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New Instruments on Energy Commodities and Financialization.

Some Deviations from Mainstream Assumptions

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Some Deviations from Mainstream Assumptions

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Abstract: The analysis of the different energy commodity contracts focuses on their typologies and the way they have been traded in different markets. The range of the energy commodity products bought and sold is very broad. In addition to electricity, the use of derivatives involves a portfolio of contracts for the natural gas, oil and coal that are used to generate electricity. Hedging fuel input costs allows power suppliers to tailor energy products and services to meet the needs of customers and counterparties. In addition, suppliers use financial risk-management tools, such as weather related derivatives, that essentially are insurance products that hedge against extreme weather conditions or other factors that affect the ultimate price paid by consumers. This paper finds out, first, the nature of and development of energy contracts and their derivatives contracts; second, the use of financial and commodity derivatives among individuals and, above all, corporates. The final section is devoted to the analysis of the primary deviations from the mainstream assumptions in terms of asset pricing.

Key words: financialisation, energy prices, derivative contracts, commodity, volatility

JEL code: E31, Q02, Q4, G12, G18.

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1. Introduction

The analysis of the different energy commodity contracts focuses on their typologies “and the way they have been traded in different markets. The range of the energy commodity products bought and sold is very broad. In addition to electricity, the use of derivatives involves a portfolio of contracts for the natural gas, oil and coal that are used to generate electricity. Hedging fuel input costs allows power suppliers to tailor energy products and services to meet the needs of customers and counterparties. In addition, suppliers use financial risk-management tools, such as weather related derivatives, that essentially are insurance products that hedge against extreme weather conditions or other factors that affect the ultimate price paid by consumers.

This paper finds out, first, the nature of and development of energy contracts and their derivatives contracts; second, the use of financial and commodity derivatives among individuals and, above all, corporates. The final section is devoted to the analysis of the primary deviations from the mainstream assumptions” in terms of asset pricing.

2. Energy products

We focus our description on three “energy products: oil, gas and electricity, along with the most important structure in the energy market such as spreads. “For the oil market the prices had been fixed until 1985 when the OPEC pricing regime collapsed. The crude oil market is the largest commodity market in the world. It is being traded at different locations but the most significant trading hubs are New York, London, and Singapore. Both crude oil and refined products are traded there. These refined products are Heating Oil, Gasoline, Fuel oil and Kerosene. We can distinguish different grades of crude oil which are determined by its weight (API gravity, the measure of how heavy or light a petroleum liquid is compared to water) and sulfur content. There have been three main regional crude oil benchmarks around on which the prices of the oil market have been concentrated for the last 20 years. These are also known as “marker” crudes. These three are from the UK the Brent Blend, from the United States the West Texas Intermediate (WTI) crude oil and the Dubai or Fateh crude from the United Arab Emirates. The spot price represents the balancing point of supply and

demand. Crude oil forwards are traded over the counter (OTC) on, for instance, the New York Mercantile Exchange (NYMEX). The market deals with spreads on the input side and on the output side. So crude oil is cracked into refined products which produce a crack spread.

With reference to the gas, its markets were opened steadily for competition during the 1980s and early 1990s. Before then, prices were controlled by authorities such as the Federal Energy Regulatory Commission (FERC). In order 636 issued on April 9, 1992 the FERC mandated open pipeline systems for transporting natural gas. There are different factors affecting demand such as consumption percentages and seasonal variation. In the winter months more gas is consumed for home heating which is reflected in the high winter prices as opposed to low summer prices. But this gap will probably become much smaller since the demand for air-conditioning and electricity consumption generated from gas is growing and the highest during the summer. So we will see a relative shift in prices from the winter to the summer. Here the marketers suffice as intermediaries between the other four players. There are different transactions of natural gas possible. There is the physical market and the monthly market. The physical market trades daily and monthly and the monthly market trades during the bid-week, the last week of the month preceding the contract month. The benchmark or the index price is set by the bid-week transactions. So the bid-week gives the predictable part of the consumer demand and the daily trade nets out the balance. The price is an average over monthly contracts that have been transacted. The real price is determined by a telephone survey held by industry publications within the FERC's Gas Market Report. The Natural gas market is first of all a collection of delivery and receipt locations. There are two services that the players sign up for, the delivery and receipt at a given location and also the transportation between two locations. The traded volumes are location" dependent based on the position in the pipeline system.

Finally, the electricity market is characterized by the need for real-time balancing of location supply and demand. The none-storage ability makes it hard to design an efficiently functioning market. Supply and demand should always be in balance. So we have an additional set of services: balancing and reserve resources. This market has a formal market clearing price at which all cash energy transactions clear".

3. Energy derivatives

The commoditization process along with the financialization has dramatically affected the energy market. Commodities markets, both historically and in modern times, have had tremendous economic impact on nations and people. Energy commodities such as crude are closely watched by countries, corporations and consumers alike. The average “Western consumer can become significantly impacted by high crude prices. Alternatively, oil-producing countries in the Middle East (that are largely dependent on petrodollars as their source of income) can become adversely affected by low crude prices. Unusual disruptions caused by weather or natural disasters can not only be an impetus for price volatility, but can also cause regional food shortages. Read on to find out about the role that various commodities play in the global economy and how investors can turn economic events into opportunities.

