and how much higher** prices need to go to ration usage. To address this in a specific way, I digress to the question of what causes prices of commodities to move in the first place. It is not as simple as supply and demand.

Section Three: What causes commodity prices to move? Commodities have unique price features and modeling problems. One of these is the fact that *most* commodities are physical and have to be stored (carbon is an exception). Storage costs lead to negative carry and the fact that commodities can have **either positive or negative cash flow depending upon whether they are in backwardation (spot prices above future prices) or contango (spot prices below future prices)**. Commodities are also **not fungible** over distances since they are physical. Transportation costs enter the picture. This can **delink a futures market** from physical activity in any given location. Individual commodities have modeling properties that are unique to their specific market, such as time storability (how long they can be stored). Commodities have extreme **time varying volatility and correlations**.

Research on commodities that comes from banks and investment houses tends to focus on futures markets. Most send around **stocks to use ratios that cover about 15 – 20 years** or the period where financial people entered the commodity picture. Stocks used in these charts are futures stocks, not all physical stocks. Prices are futures prices. Only consumption usage is the full physical use of the commodity.

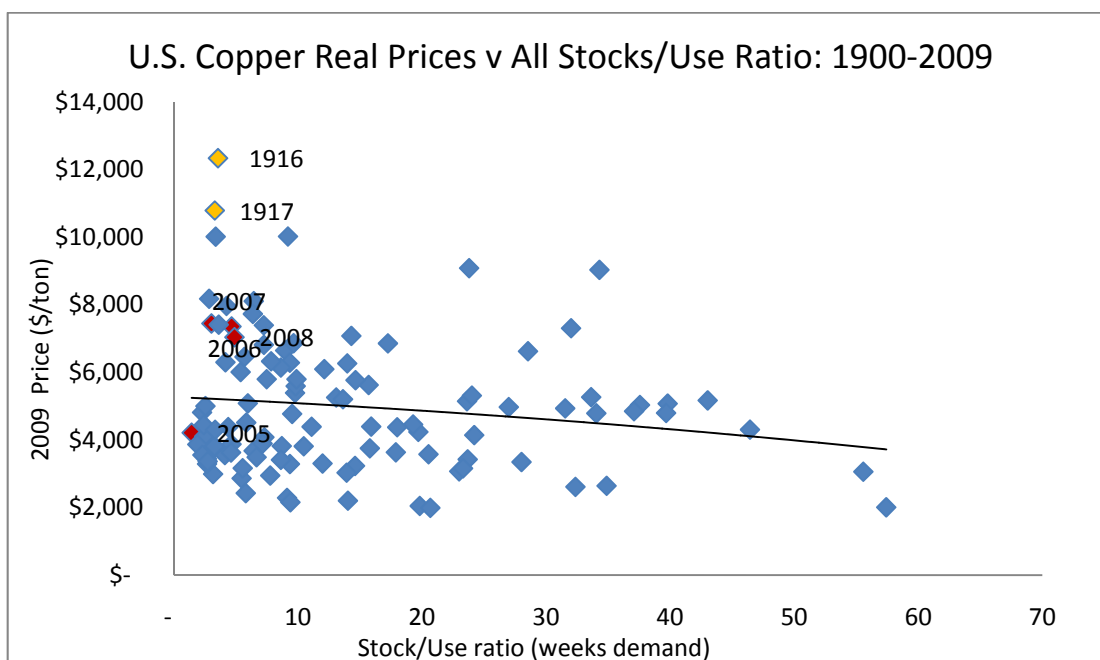
Financial modeling also tends to cover derivatives that are based on futures markets. Or it covers indices that are based on futures markets. Models normally assume that **capacity is fixed, that transportation costs are fixed, that supply demand impacts are linear, that volatility is fixed, that correlations are linear, that no factor substitution effects are present, that there are no seasonal impacts, and finally that distributions are normal**. If normal distributions are a serious problem for financial assets, they are a disaster for commodities where there are **unusually fat tails**. (I call these **black sheep**, wool being a commodity). One reason for these fat tails is that the weather impacts the price in dramatic fashion. Another reason is government intervention and subsidies. Imagine all the problems the list above creates for modeling commodity options.

