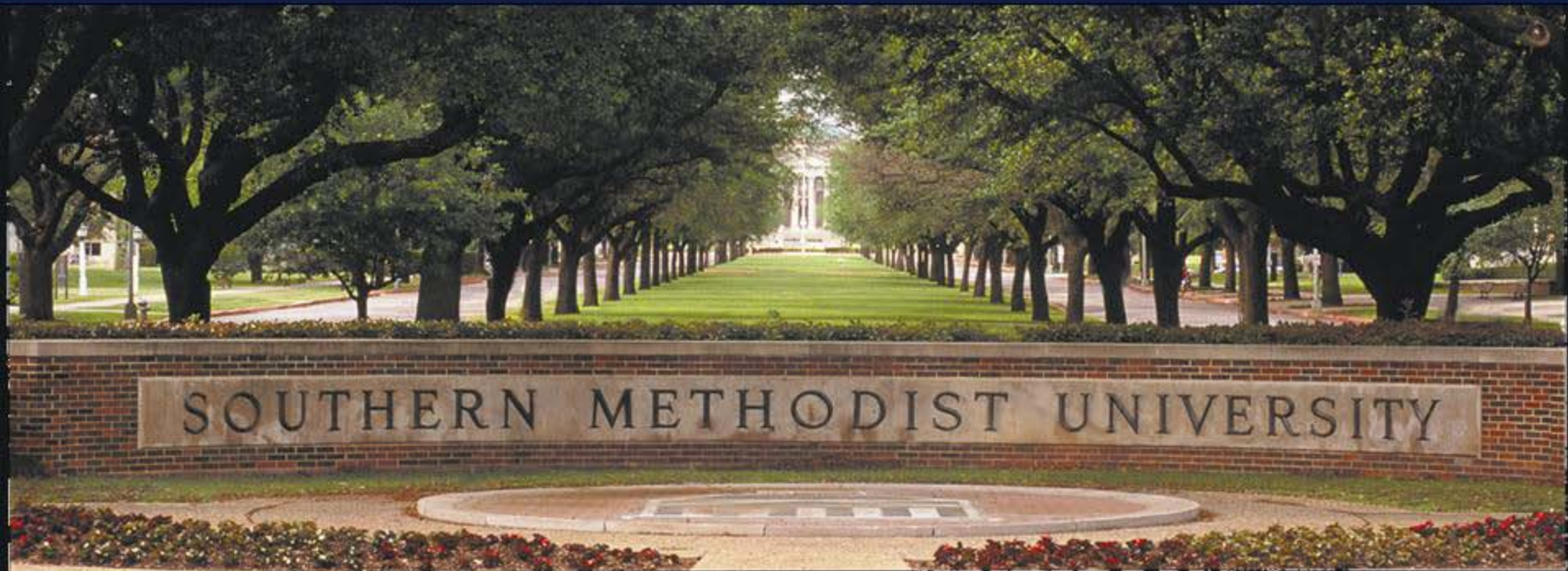


# Discussion: Does 'Paper Oil' Matter?

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*Cary M. Maguire Chair in Oil & Gas Management*



EIA Workshop on Energy Finance  
August 24, 2011

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# Agenda

- **Overview of contribution**
- **Why should we care?**
- **Comments on data base and “descriptive” measures of “financialization”**
- **Caveat regarding “excess speculation”**
- **Discussion of statistical methods and inference**