The four categories of trading commodities include:

- Energy (including crude oil, heating oil, natural gas and gasoline);
- Metals (including gold, silver, platinum and copper);
- Livestock and Meat (including lean hogs, pork bellies, live cattle and feeder cattle);
- Agricultural (including corn, soybeans, wheat, rice, cocoa, coffee, cotton and sugar).

Basic economic principles typically follow the commodities markets: lower supply equals higher prices. For instance, investors can follow livestock patterns and statistics. Major disruptions in supply, such as widespread health scares and diseases, can lead to investing plays, given that the long-term demand for livestock is generally stable and predictable.

A relevant impact on the commodity prices due to the derivative use by speculators of derivatives written on food commodities.

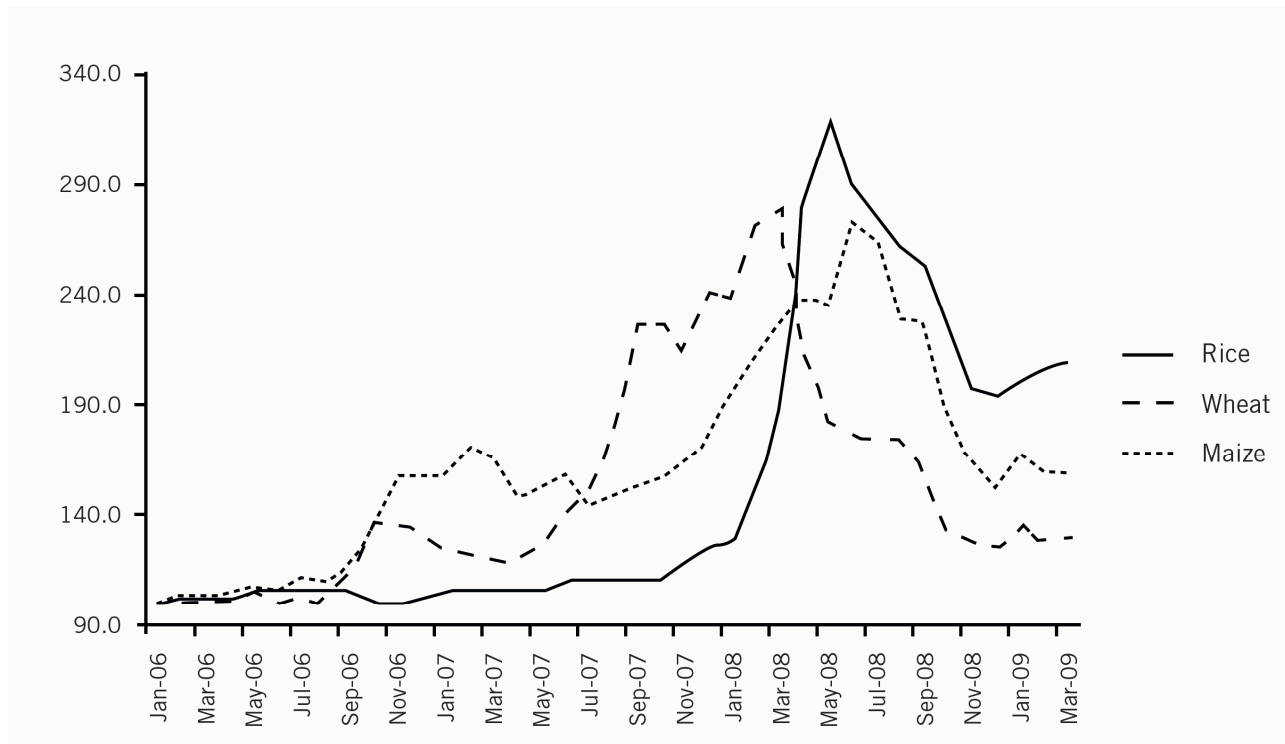
Looking at the food prices pattern, from 2005 markets for numerous agricultural commodities started “to witness price increases and higher levels of volatility (Figure 1). Food prices rose by 83% between 2005 and 2008, with maize prices nearly tripling, wheat prices increasing by 127%, and rice prices by 170% between January 2005 and June 2008. Moreover, the June 2010 issue of Food Outlook published by the UN Food and Agriculture

Organization (FAO) finds that implied volatility in wheat and soy rose steadily from 2005 to 2008, and that the rise in implied volatility for maize continued, albeit at a much lower rate, until 2009. An increasing debate as to whether these developments were the result of factors adversely affecting food supply, or whether they were caused by excessive speculation in food commodities derivatives.

Certainly, supply and demand fundamentals played an important role in the creation of the food crisis. However, closer examination reveals that the abovementioned arguments of supply and demand are insufficient to explain the full extent of the increases and volatility in food prices. It is also difficult to accept the IMF's thesis that the food price increases were the result of per capita income growth in China, India, and other emerging economies which fed demand for meat and related animal feeds such as grains, soybeans, and edible oils. That interpretation is not corroborated by data collected by the FAO for the period concerned: that data shows variously, that the supply and utilization of wheat and coarse grain increased at roughly uniform rates, that end of season stocks for grains had generally increased significantly, and that China and India exhibited falling aggregate and per capita" food grain consumption.

