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**Global Forum on Competition**

**COMPETITION AND COMMODITY PRICE VOLATILITY**

**Contribution from Mr. Torbjörn Iwarson**

-- Session I --

*This contribution is submitted by Torbjörn Iwarson (Head of Commodities, SEB Merchant Banking, Sweden) under Session I of the Global Forum on Competition to be held on 16 and 17 February 2012.*

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## REFLECTIONS ON THE CAUSES OF COMMODITY MARKET PRICE CHANGES AND VOLATILITY

-- Contribution from Mr. Torbjörn Iwarson \* --

### Introduction

1. Commodity prices, which were more or less unchanged during the 1980s and 1990s, started to rise in the period 2000-2005. Consumers have found that “things” have become more expensive, in particular as incomes, mostly in the developed part of the world has not increased at the same pace as commodity prices. Some people react to this increased feeling of resource scarcity by calling for a “sustainable” attitude towards natural resource use in the fear of resource depletion. Others fear that financial and when in collective form, anonymous, financial flows into the markets for contingent claims on commodity prices such as futures contracts and commodity index funds increase resource scarcity by increasing price or by at least increasing volatility.

#### 1. The role of futures markets

2. The three most important functions of a centralized, futures market is usually mentioned as being:

1. A source of price discovery
2. A place for producers to unload price risk and investors to carry their price risk.
3. A place to store surplus inventory

3. Most futures markets are modeled on the Chicago Board of Trade, which came into existence in 1848 as necessity called for more order in commercial activity. The discussion on the role of speculation has a long history at the CBOT.

#### 2. The role of speculation

4. Speculation is the task of assessing current and forecasting future supply and demand. The task is to find the price which balances supply and demand in the future with all known information – and the correct interpretation of such information. The objective is to avoid scarcity and to avoid wasteful overproduction. The incentive for guessing right is a profit, the compensation for the work. In any society, this task has to be performed and in a free market economy it is the role of the speculator. But who is the speculator in a free market economy? Of course the speculator is every person free to make consumption or production or storage choices. On a personal note, I remember that my mother used to buy potatoes in the fall, as she always thought it would be more expensive in the winter.

5. People who criticize speculation usually think of someone cornering the market, which almost always when it has been done, has involved the physical market. Or they may think of someone creating rents, at the expense of someone else. The creation of rents almost always requires political decisions or some other cause of special market power such as monopsony or monopoly, i.e. deficiencies in competition.

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\* Note prepared by Mr. Torbjörn Iwarson (Head of Commodities, SEB Merchant Banking, Sweden).

6. There is also the fear of “bubbles” of high prices based on thoughtless speculation in a movement of herd or crowd behavior. Knowledge of such manias is widespread in society. Examples of instances of herd behavior of the financial kind are The South Sea Bubble, the tulip mania and many other described e.g. by Mackay<sup>1</sup> and perhaps in more recent time, the “IT bubble”. Popular delusions and crowd behavior are however not limited to peoples’ investments. In other parts of society; it is well known that waves of such policy affecting thinking or lack of thinking, can exist. And these instances can be far more damaging than speculative manias.

7. One such popular delusion, may be that very high commodity prices are caused by speculation. This is belief is by no means new. One does not have to refer to popular films such as James Bond in “Goldfinger”, where the character Auric Goldfinger had secretly cornered the market for gold to get immensely rich and powerful by the push of a button, at the expense of a peaceful and unsuspecting world. In a movement that existed in the late 1800s called the “Agrarian movement”, the House of Representatives and Congress in the USA was nearly in majority to de facto outlaw futures markets. The accusation then was that speculation depressed prices. This episode is described by Lurie<sup>2</sup> and two quotes can illustrate the mood at the time

*“We are profoundly impressed with the conviction that the gigantic gambling device known as short selling, in which one party agrees to sell what never did and never will exist, and the other agrees to buy what he knows is never to be delivered to him, has been a potent cause in producing the ruinous agricultural depression from which the country has suffered”, from a print 1892*

*“By the combined action of certain persons... organised into... Boards of Trade, the prices of all kinds of farm products are so manipulated and depressed that they cannot be produced except at a loss to the farmer”, the Hurricane Grange No. 359.*

8. Two bills were presented by the agrarian movement. The first was the Butterworth Bill of 1890, where a dealer would have to pay \$1000 pa for the privilege to trade in futures and options, and for transacted volume, 5 cents / lb of cotton, and 20 cents / bu of grain bought or sold.

9. The second bill was the Hatch Bill of 1892: where a dealer would have to pay \$2000 pa + 20 cents / bu of grain. This bill passed the House easily and was sent to Congress. Congress approved it with a few amendments and it was sent back to the House for them to approve. Due to shortness of time, it was hurried to decision and failed to get the required 2/3 majority with a small margin in 1893. These two bills had such large costs to transactions and market participants, that the market had ceased to exist.

10. Meanwhile, the popular mood had changed. The CBOT wrote on “produce gambling”, which was common in the form of “bucket shops”, an older version of today’s online betting sites, that it

*“bears about the same relation to legitimate commerce and speculation... that the froth and foam of the Niagara do to the almighty volume of water underneath. It is the bubble and fuss and fury, the froth and foam upon the surface that offends, not commerce itself”, DP April 29, 1890.*

11. The magazine the Northwestern Miller, wrote in January, 1892 about the agrarian movement bills:

*“How in the world a farmer can be benefited by the passage of such a measure... is beyond us”*

12. Farmers themselves were quite active speculators, Prairie Farmer wrote on Dec 27, 1884:

*“What is wanted now, is for farmers to hold back all the grain they possibly can, and hold on to it”.*

<sup>1</sup> Memoirs of Extraordinary Popular Delusions and the Madness of Crowds, Charles Mackay, 1852.

<sup>2</sup> Jonathan Lurie, The Chicago Board of Trade 1859-1905, University of Illinois Press, 1979.