Investors **have to deal with the physical** as well as the futures market and are not just hedging back to back. This represents a lot of problems and territory to cover so I give you some examples of specific data issues below. For those who think this does not matter to them, **commodity dominant markets tend to spread these effects through the marketplace** via an effect on correlations of financial assets. This was dealt with in our SOPA #7 on coherence. Also, I would remind our long term readers that we suggested paying attention to CDO problems in Sopa # 9.

- I. **Do stocks to use ratios really work to predict prices?** Prices function to cause behaviors and especially do so in commodities. High prices should create less use and low prices more use. High prices create more supply and low prices less supply. This causes the often cited price driver of **stocks on hand in relation to usage (stocks to use)**. It captures price factors at their simplest level. It should work to predict prices but it does not work well during demand shocks especially when the real physical world is

examined. The most obvious example is during times of government intervention, especially so during times of war.

Copper is shown below for 110 years with the annual US spot price on the left scale and the annual average delivery stocks divided by the use or consumption in weeks. Real prices are used to remove inflation effects. Over the 110 years, there are 20 years when the high price is more “disconnected” from stocks/use than it was in 2008. (Source: LME). In 1916-1918 prices were triple the “disconnect” due to price fixing by the Committee of the War Industries Board. **Given that half of all data points** below are relatively disconnected for a whole year from implied stocks/use price prediction, extreme caution is warranted. The **current scenario of higher prices with average stocks on hand is not an outlier**. As we enter a period with higher levels of government intervention and carte blanche for regulation, risk of disconnect rises. This holds true for all commodities we could examine back this far.

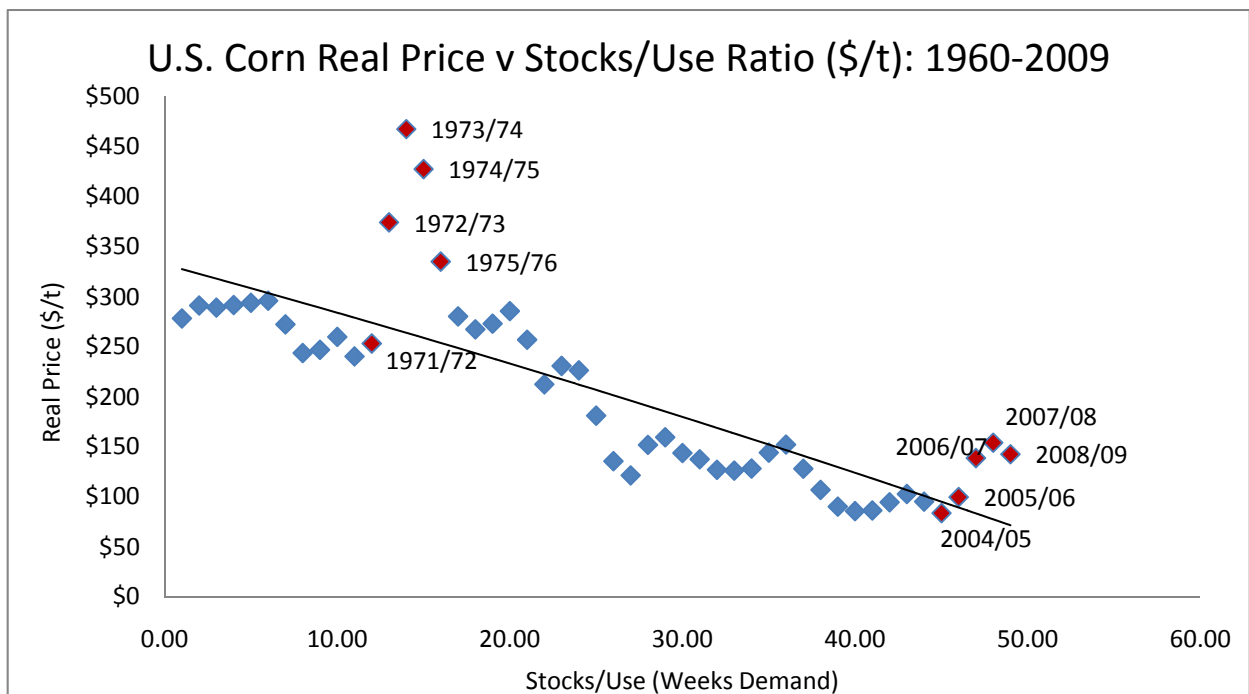


A second reason price prediction from stocks/use can break down is a **demand shock** such as that presented in this SOPA. Supplies can be very high but if the demand shock is large enough, the demand cannot get its hands on the supply. **Deliverable stocks can soar while prices also soar**. Ag traders get one guess as to which year this occurred in corn.