Traditional speculation in agricultural commodities markets based on market fundamentals – above all on the demand and supply for any particular commodity, has been experienced along with Another form of speculation is based simply on market momentum. This is herding behaviour in times of strong (usually upward) price trends, which in developed and easily accessible markets can result in the emergence of speculative bubbles. Far from providing a stabilizing hand, such speculation tends to increase price volatility. Such momentum-based speculation may have been the main cause of the food price crisis in 2007-2008.

Figure 1 – Index number of world trade prices



Source: J. Ghosh, “The unnatural coupling: Food and Global Finance” (2010), at 76. Using data accessed on 29 March 2009, from: <http://faostat.fao.org/>.

According to a report from the World Development Movement, Goldman Sachs made about 400 million dollars betting on food prices in 2012, the same year Goldman Sachs recorded a revenues increase pf about 30% and the capitalization of about 40%. The same happened to other large investment banks exposed to the food commodity market.

Energy plays are also common for commodities. Global economic developments and reduced “oil outputs from wells around the world can lead to upward surges in oil prices, as investors weigh and assess limited oil supplies with ever-increasing energy demands. However, optimistic outlooks regarding the price of oil should be tempered with certain considerations. Economic downturns, production changes by the Organization of the Petroleum Exporting Countries (OPEC) and emerging technological advances (such as wind, solar and biofuel) that aim to supplant (or complement) crude oil as an energy purveyor should also be considered. Commodities can quickly become risky investment propositions because they can be affected

by eventualities that are difficult, if not impossible, to predict. These include unusual weather patterns, natural disasters, epidemics and man-made disasters. For example, grains have a very active trading market and can be volatile during summer months or periods of weather transitions. Therefore, it may be a good idea to not allocate more than 10% of a portfolio to commodities (unless genuine insights indicate specific trends" or events).

With commodities playing a major and critical role in the global economic markets and affecting the lives of most people on the planet, there are multitudes of commodity and futures exchanges around the world. Each exchange carries a few commodities or specializes in a single commodity. For instance, the U.S. Futures Exchange is an important exchange that only carries energy commodities".

The energy markets are undergoing rapid deregulation leading to more competition, increased volatility in energy prices and exposing agents to potentially much greater risks.

Deregulation impacts both consumers and producers.

Among other increased volatility factors we can add:

- a) Investment banks are being drawn into the area as they look for new markets in which to operate;
- b) An increasing number of power marketers entering the market and playing a role as «energy investment banks» (this is the way Enron used to name itself before its collapse)

This combination of the two different sides of the market, along with the sheer size of the market at the sales level, has the potential to make energy derivatives one of the fastest growing of all derivatives markets

The categorization of energy derivatives is contained in table 1.

Table 1 – Energy Derivatives

Physical			Financial		
Standard	Exotic	Assets	Standard	Exotic	
<i>Futures</i>	Price-based American options	Volumetric <i>Swing options (recall, nominalinal etc.)</i>	Storage	<i>Futures</i> <i>Forwards</i>	American options Asian options
<i>Forwards</i>	Asian options	Power plants	<i>Swaps</i>	<i>European options</i>	Swaptions <i>Spread options, etc.</i>
<i>Swaps</i> <i>European options</i>	Swaptions <i>Spread Options</i> Tolling, etc.	Transmission			

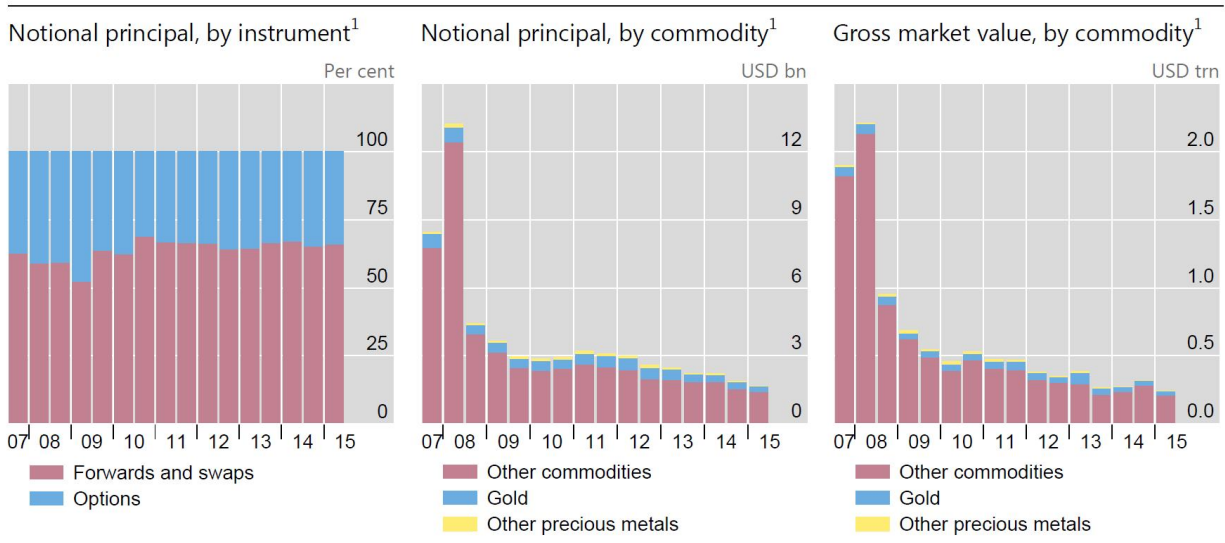
Swaps in the energy market are just the same as swaps in the financial market. They are an exchange between two parties of different wanted, by both parties, financial “goods. In the financial world this is an interest rate exchange, floating for fixed and vice versa. Their popularity mainly stems from the following three reasons:

1. Flexibility, OTC, easily customizable transactions;
2. Typically financially settled, no physical delivery, off balance sheet and non-regulated;
3. Uniquely suited for hedging applications.

The most frequently encountered swap is the fixed price swap: The counterparty pays a fixed amount for a time period to the other party while he receives a floating amount for that same period. The fixed price can change or stay the same for the whole period while the floating price is linked to” a spot price index.

In Spring 2011, commodity assets under management (CAUM) surpassed \$400bn for the first time. Less than a year earlier, in July 2010, CAUM had broken the \$300bn mark. Over the course of the prior decade, CAUM rose by \$290bn – with investment inflows accounting for the bulk (\$245bn) of the increase. This development partly reflects the growth of physically-backed financial assets, such as precious-metal exchange-traded products. During the last years, after the beginning of the crisis, the notional has rapidly decreased (figure 2).

Figure 2 – Commodity derivatives. Notional by instrument and commodity (2007 – 2015)



Further information on the BIS derivatives statistics is available at www.bis.org/statistics/derstats.htm.

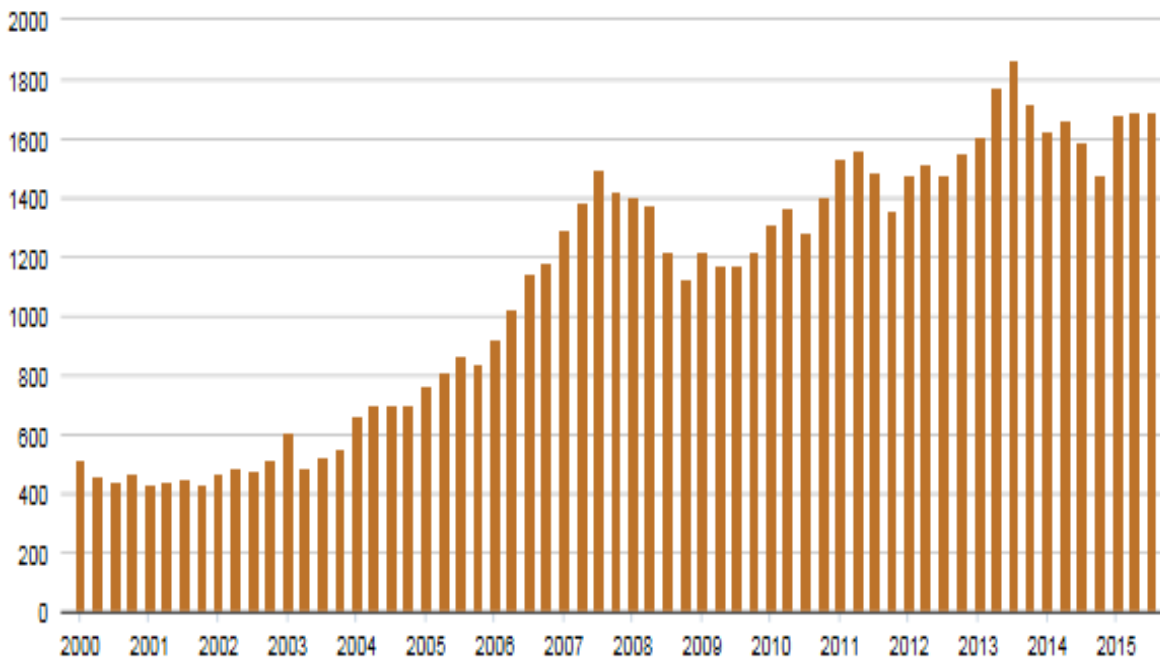
¹ At half-year end (end-June and end-December). Amounts denominated in currencies other than the US dollar are converted to US dollars at the exchange rate prevailing on the reference date.

Source: Bank of International Settlements, November 2015

Most of these “contracts are standardized and well understood products, almost easy to use and in some cases securitized into certificates devoted to the retail market. In the energy market these products are also used but with underlying products in the energy market¹. Within the commodity derivatives, energy contracts have on the other side experienced a significant increase (figure 3). Crude oil futures should account for a substantial part of this growth. Between July 2004 and July 2008, open interest in exchange-traded futures and futures options on crude oil, natural gas and corn (important for ethanol production in the United States) almost tripled. Although the number of open positions dropped substantially in the following year, open interest in those markets remains two to three times higher than just a decade ago – in part as a the result of greater market participation” by index investors, hedge funds and other financial institutions.