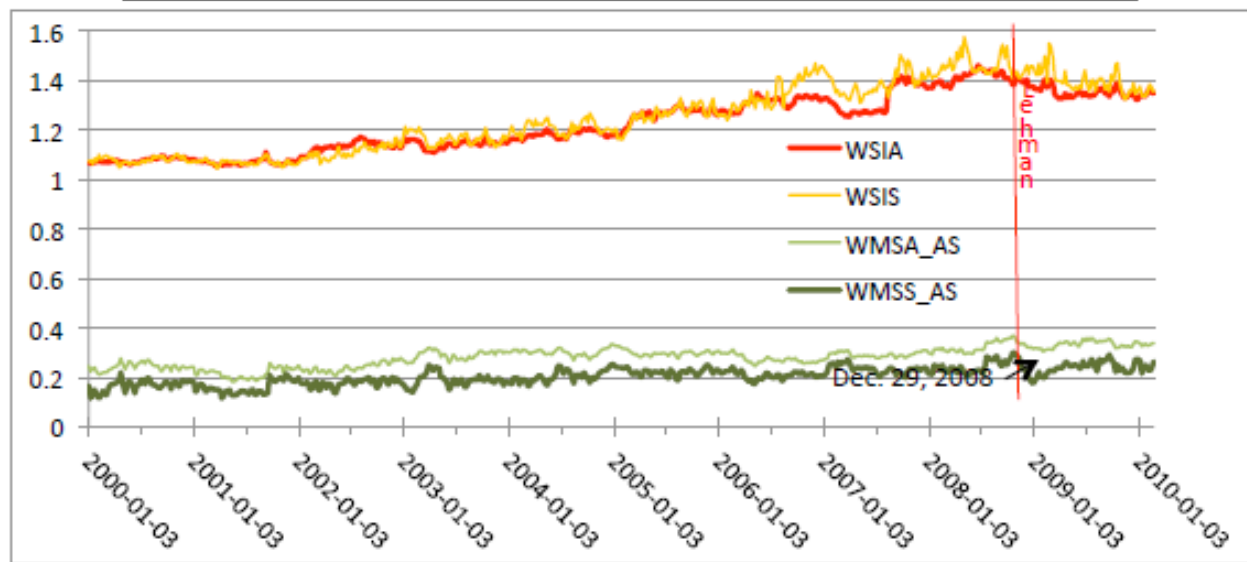
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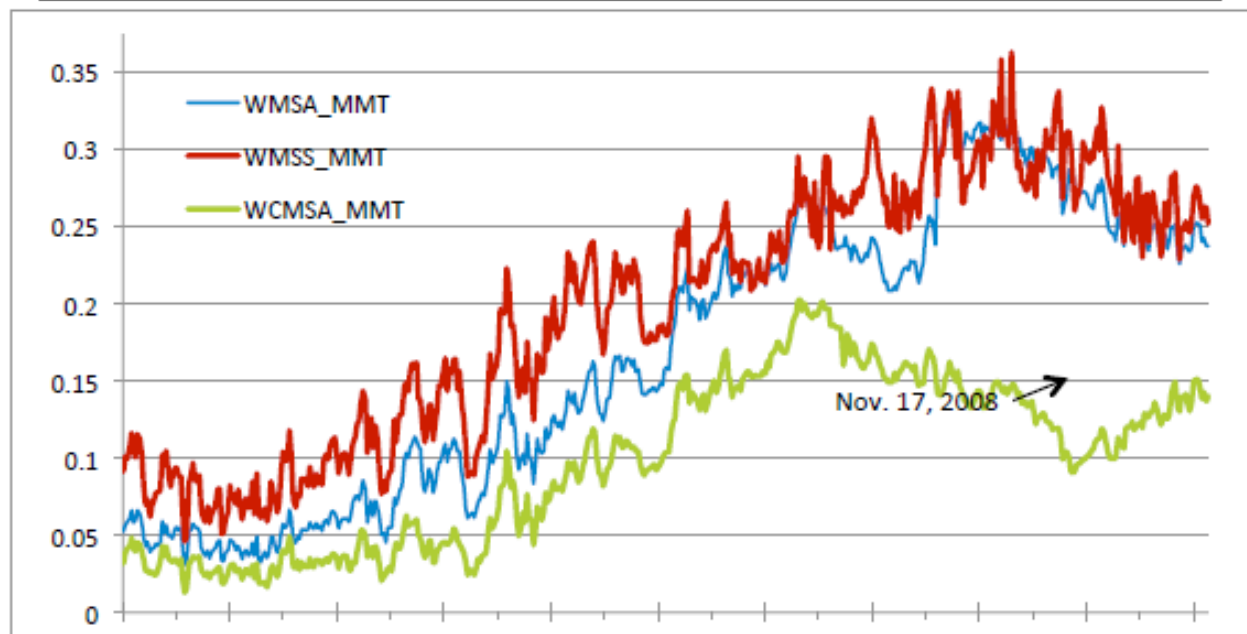
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**Figure 2: Financialization of Energy Futures Markets, 2000-2010**