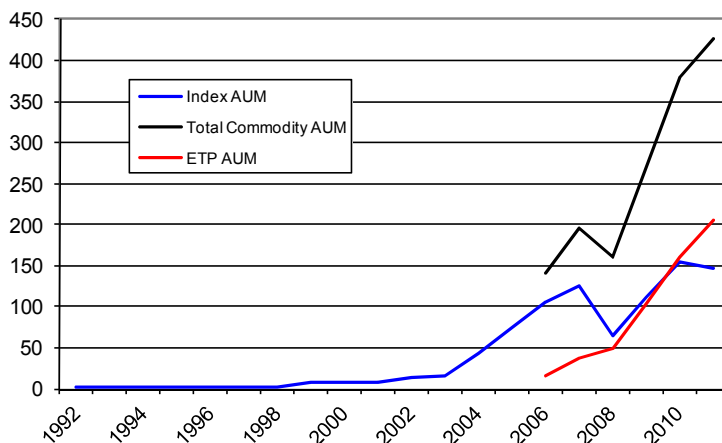
13. The reason most cited for not interfering in the commodities markets was that

*“the ethical distinctions involved between legitimate and illegitimate speculation are not easily reducible to exact legal definition”, Newman Smyth, Forum 19, 1895.*

14. This is still today true. Thus, as was written at even an earlier date, there is nothing new under the sun.

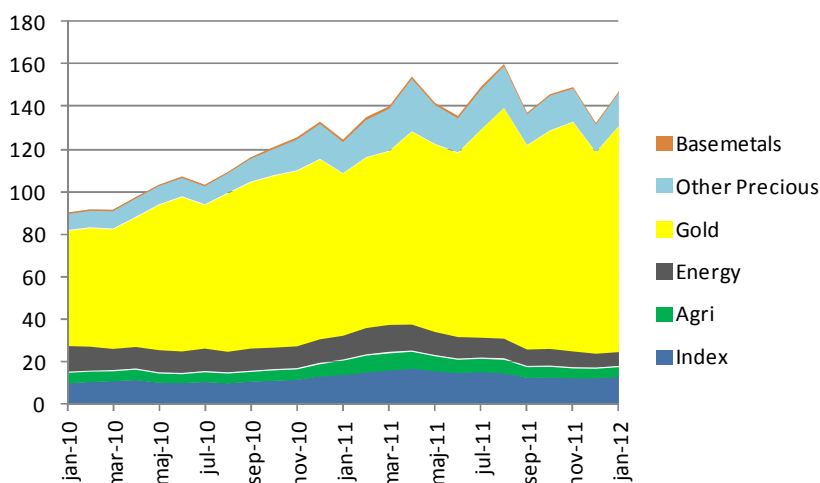
**3. Today, how much money is investing in futures contracts on commodities?**

15. The amount invested in commodity futures and commodity markets is by Barclays Capital<sup>3</sup> estimated to more than 400 billion US dollars. Most of this is now invested in Exchange Traded Products (“ETP”), that is, as notes or fund units which are traded at low cost on the infrastructure of stock exchanges and custody accounts built up during the stock market boom of the 1980s and 1990s. Below we see a diagram of Assets Under Management (“AUM”) in USD bn.



Source: SEB Commodities, Barclays Capital

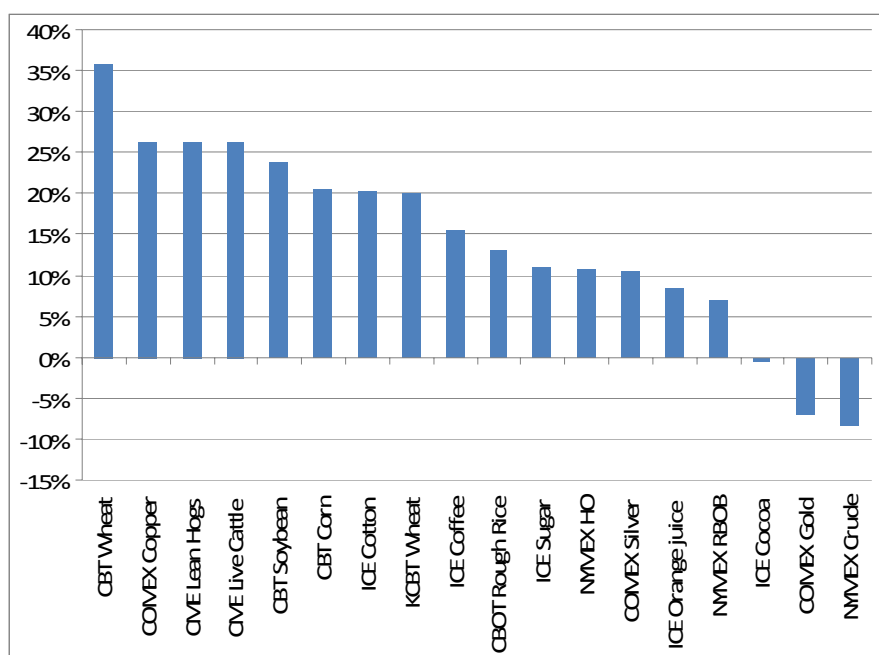
16. We can also study AUM of ETPs only, where it is easy to get data. Below we see how AUM is split between sectors of the commodity market, updated to the end of January 2012.



Source: SEB Commodities, Bloomberg

<sup>3</sup> The commodity investor, Barclays Capital, December 20, 2011.

17. We see that most of AUM is in gold, which does not behave as a commodity, but as a financial asset. While stocks of crude oil may last for a couple of weeks of consumption if production stopped, stocks of gold would last for nearly 50 years. We also see that the “financialisation” of base metals is not happening. Whatever goes on in base metals markets that seem curious, is created by industrial agents and governments. Agriculture products are also quite a small part of the total. In certain, fairly small qualities, such as the soft red winter wheat futures market traded in Chicago, there can be a large proportion of index investors. There is however arbitrage possibilities to the much larger markets of hard red winter wheat in Kansas City. It is slightly myopic to just look at the share of index investors in Chicago wheat. Below we see the share of “swap dealers” net position of open interest in a selection of US commodity futures markets.



Source: SEB Commodities, CFTC, Bloomberg

18. Note that swap dealers who is thought to represent financial investors is net short cocoa, gold and crude oil. Should we interpret this as that “savers” are in fact “borrowers”? If we sum up AUM in ETPs that invest in crude oil, do we find a negative number? Obviously the answer is no. Maybe the CFTC swap dealer data is not all that reliable to make inferences about commodity investment flow as one may have believed.

19. In any case, there are many producers exposed to the risk of falling prices and operational loss. To insure against this risk, they turn to futures and OTC swap markets and banks to sell forward and get a fixed price and thereby unloading risk. No one carries this risk for free. There is a risk premium. This was described by Keynes in his book “A Treatise on Money” in 1930<sup>4</sup>. Futures prices are lower than the expectation is that the spot price will be in the future. Keynes called this “the theory of normal backwardation”. The risk premium lies in this discount to spot prices that exist over time in futures prices. For products such as wheat, the price risk is the largest source of income variation between years for a grain grower, for example in Sweden. There is a demand for buying insurance against this risk, i.e. to sell

<sup>4</sup> John Maynard Keynes, “A Treatise on Money: The Pure Theory of Money and The Applied Theory of Money. Complete Set”, Martino Fine Books, 2 June 2011.

forward. For consumers in Sweden, the exposure to wheat prices is negligible. There is little demand from them to hedge wheat consumption costs. Hence, someone else must act insurance company and these are for example savers. However, savers are exposed to price risk on “things” such as wheat, because for example pension funds save money that will be consumed by someone in the future and among things consumed are wheat. If “things” get more expensive there is a risk reduction to be gained by investing in commodity markets. Both producers and savers are better off when they can help each other over the futures exchange.