¹ Statistics on US energy derivatives can be found at <http://www.cmegroup.com/trading/products/#pageNumber=1&sortField=group&sortAsc=true&group=7>

Figure 3 – Oil Futures (US Exchanges, thousands of contracts, 2000 – 2015)



Source: NYMEX CME Group

Both commercial participants (those that have a direct interest in physical oil production, consumption, or trade) and non-commercial investors (money managers and funds that are interested in trading contracts for investment and diversification purposes) have shown increased trading activity.

Recently, a large stream of literature has been produced in order to evaluate the co-movements among commodity prices and derivatives.

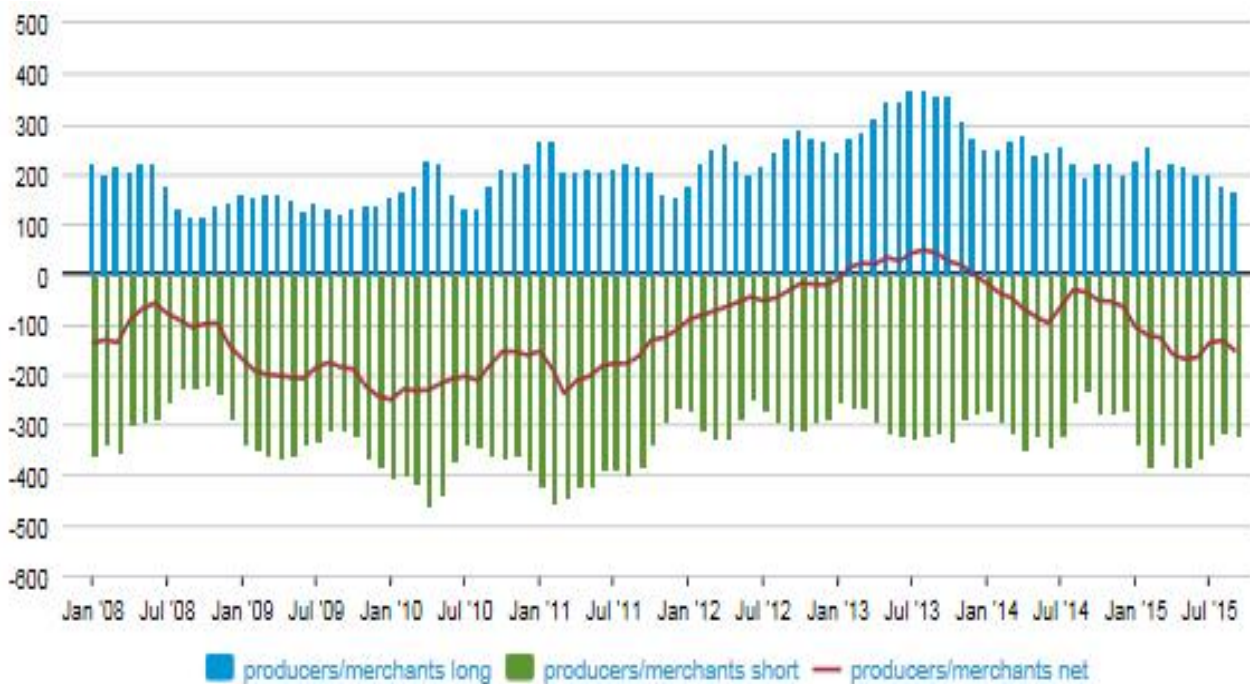
Ghosh, Heintz, and Pollin (2011) demonstrate a huge impact for the use of futures contracts and the spot commodity prices. They also conclude that a string policy implication deserves that regulators design a set of rules “to enact and enforce policies capable of effectively dampening excessive speculative trading on the commodities markets for food”.

Pradhananga (2015) shows that as financialization of the commodities futures market proceeded and more traders entered the futures market, market liquidity increased. Much of the rise in liquidity was due to increasing investment in commodity indices, which meant that futures of unrelated commodities were being bought and sold together as part of a portfolio. This increase in liquidity across different

commodity markets, lead to the synchronized change and positively correlated in commodity prices. Pradhananga (2015) provides strong empirical evidence that financialization of the commodities market led to the recent rise in co-movement of (unrelated) commodity prices.

A significant factor to underline is the microstructure of agents trading commodity (and energy) derivatives. As shown in figure 4, producers, merchants, processors, and end users were net short in futures positions on U.S. exchanges from 2008 until 2015, but the period of early 2013. This is consistent with the purpose to edge a position that is structurally long for their storage of commodities.