**Panel A: Excess Speculation and Commodity Swap Activity (incl. Index Trading)**



**Panel B: Hedge Fund Share of the Energy Futures Open Interest (incl. Cross-Market Traders)**



**Table 4: Cross-Market Trading Activity, 2000-2010**

Commodity	Classifications in Commodity Markets						Equity Futures Classification	
	<u>All Cross-Market Traders</u>		<u>Commodity Swap Dealers</u>		<u>Hedge Funds</u>		<u>Hedge Funds</u>	
	Count	% of all traders	Count	% of all cross-traders	Count	% of all cross-traders	Count	% of all cross-traders
Crude Oil	1108	28.0%	63	5.7%	363	32.8%	274	24.7%
Heating Oil	335	8.5%	26	7.8%	170	50.8%	138	41.2%
Natural Gas	743	18.8%	49	6.6%	300	40.4%	235	31.6%

Notes: For the three main energy futures markets for which trader-level position data are available for the entire 2000-2010 period, Table 4 provides information on the number and relative importance of the subset of large commodity futures traders who also held, at some point in the sample period (July 1, 2000 through February 26, 2010), positions in the S&P500 e-Mini equity futures contract.

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**Table 5: Market Fundamentals as Long-run Determinants of the GSCI-Energy vs. S&P500 Dynamic Conditional Return Correlations**

**Panel A: Treating the Post-Lehman Period as any other Period**

	Model 1			Model 2			Model 3		
	<u>1991-2000</u>	<u>2000-2010</u>	<u>1991-2010</u>	<u>1995-2000</u>	<u>2000-2010</u>	<u>1995-2010</u>	<u>1991-2000</u>	<u>2000-2010</u>	<u>1991-2010</u>
Constant	0.199022 ** (0.07939)	-0.0727729 (0.1121)	-0.0640187 (0.07809)	0.181332 (0.06578)	-0.291257 ** (0.1398)	-0.180740 (0.1106)	0.201441 ** (0.08028)	-0.0495553 (0.1111)	-0.0290865 (0.07028)
ADS							-0.0891680 (0.08694)	0.120929 (0.1477)	-0.0940820 (0.06288)
SHIP	-0.0934936 (0.2653)	-0.597573 ** (0.2822)	-0.274154 (0.1855)				-0.113461 (0.2694)	-0.754496 ** (0.3682)	-0.277686 (0.1680)
SPARE				-0.0111549 (0.02713)	0.134130 ** (0.06252)	0.0581962 (0.04732)			
UMD	0.0469638 (0.06844)	0.154878 (0.1092)	0.102411 (0.07740)	0.00106191 (0.03897)	0.141386 (0.1044)	0.0876287 (0.07926)	0.0468735 (0.06957)	0.141192 (0.1082)	0.102172 (0.06996)
TED	-0.309478 * (0.1735)	0.480288 ** (0.2066)	0.297959 ** (0.1382)	-0.164767 (0.1122)	0.516236 ** (0.2046)	0.362652 ** (0.1530)	-0.269397 (0.1754)	0.592622 ** (0.2955)	0.193733 (0.1274)
LogLklhd	808.803	862.764	1662.03	504.142	862.37	1356.24			