#### **4. Why invest in commodities?**

20. There are many reasons why people invest in the commodities market through futures contracts. The first is that the risk premium offered by producers who sell futures contracts to protect themselves against price risk has been attractive and at the same level as the risk premium in the stock market. There is also a low or sometimes even negative correlation between commodity price changes and stock markets. An investment into the commodity market for someone who already has stocks and bonds will reduce the risk in the portfolio and make it safer. It is possible to get the same high return but at a lower risk. A further reason why people invest in commodities is that commodities as a group has a positive correlation to inflation, while both stocks and bonds have a negative correlation. We have a situation today with record high government debts and record low interest rates. This combination has always lead to inflation, i.e. the loss of purchasing power of savings. Investment in commodities gives some protection against this risk. The final and perhaps most important reason why people invest in commodities is that half the world’s population is growing, notably China. As a country goes from poor to developed, there is a growing demand for everything from dishwashers to modern houses with plumbing. There is a demand shock temporarily driving the commodity markets.

#### **5. Does financial flow affect commodity prices?**

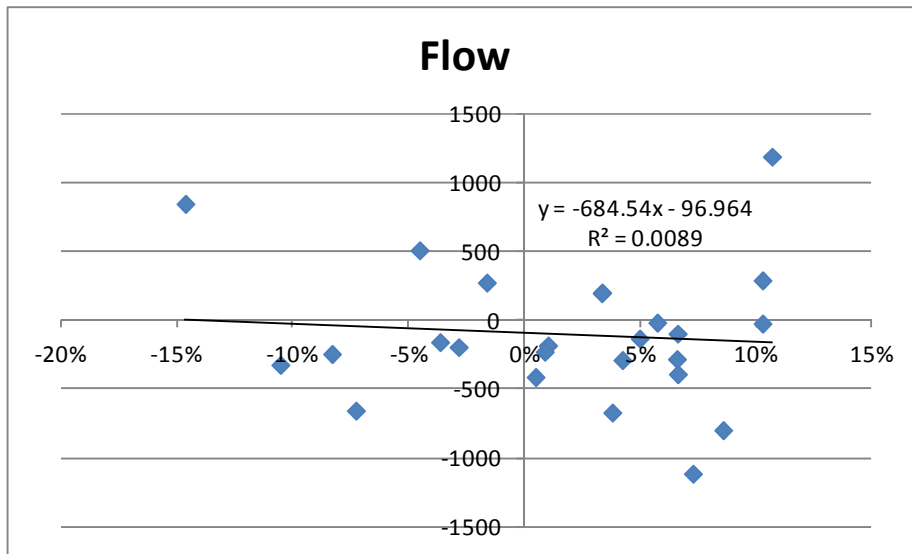
21. A number of studies for example by EDHEC Risk Institute<sup>5</sup> and the agricultural economist Scott Irwin<sup>6</sup> and Dwight Sanders, have been done during the recent years, mainly using weekly Commitment of Traders data from the US markets published by the CFTC. Naturally, organizations such as the IMF, the FAO and the OECD has studied and published reports. These have found correlation between financial flows and price changes. The causation does however seem to go from fundamentally-caused market price changes to purchases or sales of futures contracts by financial actors. There is little evidence that financial flow cause prices to move, at least over a time horizon relevant for the economy at large. If financial actors had superior information one would actually expect them to move price permanently and this would be a good thing, but there is no evidence of this. Anyone who has ever entered a limit order into an order book for a futures contract or a common stock knows that one can momentarily change the best bid or best offer price, but that is not the same thing as permanently moving the market as other people with a different view of the right price have time to react.

22. Instead of analyzing CFTC data, one can look at flow into and out of an exchange-traded fund. The largest energy-related ETP listed and with data available on the Bloomberg information system has had the following relationship between flow (in million dollars) to the percentage change in the price of crude oil, on a monthly basis the last two years:

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<sup>5</sup> EDHEC Risk Institute, “Has There Been Excessive Speculation in the US Oil Futures Markets? What Can We (Carefully) Conclude from New CFTC data?”, November 2009.

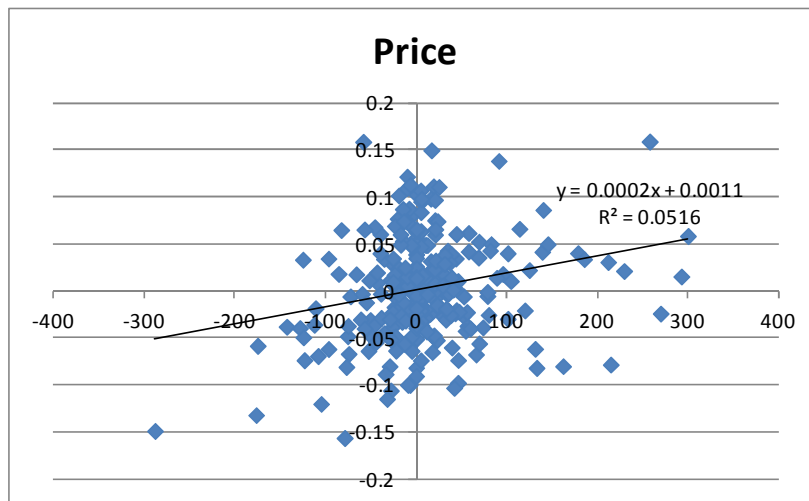
<sup>6</sup> Scott H. Irwin and Dwight R. Sanders, “The Financialization of Commodity Futures Markets or: How I Learned to Stop Worrying and Love the Index Funds”, October 2010 (<http://ssrn.com/abstract=1699793>).