Figure 4 – US futures position by producers and merchants. Thousands of contracts (2008-2015)

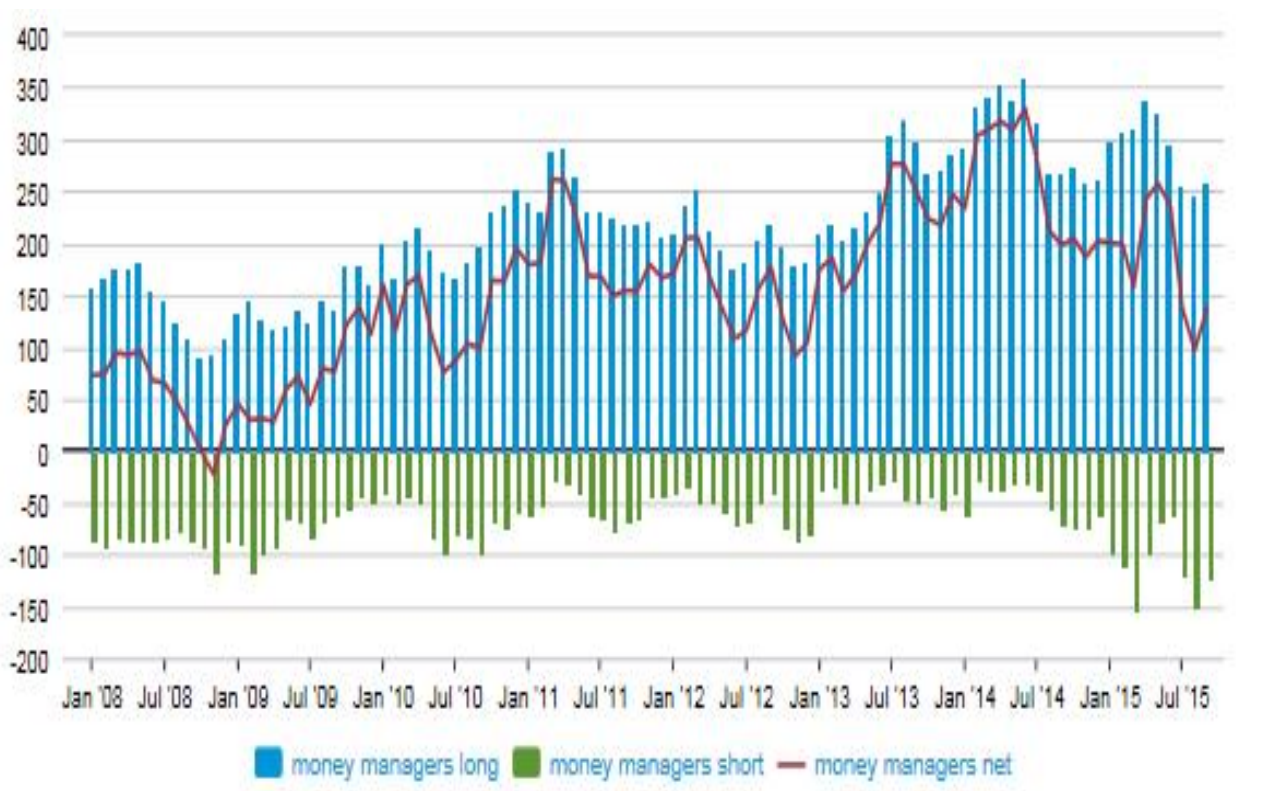


Source: CFTC, US Energy Information Administration

On the other side, most index funds are "long only" funds whose value will increase only when the prices of the underlying commodities rise (figure 5). Investors in such instruments expect commodity prices to rise; money is lost if the values of the underlying commodities in the index decrease. Many of the managers of index-style investments do not trade the

individual components of an index on a daily basis; instead, they buy and hold these investments over periods of months or years, rolling contracts forward to avoid physical delivery.

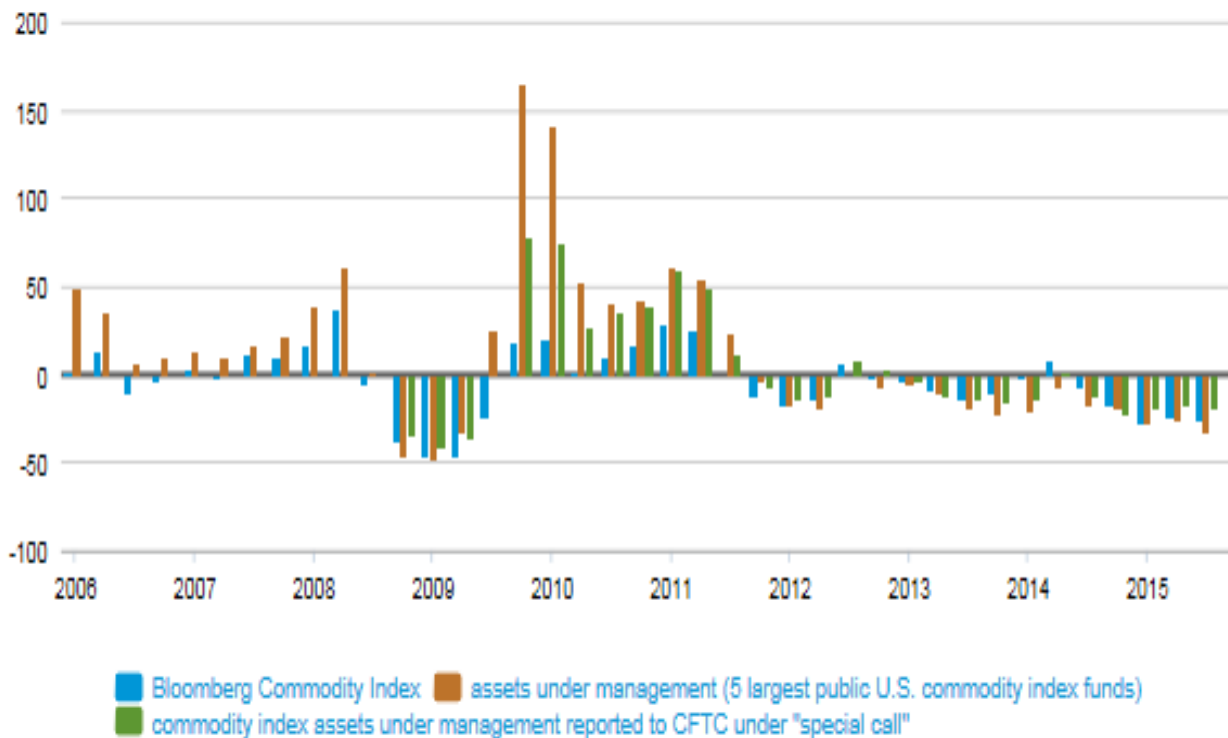
Figure 5 – US futures position by money managers. Thousands of contracts (2008-2015)



