Commodity Trading Advisors: Are they a threat for futures commodity markets ?*

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Abstract

Nowadays commodity investing is facing a tremendous interest from all kinds of investors, the surging amount invested in commodity related indices being one of the manifestations of this phenomenon. Due to their historical de-correlation with conventional securities and their hedging properties against inflation, commodity investment is being perceived as a true asset class. Therefore, the question of commodity investment is of interest for investors but also for academics. As a consequence, there had been a common statement that the commodity price rally of the last 10 years is largely due to new operators in the futures markets. The economist point of view on that issue was to question if the "speculators" side had affected those markets. As a matter of fact alternative investment, encompassing CTAs CPOs and Hedge Funds, had been criticized for their presumed bad impact on the commodity futures prices. This paper will not seek to find a clear-cut answer to the ancestral economic question of the financial operators increasing the risks in futures markets. The aim of this paper is to demystify one the historical actor of the futures markets whom are often misunderstood by non-financial actors. Using quantitative methods (multifactor models and rolling style analysis windows) we find that CTAs seem to have a relatively low exposure to commodities futures. We also try to define the causality relation between those whom are liquidity provider and liquidity user using the CFTC data on open interest from major futures contracts. Using Variance Decomposition and Granger causality test, on a sample of the major contracts, we find that non commercial investors seemed to enter the future market after a change in commodity prices not the other way around, playing therefore the role of liquidity provider for most of the commodity analysed in this study.

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Key Words: CTA, commodity, volatility, open interest, Vector Auto Regression, Style Analysis

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Section I : Introduction to Commodity Trading Advisors

Commodity Trading Advisors (CTA henceforth) are often misperceived by non-financial actors engaged in economical commodity-related question. First things first, a simple and brief presentation of the CTAs might be relevant in order to introduce this paper. CTAs have been denominated in this manner because of the underlying contracts they were trading in initially, as one may obviously understand commodity futures. CTA are money manager investing in global markets futures contracts in order to produce a total return (using also short selling on the futures contracts). The high number of contracts they trade in and the use of both long and short side ensuring investors to purchase a share of a global diversified portfolio of futures contracts. The official definitions for CTAs and CPOs given by the Commodity Futures Trading Commission (CFTC henceforth) are the following ones:

Commodity Trading Advisor (CTA)- Any person who, for compensation or profit, directly or indirectly advises others as to the advisability of buying or selling commodity futures or option contracts or issues analyses or reports concerning commodity futures or options.

Commodity Pool Operator (CPO) - An individual or firm that operates a commodity pool. (For example: If a pool is organized as a limited partnership, its general partner typically is its CPO.) A commodity pool is an investment trust, syndicate, or similar form of enterprise operated for the purpose of trading commodity futures or option contracts

CTAs funds may be divide into two major strategies Trend following and non trend following. They may also be subdivided in Systematic and Discretionary. The former uses Traders systems which could be underpinned on moving averages trades signal to more complex system based on more refined econometric models (Conditional multivariate GARCH for shock persistence). Hence technical and quantitative analysis play a prominent part in the decision making process of CTAs. Therefore this latter strategy might be perceived as black box tools where fund manager, after defining the futures program, have to fine-tune the model to deal with the conjuncture.

Still, because of their name Commodity Trading Advisors may induce people to think that the majority of the contracts they trade in are genuine commodity futures. However, thanks to the introduction of currency, financials and others more liquid futures contracts CTAs evolved into a more diversified, with regards to the underlying asset class, portfolio of futures contract. Hence, in a way, CTAs evolved to Managed Futures.

As a consequence we will try in section II to give some evidence and proof of this underlying asset evaluation with first a descriptive statistics panel showing CTAs indices and commodity indices. Then we provide a more quantitative analysis using style analysis rolling windows in order to show the evolution of CTAs onto non-commodity related contracts. Consequently, to confirm the result of the Style Analysis, we use factor analysis on different risk exposure to show that to some extent CTAs are more sensible to factors, which are non-essentially related to commodity.

In section III we try to define the relation and causality of the non-commercial, which CTAs fund are part of, versus the commercial. In order to find out and clarify whom are liquidity providers we will use Vector Auto Regression technique. In the first place we estimates VAR models for every couple of major commodity contract with its related Non Commercial Open Interest change. Then we use variance decomposition to confirm the VAR model. Finally in this section we compute granger causality test in order to determinate the direction of the causality.

Lastly Section IV concludes this paper and gives some hints on the possible sources of improvement and research in the commodity/ CTA field.

Section II : CTAs and Commodity futures : to what degree are they related ?

In this section we will try to illustrate that CTAs had evolve and are relatively exposed to commodity futures. Therefore we will demystify the general thinking by non-specialist actor believes that CTAs fund invest massively in commodity futures[1]. The lack of transparency and the difficulty to find public information on the composition of CTAs had guided the way this section is structured. First, we will introduce and illustrate the relation of commodity futures and CTAs using a multi regression on the major CTAs index.

Throughout this paper we will use different CTAs index as a proxy of the CTAs industry. We will also use commodities index in order to compare the composition versus the CTAs ones. Table X shows a brief panel of the descriptive statistics of the major CTAs Index and also some major commodity Index : the Reuters Jefferies CRB, the Dow Jones AIG Commodity Index and the Goldman Sachs Commodity Index. We introduce them briefly in order to understand their differences.

The Reuters Jefferies Commodity Research Bureau Index (RJ-CRB) – is the oldest commodity index used by the financial sector as it was developed in 1957 and began trading in 1986. After a major revision, on May 10 2005, the RJ/CRB index now assigns each commodity to one of four tiers, with weightings ranging from 23% for crude oil to 1% for orange juice, nickel and wheat (instead of giving all the commodities an equal weight as it was the case before). Furthermore, the index is currently rebalanced on a monthly basis and prices are drawn from the nearby futures contract month, rather than the six-month average previously used as reference period.

DJAIG-CI - Dow Jones-AIG Commodity Index - The Dow Jones-AIG Commodity Index launched in 1998 is an arithmetically calculated price index composed of futures contracts on 20 commodities. The DJAIG-CI considers the relative amount of trading activities combined with the level of production of respective commodities to derive its weight in the index. With regards to weights, the DJAIG-CI follows two major rules: no group of commodities should represent more than 33 % of the whole index and no single commodity should account for less than 2 % or more than 15% of the index. The index is rebalanced and re-weighted every January. Cocoa, for instance, was increased from the index in 2005 because its weighting fell below the 2%.

GSCI – Goldman Sachs Commodity Index – created in 1991, the Goldman Sachs Commodity Index is an arithmetic measure of the performance of actively traded dollar denominated nearby commodity futures contracts. Weights, based on respective commodity world productions, are

[1] We obviously assume in average, because they are CTA focused on commodity futures.

determined each July and are made effective the following January. All contracts are rolled prior expiration. Currently, the GSCI contains 24 commodities: 6 energy products, 5 industrial metals, 8 agricultural products, 3 livestock products and 2 precious metals. There are also several sub-indices available such as: energy, livestock, industrial and precious metals. One of the main features of the GSCI is its exposure to energy prices, which is generally as high as three-quarter of its index.

Therefore, we have a panel of commodity indices relatively diversified as it encompass indices with diverse futures contracts and different weighting in the general commodity sectors : grains, industrial metals, precious metals, energy, soft, live cattle.

The panel of CTA index is composed of the **CISDM** full range of indices[2] (CTA,CPO, Financial etc..), the **CSFB** Managed Futures Index, the **ITR40** CTAs Index and the **EDHEC** CTA index.

The **CISDM CTA** (CTA henceforth) Asset Weighted Index reflects the dollar-weighted performance of Commodity Trading Advisors (CTAs) which trade a wide variety of OTC and exchange traded forward, futures and options markets (e.g., physicals, currency, financial) based on a wide variety of trading models..
The **CISDM CPO** (CPO henceforth) Asset Weighted Inde*x* reflects the dollar-weighted performance of public and private (CPOs) firms responsible for investing commodity pools' assets in commodity futures and options positions.
The **Credit Suisse First Boston/ Tremont Managed Futures Index** (CSFB Henceforth) Asset Weighted Inde*x* composed of CTAs which, invest in listed financial and commodity futures markets and currency markets around the world.
The **ITR40 CTA Index** (ITR40 henceforth) tracks the performance of the 40 leading managed futures programs and then compute the dollar-weighted average performance of those 40 programs every month.
The **EDHEC Global CTA Index** (EDHEC Henceforth) as the first component, using Principal Component Analysis, of the group of CTAs Index encompassing : CSFB, CISDM, S&P, Barclay and HF Net.

Generally speaking the methodology of this panel index is the same except the EDHEC one. For the rest the index is asset weighted within the funds, which are reporting to the proprietary database. Re-balancements are monthly computed. The EDHEC index seems to be the most exhaustive, due to his methodology which uses other database to extract the general movement of the CTAs industry.

[2] See appendices for a more in depht definition of the whole CISDM indices.

Table 2.1 Descriptives statistics from 1994 to august 2006*

	CISDM CPO	CSFB MAN FUT	CISDM CTA	CISDM CUR	CISDM DISC
Mean	0.005915	0.005485	0.006636	0.003537	0.007397
Median	0.005700	0.002100	0.005900	0.003700	0.004900
Maximum	0.068600	0.099500	0.078000	0.105200	0.067800
Minimum	-0.050400	-0.093500	-0.044500	-0.041500	-0.035400
Std. Dev.	0.024289	0.034554	0.024778	0.020259	0.016469
Skewness	0.203990	0.053402	0.402219	0.828586	0.871830
Kurtosis	2.672562	3.311429	3.002105	6.118249	4.416281
Jarque-Bera	1.721800	0.681988	4.071497	78.45516	31.74902
Probability	0.422781	0.711063	0.130583	0.000000	0.000000

	CISDM EQU	CISDM FIN	ITR 40	CISDM SYST	EDHEC CTA*
Mean	0.003941	0.008185	0.006846	0.005372	0.006281
Median	0.006500	0.003500	0.006000	0.003600	0.005052
Maximum	0.089000	0.099400	0.088400	0.095600	0.085941
Minimum	-0.090300	-0.075100	-0.077700	-0.053500	-0.054295
Std. Dev.	0.027467	0.031910	0.032857	0.025978	0.026996
Skewness	-0.668836	0.535376	0.213246	0.357917	0.218162
Kurtosis	4.960811	3.416879	2.892531	3.571669	3.126644
Jarque-Bera	35.44818	8.306874	1.217087	5.280119	0.989083
Probability	0.000000	0.015710	0.544143	0.071357	0.609850

	CRB	DJAIGCTR	GSCITR
Mean	0.004012	0.008801	0.009638
Median	0.004736	0.009028	0.010270
Maximum	0.071115	0.102253	0.168726
Minimum	-0.061072	-0.075449	-0.144110
Std. Dev.	0.026312	0.037836	0.057939
Skewness	0.050232	0.012302	0.056192
Kurtosis	2.604370	2.767599	3.069979
Jarque-Bera	1.027467	0.336796	0.108085
Probability	0.598258	0.845018	0.947392

* The EDHEC index only start in 1997

In order to assess the composition of CTAs using CTAs index we compute multi regression on the different CTAs index using rolled commodity futures price changes as independent variable. The sample used is the one provided by the Commodity Research Bureau also used to compute the RJ-CRB index. The sample contains 19 commodity futures contracts[3].

We carried out the regression on the following three indices : ITR 40, CSFB Managed Futures and the CISDM CTA index. The result of the regression with the t-stats and the adjusted R^2 is provided in table 2.2.

Table 2.2 CTA regression on commodity futures regressors from 1994 to 08-2006

	CISDM CTA		ITR 40		CSFB Managed Futures	
Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Platinum	0,026	*0,501*	0,003	*0,051*	0,000	*-0,005*
Oats	0,032	*1,275*	0,033	*0,963*	0,033	*0,926*
Nat-Gas	0,036	*2,749*	0,056	*3,213*	0,049	*2,690*
Lean Hogs	-0,010	*-0,533*	-0,014	*-0,550*	-0,023	*-0,861*
Live Cattle	-0,063	*-1,532*	-0,090	*-1,631*	-0,079	*-1,383*
Coffee	-0,004	*-0,253*	0,000	*-0,012*	-0,003	*-0,158*
Orange Juice	-0,015	*-0,642*	-0,016	*-0,504*	-0,002	*-0,065*
Unleaded Gas	0,015	*0,666*	-0,009	*-0,279*	-0,014	*-0,438*
Heating Oil	0,028	*0,857*	0,036	*0,810*	0,057	*1,249*
Copper	0,035	*1,143*	0,041	*1,008*	0,044	*1,053*
Gold	0,039	*0,561*	0,042	*0,462*	0,061	*0,640*
Cotton	-0,017	*-0,703*	-0,035	*-1,091*	-0,059	*-1,788*
Corn	0,023	*0,551*	0,039	*0,702*	0,024	*0,408*
Crude Oil	-0,048	*-1,109*	-0,031	*-0,537*	-0,024	*-0,403*
Cocoa	-0,001	*-0,055*	0,018	*0,596*	0,013	*0,412*
Wheat	-0,005	*-0,159*	-0,006	*-0,146*	-0,021	*-0,478*
Silver	0,048	*1,324*	0,042	*0,870*	0,074	*1,465*
Sugar	-0,036	*-1,614*	-0,045	*-1,479*	-0,033	*-1,066*
Soybeans	0,008	*0,212*	0,005	*0,113*	0,025	*0,507*
Adjusted R^2	**0,10**		**0,09**		**0,11**	

As we can see the regression adjusted R^2 are quite low showing *de facto* that our model fails to explain in average more than 10 % of the CTAs index variance. Concerning the sign of the coefficient on the three different multi regression, there seems to be some accordance between the index for some futures contracts. As a consequence, Lean Hogs, Live Cattle, Orange Juice, Cotton, Crude Oil, Wheat and Sugar seemed to have the same sign and a quite consistent range of confidence between the three regressions. The coefficient showing the maximum value is the Silver for the CISDM CTA and CSFB

[3] The list and descriptive statistics is provided in the appendices

index although it is the Natural Gas for the ITR 40. The coefficient showing the minimum value is the Live Cattle for the three regressions.

However, regarding statistical significance every commodity futures but Natural Gas failed to pass the level of 95 % confidence. We can also point out that Natural Gas show an average a 99.8 % confidence conversely the coffee show the lowest average confidence interval 55.6 %.

Therefore, those results shed some light to the question of the composition of the CTA. If CTAs were massively invested in commodities our model must have explained more than 10 % of the variance, hence the betas should have been statistically different from zero. As it is not the case we though relevant to apply the same model and methodology to the commodity index.

Table 2.3 Commodity index regression on commodity futures regressors from 1994 to 08-2006

	GSCITR		DJAIGCTR		RJCRBCI	
Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
Platinum	0,084	*2,193*	0,024	*0,852*	0,067	*3,749*
Oats	-0,012	*-0,657*	-0,019	*-1,387*	-0,003	*-0,334*
Nat-Gas	0,104	*10,646*	0,072	*9,845*	0,027	*5,919*
Lean Hogs	0,021	*1,464*	0,014	*1,317*	0,009	*1,380*
Live Cattle	0,053	*1,726*	0,087	*3,825*	0,077	*5,311*
Coffee	0,005	*0,458*	0,029	*3,288*	0,040	*7,207*
Orange Juice	-0,014	*-0,783*	-0,007	*-0,545*	0,063	*7,478*
Unleaded Gas	0,061	*3,577*	0,030	*2,405*	0,009	*1,083*
Heating Oil	0,093	*3,709*	0,029	*1,590*	0,042	*3,590*
Copper	0,035	*1,531*	0,111	*6,620*	0,059	*5,556*
Gold	0,048	*0,943*	0,082	*2,158*	0,101	*4,182*
Cotton	-0,025	*-1,376*	0,003	*0,222*	0,042	*4,930*
Corn	0,072	*2,310*	0,038	*1,634*	0,033	*2,266*
Crude Oil	0,319	*9,910*	0,179	*7,511*	0,071	*4,694*
Cocoa	0,001	*0,088*	0,029	*2,366*	0,061	*7,779*
Wheat	0,025	*1,070*	0,052	*2,942*	0,049	*4,397*
Silver	-0,044	*-1,619*	0,035	*1,745*	0,035	*2,722*
Sugar	0,035	*2,071*	0,008	*0,634*	0,046	*5,831*
Soybeans	0,049	*1,795*	0,124	*6,191*	0,090	*7,073*
Adjusted R^2	**0,91**		**0,88**		**0,90**	

We can already see that the adjusted R^2 show that our model explained on average 90 % of the variance. Globally speaking, the coefficient are in average statistically different from zero, except for some commodities in the GSCI regressions but this may be explained by the concentration of this index in the energy sector 70 % in average. As a matter of fact Crude Oil, Heating Oil, Nat-Gas,

Unleaded Gas have t-stats far from 2 with strong level for the estimated coefficient confirming the really strong exposition to the energy sector.