Source: SEB Commodities, Bloomberg

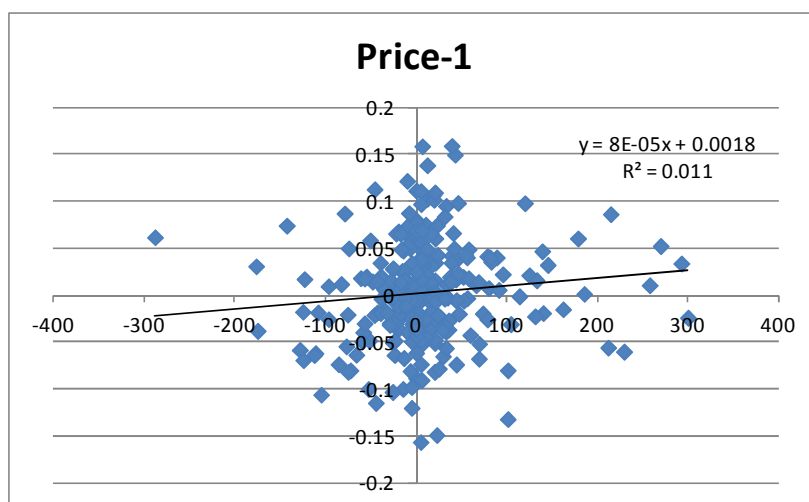
23. There is in other words, with such a low R2, no relationship at all.

24. If one turns to the largest ETP on agricultural products (futures) it is the Powerhares DB Agriculture, listed on NYSE. Using weekly data for assets under management and weekly changes in the price of wheat on CBOT, we find the following relationship between change in price and change in AUM for the same week. This does however, not say anything about causation.



Source: SEB Commodities, Bloomberg

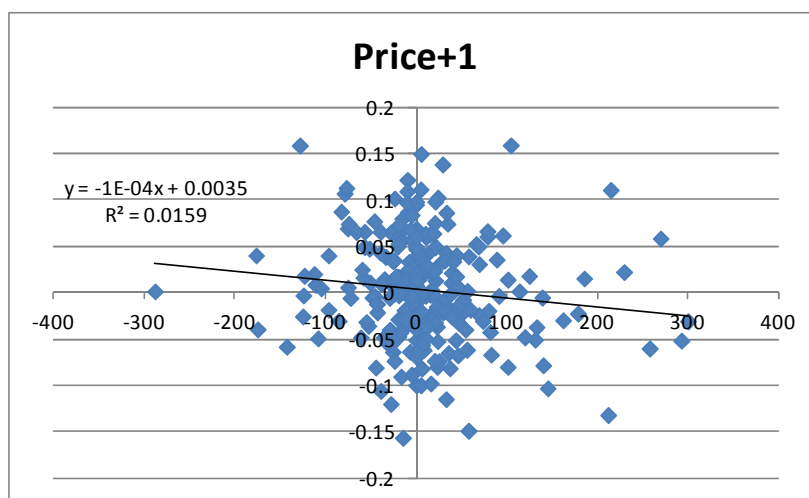
25. We can now look at the relationship between the price change the week before and the change in AUM for the current week:



Source: SEB Commodities, Bloomberg

26. We see that this has if anything a positive relationship, but the R2 is certainly not high. An increase in the price last week made investors buy the following week.

27. Now we finally look at the relationship between a change in AUM the current week and the change in price the next week:



Source: SEB Commodities, Bloomberg

28. This has if anything a negative effect. An investment in this the largest ETP on agricultural products has tended to be followed by lower prices, not higher.

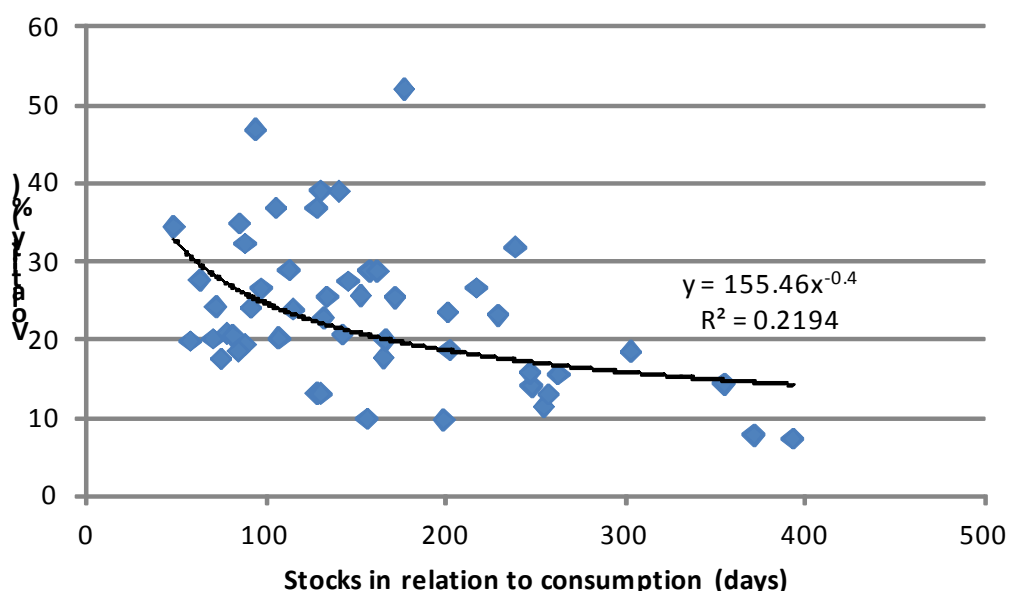
29. We must also note how extremely insignificant the explanatory power of investment flow is, even on a weekly basis. There is clearly no support for claims that investment flow increases prices for commodities when explanatory power is microscopic and if anything the effect has the opposite sign, as we saw in the examples above.



## 6. Some causes of volatility today

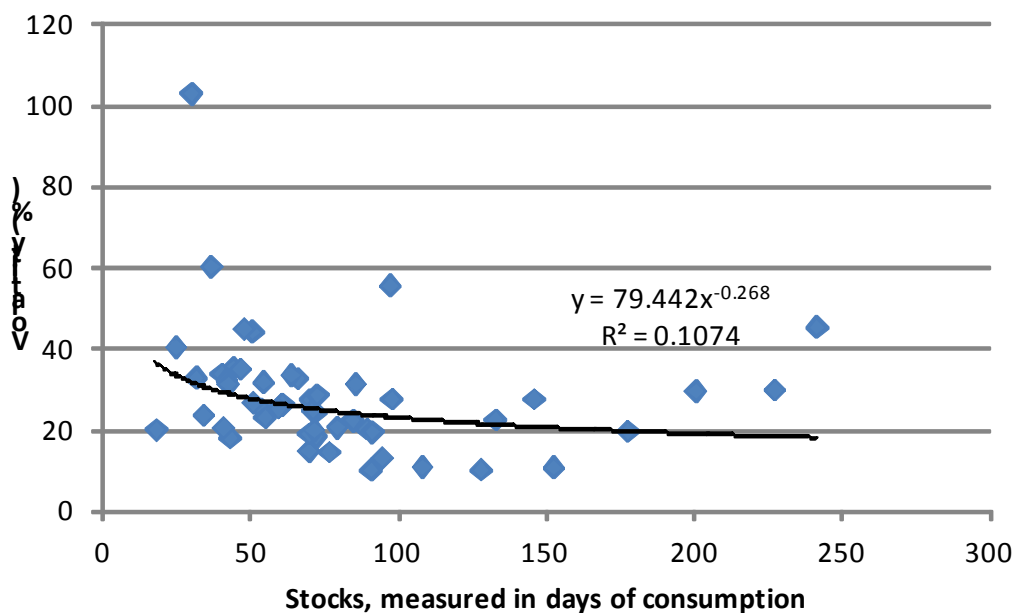
30. The textbook cause of price change or price variability is change in supply or demand. The end result of supply and demand for agricultural products, where we more or less consume what we produced in the same annual production and consumption year, is carryover, or carry out stocks. That level is a key factor and forecasts and changes in forecasts about the level of carry out stocks have a large impact on markets. Commodity markets have the institution of “storage”, which no other market, such as the equity or bond market has. Storage is filled when prices are low and emptied when prices are high (in relation to long term production costs) and prices are temporarily changed due to short term disturbances in consumption or for agricultural products, mostly due to production disturbances such as drought. Storable commodities where storage is inexpensive, have low price variability. The spot price of electricity, impossible to store, has a high volatility and the need to manage exposure to such price risk via futures markets and contingent claims in general, is high. The price of wood has a very low price volatility, since logging can be moved 10 years earlier or later without much cost to optimal production. Stocks are huge. There is no market for contingent claims on wood, since price risk is not much of a risk.