**Table 5: Market Fundamentals as Long-run Determinants of the GSCI-S&P500 Dynamic Conditional Correlation**

**Panel B: Treating the Post-Lehman Period unlike previous Years**

	Model 1 + DUM		Model 2 + DUM		Model 3 + DUM			
	2000-2010	1991-2010	2000-2010	1995-2010	2000-2010	1991-2010		
Constant	-0.0385206 (0.05929)	-0.0133945 (0.04506)	-0.189684 (0.06799)	*** -0.118617 (0.05827)	**	-0.0178242 (0.05516)	-0.00982412 (0.04566)	
ADS					0.144228 (0.07731)	* -0.00556276 (0.04499)		
SHIP	-0.403081 (0.1544)	*** -0.282846 (0.1109)	**			-0.581261 (0.1795)	*** -0.279126 (0.1107)	
SPARE			0.0973745 (0.03288)	*** 0.0613461 (0.02581)	**			
UMD	0.0978540 (0.05570)	* 0.0748004 (0.04496)	*	0.0858745 (0.05115)	* 0.0623155 (0.04212)		0.0814175 (0.05151)	0.0752574 (0.04498)
TED	0.189270 (0.1002)	* 0.0937619 (0.07906)		0.208681 (0.09205)	** 0.130900 (0.07568)	*	0.313905 (0.1287)	** 0.0871756 (0.08180)
DUM	0.426532 (0.1173)	*** 0.475822 (0.1079)	***	0.422350 (0.1075)	*** 0.452321 (0.1003)	***	0.481028 (0.1182)	*** 0.459802 (0.1173)
Log likelihood	867.215	1669.27	867.342	1363.33				

**Table 6 – Panel A: Speculative Activity as a Long-run Contributor to Energy-Equity Dynamic Conditional Correlation**

Constant	<u>2000-2010</u> -1.33255 *** (0.3603)	<u>2000-2010</u> -3.35782 *** (1.001)	<u>2000-2010</u> -2.43970 (1.943)	<u>2000-2010</u> -3.69302 (2.274)	<u>2000-2010</u> -0.883597 ** (0.3499)	<u>2000-2010</u> -2.99169 *** (1.002)	<u>2000-2010</u> -2.80875 (2.313)	<u>2000-2010</u> -3.87777 (2.403)
ADS					0.0831803 (0.1059)	0.0948211 (0.08943)	0.0783511 (0.1062)	0.0916956 (0.08828)
SHIP					-0.991052 *** (0.3290)	-0.942787 *** (0.2555)	-0.969616 *** (0.3324)	-0.879629 *** (0.2763)
SPARE	0.225132 *** (0.05261)	0.192512 *** (0.04506)	0.222424 *** (0.05387)	0.188613 *** (0.05087)				
UMD	0.0945118 (0.06361)	0.0943261 (0.06159)	0.0984478 (0.06539)	0.0955083 (0.06205)	0.108127 (0.07765)	0.0964163 (0.06442)	0.109796 (0.07869)	0.0949859 (0.06418)
TED	2.79563 *** (0.8371)	6.70761 *** (2.290)	2.76489 *** (0.8476)	6.52361 *** (2.489)	2.24744 ** (0.9595)	4.58889 ** (2.249)	2.17786 ** (0.9529)	4.24447 * (2.308)
WMSS_MMT	4.15750 *** (1.290)		5.48540 * (2.839)		4.00675 *** (1.522)		6.35606 * (3.424)	
WMSS_AS			1.63931 (3.037)	0.156530 (2.274)			2.73698 (3.637)	0.212229 (2.391)
WMSS_TCOM			1.36403 (2.370)	0.259968 (1.631)			2.39518 (2.808)	0.689258 (1.674)
WSIA		2.36713 *** (0.7563)		2.54662 ** (1.280)		2.41098 *** (0.7987)		2.89488 ** (1.360)
INT_TED_MMT	-8.49444 *** (2.719)		-8.39324 *** (2.755)		-6.59982 ** (3.054)		-6.38725 ** (3.037)	
INT_TED_WSIA		-4.63228 *** (1.630)		-4.50740 ** (1.762)		-3.13160 * (1.603)		-2.89702 * (1.637)
Log likelihood	876.051	866.668	876.977	868.167	875.138	868.212	876.075	869.478