Those results lead us to draw a rough first conclusion about the average exposition of the CTAs to commodities. We may state that it is very limited on the concerned period January 1994 to August 2006.

In order to pursue our illustration of the limited exposure of CTAs onto commodity futures we would like to adopt a factor analysis approach i.e. using different factors as regressors in a model and using OLS for estimated the coefficients. We have selected a panel of 16 probable factors choosing different asset class, investment region, maturity, expressed in monthly changes or in level :

1. the Consumer Price Index (CPI), in its general form i.e. including foods and energy
2. the VIX index, which a measure of the implicit volatility in the equities markets
3. the EONIA
4. the Fed Funds Rates
5. the JP Morgan Emerging Bonds Index +, as a proxy for emerging bonds
6. the Morgan Stanley Capital Investment (MSCI) World, as a proxy for the world equity market
7. the S&P 500, as a proxy of the US equity Market
8. the Citigroup Bonds Index 1-3 year
9. the Citigroup Bonds Index 3-5 year
10. the Citigroup Bonds Index 5-7 year
11. the Citigroup Bonds Index 7-10 year
12. the Citigroup Bonds Index 10+ year
13. T-bills 12 weeks
14. T-bills 4 weeks
15. T-bills spread (12 W minus 4 W)
16. the RJ-CRB index (as we believe it as the more diversified commodity index)

We use stepwise regression to combine the most efficient set of regressors with a backward elimination method which consist to include the whole set of independent variable and to remove the variable with the smallest t-statistics. However, as we are using limited numbers of CTAs index, we cannot used a panel approach and we must test every set of regressors onto each of the 6 CTAs index choose (EDHEC, CISDM CTA & CPO & Diversified, ITR 40 and finally CSFB). The period of analysis is from January 1997 to August 2006, we deliberately reduce the period in order to analyse the EDHEC index which is constructed with the Principal Component Analysis method on the whole universe of CTAs index. Therefore, we had to create a “rule of thumb” for choosing the explanatory variable

considering each index. We decided to keep a factor if it showed at least once (i.e. in one index regression) a t-stat superior at the threshold of 1,90.Table 2.4 displays the result for the 6 indexes concerned on the defined period.

Table 2.4 Factor Loadings for CTAs Index Sample Using Stepwise Regression

	SP500	VXL	CTG$ +10Y	CTG$1-3 Y	CRB Index	CPI Index	Adjusted R^2
CPO	**-0,001**	**0,000**	**0,473**	**-0,393**	**0,191**	**-1,078**	**0,226**
t-stats	*-2,100*	*2,605*	*3,485*	*-1,932*	*2,460*	*-1,583*	
CSFB	**-0,001**	**0,000**	**0,669**	**-0,222**	**0,255**	**-1,540**	**0,275**
t-stats	*-1,780*	*1,735*	*3,582*	*-0,793*	*2,378*	*-1,640*	
CTA	**-0,001**	**0,000**	**0,409**	**-0,170**	**0,185**	**-1,475**	**0,236**
t-stats	*-1,731*	*2,896*	*2,965*	*-0,822*	*2,341*	*-2,131*	
EDHEC	**-0,001**	**0,000**	**0,463**	**-0,170**	**0,224**	**-1,459**	**0,253**
t-stats	*-1,433*	*2,569*	*3,153*	*-0,775*	*2,658*	*-1,980*	
DIV	**-0,001**	**0,000**	**0,466**	**-0,256**	**0,201**	**-1,470**	**0,223**
t-stats	*-1,735*	*2,534*	*3,031*	*-1,110*	*2,284*	*-1,904*	
ITR	**-0,002**	**0,000**	**0,621**	**-0,388**	**0,247**	**-1,880**	**0,277**
t-stats	*-2,505*	*2,701*	*3,595*	*-1,497*	*2,489*	*-2,166*	
Average	**-0,001**	**0,000**	**0,517**	**-0,266**	**0,217**	**-1,484**	**0,248**
t-stats	*1,881*	*2,507*	*3,302*	*1,155*	*2,435*	*1,901*	

The final subset of regressors for the factor analysis is composed of the S&P 500, the VIX expressed in level, the Citigroup Bond Index maturity + 10 years, the Citigroup Bond Index maturity 1-3 years, the RJ-CRB index and the CPI. We have calculated averages for the coefficient level as well as the t-stats. The R^2 adjusted showed that on average our model explained 25 % of the variance of the monthly CTAs returns. Regarding the coefficient, results are consistent between the indices, CTAs return seemed to be not exposed to equities factor as proved with the quasi-null coefficients, but statistically significant, S&P and VIX betas. Conversely, CTAs returns seemed to be positively exposed to long maturity bonds as shown by the high coefficient and high t-stats. Interestingly enough, CTAs return seemed to be consistently negatively exposed to lesser maturity bonds (1-3 years) although this result is far less robust according to the lower level of the t-stats. Obviously CTAs are positively exposed to Commodities as a whole with an estimated coefficient of 0.22 in average and a t-stats of 2.43. The high estimated negative coefficient regarding CPI, seems to confirm that CTAs return are not replicable with solely commodity futures. Hence, commodity futures are historically positively correlated with the inflation, we can point out the inverse situation concerning CTAs in our analysis. This negative coefficient might be attributed to the negative impact of inflation on real interest rates. As a consequence, the factor analysis reveals that CTAs Return, in our analysis, seemed to be more exposed

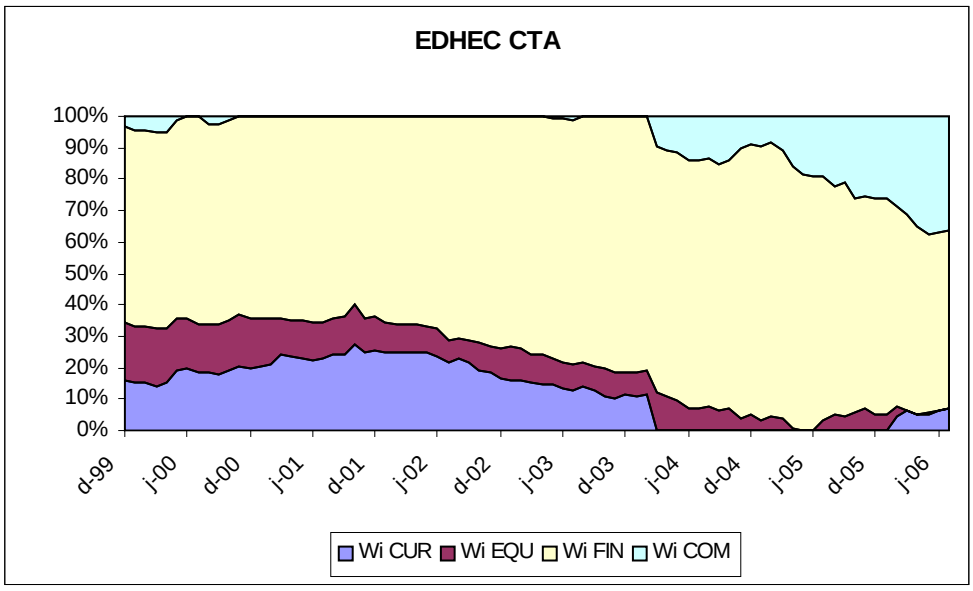
to long maturity bonds index than commodities as a whole during the 1997-2006 period. It confirms the intuition, also characterized by the evolution of the name from CTA to Managed Futures, that CTAs had evolve from a massive commodity futures to much more liquid financial instruments, the sigh of the CPI coefficient comes also as a confirmation.

So far we had only considered the CTAs during a static period, with commodity futures multiple regression from 1994 to 2006 and with factor analysis from 1997 to 2006. At this point we find relevant to try to assess the evolution of CTAs exposure in a dynamic fashion. In order to address this issue we will borrow a technique usually used in Investment funds & Portfolio Performance measures called Return Based Style Analysis[4].

Return Based Style Analysis (RBSA) had been initially introduced by, the Nobel Prize Winner, William Sharpe in 1992 in the Journal of Portfolio Performance. The RBSA is a constraint factor model in which the regressors are Market Index[5]. The level of constraints determined the form of the Style Analysis, the weak form is when the sum of the beta should equal one i.e. meaning that every coefficient is the weight of the factor on a portfolio approach. The strong form adds the positivity constraint, i.e. every factor must be positive removing short selling in a portfolio approach.

Therefore, in order to assess the evolution of the exposure of CTAs we will compute rolling window style analysis, i.e. we will use a period of 36 months to evaluate one static point of Style Analysis then we offset of one month in order to compute 80 points of style analysis, giving the dynamic evolution of the exposure. The graph below is the dynamic style analysis of the Edhec CTA Index from December 1999 to July 2006.

Graph 2.1 Rolling Window Style Analysis Example with EDHEC CTA index



[4] The reader may read "The handbook of Equity Style Management" Frank Fabozzi Series, Wiley Finance, Third Edition 2003

[5] Note that this technique for alternative Investment had been used in W. Fung with Hedge Funds "Empirical characteristics of dynamic trading strategies : the case of hedge funds"

Due to the strategies used (short selling , leverage) and the diversity of the markets they invest in (OTC or exchange) and also the asset class (interest rates, commodities, currency, equity derivatives etc..) the choice of Style Index for CTA is quite restrained. Fortunately the CISDM do provide a full range of CTA indices based on their CTAs database. In order to assess the evolution we had used as CTA Style Benchmark from the subset of the CISDM CTAs database[6].
The panel of the CTA Style Index is the following One :

1. Currency (**WI CUR**): Asset Weighted, specialize in currency trading
2. Financial (**WI FIN**) : Asset Weighted, Financial Futures (Interest Rates etc..)
3. Stock (**WI EQU**) : Asset Weighted, specialize in stock index futures and options
4. Commodity (**WI COM**) : Using Principal Component Analysis on the 4 Major Commodity Future Index (RJ-CRB, GSCI TR, DJ-AIGCI, RICI) We use the first component (eigenvector1) which explained 87 % (eigenvalue) of the total variance.

The whole sample of Rolling Windows Style Analysis is displayed in the appendices for the 6 CTAs indices. From this sample we can draw some conclusion regarding the evolution of the CTA exposure.

First, commodities seemed to have represented a low percent of the global average exposure of CTA during the period 1997-2006. However, since 2003-2004 the exposure has raised from almost 0 % in 2002 until 20-25 % in average at the end of 2005. It shows that there had been a relation between commodity price rally and CTA investment. However, at this point we cannot determined the causality i.e. do CTA enter the market consequently of a price shock or do CTA impulse the shock on price ? We will try to give some answer to that question in the following section. Moreover, the exposure seems have lessen since the second quarter of 2006[7]. To confirm this graphical intuition we had also computed Rolling Style Analysis with a smaller "in-sample" analysis 24 months in order to reduce the possible lag of the calculation.

Second, the financial (WI FIN) coefficient is by far the most prevalent in all the indices and represent in average al least 50-60 % of the CTA market, meaning that they trade in market apparently more liquid. This finding has to be linked with the factor analysis which clearly shed light to the strong exposure to long maturity bond.

[6] The reader may read "*Benchmarking CTA Performance with a Passive Future Based Index*" CISDM Working Paper 1999, Spurgin, Schneeweis, Georgiev., for the methodology used to construct the Style Index.
[7] We have also

Section Remarks

As a section conclusion, we can point out our findings about the relation of Commodity Futures taken separately, Commodity Index, and CTAs index as proxy for whole CTAs Industry.

- We can point out that CTAs return cannot be explained using an exhaustive panel of commodity futures. The regression adjusted R^2 were very low 0.10 in average, and the coefficient (except Nat Gas) insignificant. Whereas commodity index, CTA's return cannot be replicated solely with commodity futures
- The factor analysis on a large panel of plausible factors had confirmed the intuition caused by the regression analysis. Using Backward Selection Stepwise Regression we select a subset of 6 factors explaining about 25 % of the variance of CTAs returns. The analysis of the estimated factors reveals that CTAs were positively exposed to long Maturity bonds, also positively exposed to commodities (first component using PCA) but also negatively exposed (with the highest level of coefficient) on the proxy for inflation the CPI index. Therefore, it seems that CTAs return were determined, on the concerned period, by financial factors related to interest rates and bonds.
- The Style analysis of the CTAs using the dynamic approach had provided some insights about the evolution of the general exposure of CTAs. Apparently, using a period of 36 months to estimate one point of Style Analysis, we find that CTAs during the global period 1999-2006 were largely invested in financial (interest rates, bonds etc ....) underlyings. To refine the analysis we can draw three different period in this global analysis. The first one 1997-2001 where CTAs seem to reduce the commodity exposure to profit the financial, currency and the equity exposure. The second one 2001- mid 2003, an increase of the financial exposure and a reduction of the currency and equity. Finally mid 2003-2006 a major increase in commodity exposure. We could have also draw a fourth period beginning from mid 2006 to July 2006 where it seems that CTAs have reduced their commodity exposure. However, the lack of data[8] make this assumption really unstable.

[8] This update is made in september.

Section III Are the speculators responsible of the commodity price rally and volatility increase of the last 10 years ?

Since 2003 there had been a tremendous focus on the commodity price instability, especially about the theory that it was mainly due to the participation of the hedge funds in the commodity futures markets. Non-specialised financial press and media in general had constantly declared that price volatility was attributable to the increasing Hedge funds trading activity in those markets. Hence, after having illustrated in the previous section that CTAs are massively invested in financial futures[9], that their factor exposure had confirmed this statement and even if from the mid 2003 until 2006 there seems to be a drastic increase in commodity exposure we cannot draw some early conclusion without assessing the causality direction. Therefore, we would like to extend the scope of this paper on the threat of "hedge funds[10]" on the futures commodity markets.

The presumed fact that "Hedge funds" activity is the cause of the price volatility increase had been too eagerly related to non specialised audience. Thus, there is often a common thinking that "Hedge funds" and CTAs industry is a threat for futures commodity markets without giving clear-cut statistical evidences. The threat of Hedge funds could not be underpinned solely on verbal assumptions commonly shared by non professionals for the most part.

As a consequence, we can easily understand that two issue have to be examined in order to qualify if the so-called Hedge funds are a threat for commodity markets :

- First we have to assess the trading activity of Non commercial investors[11] compared to commercial investors or as the classical economy theory like to call the speculators against the hedgers.
- Second we have to determine the sense of the causality i.e. if there is an increasing activity of the speculators, is the latter triggered by the changing pattern in commodities price (in this case they will be liquidity providers to the hedgers) or the opposite are they responsible of the change in price (therefore disturbing the hedgers plans).

As we mentionned, we will analysed the CFTC database which provides some data breakdown regarding open interest. Open interest is defined by the CFTC as "... the total of all futures and/or option contracts entered into and not yet offset by a transaction, by delivery, by exercise, etc...". According to the CFTC distinction is made between "commercial and non-commercial traders",

[9] On an average basis obviously. There is still CTA's with a net Commodity Bias.
[10] We mis-use deliberately the term Hedge Funds even if we know that it is an incorrect short cut to mention speculators.
[11] According to the distinction of the Commodities Futures Trading Commission (CFTC henceforth)

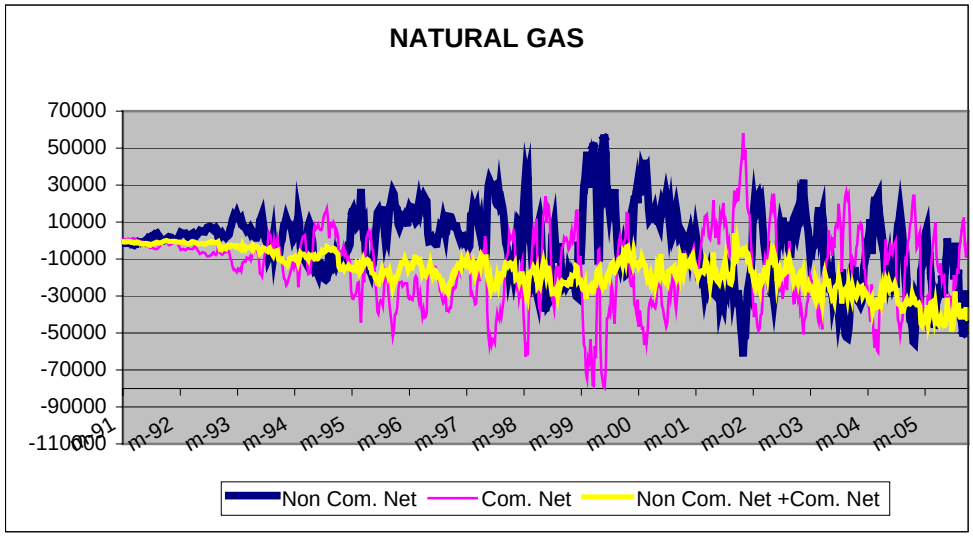
depending on the use of futures contracts for hedging as defined in the commission's Regulation (1.3 (z)) and filing the CTC form 40 stating that it is commercially ".... engaged in business activities hedged by the use of the futures or option markets...". Obviously a trader might be classified by the CFTC as a commercial one for one commodity and as non commercial for one another.