31. It is a well-known characteristic of commodity price volatility, that up-moves in price tend to be larger in size than down-moves. People fear higher prices or the scarcity higher prices reflect. Markets for financial assets such as stocks and bonds behave in the opposite way, with larger down-moves than up-moves. Fear to lose hard-earned savings dominates. For commodity markets one would expect scarcity, i.e. low stocks, to be related to high prices. We can take a look at annual data from the USDA on US stock levels for corn and wheat, compared to 90-day historical volatility to see that this is indeed the case. Below we see the annual relationship between 90-day historical price volatility of the shortest to maturity CBOT wheat contract and carry out stocks in the USA, in relation to consumption, measured in days of consumption, for wheat from 1960.



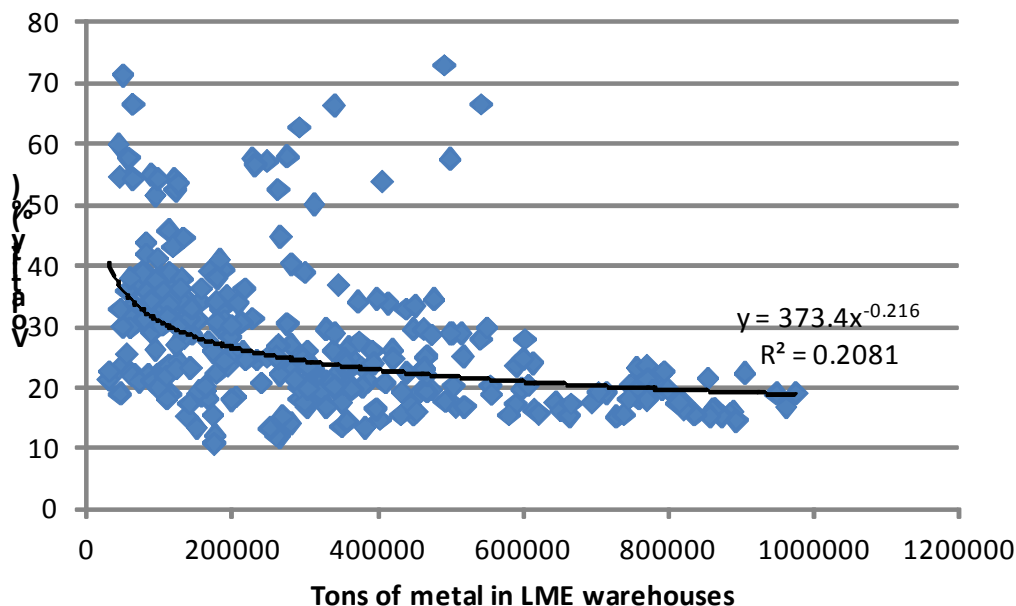
Source: SEB Commodities, Bloomberg

32. Below we see the same chart for corn:



Source: SEB Commodities, Bloomberg

33. We may even extend this to LME Copper, where stocks are measured in metric tons, and see the same relationship on weekly data from 1986 to 2011.

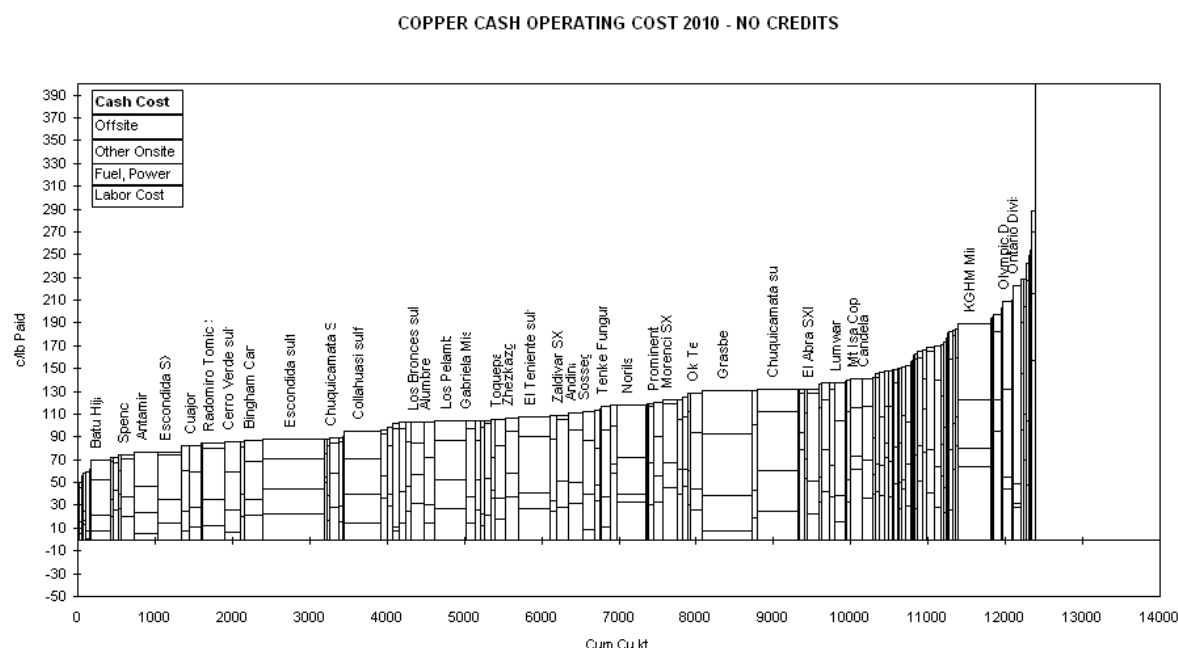


Source: SEB Commodities, Bloomberg

34. Note that the explanatory power of stocks, the end result of supply and demand, is not insignificant, even as we are using a fairly crude measure of volatility. So, is volatility high now because stocks are low? Well, stocks of for example corn are at the lowest level since 1973 when measured in

relation to consumption. The price is high, due to increased consumption and weather-related low production. The high price will, however, stimulate increased production.