**Table 6 – Panel B: Speculation as a Long-run Contributor to the Energy-Equity Dynamic Conditional Correlation (Lehman control)**

	<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>			
Constant	-0.826467 (0.2323)	***	-1.96763 (0.7290)	***	-2.56901 (1.057)	**	-3.17242 (1.273)	**	-0.461911 (0.2244)	**	-1.52392 (0.8044)	*	-2.87995 (1.233)	**	-3.34485 (1.425)	**
ADS									0.117027 (0.07312)		0.126365 (0.06792)	*	0.120451 (0.05874)	**	0.117706 (0.05392)	**
SHIP									-0.683454 (0.2240)	***	-0.685360 (0.1912)	***	-0.485068 (0.1885)	***	-0.465401 (0.1730)	***
SPARE	0.154870 (0.03576)	***	0.135986 (0.03237)	***	0.121034 (0.03185)	***	0.107117 (0.03093)	***								
UMD	0.0710231 (0.04025)	*	0.0727269 (0.03981)	*	0.0579558 (0.03378)	*	0.0586289 (0.03274)	*	0.0791648 (0.04991)		0.0770952 (0.04569)	*	0.0583944 (0.03943)		0.0578297 (0.03611)	
TED	1.77734 (0.5081)	***	4.60514 (1.485)	***	1.38053 (0.4230)	***	3.39324 (1.346)	**	1.39977 (0.5754)	**	3.12007 (1.577)	**	0.979815 (0.4400)	**	1.91951 (1.300)	
WMSS_MMT	2.37960 (0.8664)	***			5.22120 (1.523)	***			1.95108 (1.052)	*			5.69068 (1.783)	***		
WMSS_AS					0.896538 (1.624)		-0.949729 (1.275)						1.29104 (1.905)		-1.08246 (1.443)	
WMSS_TCOM					2.82919 (1.358)	**	1.07074 (0.9123)						3.77961 (1.577)	**	1.57570 (0.9986)	
WSIA			1.32955 (0.5596)	**			2.21413 (0.7198)	***			1.19816 (0.6568)	*			2.40606 (0.8107)	***
INT_TED_MMT	-5.51366 (1.676)	***			-4.30584 (1.402)	***			-3.95743 (1.876)	**			-2.67353 (1.454)	*		
INT_TED_WSIA			-3.20403 (1.064)	***			-2.37744 (0.9594)	**			-2.08711 (1.132)	*			-1.27853 (0.9324)	
DUM	0.347098 (0.09457)	***	0.350655 (0.09879)	***	0.445824 (0.09043)	***	0.380342 (0.08412)	***	0.407072 (0.1299)	***	0.387593 (0.1283)	***	0.553881 (0.1223)	***	0.450287 (0.1086)	***
Log likelihood	881.086		871.939		884.97		875.182		879.213		872.486		883.634		876.139	