We compute a measure of Non commercial investors activities as the percentage of net position (i.e. long positions minus short positions) for both types of investors for a panel of 12 commodity futures encompassing every commodity sector (grains, soft, precious metals, industrial metals, energy). In the first place we plot graph in order to assess if the direction of each investors, assuming that they should increase volatility if they had opposite positions. In the second place, we will compute the percentage of non commercial activity on the global Total interest.We had computed rolling regression on every commodity futures monthly price changes to the related total Open Interest (long position plus short position) of non commercial. This technique is usually employed to qualify the impact of Non commercial activity on price, even if it did not address the causality issue at all.

Finally, we had assess the causality direction for our panel of commodity Futures using Vector Autoregression (VAR) and Granger Causality Test. It allowed us to give some elements of response to the following question : Is the Non commercial responsible of the changing patterns in the speculation side or is the price shock a signal to get in for the Non Commercial speculators?

As we mention we have computed Net Open interest for each commodity and each participant (Commercial and Non Commercial). The Graph 3.1 show an exemple of the result, the whole sample may be find in the appendix of this paper for the rest of the 12 commodity futures from 1990 to 2005.

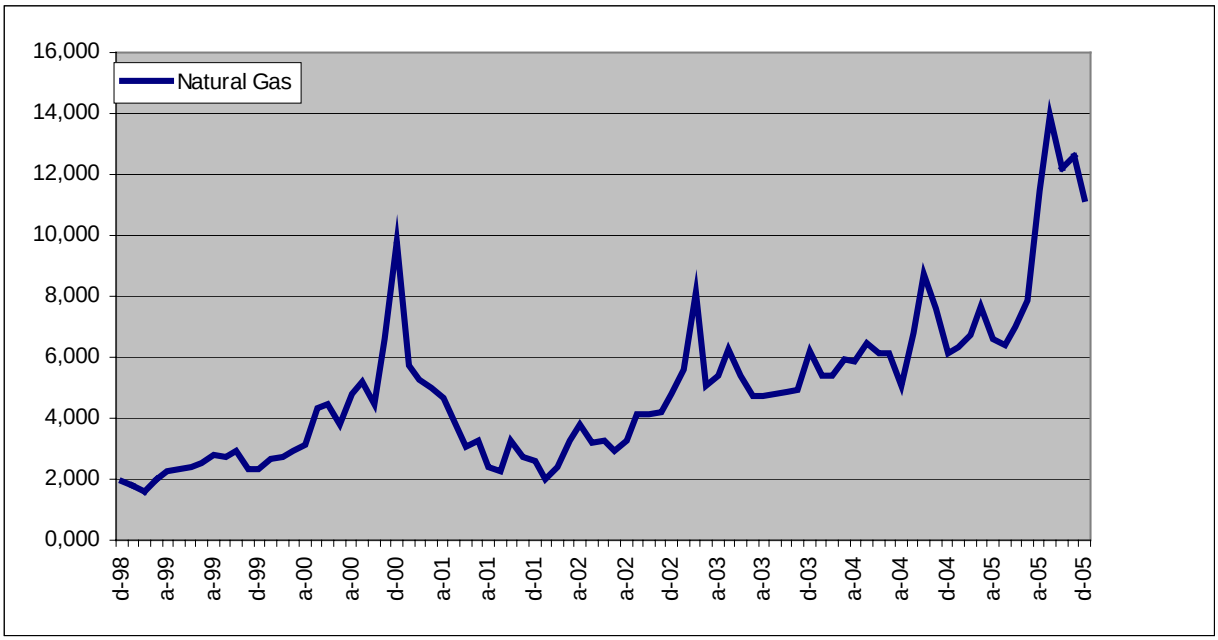
Graph 3.1 Non Commercial Net, Commercial Net and Net Cross Position for Natural Gas.



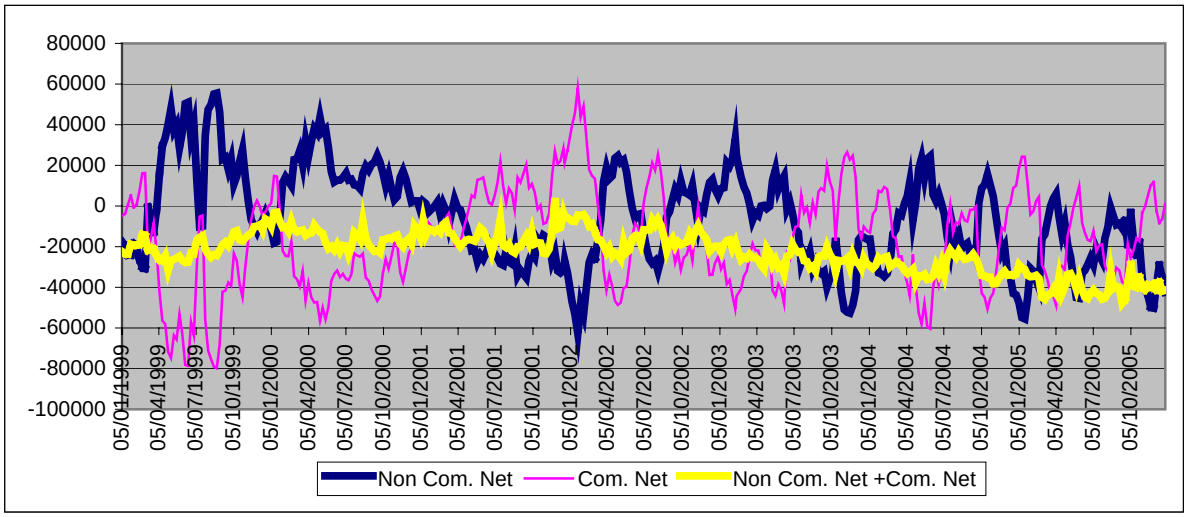
The blue line depicts the Net position (Long minus Short) on Non Commercial open interest, the pink one is the same applying to Commercial and finally the yellow one is the Net position of the blue one plus the pink one. This allows us to assess if the confrontation of the two positions (Non Commercial Vs Commercial) have been lead by the Non Commercial.

For instance in the case of Natural Gas the Graph shows us that from 2002 until 2005, the net cross position (the yellow line) is negative, thus the dominant position is short the future market of Natural Gas. Only the Future price of Natural Gas have not declined during this period.

Graph 3.2 Natural Gas on NYMEX from 1998 until 2005.

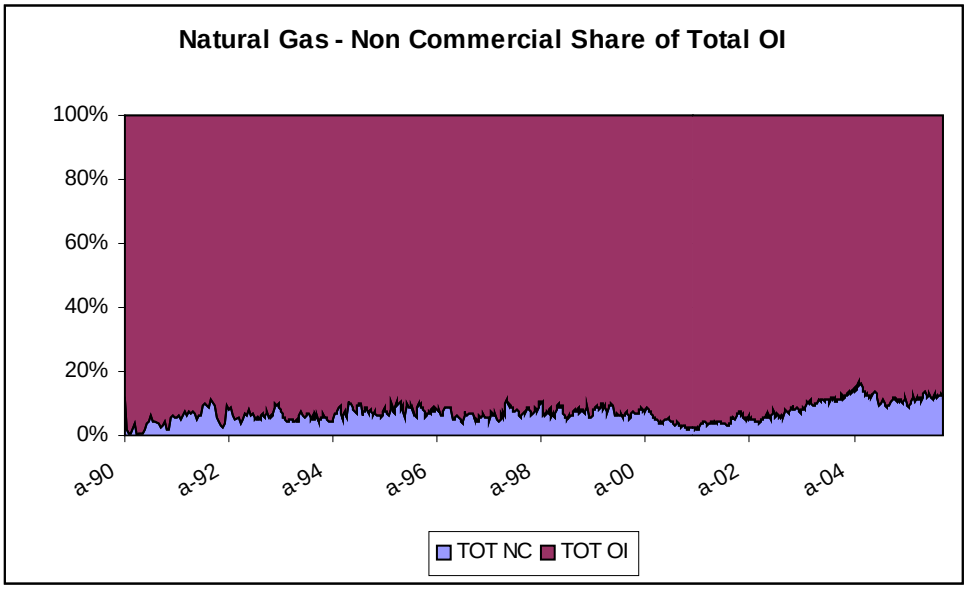


Then, from the information contained in the net cross-position, we apparently cannot determine a clear impact on price. At this point we cannot know the relation between Non commercial Open Interest and Natural gas Price. In order to facilitate the lecture of the graph 3.1 we present a restrained sample version of this graph, which is easier to analyze.



During the period of 2003 until 2005 there seems to be an alternation of net Long position and Net short position between the Non commercial (blue line) and the Commercial (pink line), therefore it is difficult to attribute the effect of the net cross position. In order to evaluate the percentage of Total Open interest of Non commercial Vs Global Total Open Interest we had plotted graph of every commodity open interest breakdown. Graph 3.3 shows an example, the whole sample of graph is in the appendix.

Graph 3.3 Non Commercial Share of Global Total Open Interest for Natural Gas

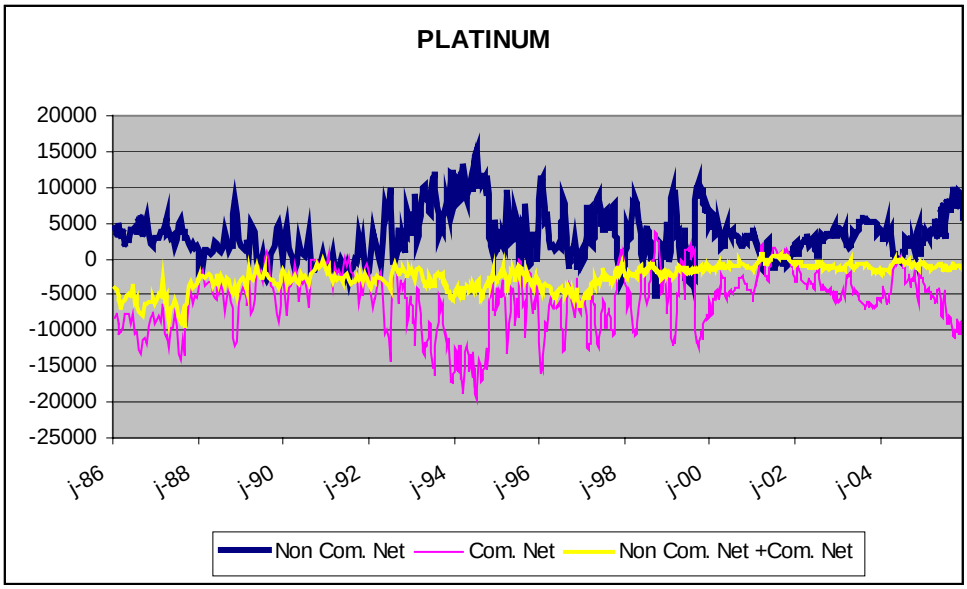


As we can see, the Non commercial is quite low in average 9 %, even if we can remark that it has increased from 2003 to a range of 12 –16 % with a peak in may-June 2004. Generally speaking, in our sample of chosen commodities the average percentage of open interest attributable at the Non Commercial is ranging between 10 and 20 %. However, there is very different pattern with regards to the type of commodity futures. For instance, as far as metals futures (Copper, Platinum & Gold) are concerned Non commercial operators represent more than 18 % in average. Conversely, the energy sector (Crude Oil, Nat-Gas, Gasoline & Heating Oil) is much more less exposed to Non Commercial Operators positions (10 % in average), even if we might see small upward movement from 2003 to the end 2005. Concerning agricultural Commodity (Grains plus Soft), interestingly enough they seemed to be higherly exposed to Non Commercial operators, about 16 % in average, with some cases showing patterns like Wheat, Cotton and Coffee.

From this analysis of the percentage of the Total Open Interest Share of Non Commercial Operators and the Evolution of Net Non commercial, Net Commercial and Net Cross Operators, we can state that there is apparently no clear relation between Non Commercials Operators and the Evolution of prices of the underlying Commodity. The second remark is that we can distinguish different pattern with regards of the variability of the positions of both operators (blue and pink lines). For some

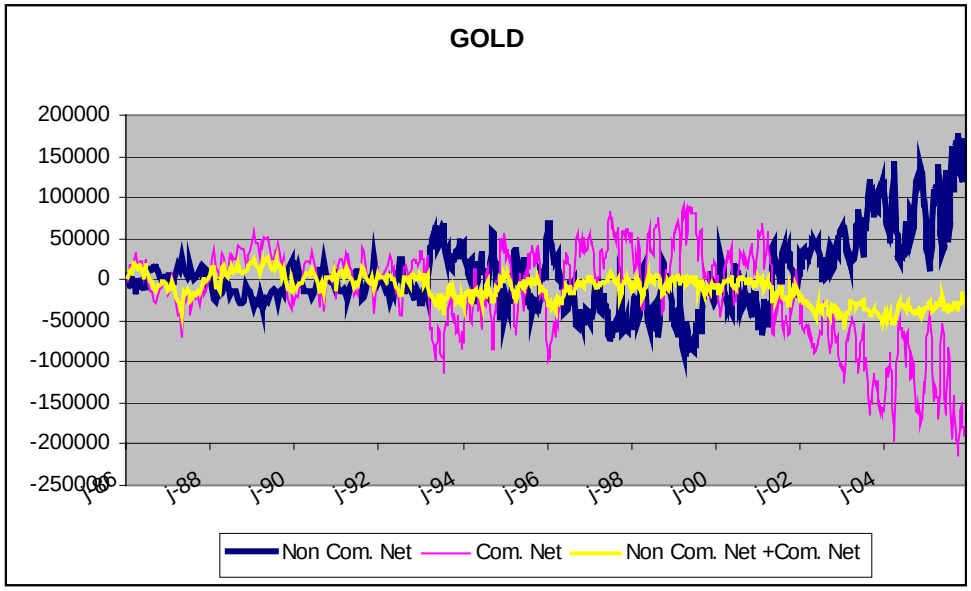
commodities there is a defined historic bias for Non Commercial and Commercials, for instance Platinum Futures in graph 3.4, shows explicitly that NC have a net long bias.

Graph 3.4 Non Commercial Net, Commercial Net and Net Cross Position for Platinum.