Transportation enters the picture during a demand shock. Shortages of equipment to move or offload stocks **expand margins** for those with the prescience to get long

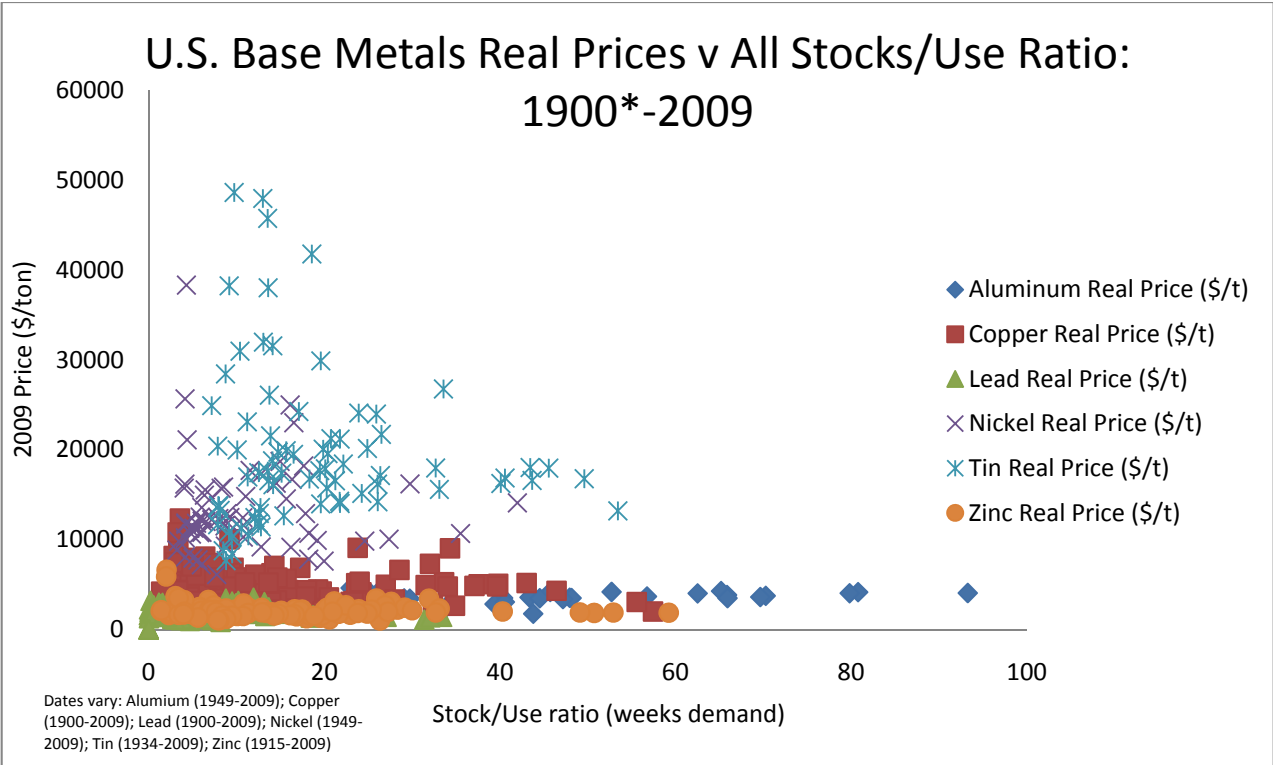
transportation and facilities. This is the primary argument for owning commodity equities as opposed to commodities. During demand shocks, stocks can keep many markets in cantango with their attending negative carry. Investors in raw commodities suffer versus those in commodity equities.

Below is average cash corn prices vs stocks/use for 50 years. Yes it was 1974 when corn was coming out of the woodwork while prices rose substantially in futures. The arbiter is of course the basis or price relationship between the cash and futures. **It widens** along with margins for commercial firms.



Another reason for disconnect is rapid substitution effects. Corn is fed to cattle. Corn is now burned for fuel in an amount that impacts feed substitution (see SOPA #15 Ethanol). The uneconomic outcome of this is that the cattle herd in the US is at a 50 year low. All but overpaid financial people should **plan on eating more rice**.