**Table 6, Panel C: Cross-Market Trading as a Long-run Contributor to the GSCI-S&P500 Dynamic Conditional Correlation**

	<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>		<u>2000-2010</u>	
Constant	-0.778333	***	0.210448		-0.971063		-0.783793	***	0.315275		-0.675490	
	(0.2196)		(0.4022)		(0.8296)		(0.2277)		(0.4216)		(0.8831)	
ADS							0.0381775		0.0536956		0.0631063	
							(0.06174)		(0.05042)		(0.04728)	
SPARE	0.178190	***	0.129834	***	0.104834	***	0.179592	***	0.126999	***	0.102546	***
SHIP?	(0.04215)		(0.03684)		(0.03318)		(0.04372)		(0.03755)		(0.03384)	
UMD	0.0722604		0.0565843		0.0645123	*	0.0715149		0.0540846		0.0602626	*
	(0.04570)		(0.03696)		(0.03534)		(0.04713)		(0.03760)		(0.03580)	
TED	1.37460	***	1.01301	***	3.29099	**	1.46240	***	1.07753	***	3.14341	**
	(0.4684)		(0.3643)		(1.400)		(0.5075)		(0.3831)		(1.427)	
WCMSA_MMT	5.10806	***	3.92980	***			5.13408	***	3.76414	***		
	(1.717)		(1.358)				(1.783)		(1.392)			
WCMSA_AS			-3.73983	**	-2.86410	*			-4.14034	**	-3.40879	**
WMSATCOM?			(1.543)		(1.567)				(1.629)		(1.653)	
WSIA					1.08753	**					0.946378	*
					(0.5081)						(0.5354)	
INT_TED_CMMTA	-9.82038	***	-6.96981	**			-10.2754	***	-7.13595	**		
	(3.644)		(2.862)				(3.853)		(2.950)			
INT_TED_WSIA					-2.26677	**					-2.11807	**
					(1.005)						(1.028)	
DUM	0.214922	*	0.370933	***	0.431396	***	0.230696	*	0.418018	***	0.496860	***
	(0.1120)		(0.1067)		(0.1017)		(0.1226)		(0.1196)		(0.1197)	
Log likelihood	881.802		885.162		875.116		882.31		885.943		876.387	



**Table 7: Pre-Lehman Determinants of Equity-Energy Dynamic Conditional Correlations**

Variable	Model 2 2000-2008	Model 3 2000-2008	Model 4 2000-2008	Model 5 2000-2008
Constant	-1.6746 (1.252)	-2.4958** (1.205)	-3.9349** (1.570)	-4.4461*** (1.491)
SHIP	-0.6143*** (0.1669)	-0.7603*** (0.1639)	-0.5533*** (0.1427)	-0.6764*** (0.1446)
UMD	0.0322 (0.0395)	0.0242 (0.0363)	0.0257 (0.0333)	0.0184 (0.0313)
TED	0.2903*** (0.0755)	1.3782*** (0.3954)	0.2002*** (0.0714)	1.0994*** (0.3476)
WMSS_AS	0.2601 (1.949)	0.7225 (1.817)	0.9328 (1.681)	1.2839 (1.597)
WMSS_MMT	4.0546** (1.885)	6.7724*** (2.000)	4.0345** (1.582)	6.3014*** (1.710)
WMSS_TCOM	2.1266 (1.501)	2.5937* (1.408)	3.4385** (1.445)	3.7444*** (1.375)
INT_TED_MMT		-4.3087*** (1.481)		-3.5321*** (1.279)
WSIA			1.3509** (0.6650)	1.2395* (0.6362)
<b>SPARE?</b>				
Observations	436	436	436	436