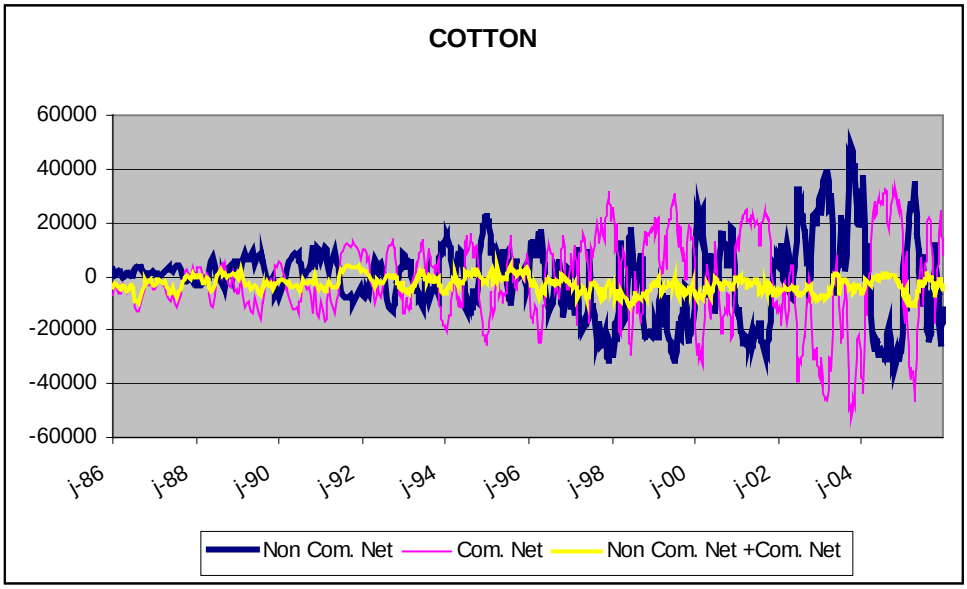
Alternatively some commodity Futures show periodic patterns as consecutive non-seasonal net bias. Gold is good illustration, showing also an explosive configuration in the recent past.

Graph 3.5 Non Commercial Net, Commercial Net and Net Cross Position for Gold.



Conversely, some commodities do not show defined patterns, but only a successive alternative configuration of Net long & Net short Bias from the same operators. Cotton is a good illustration of this characteristic configuration, which is also explosive.

Graph 3.6 Non Commercial Net, Commercial Net and Net Cross Position for Cotton.



Finally, from the analysis of Percentage Share of Total Open Interest we can conclude that the Commodity that we might have though more exposed to Non Commercial operators, for instance those from the energy sector, are interestingly not the ones the more exposed. This might confirm our intuition that Energy commodity futures are too eagerly taken as example in the un-evidenced mediatised illustration of the Threat of Non Commercial operators in commodity futures markets.

Still, those insights, which also confirm the findings of section II, do not provide us an assessment with regards to the price formation in the markets. Some studies, dealing with the impact of Non Commercial positions on prices, uses linear regression analysis to assess jointly the causality and the percentage of variance (price volatility) explained by the model (using the R^2). In order to criticize this approach we did compute linear regression taking the Monthly Futures Price Changes as a dependent variable and the Monthly Change of total Open interest of Non Commercial operators as independent variable. We estimated the coefficient using OLS. The period of analysis is from 1994 - 2005.

We also compute rolling windows regression[12] of 36 months in order to have a dynamic insight on the analysis. For the sake of brevity we only report the Statistics of the whole sample regression, and the average statistics of the 110 regression of 36 months for every of the 10 commodity futures.

[12] Even if we know that it is not a robust statistical approach.

Table 3.1 Regression Statistics for every Commodity futures

	Coefficient	T-Stats	R^2 Adjusted
Crude Oil	1,438	2,487	0,035
A.R.	*0,924*	*2,519*	*0,176*
Copper	0,009	0,606	0,003
A.R.	*0,061*	*0,843*	*0,030*
Gold	1,589	1,492	0,015
A.R.	*1,541*	*2,140*	*0,153*
Cotton	-0,006	-0,216	0,000
A.R.	*0,057*	*0,758*	*0,022*
Platinum	0,018	1,946	0,026
A.R.	*1,166*	*1,120*	*0,050*
Wheat	0,016	0,560	0,001
A.R.	*-0,018*	*0,797*	*0,024*
Cocoa	0,007	0,205	0,000
A.R.	*-0,030*	*1,098*	*0,048*
Coffee	0,043	1,100	0,008
A.R.	*0,061*	*0,893*	*0,031*
Heating Oil	0,042	1,811	0,023
A.R.	*0,602*	*1,395*	*0,077*
NatGas	0,010	0,213	0,000
A.R.	*0,102*	*0,849*	*0,028*

Regarding the whole sample, the regressions (both types, rolling and whole sample) fail to explain a significant part of price volatility 2 % in average. We can point out that the rolling regression share the same profile of low R^2 with two exceptions Crude Oil and Gold. The estimated coefficients are not different from zero except Crude Oil (in both types of regression) and Gold on the rolling analysis.

Therefore if we confine ourselves to the regression analysis (whole sample or rolling) we cannot draw major conclusion on the impact of Non Commercial open interest onto price volatility. First regression R^2 are very low hence the estimated coefficient results must be taken with extreme cautious. Second, only two commodities seem to have coefficient different from zero at a level at least of 95 % confidence. Finally, linear simple factor regression analysis is not a measure of causality but a measure of correlation in the large sense.

Hence, in order to evaluate the impact of Non Commercial in the price formation we will use Vector Auto Regression (VAR) techniques, which will help use in the fist place to assess the variance decomposition of the price formation and in the second place Granger Causality Test to evaluate the causality direction between Non Commercial open interest and Commodity Futures Returns. For the sake of reliance we execute the VAR analysis on the whole sample from 1994 – 2005 and a smaller sample of 2002 – 2005, as a proxy for the recent movements.

In order to find the optimal lag for the VAR estimation model we used the Akaike Information Criteria (AIC) and the Schwartz Criteria (SC) by inferring with different lags, choosing the lower pair of statistics. We find that a lag of 1 gave the more efficient results according to the defined criteria. We consistently evaluate every VAR lag structure, confirming that it lies in the Inverse Roots of the Auto Regressive characteristic polynomial Then we compute the variance decomposition at 10^{th} level (1 level = 1 month) for every commodity futures. We synthesize the results in table 3.2. A & B (page 22) for the whole sample and 3.2 B for the smaller sample.

Regarding the variance decomposition of futures prices change on both samples, we can see that it is due in average to 99 % to commodity prices change itself and due to 1 % to Non Commercial open interest. Results between the two samples are consistent. However we might still isolate some commodity showing an interesting difference with this variance attribution. In the global sample Corn (1.23 %) Heating Oil (1.64%) and Natural Gas (1.18 %) present above average coefficient meaning that in this three commodity the impact of Non Commercial open interest is higher.

The smaller sample confirms the heating Oil case (1.29 %) and introduce a new "outlier" with Copper showing the highest coefficient (2.77%), meaning that 2.77 % of Copper price changes might have been influenced by the Non Commercial positions in Copper futures market during the period of 2002 –end of 2005.

Regarding this time the variance decomposition of Non Commercial Open Interest on both samples, we can see that it is due in average to 92.5 % of itself and to 7.5 % to commodity prices. Conversely the Commodity price Variance Decomposition, the Non Commercial Open Interest Variance Decomposition shows very variable results depending on the commodity Futures, we will comment it in detail for every sample. Concerning the global period the results are lower in average due to 95 % to itself and 5 % to commodity Prices. We can point out 6 commodity futures showing interesting results. The Variance Decomposition due to Commodity Prices on Non Commercial open interest is 9.45 % for Coffee, 3.19 % for Cotton, 13.8 % for Crude Oil, 5.27 % for Gold, 5.28 % for Heating Oil and 3.29 % for Platinum. Hence it means that, for instance, the variance of Crude Oil's Non Commercial

Open Interest is due to 14 % to a Commodity Price Change, meaning that a positive shock on Crude Oil Prices (an increase price) will lead to an increase of Non Commercial futures positions.

The smaller period of analysis confirms our previous results to a larger extent. As a matter of fact the average variance explained by the Commodity prices on Non Commercial OI is 10 % although it present also some large difference between commodity futures. Those results confirms the commodity isolated by the global sample analysis (except for cotton with a small coefficient compared to the rest of the commodity futures) with Coffee 11.18 %, Crude Oil 38.24 %, Gold 22.75 %, Heating Oil 18.24 %, Platinum 6.11 % and Wheat 5.42 %.

Therefore it means that for Crude Oil, if the Crude Oil Futures Price increases by 1 % the positions on Crude Oil Futures market will increase by 40 %. Hence the increasing positions in energy commodity futures by Non Commercial operators are following a shock on the price not the other way around.

To confirm our assessment of the causality from the price to the increased Open Interest we have computed Granger Causality Test for every Commodity contract for both sample periods. The Granger Causality Test gave us mixed results compared with the variance decomposition. Moreover, they confirms the causality for Coffee on both sample, confirm the causality for Gold on the recent sample, but fail to indicate clear-cut causality for Crude Oil or Heating Oil showing strong variance decomposition on the recent Sample.

For instance on the global period sample we can hardly determine a one-way causality regarding the Fisher Statistics on the two null hypothesis. The first one could be read like this :
H0 : Non Commercial Open Interest does not Granger Cause Commodity Price Change (Here Crude Oil) The F-stats is 1.17 with a probability of 0.28 versus the opposite null hypothesis, Commodity prices does not Granger cause Non Commercial Open Interest with F-stats of 1.20 with a probability of 0.27. Based on this comparisons Gold, Heating Oil and Crude Oil seem to present a weak two-way causality on the global period. Conversely Cotton and Coffee present stronger one-way causality where commodity prices changes do Granger cause the Non Commercial Open Interest changes.

Table 3.2 A & B Variance Decomposition and Granger Causality Tests for the commodity panel.

Variance Decompo.	Commodity Price Changes:			NC Total OI changes:	
	S.E.	COMMO_CH	OI_CH	S.E.	COMMO_CH	OI_CH
Cocoa	0,09	99,99	0,01	0,24	0,08	99,92
Coffee	0,13	99,86	0,14	0,27	**9,45**	90,55
Copper	0,07	99,12	0,88	0,38	1,53	98,47
Corn	0,07	98,77	**1,23**	0,24	0,01	99,99
Cotton	0,09	99,75	0,25	0,28	**3,19**	96,81
Crude Oil	0,09	99,17	0,83	0,26	**13,80**	86,20
Gold	0,04	99,69	0,31	0,36	**5,27**	94,73
Heating Oil	0,11	98,36	**1,64**	0,39	**5,28**	94,72
Natural Gas	0,17	98,82	**1,18**	0,30	0,87	99,13
Platinum	0,05	99,85	0,15	0,42	**3,29**	96,71
Wheat	0,08	99,48	0,52	0,22	0,30	99,70

Granger Causality	OI Changes to Commodities		Commodities Changes to OI	
	F-Stats	Prob	F-Stats	Prob
Cocoa	0,0008	0,9781	0,0535	0,8175
Coffee	0,2119	0,6460	**9,6591**	**0,0023**
Copper	1,1250	0,2907	2,0431	0,1551
Corn	1,7075	0,1935	0,0025	0,9606
Cotton	0,3364	0,5628	**4,4963**	**0,0357**
Crude Oil	1,1721	0,2808	1,2116	0,2729
Gold	0,4080	0,5241	0,3416	0,5599
Heating Oil	2,3378	0,1285	2,1476	0,1450
Natural Gas	1,6801	0,1970	0,6452	0,4232
Platinum	0,2121	0,6459	0,4893	0,4854
Wheat	0,7224	0,3968	0,1160	0,7340

Variance Decompo.	Commodity Price Changes:			NC Total OI changes:	
	S.E.	COMMO_CH	OI_CH	S.E.	COMMO_CH	OI_CH
Cocoa	0,11	99,50	0,50	0,26	0,30	99,70
Coffee	0,11	99,82	0,18	0,22	**11,18**	88,82
Copper	0,07	97,23	**2,77**	0,37	3,90	96,10
Corn	0,07	99,72	0,28	0,22	0,05	99,95
Cotton	0,10	99,37	0,63	0,29	2,77	97,23
Crude Oil	0,10	99,75	0,25	0,23	**38,24**	61,76
Gold	0,04	99,03	0,97	0,29	**22,75**	77,25
Heating Oil	0,12	98,71	**1,29**	0,31	**18,24**	81,76
Natural Gas	0,19	99,89	0,11	0,27	0,55	99,45
Platinum	0,05	99,44	0,56	0,45	**6,11**	93,89
Wheat	0,07	99,70	0,30	0,18	**5,42**	94,58

Granger Causality	OI Changes to Commodities		Commodities Changes to OI	
	F-Stats	Prob	F-Stats	Prob
Cocoa	0,3671	0,5446	0,2284	0,6327
Coffee	0,1913	0,6618	**7,5038**	**0,0062**
Copper	2,0774	0,1495	1,5612	0,2115
Corn	0,2335	0,6289	0,0005	0,9819
Cotton	0,4920	0,4830	2,0908	0,1482
Crude Oil	0,2152	0,6427	1,2829	0,2574
Gold	0,8864	0,3465	**2,7815**	**0,0954**
Heating Oil	1,0784	0,2990	2,0779	0,1494
Natural Gas	0,0892	0,7652	0,3944	0,5300
Platinum	0,4693	0,4933	0,2321	0,6300
Wheat	0,2455	0,6202	**3,0919**	**0,0787**

Section Remarks

As a section conclusion, we can point our findings about the relation of Commodity Futures' price changes and Non Commercial Total Open Interest changes, using the aggregated CFTC weekly open interest database.

- We can point out that NC Open interest represent in average a small share of the total open interest, confirming our intuition that the NC positions would have a small impact on commodity prices. Moreover, the highest share of NC open interest are not those which are the more relayed in the media.
- The NC Open interest seems to be very different in every commodity futures market, thus showing very diverse patterns of net positions without being consistently net long to boost the price. There seems to be very little connection between the net Open Interest of non commercial and the commodity prices.
- The simple linear regression had shown that the correlation between NC OI and Commodity prices is very low, hence the percentage of variance explained by a simple regression model with NC OI as independent variable.
- The variance decomposition had shown that the more mediatised commodity futures, in the recent period, had enjoyed the liquidity granted by the NC operators not the other way around. The causality being in average from the prices to a raise in positions futures.

Section IV : Conclusion and further paths of research

The return analysis on the panel of the major CTAs indices had provided us some insights about the evolution of the global CTAs market. The factor analysis shed some lights on the factors exposure with sensibility to long term maturity bonds and a negative exposure for the CPI index. Thus, those elements had been also confirmed by the general analysis of the Non Commercial Open Interest where both CTAs, CPOs and Hedge funds belong to.
The non commercial open interest analysis helped us to quantify the Non commercial share of total open interest and to defined the direction of the causality, giving us also range of price impact with the variance decomposition. We find that Non commercial were liquidity providers, as they enter a market after a shock in the price not the other way around. Alternative Investment as a representation of Non commercial had been liquidity provider more than liquidity disturber during the commodity price rally,

As a consequence, we think that the Alternative Investment trial against Commodity Price had been too eagerly judged, especially by non-specialised financial press, surfing on the Hedge Funds Criminal Affairs wave. Thus, with the general "press heat" on Hedge Funds, alternative investment had been an easy target to castigate when nobody were capable of understanding the fundamentals driving the commodities markets.

Paths of improvements might have been first to use a disaggregated open interest database in order to qualify every type of investors and their contribution. Another improvements might have been to use a CTAs database in order to proceed to cross section analysis in the factor analysis. Our sample of CTAs index is representative but the whole market might have been better to test the general exposure evolution breakdown. Finally, a specified analysis of a small panel of commodities taking into account the impact of the fundamentals drivers of commodities (Supply / demand, Backwardation/contango ratio, roll return, convenience yield estimation..) with the open interest analysis could have been another confirmation of our analysis.