Over a broad spectrum of commodities and time, stocks/use does anchor prices and investors would do well not to deviate far from its predictions. Still, during times when demand shocks, government intervention and spending, and competitive devaluation reign, one should assume **deviations as much as 35%**. Deviations can last 5 years during which time the fundamentals of stocks and usage will have changed. Below are base metals over 110 years. These metals show the same tendency and deviations mentioned above.

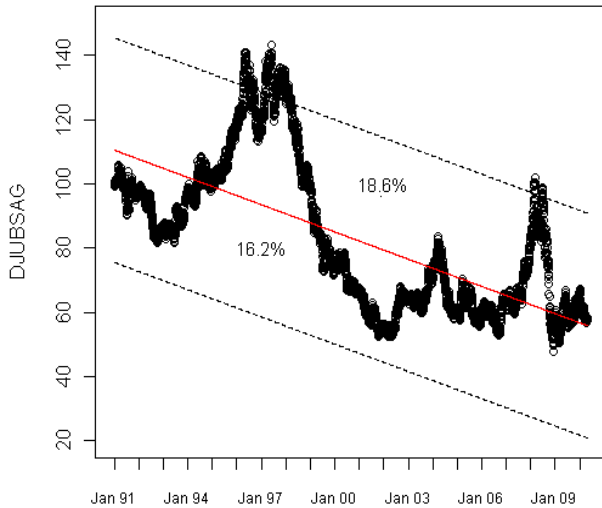


II. **What is the impact of volatility on modeling?** Commodities are highly volatile as individual assets. With volatility at 2-3 times a balanced portfolio of financial assets, they are as volatile **all the time as the 5%** of the time financial assets are when they are making their left tails. Volatility of commodity indices are much lower and benefit from diversification since commodities are not very correlated (until they are).

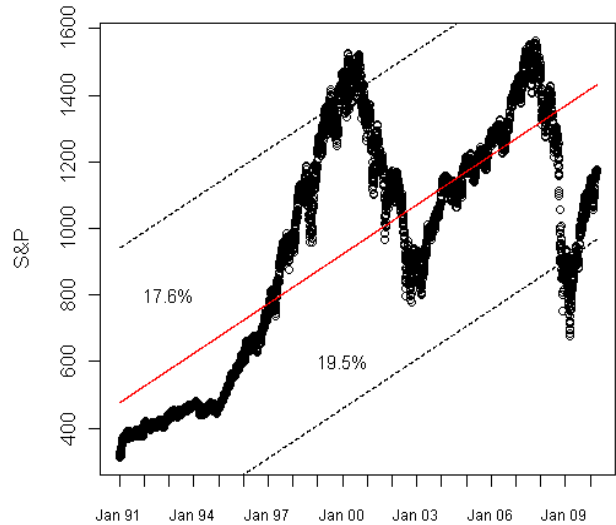
Commodities are **most volatile in bull markets**. The chart below shows data of the DJUBS index since 1990. When commodities are above the trend line, volatility is 18.6%. Below the trend line volatility is 16.2%. This 2.2% difference is in a quiet period for commodities and constitutes a 14% difference. This is shown on the **chart below**. In prior demand shocks, we can see differences of 30% in average volatility. Equities for the same period behaved in the opposite fashion as shown on the chart to the right of the commodity chart.

SOPA #19 is going to focus entirely on solutions to risk assessment in commodities and volatility will be one of the focal points. Another focus will be extreme left tail events (**black sheep**). We will show some of the benefits of using principal components analysis for hedging. Commodities provide extreme challenges and we find **few hedge funds who really understand this at a detailed level**.

DJUBSAG Index with trend, since 1991



S&P500 Index with trend, since 1991



This SOPA has focused on why **commodities are the main beneficiary** of the fiscal mess and fallout of 2008. Certainly there will be pockets of fiscal crisis as this is now a poker game where the kings and queens are wild. These generally add to the worry over paper currency and the shift toward real assets and real construction of things that benefit the taxpayer. Governments have more power to impose caps, restrictions and taxes that drive up prices. They will continue and increase a **long history of price subsidies** for users. I believe this is a perfect setup for the Price of Power phase of the super-cycle.

Mari Kooi

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May 5, 2010