35. Another reason that price variability is higher when price is higher is that the production cost curve is steeper at higher marginal cost of production. A change in demand when almost all capacity is used has a larger effect on cost and therefore in equilibrium, price. Below we see a production cost curve for copper. Note the steeper curve to the right, towards 100% production capacity utilization.

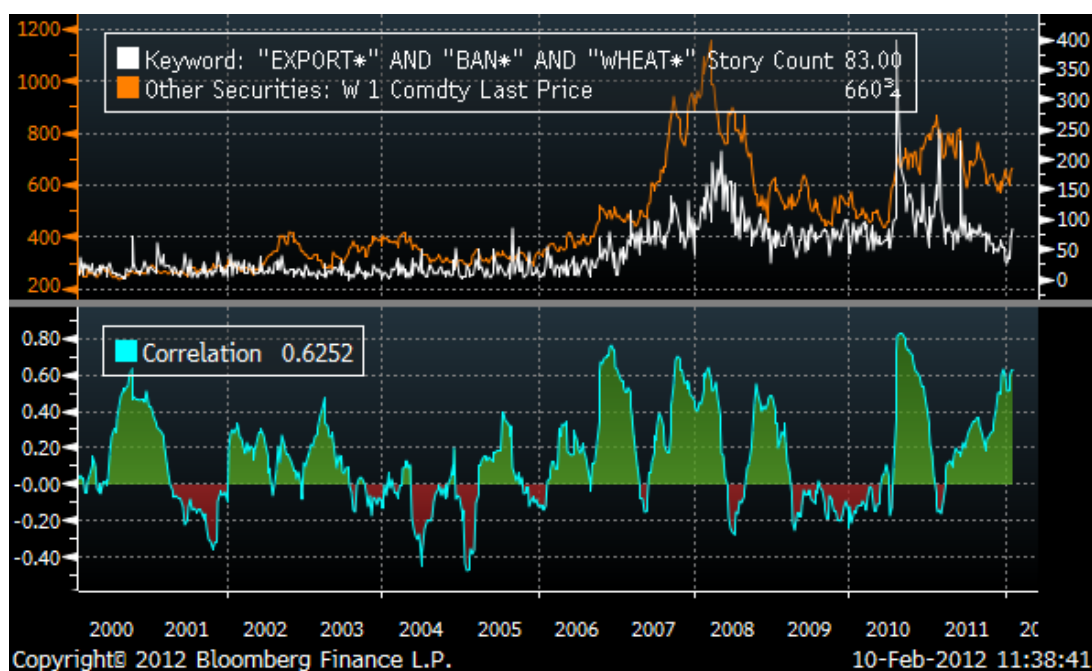


Source: SEB Commodities, various sources

## 7. What if we misinterpret the high price as caused by “speculation”

36. It has been attempted to control the market price to make “things” affordable, thus with the objective to make a social gain. One of the best known examples of this was the price ceiling on crude oil in the US up to 1973, which made it uneconomical to produce crude oil domestically and as global prices increased, made it uneconomical to import and sell the product domestically. Another example was the price limit on electricity in California, which Enron got the blame for shutting down. California had not built a single power station for decades and was dependent on imports from other states. When grid prices including transportation costs for energy increased, who would buy it more expensively outside California and sell it at a loss in California? In both these cases, deliveries stopped. The policy error was on the side of government policy in both cases.

37. Another such reaction, particularly in agricultural market, is the “temporary” introduction of export taxes or export bans. The purpose is to protect the own country against a food scarcity as rationed by a high price. The effect on the global market and countries dependent on imports can be severe. Government policy of export bans clearly is both the result of high prices and also worsens the situation for all other consumers dependent on the global market. Below we see a diagram of the price of wheat and the number of news articles containing all the words “wheat”, “export” and “ban”. We also see that the correlation between high prices and the popularity of these words is quite high, particularly when wheat prices were high due to drought in 2007 and 2010.



Source: Bloomberg, weekly data

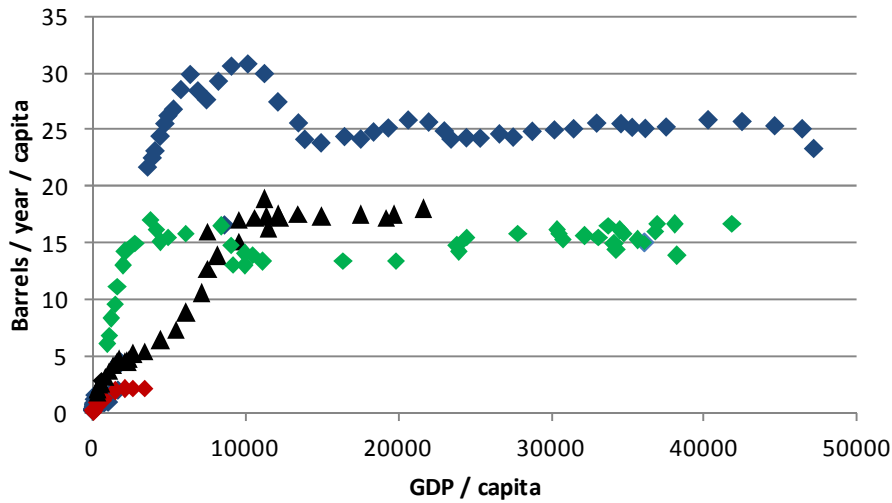
38. Export bans are unfortunate, because an export ban for a country with a large farming community makes the free market price which is a reflection of scarcity, not reach the farmer. A high price would stimulate the farmer to plant more on marginal land or use more intensive farming methods that would otherwise not be profitable. It is a saying in farming that the best cure for a high price is the high price. Disconnected from the real price caused by real supply and demand, production cannot respond to solve the scarcity situation and bring the price down when the domestic price is artificially low compared to the global equilibrium. Does this have to do with speculation? In a way, because the speculation made, is that scarcity will be temporary and somehow solve itself in the long run. And the speculation is made by a government, who has created a rent.