Source: CFTC, US Energy Information Administration

During the world financial crisis that occurred in the latter half of 2008 and 2009, markets saw a dramatic increase in the correlation between crude oil and other commodities as demand decreased for raw materials (figure 6).

Figure 6 – Commodity index AUM and Bloomberg index level (% change yoy)



Source: CFTC, US Energy Information Administration

Both before and after the world economic slowdown, there were observable increases in the correlations between commodity prices.

4. The use of financial and commodity derivatives

In the last three decades, a number of studies examined risk management practices, focusing on management behaviour in “presence of a potential risk and showing a detailed explanation about the financial instruments adopted in management activity. Some studies described the use of derivatives by non-financial firms [see Hakkarainen et al., “(1997); Berkman and Bradbury (1996); Judge (1995); Alkeback and Hagelin (1996); Bodnar and

Gebhardt (1997); Bodnar et al. (1998); Pramborg (2000); El-Masry (2001)], yet, another group of researchers investigated the determinants of corporate hedging policies by financial firms [Fatemi and Fooladi (2005)] or by public companies listed [Berkman et al. (1996)]. Some studies, finally, analysed both financial and non-financial firms, listed and not listed [see Block and Gallagher (1986); Dolde (1993); Anand and Kaushik (2004); Servaes and Tufano (2005)]. Block and Gallagher (1986) examined the corporate use of derivatives in interest rate exposure hedging activity in United States, after in October of 1979 the Federal Reserve had changed its policy, increasing the interest rates volatility, creating an incentive for hedging activity of interest rate exposure. Other incentives for hedging included the predominance of floating rates on the short-term side of the credit markets and the ever-increasing debt burden of U.S. corporations. In spite of these factors, the use of hedging through interest rate futures and options resulted in a relatively immature state.

They used questionnaires to gather data from all Fortune 500 companies, receiving answers from 193 of them, with a rate of response of 38,6%. Results showed that approximately one out of five firms used interest rate futures and options to hedge the interest rate exposure, with a higher usage degree by larger firms and firms in traditionally commodity-oriented industries. The two most frequently used hedging instruments were Treasury bill futures and Eurodollar futures. Interest rate futures seemed to enjoy a greater popularity than interest rate options. Among the respondents, futures were perceived as being advantageous in terms of cost and efficiency in hedging and options were seen as providing less risk exposure and fewer administrative problems.

Out of the 193 respondents to the survey, approximately eighty percent were currently non-users of interest rate futures and options. The primary reasons given for non-utilization were top management resistance, lack of knowledge, restriction on upside potential, the expense involved and legal and accounting obstacles.

The survey conducted by Dolde (1993) on Fortune 500 companies (244 of which completed the questionnaire, with a 48,8% response rate)² reported that large companies diverged greatly in the scope and sophistication of their approach to risk management, despite bigger firms could profit of a greater portfolio diversification, making the risk exposure less urgent. Small companies reputed the costs of management of financial risks as a negative voice of their budget, ignoring the benefits that could come down from such activity. Another important explanatory variable of the risk management approach was found in the view of market directions by the treasurer.

Of the 244 Fortune 500 companies that responded to the survey, over 85% reported swaps, forwards, futures, or options in managing financial risk.

Hakkarainen et al. (1997) exhibited the results of a survey conducted in 1994 on interest rate risk management in the top 100 largest Finnish non-financial firms³. The data for this study consisted of answers to a questionnaire and financial statement data. The questionnaire was mailed in 1994 to 100 firms⁴, 84 participated. The Finnish survey found that most common features in the interest rate risk management approach were avoidance of risks and minimization/maximization of interest expenses/income, revealing risk aversion to be the prevailing attitude in most firms. A very interesting finding was that over 40% of the responding firms had not made an effort to estimate the interest rate exposure of any item. However, the evidence suggested that large firms employ duration and gap analyses more frequently than small firms.