# LONG-RUN STRUCTURAL MODELLING\*

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This version, May 2001

## Abstract

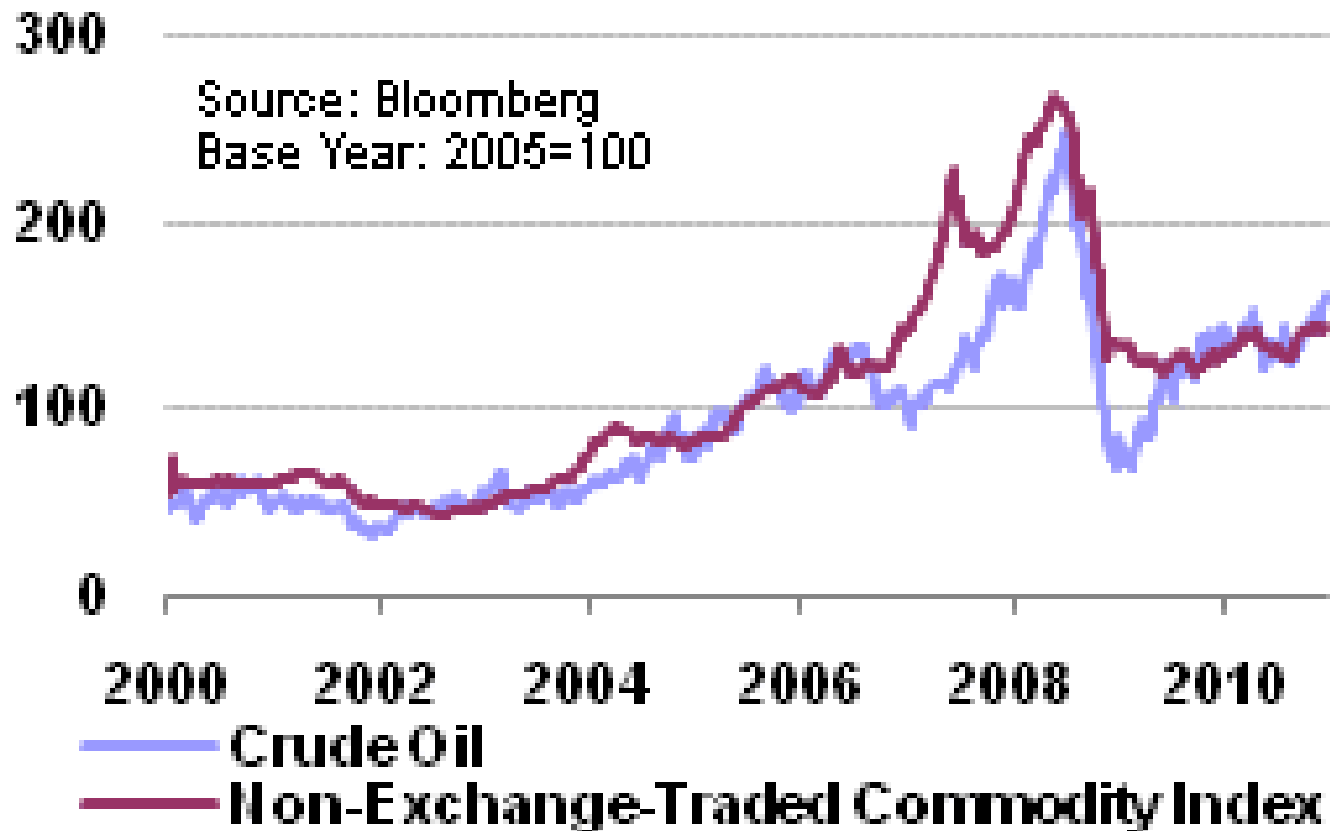
The paper develops a general framework for identification, estimation, and hypothesis testing in cointegrated systems when the cointegrating coefficients are subject to (possibly) non-linear and cross-equation restrictions, obtained from economic theory or other relevant *a priori* information. It provides a proof of the consistency of the quasi maximum likelihood estimators (QMLE), establishes the relative rates of convergence of the QMLE of the short-run and the long-run parameters, and derives their asymptotic distribution; thus generalizing the results already available in the literature for the linear case. The paper also develops tests of the over-identifying (possibly) non-linear restrictions on the cointegrating vectors. The estimation and hypothesis testing procedures are applied to an Almost Ideal Demand System estimated on U.K. quarterly observations. Unlike many other studies of consumer demand this application does not treat relative prices and real per capita expenditures as exogenously given.



# Alternative Experiment: Examine Non-Traded Commodities

- Rice
  - Coal
  - Manganese
  - Rhodium
  - Cadmium
  - Cobalt
  - Tungsten
- ... also, iron ore, steel, eggs, onions, asphalt, gypsum, magnesium, etc.

## Non-Exchange-Traded Commodity Prices vs Crude Oil Prices



Source: <http://buyuksahin.blogspot.com/2011/03/volatility-not-unique-to-exchange.html>

**Thank You!**