39. Hence, we have seen that attempting to cure the symptom (a high price) with government imposed price fixing either explicitly or indirectly through export bans, is no long term solution and causes harm. Likewise, a ban or a restriction on free trade in risk movement instruments such as futures contracts with the purpose of curing the symptom of a high (or as was the case 120 years ago, a low) price, is probably not a good idea either because there is no evidence of causality going from financial flows to prices and the explanatory power of such flows is in all practicality zero.

## 8. What other cause of low stocks is there?

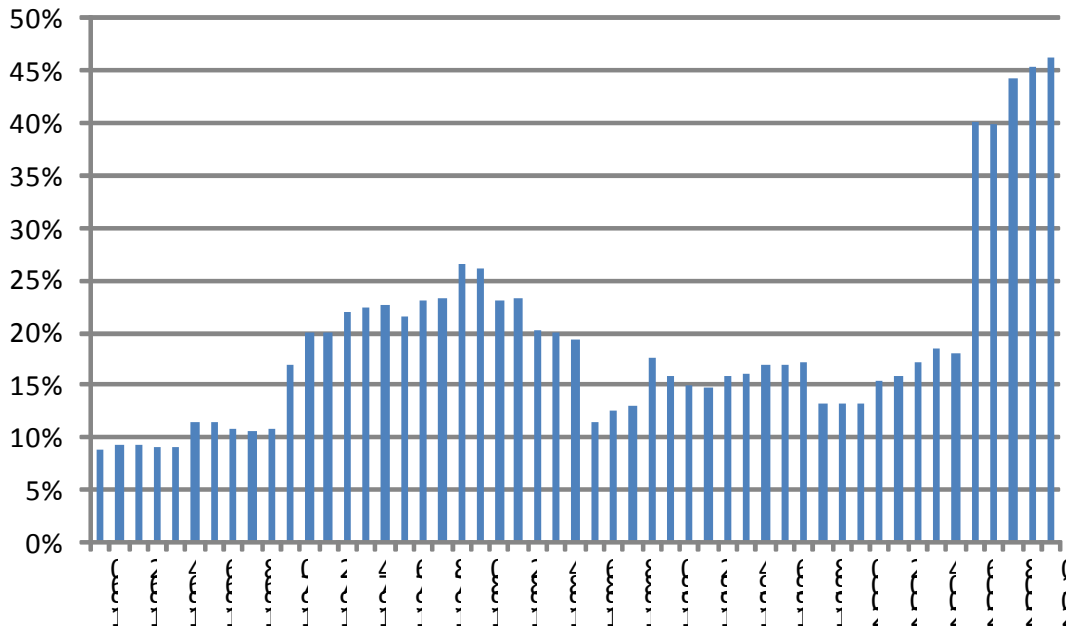
40. There was a huge commodity price boom in the 1970s. There was the same discussion of resource scarcity and the fear that this would lead to the “limits to growth”. This proved wrong. Production caught up with consumption growth and commodity markets became quiet in the 1980s and 1990s.

41. As countries develop from poor to rich, there is a phase where a GDP change has a large effect on the demand for “things”. We can study OECD countries which have gone through this phase and find that this commodity-demand-heavy range can be defined as the period when, in current USD, GDP per capita is between 2000 and 13000 dollars. We see an example of this below in the consumption of oil per capita per year and the level of GDP per capita on an annual basis.



Source: SEB Commodities, World Bank data, BP Statistical Review, Bloomberg

42. With World Bank data we can see the share of the global population (where GDP was reported) having between 2000 and 13000 USD as GDP / capita. We see this below:



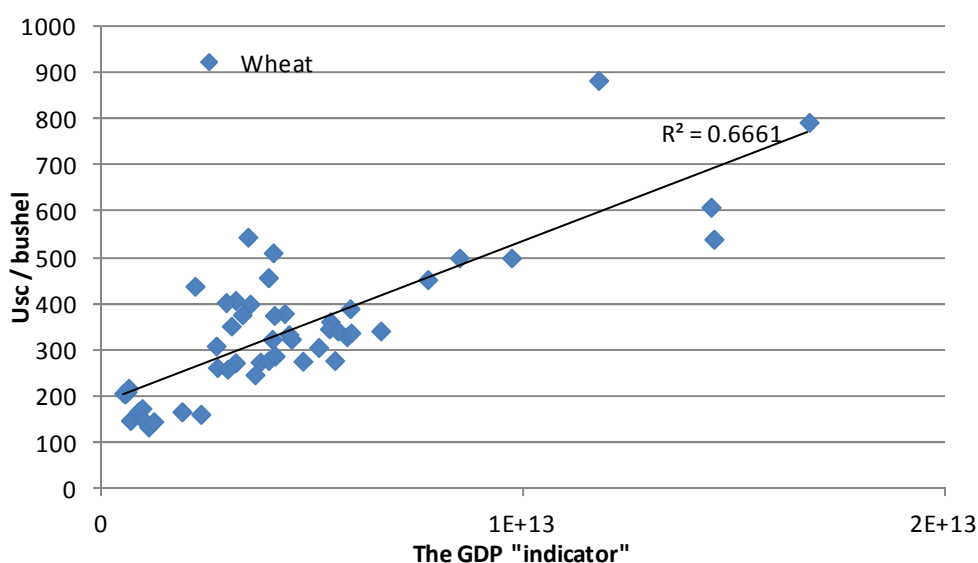
Source: SEB Commodities, World Bank data

43. Here, we clearly see the reason for the commodities boom during the 1970s and we also see why there is a commodities price boom since about 2005. There is also hope that this period with increased demand, low stocks and high prices will be followed by bust – but the solution is absolutely not regulation of the high price, that will not stop development.