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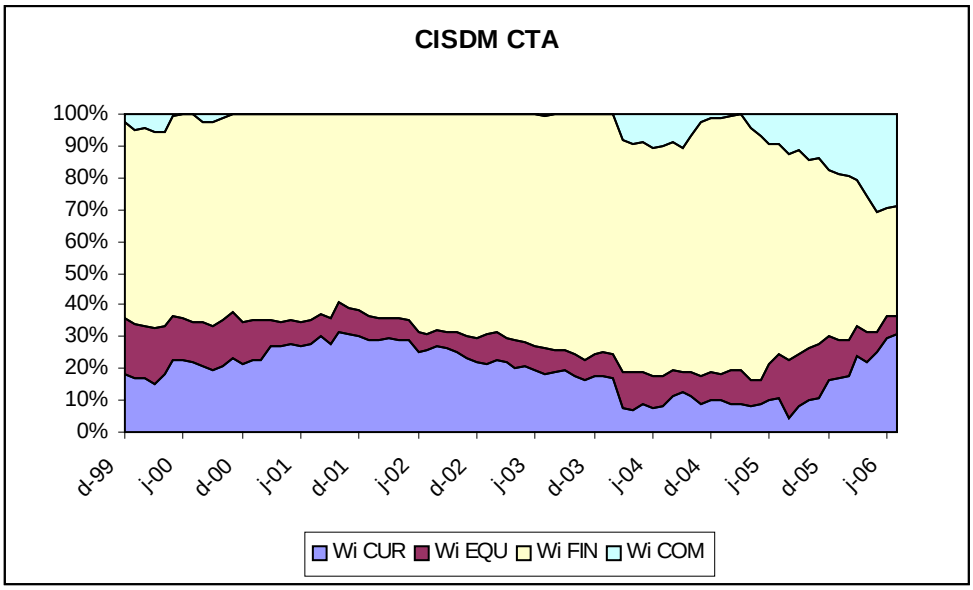
Appendices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100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
d-99
j-00
d-00
j-01
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j-05
d-05
j-06
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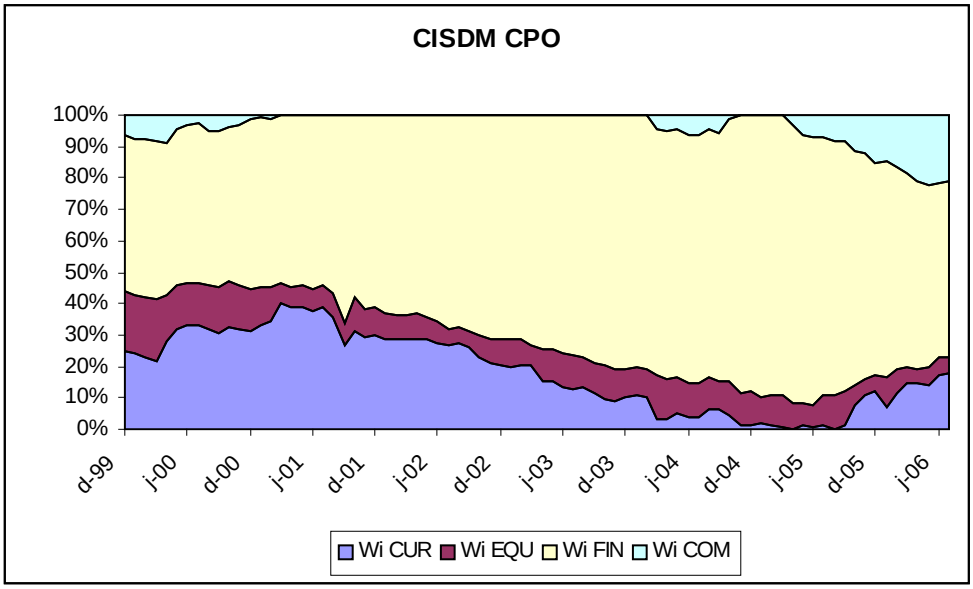
Wi EQU
Wi FIN
Wi COM