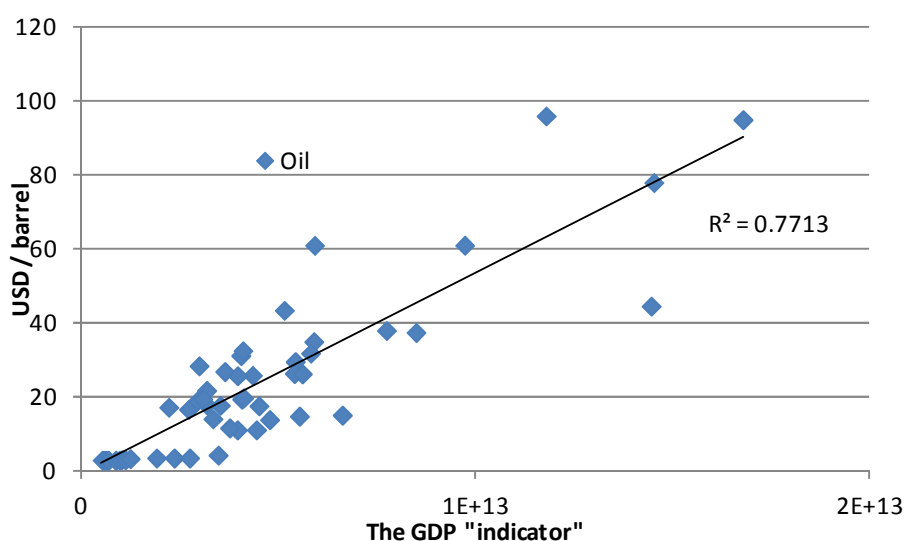
44. The solutions may be a choice of increased production and adaptation via rationing and substitution – and the purchasing of insurance against higher prices of “things” (lower purchasing power of savings) through commodity investment in futures.

45. The popularity of futures investment, also increases the possibility to make certain the selling price for producers. It makes production safer as a business endeavour, thus making it more attractive to produce; more is produced, which is a solution too.

46. We can construct a commodity demand indicator, for example with the sum of the GDP (in current USD) for all countries with a GDP per capita between 2000 and 13000 current USD per capita. This indicator looks very similar to the population graph above. We can compare it to the price of oil / barrel and the price of wheat / bushel and we get the following diagrams:

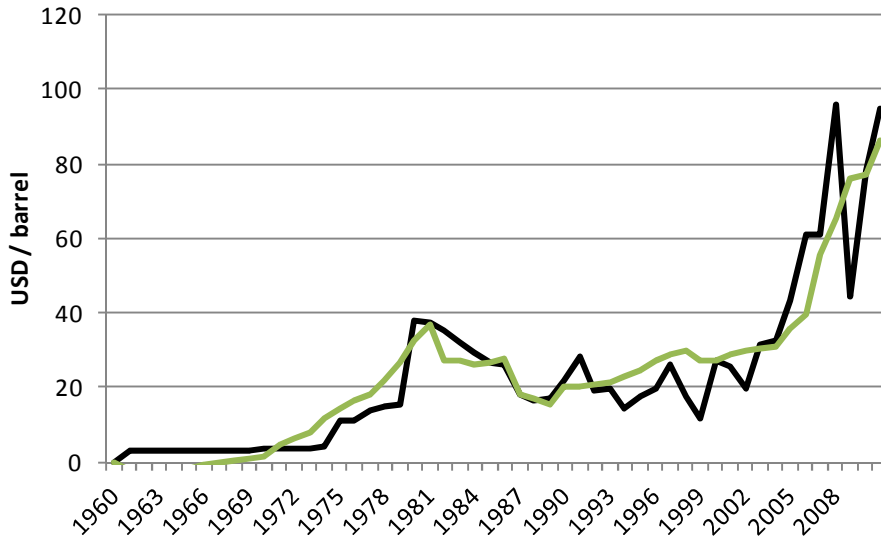


Source: SEB Commodities, World Bank data.



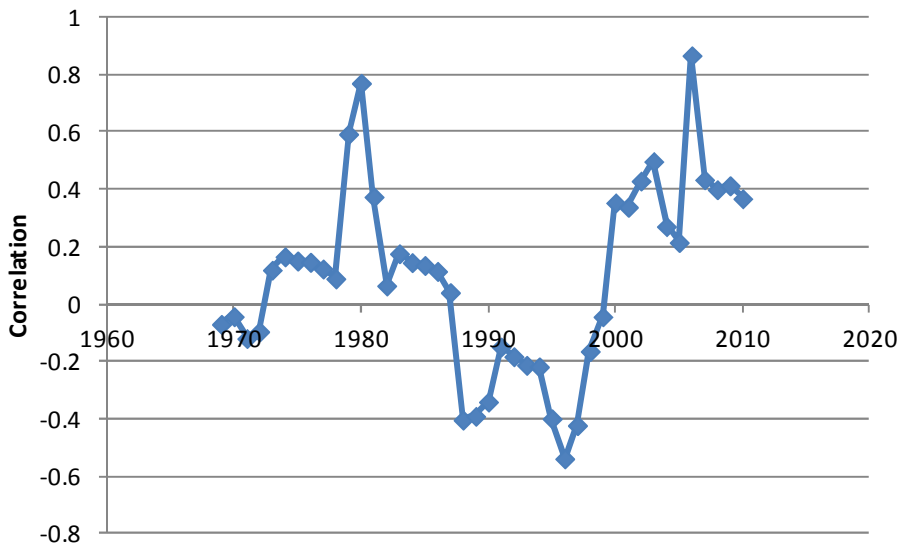
Source: SEB Commodities, World Bank data.

47. A simple linear regression model with this “indicator” and US CPI (to adjust for changes in the purchasing power of the US Dollar) as explanatory variables, gives the following estimated “synthetic” oil price, plotted with the actual price:



Source: SEB Commodities

48. Since there is a relationship between high prices and volatility (the fear of scarcity), we would expect to see a relationship between this indicator and volatility of for example, the CBOT wheat price, and this is also the case, as we see in the diagram below of rolling 10 year correlations.



Source: SEB Commodities, World Bank data, Bloomberg

49. We clearly see a strong relationship between “modernization” of emerging economies and commodity market price volatility.

50. It may be interesting to look at the populations, their size and for how long time they were in this commodity demanding phase. That we see below:

<b>Country</b>	<b>Population (mill)</b>	<b>&gt;2000 \$ GDP/capita</b>	<b>&gt;13000 \$</b>	<b>Years in boom phase</b>
USA	307	1950s	1980	25
Sweden	9	1961	1985	24
Europe	600	1970s	Early 80s	25
Germany	82	1970	1985	15
Japan	128	1971	1985	14
Korea (South)	49	1983	2002	19
Brazil	194	1987	2011	24
China	1330	2006		
Indonesia	230	2008		
India	1200	2012		
Average, years				20.9

51. The 70s commodity boom was thus created by Europeans, eastern and western, the USA and Japan. This was tackled with inflation. Now there are larger populations going through “industrialization” and if the movement continues, there will probably be commodity demand increases for a long time still, until boom turns to bust in the commodity markets.

## 9. Summary

52. High commodity prices, and the volatility associated with scarcity and high prices, are not caused by the insurance market for price risk that derivatives markets are. A misunderstanding of the causes of high prices, can lead to decisions that make the situation worse by cutting off the signaling value of a high price to producers to produce more. An example of this is export bans for grain. The industrialization of large populations in the world is behind the commodity boom, high prices and high volatility, and this is likely to continue for many years.