CISDM CPO
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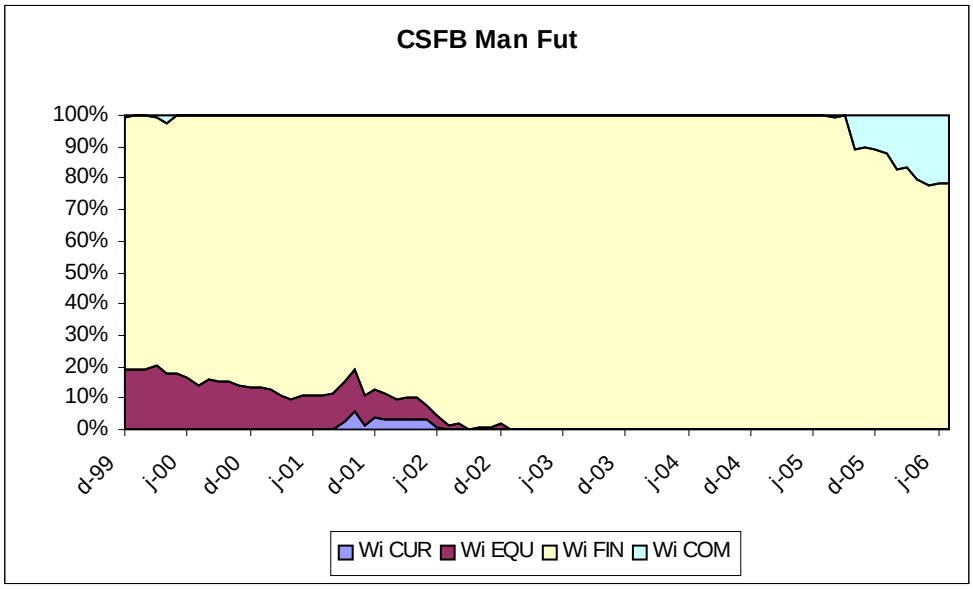
CSFB Man Fut
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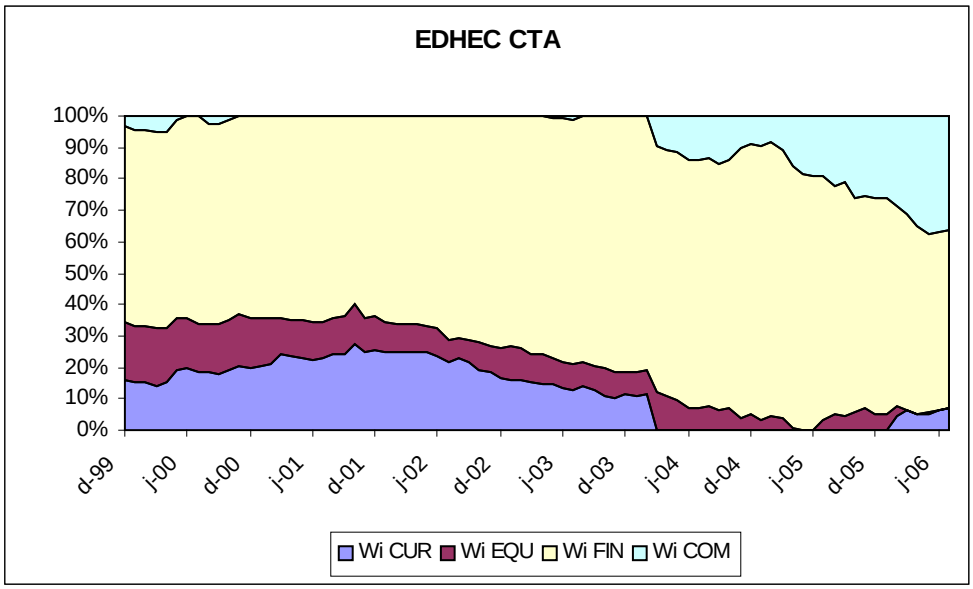
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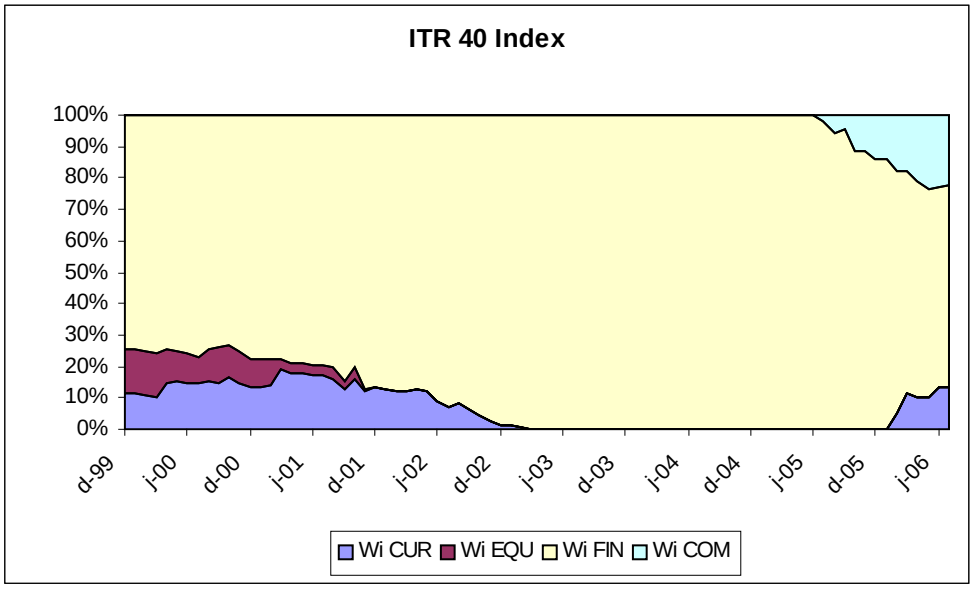
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90%
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60%
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j-00
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j-01
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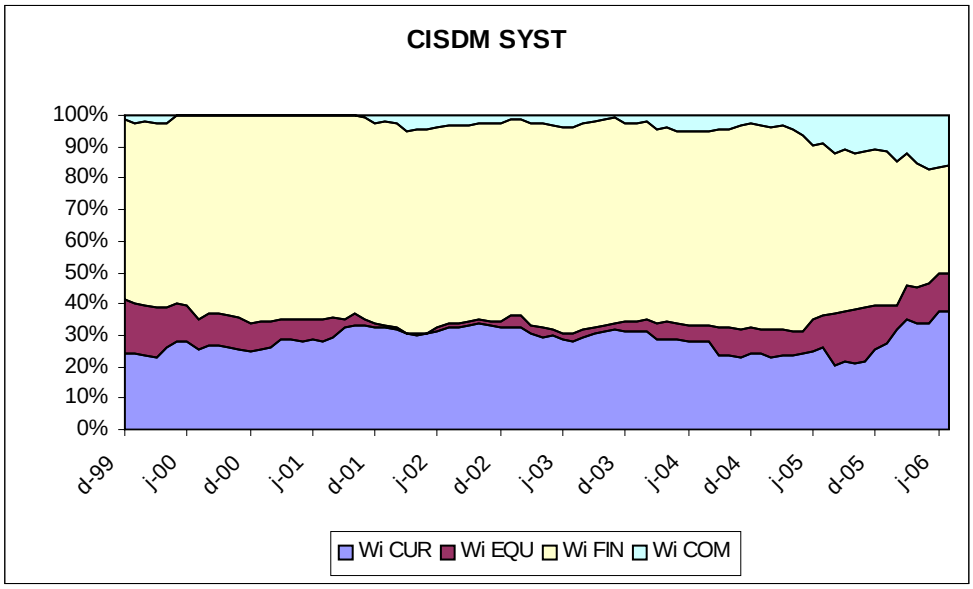
CISDM SYST
100%
90%
80%
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d-99
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d-00
j-01
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j-02
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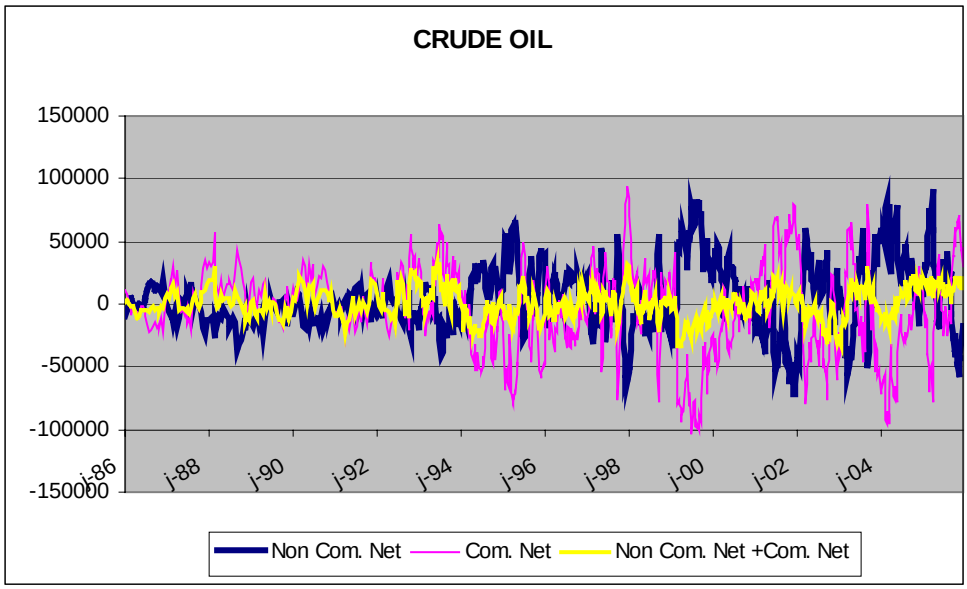
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j-86
j-88
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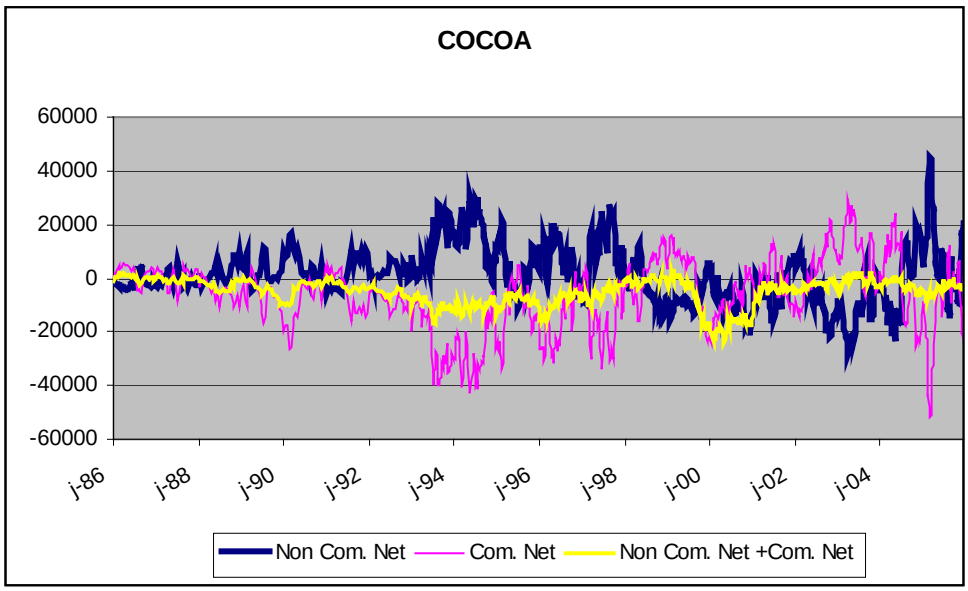
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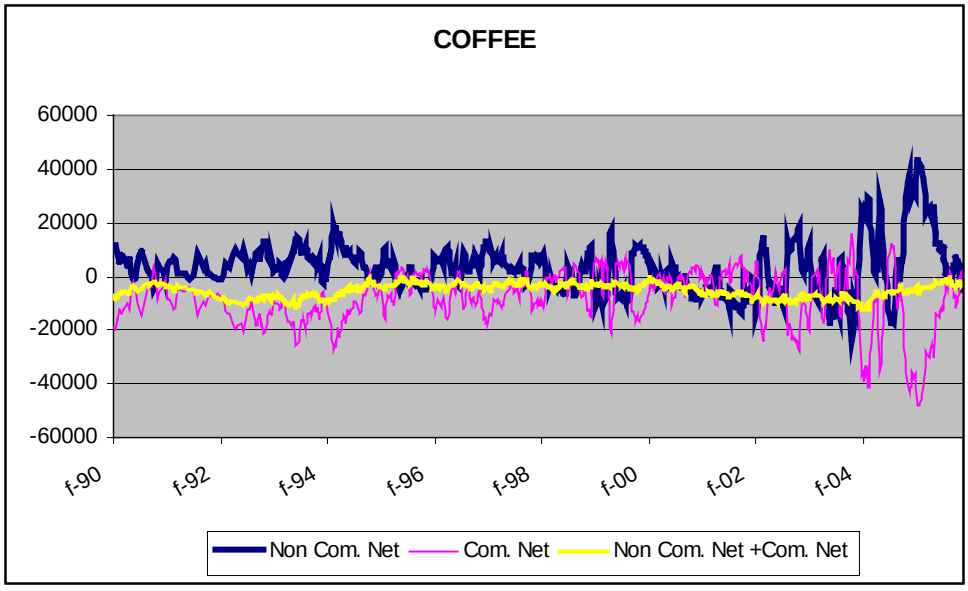
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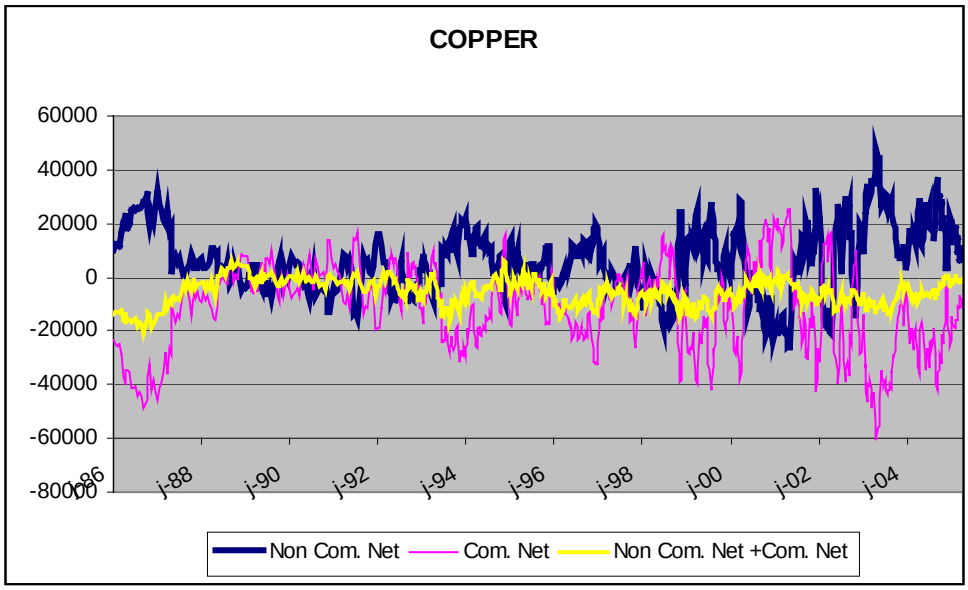
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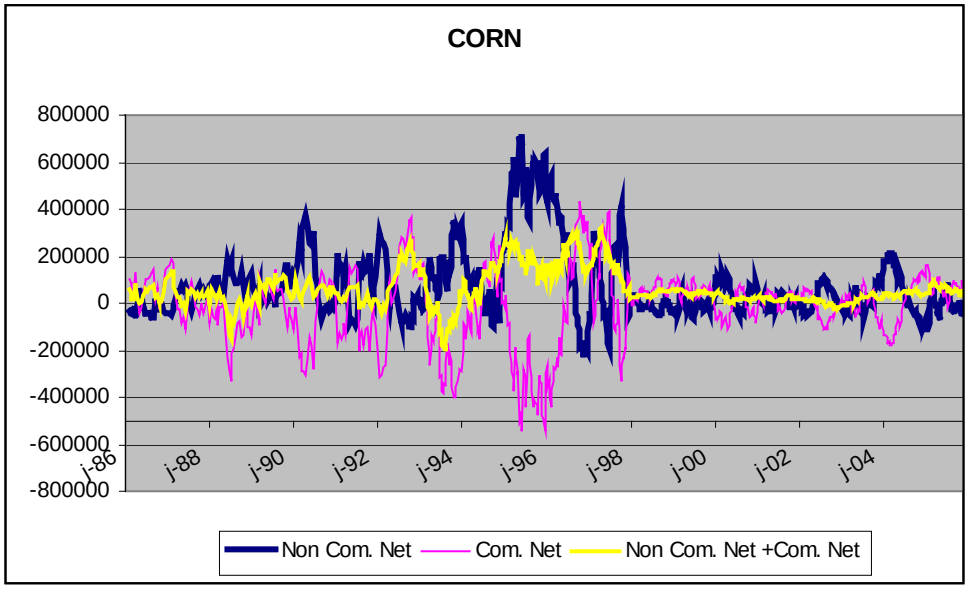
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600000
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j-88
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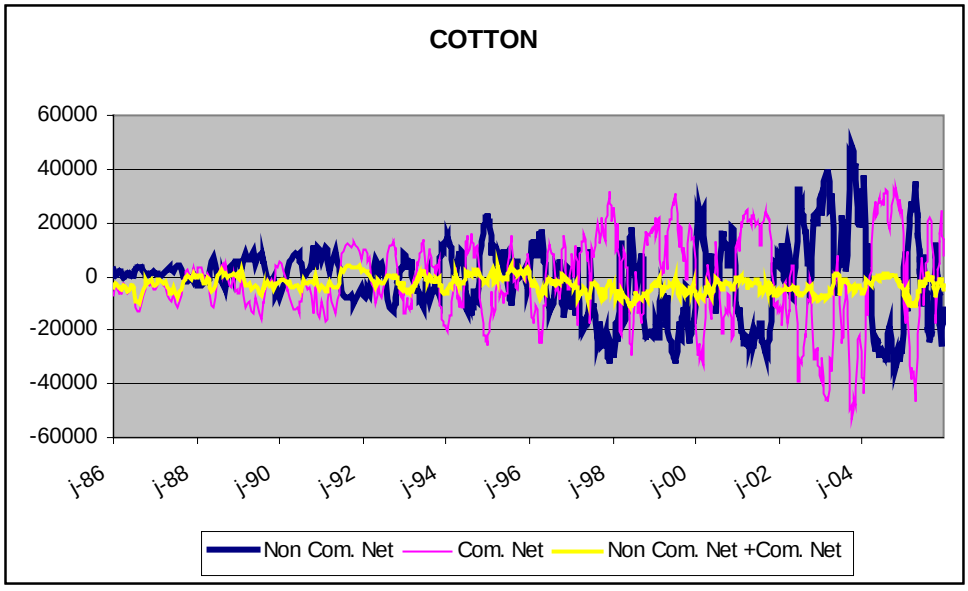
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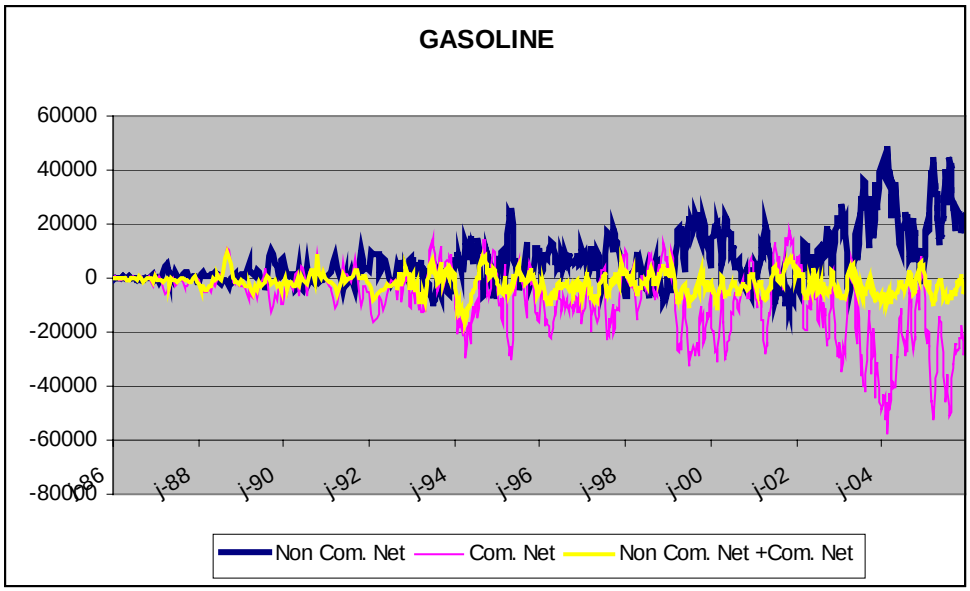
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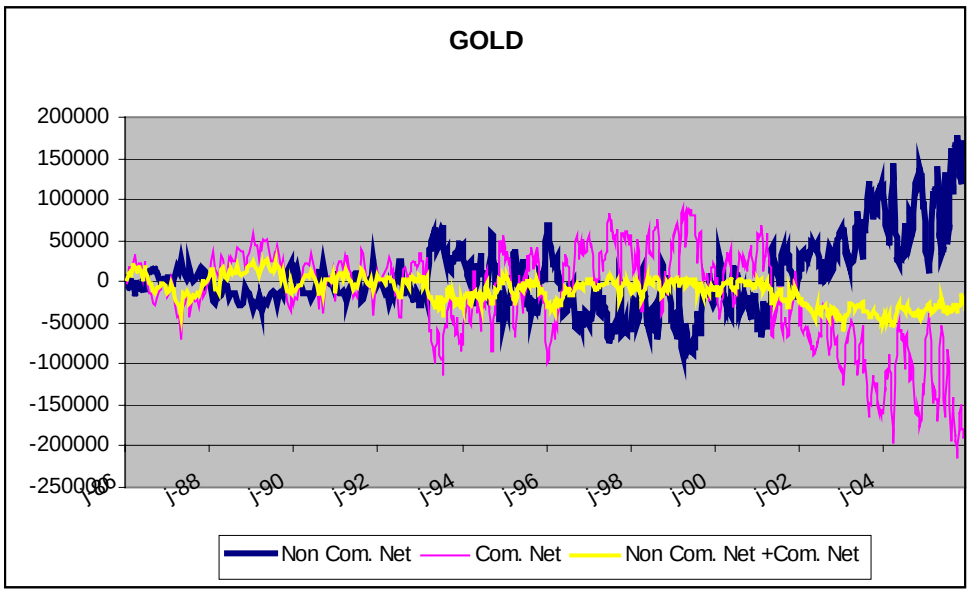
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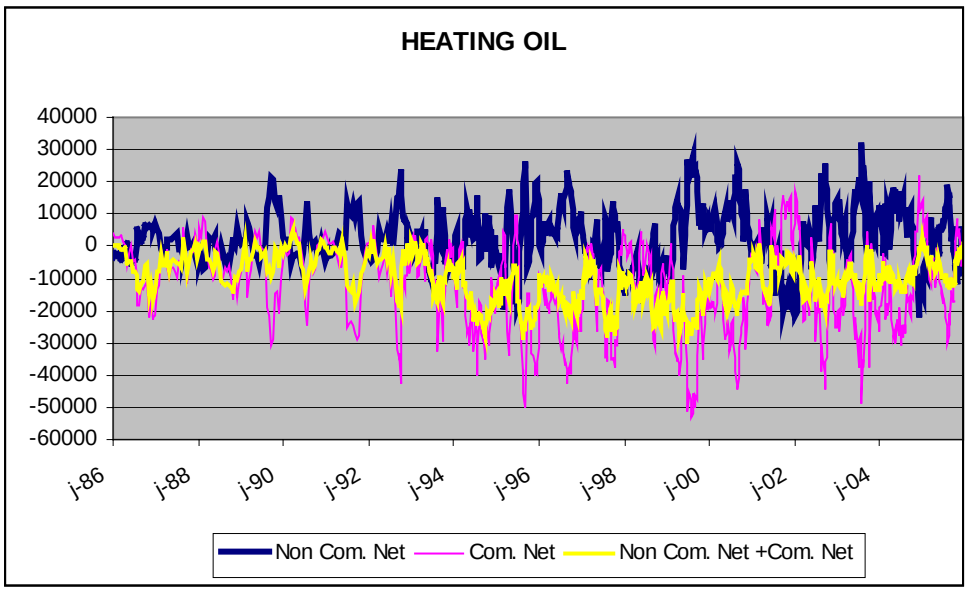
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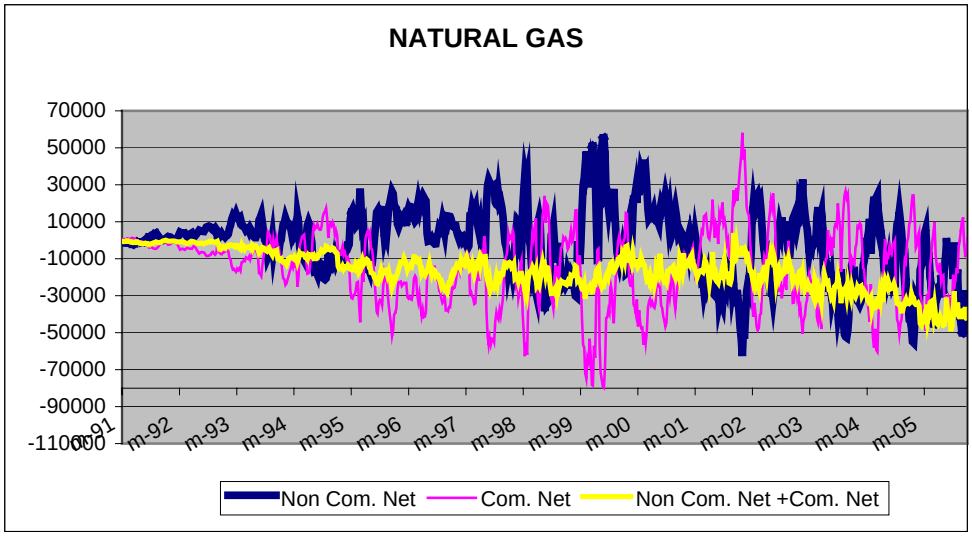
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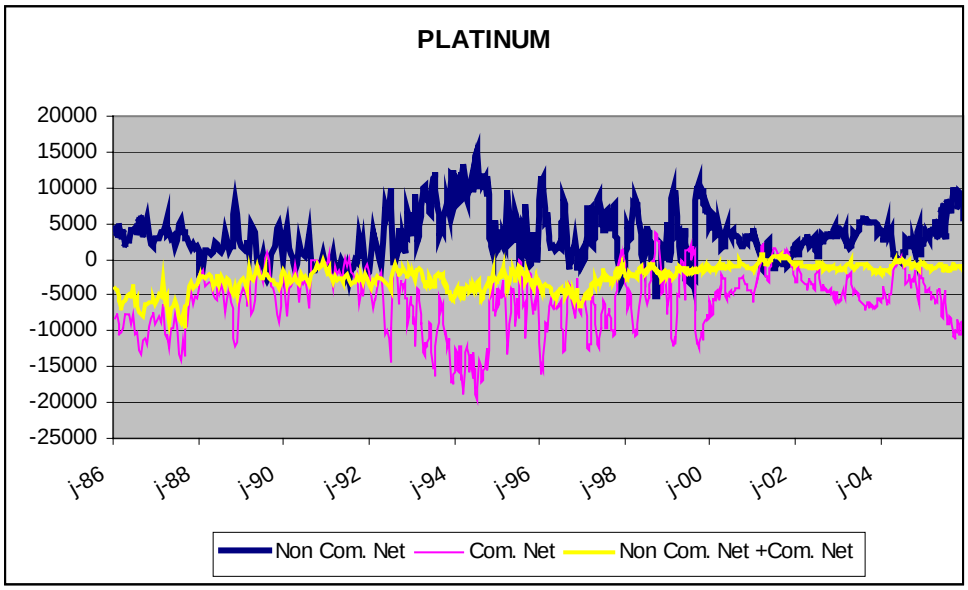
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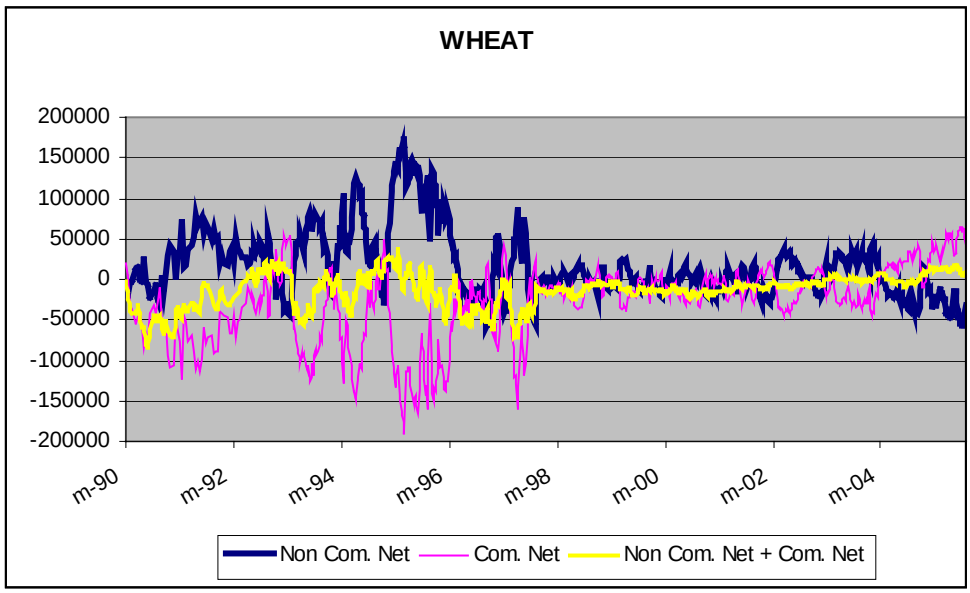
Non Com. Net +Com. Net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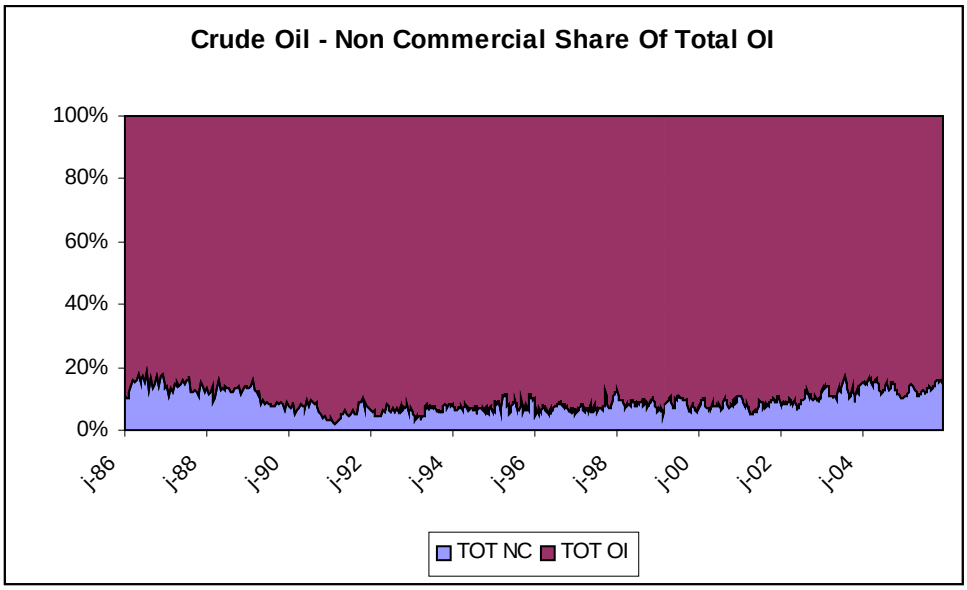
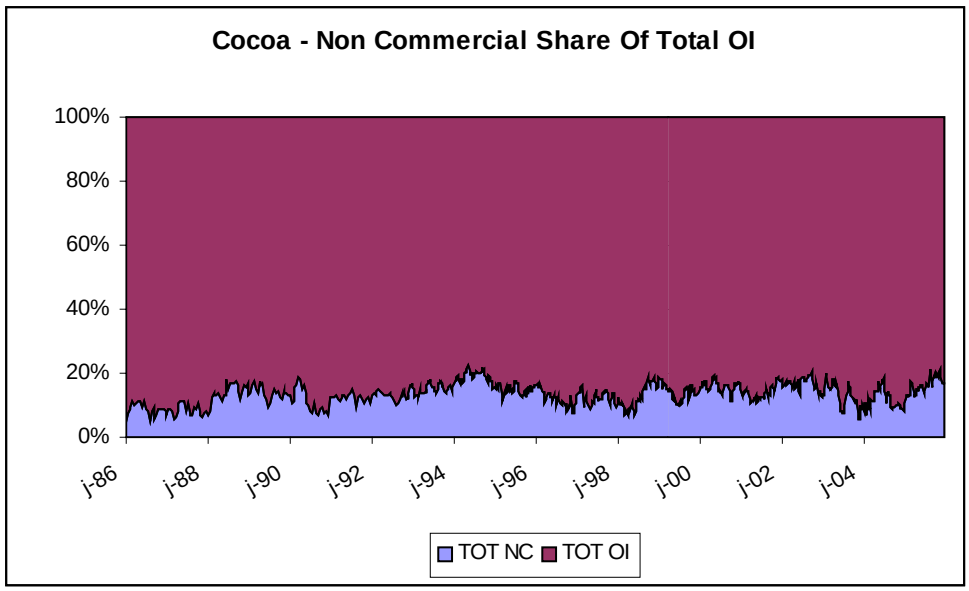
Non Com. Net
Com. Net
Non Com. Net + Com. Net


Crude Oil - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
j-92
j-94
j-96
j-98
j-00
j-02
j-04
TOT NC
TOT OI


Cocoa - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
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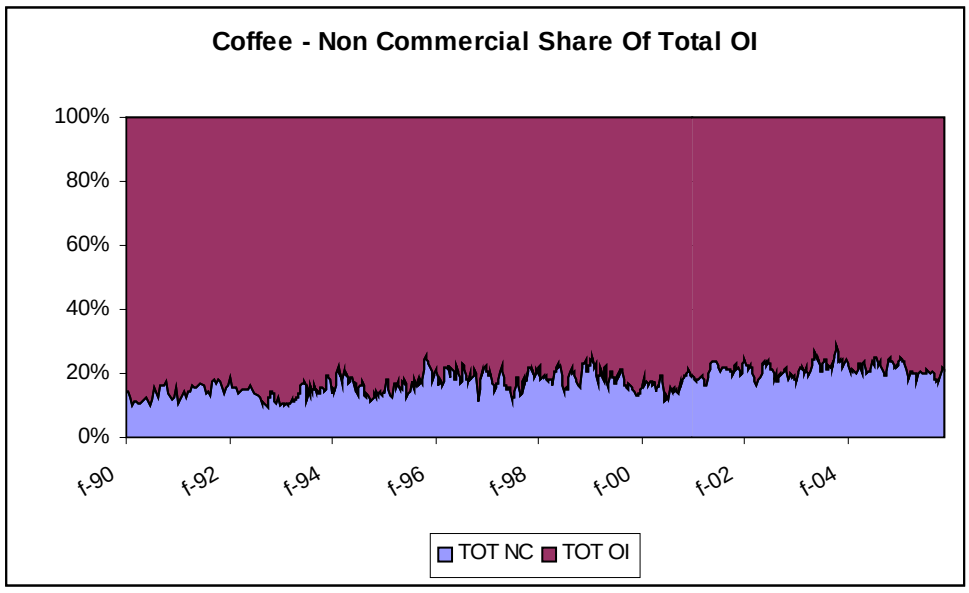
j-94
j-96
j-98
j-00
j-02
j-04
TOT NC
TOT OI


Coffee - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
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f-96
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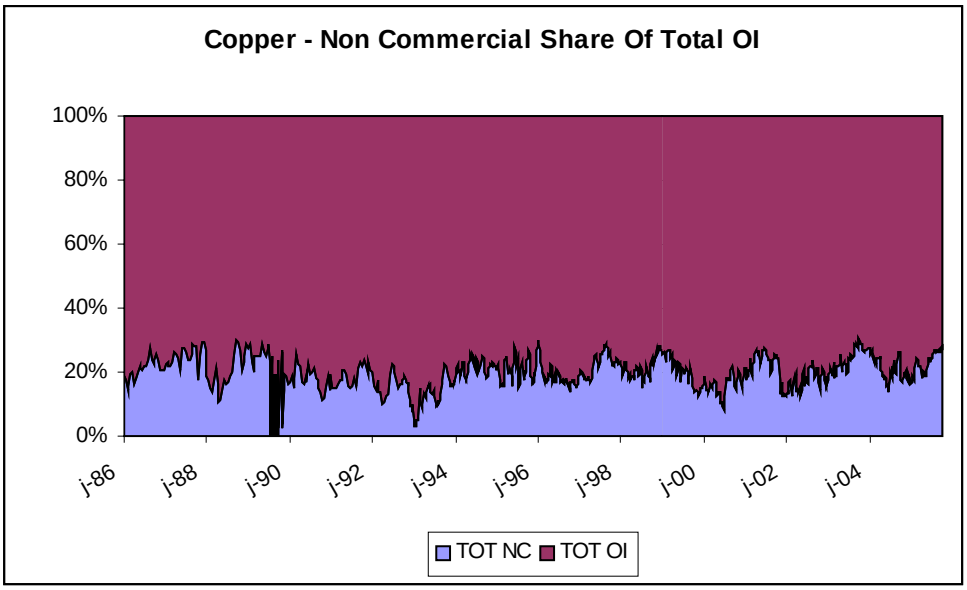
TOT OI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100%
80%
60%
40%
20%
0%
j-86
j-88
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j-96
j-98
j-00
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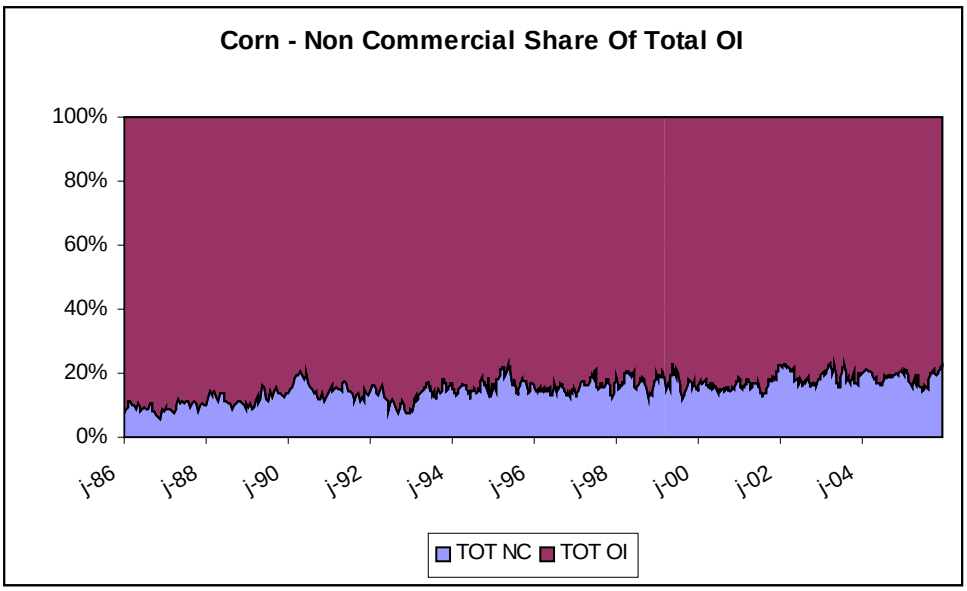
TOT NC
TOT OI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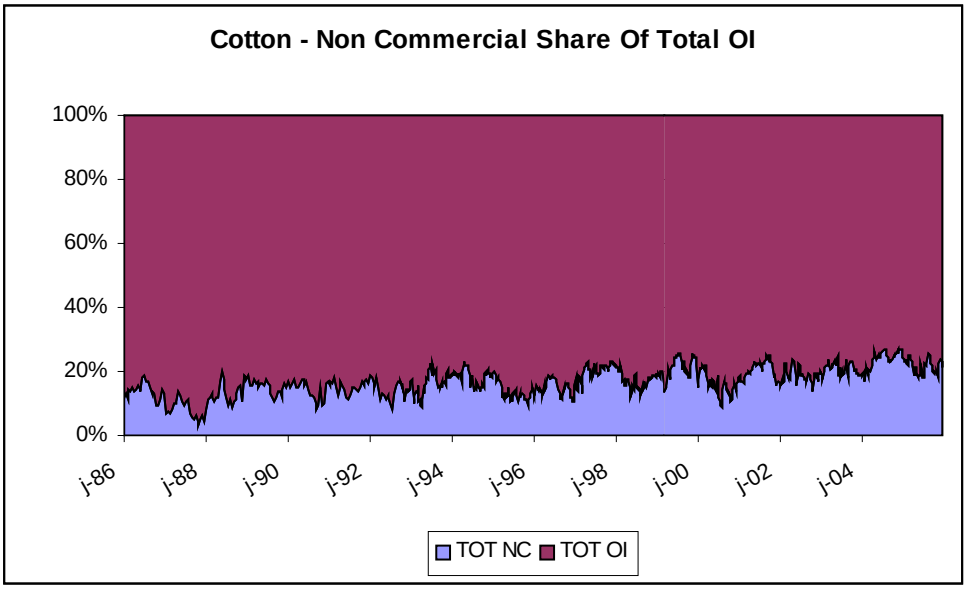
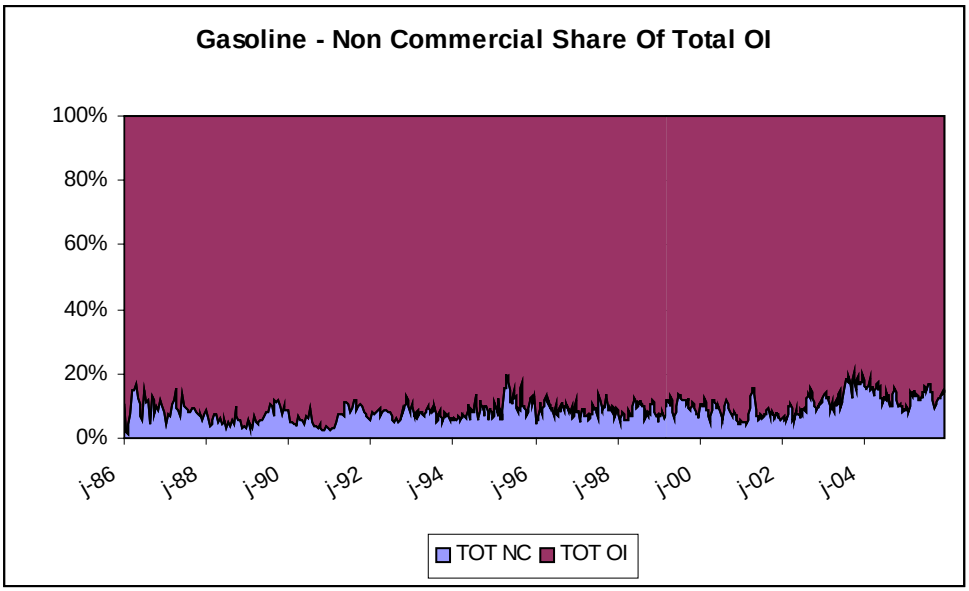
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
j-92
j-94
j-96
j-98
j-00
j-02
j-04
TOT NC
TOT OI


Cotton - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
j-92
j-94
j-96
j-98
j-00
j-02
j-04
TOT NC
TOT OI


Gasoline - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
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j-96
j-98
j-00
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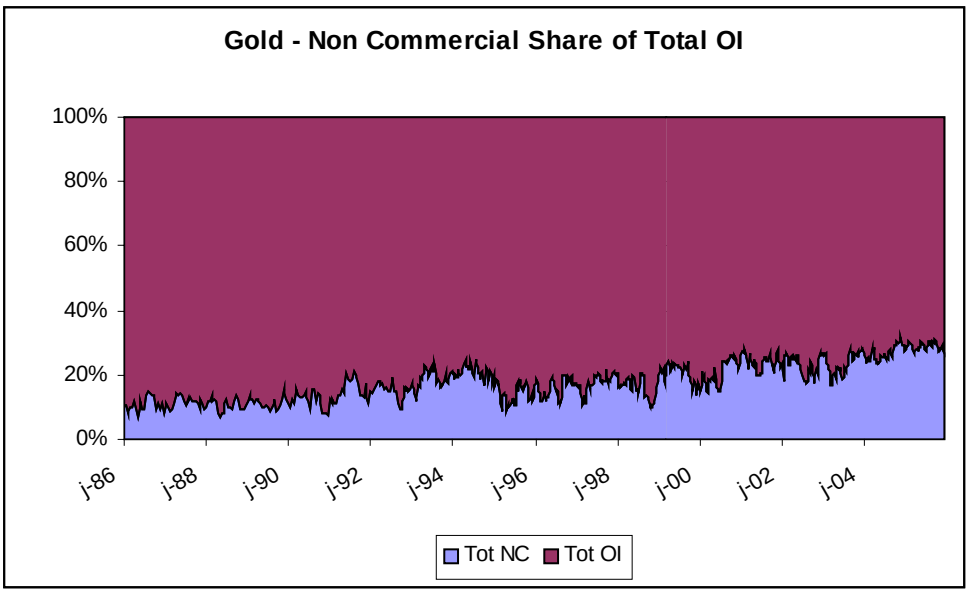
TOT NC
TOT OI


Gold - Non Commercial Share of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
j-92
j-94
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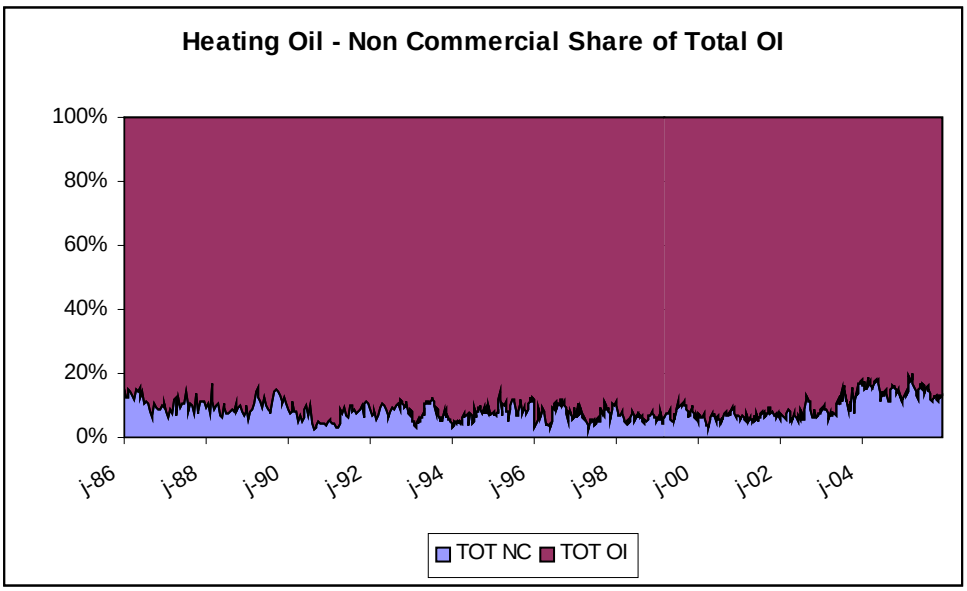
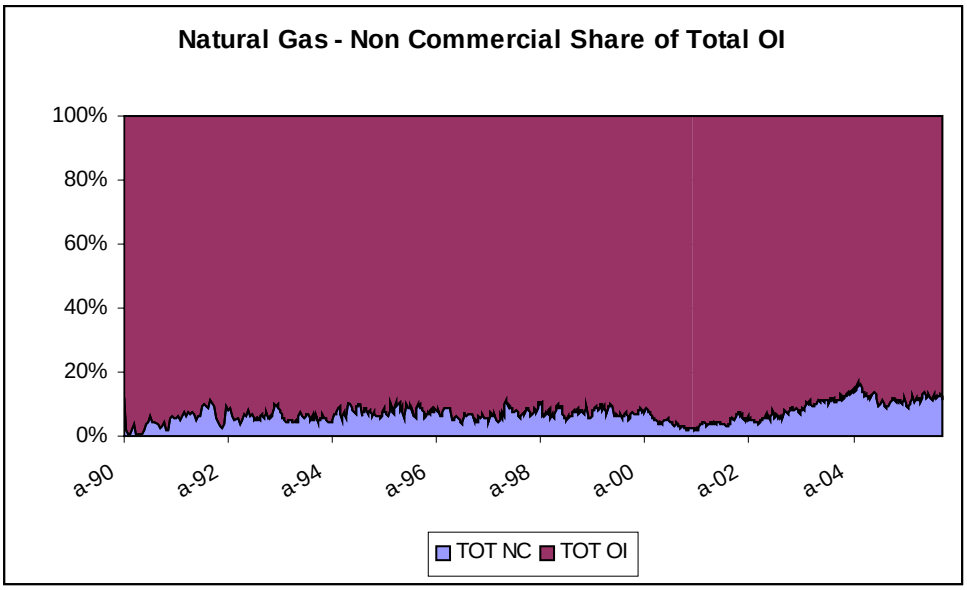
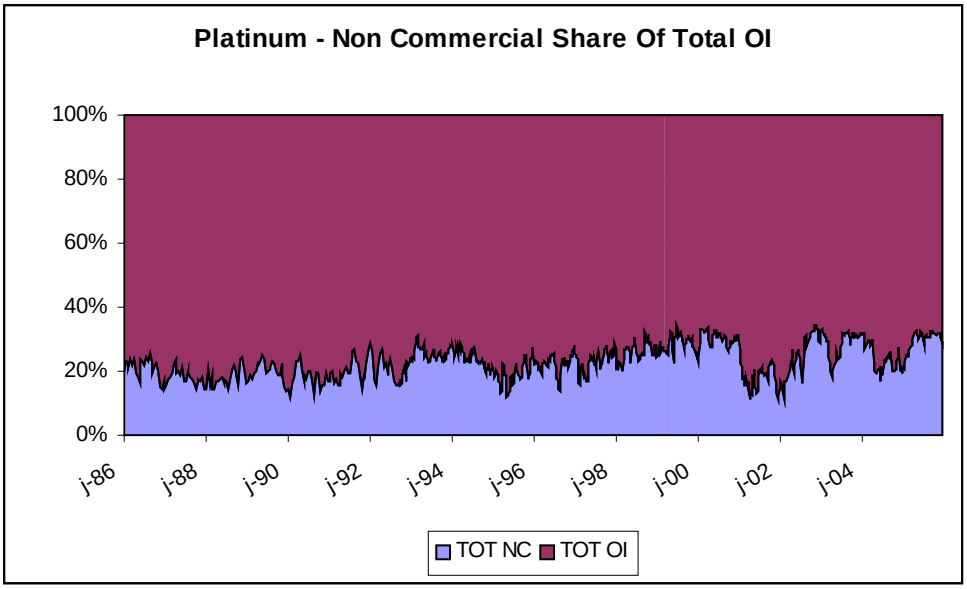
j-98
j-00
j-02
j-04
Tot NC
Tot OI


Heating Oil - Non Commercial Share of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
j-90
j-92
j-94
j-96
j-98
j-00
j-02
j-04
TOT NC
TOT OI


Natural Gas - Non Commercial Share of Total OI
100%
80%
60%
40%
20%
0%
a-90
a-92
a-94
a-96
a-98
a-00
a-02
a-04
TOT NC
TOT OI


Platinum - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
j-86
j-88
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j-92
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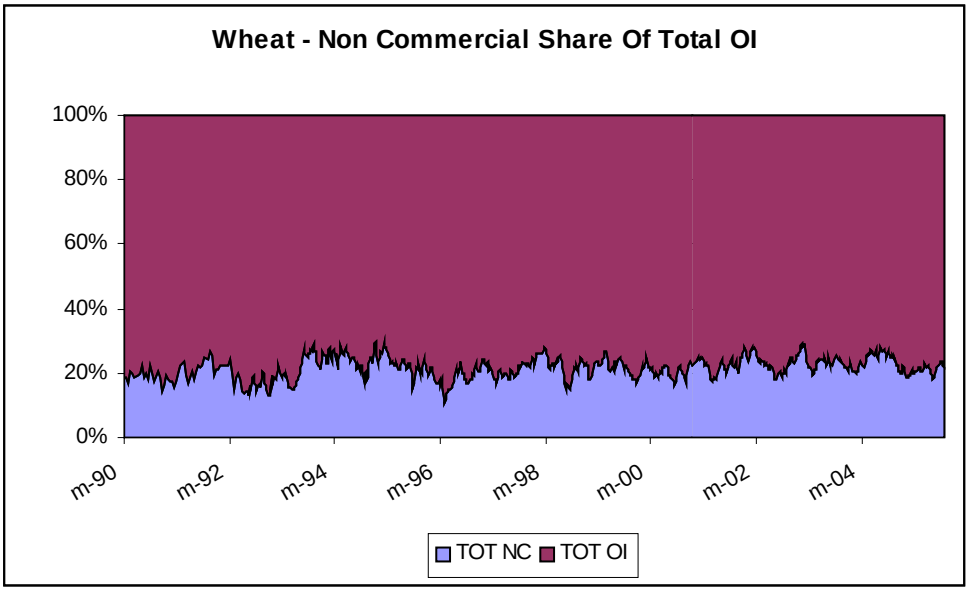
j-96
j-98
j-00
j-02
j-04
TOT NC
TOT OI


Wheat - Non Commercial Share Of Total OI
100%
80%
60%
40%
20%
0%
m-90
m-92
m-94
m-96
m-98
m-00
m-02
m-04
TOT NC
TOT OI

Only funds that have reported monthly returns and assets at the time the indices are calculated are included.Only funds with more than USD 500,000 in assets and one year of reporting history are included in the indices. The assets of funds reporting in currencies other than USD are converted to USD using the closing exchange rate on the last business day of the respective month. Fund weights are dynamic and change from month to month. The weights are calculated by dividing the assets under management of a particular fund by the total assets under management for that group in any given month. For example, if there are 30 CTAs classified as Physicals that meet the criteria above, the weight for fund *k* would be the assets under management for fund *k* divided by the total assets under management for the 30 CTAs. Once calculated, index performance numbers are never revised.

$$\Sigma$$

where w k *is the weight of each CTA and* R kt*is the corresponding return for month* t.. *The weight* w k *is defined as*

Where, *f k (k=1….30)* is the reported assets under management for fund *k*.

CTA/CPO Index Rules-Equal Weighted Indices

Only funds that have reported monthly returns and assets at the time the indices are calculated are included. Only funds with more than USD 500,000 in assets and one year of reporting history are included in the indices. The indices are calculated as simple arithmetic averages for that group. For example, if there are 30 CTAs classified as Physicals that meet the criteria above, the return would be a simple arithmetic average of the returns of those 30 CTAs. Once calculated, index performance numbers are never revised.

CISDM CTA & CPO Index Descriptions

Asset Weighted Indexes

1. CISDM CTA Asset Weighted Index:
The CISDM CTA Asset Weighted Index reflects the dollar-weighted performance of Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. CTAs trade a wide variety of OTC and exchange traded forward, futures and options markets (e.g., physicals, currency, financial) based on a wide variety of trading models. In order to be included in the asset weighted index universe, a CTA must have at least $500,000 under management and at least a 12-month track record. The index goes back historically toJanuary 1980.

2. *CISDM CTA Asset Weighted Discretionary Index:*
The CISDM CTA Asset Weighted Discretionary Index reflects the dollar-weighted performance of discretionary Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Discretionary CTAs trade a variety of financial, currency, and commodity futures/options using a wide variety of trading models including those based on an individual trader's beliefs. In order to be included in the discretionary universe, a CTA must have at least $500,000 under management and at least a 12-month track record. The index goes back historically to January 1987.

3. *CISDM CTA Asset Weighted Systematic Index:*
The CISDM CTA Asset Weighted Systematic Index reflects the dollar-weighted performance of systematic Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Systematic CTAs trade a wide variety of OTC and exchange traded forward, futures and options markets using a predetermined systematic trading model. In order to be included in the systematic universe, a CTA must have at least $500,000 under management and at least a 12- month track record. The index goes back historically to January 1992.

4. *CISDM CTA Asset Weighted Currency Index:*
The CISDM CTA Asset Weighted Currency Index reflects the dollar-weighted performance of currency Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Currency CTAs trade currency futures/options and forward contracts based on a wide variety of trading models. In order to be included in the currency universe, a currency CTA must have at least $500,000 under management and at least a 12-month track record. The index goes back historically to January 1990.

5. *CISDM CTA Asset Weighted Diversified Index:*
The CISDM CTA Asset Weighted Diversified Index reflects the dollar-weighted performance of diversified Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Diversified CTAs trade a wide variety of financial futures/options, currency futures/options and forward contracts as well as physical futures/options based on a wide variety of trading models. In order to be included in the diversified universe, a diversified CTA must have at least $500,000 under management and at least a 12-month track record. The index goes back historically to January 1987.

6. *CISDM CTA Asset Weighted Financials Index:*
The CISDM CTA Financials Index reflects the dollar-weighted performance of financials

Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Financials CTAs trade a wide variety of financial futures/options based on a wide variety of trading models. In order to be included in the financials universe, a financials CTA must have at least $500,000 under management and at least a 12-month track record. The index goes back historically to January 1987.

7. *CISDM CTA Asset Weighted Equity Index:*
The CISDM CTA Asset Weighted Equity Index reflects the dollar-weighted performance of equity Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Equity CTAs trade a wide variety of OTC and exchanged traded equity futures/options and use a wide variety of trading models. In order to be included in the equity index universe, an equity index CTA must have at least $500,000 under management and at least a12-month track record. The index goes back historically to January 1994.

8. CISDM CTA Asset Weighted Physicals Index:
The CISDM CTA Asset Weighted Physicals Index reflects the dollar weighted performance of physicals Commodity Trading Advisors (CTAs) reporting to the CISDM Hedge Fund/CTA Database. Physicals CTAs trade a wide variety of OTC and exchanged traded commodity futures/options within the energy, agricultural and metals complex and use a wide variety of trading models including those based on systematic models, fundamental economic data and/or individual trader's beliefs. In order to be included in the physicals index universe, a physicals CTA must have at least $500,000 under management and at least a 12-month track record. The index goes back historically to January 2001.

9. *CISDM CPO Asset Weighted Index:*

The CISDM CPO Asset Weighted Inde*x* reflects the dollar-weighted performance of public and private Commodity Pool Operators (CPOs) reporting to the CISDM Hedge Fund/CTA Database. CPOs are firms responsible for investing commodity pools' assets in commodity futures and options positions. In order to be included in the CPO Asset Weighted Index universe, a fund or pool must have at least $500,000 under management and at least a 12-month track record. The index goes back historically to January 1990.

	CC = cocoa	CL = Crude Oil	CRB Index	CT = Cotton	GC = Gold
Mean	0.006090	0.014262	0.003324	0.002530	0.002611
Median	-0.004650	0.016714	0.002931	-0.002876	-0.000131
Maximum	0.345646	0.365933	0.071115	0.247492	0.160499
Minimum	-0.280829	-0.221914	-0.061072	-0.332835	-0.093143
Std. Dev.	0.093608	0.091129	0.025976	0.090271	0.036775
Skewness	0.781986	0.196819	0.079475	0.017974	0.700581
Kurtosis	4.806710	3.843036	2.702101	3.877835	4.614596
Jarque-Bera	34.26127	5.193965	0.684054	4.631321	27.42104
Probability	0.000000	0.074498	0.710329	0.098701	0.000001

	C = Corn	SB = Sugar # 11	S = Soybeans	JO = Orange Juice	KC = Coffee
Mean	0.000346	0.006258	0.001607	0.004808	0.010504
Median	-0.002571	0.015226	-0.001471	-0.000597	-0.008998
Maximum	0.158940	0.463178	0.195726	0.289375	0.505952
Minimum	-0.313801	-0.173097	-0.328667	-0.221307	-0.303907
Std. Dev.	0.073122	0.092857	0.071963	0.085394	0.128923
Skewness	-0.618466	0.898309	-0.702355	0.475524	0.995887
Kurtosis	4.752647	6.332364	5.738517	3.620093	4.559668
Jarque-Bera	27.61065	85.99495	56.83612	7.734056	38.39835
Probability	0.000001	0.000000	0.000000	0.020920	0.000000

	O = Oats	W =Wheat	PL =Platinum	SI = Silver	HU = Unleaded Gas
Mean	0.006308	0.002050	0.007387	0.006147	0.018403
Median	-0.005076	-0.013660	0.005642	0.003784	0.013394
Maximum	0.243363	0.284927	0.124539	0.186529	0.527221
Minimum	-0.174373	-0.175760	-0.153008	-0.234991	-0.321764
Std. Dev.	0.088407	0.076111	0.047089	0.067990	0.130539
Skewness	0.204003	0.611908	-0.251132	-0.044718	0.774079
Kurtosis	2.607897	3.620329	3.415519	3.802387	5.425067
Jarque-Bera	1.921281	11.29521	2.549549	3.910945	49.66644
Probability	0.382648	0.003526	0.279494	0.141498	0.000000

	HG = Copper	HO = Heating Oil	NG = Natural Gas	LC = Live Cattle	LH = Lean Hogs
Mean	0.008454	0.015211	0.026569	0.002879	0.006428
Median	0.002672	0.010747	0.016483	-0.003137	0.008792
Maximum	0.209395	0.383710	0.483533	0.161530	0.411470
Minimum	-0.201304	-0.369058	-0.416164	-0.222166	-0.403709
Std. Dev.	0.067412	0.108368	0.173804	0.050441	0.108926
Skewness	0.453186	0.475031	0.397194	-0.272874	0.073787
Kurtosis	3.679198	4.861806	3.245485	5.311821	4.883779
Jarque-Bera	7.696920	26.21363	4.147901	33.85415	21.42241
Probability	0.021313	0.000002	0.125688	0.000000	0.000022