² The main differences between Dolde (1993) and Block and Gallagher (1986) questionnaires were represented by the parameters utilized by Dolde in defining his own survey. In fact, the researcher studied not only corporate activity in interest rate risk management but the foreign rate risk hedging activity, too. Furthermore, Dolde reported information about the use of swaps, futures, forwards and options.

³ Finnish firms have been faced with greatly fluctuations interest rates since the deregulations of the money market bean in the latter half of the 1980s. due to efforts to curb domestic demand and support the external value of the money, money interest rate were high around the turn of the decade. After the flotation of the money, interest rates fell substantially. Long-term interest rates rose in 1994 as a result of the world-wide bond rally while there was a downward trend in short-term rates, owing to low inflation and ample money market liquidity resulting from efforts of the central bank to stimulate growth.

⁴ The authors considered like discriminatory factor the turnover value of 1992.

Regarding hedging instruments, the answers show that, first of all, the Finnish firms used the Interest Rate Swap (IRS), the second common instrument was the Forward Rate Agreement (FRA), and third, the Over The Counter (OTC) options.

Berkman and Bradbury (1996) presented an empirical study on the determinants of corporate use financial derivatives in New Zealand⁵, extending previous research findings by including other explanatory variables that they expected to influence the corporate hedging decision. Specifically, they tested the managerial risk-aversion hypothesis, the relation between the use of derivatives and the level of foreign activities and the need to coordinate investing and financing policies. The authors sampled all firms listed on the New Zealand stock Exchange excluding foreign firms⁶ and firms in the financial services sector. Of the remaining 116, 55 firms (48%) held financial instruments at balance date. None of the firms in the sample indicate that derivative financial instruments were used for speculative purposes. According to finance theory about risk management, the data showed that corporate derivative use increase with leverage, size, the existence of tax losses, the proportion of share held by directors, and the payout ratio, and decrease with interest coverage" and liquidity.

The study by Judge (1995) introduces a different way to define hedging: it recognised that firms can manage their risks in several ways and therefore firms that did not use derivatives might hedge through alternative means.

Like other previous studies, this paper empirically investigated the determinants of corporate hedging using a sample of large firms. The sample was selected from the 1995 FTSE500 which listed the 500 largest UK companies quoted on the London Stock Exchange,

⁵Also in New Zealand the use of financial derivatives has grown dramatically since the deregulation of New Zealand financial markets in 1984. Over the period June 1987 to June 1994, the notional amount of swaps held by financial institutions increased from \$2,350 million to \$39,710 million; options and futures increased from \$6,436million to \$29,106 million; and forward contracts increased from \$53,710 million to \$143,076 million.

⁶ Because they were not subject to the same financial disclosure rules as local firms.

ranking a company by its market capitalisation. The sample was restricted to non-financial firms⁷, so that the final sample consisted of 441 non-financial firms.

Results showed that 78% of the 186 societies exhaustively completing the questionnaire revealed to use derivatives as a tool of risk coverage, while the figure inferred by the annual report was slightly lower (67%).

Besides, from the data it is possible to deduce that, mainly, the implicit assumption is that derivatives were used for hedging rather than speculation and that the great enterprises used more commonly these products than small enterprises.

Jalilvand (1999) and Jalilvand and Switzer (2000) analysed the outcomes of a survey conducted in 1996 on a sample of Canadian listed non-financial companies. Jalilvand (1999) showed that scale, operational efficiency, and the level of the integration of treasury activities are important determinants for identifying Canadian and international users of derivatives. The maturity debt was also longer for users of derivatives, suggesting that derivatives may be used to reduce the adverse effect of wealth transfers from shareholders and bondholders. The author found no evidence that managerial risk aversion and ownership concentration influence corporate use of derivatives in Canada.

From the comparison between the Canadian, American and New Zealand societies, the author underlined that all of them were governed by similar influences and that they differed only in the role that every of them attributed to the alternatives forms of coverage, as the liquidity, the dividend payout and the use of different debt instruments.

Jalilvand and "Switzer (2000) provided evidence of important similarities and differences in derivatives usage between Canadian, U.S, and European risk managers⁸, revealing that the use of derivatives products was more widespread in Canada than in United States and Continental Europe. Most firms were found to have written risk management policies, but did not benchmark their treasury performance. Moreover, Canadian risk managers were less

⁷ Firms from the financial services sector were excluded from the sample because their risk management activities include both hedging and speculative transactions.

⁸ See Bodnar, Hayt, Marston and Smithson (1995), Downie, McMillan, and Nosal (1995), Bodnar, Hayt, and Marston (1996), Dolde (1993).

inclined than their European and American counterparts to take positions based on their views on the market.

Berkman et al. (1997) describe derivatives usage of a sample of New Zealand (NZ) firms⁹ compared with the results of previous US surveys¹⁰. The main issue the authors addressed was whether derivatives use is a phenomenon primarily limited to the sophisticated and liquid US financial markets. The focus on a small economy such as NZ provides an interesting perspective. The objectives of financial risk management are very similar for both NZ" and the US.

In the same way, the data showed, surprisingly, that New Zealand companies used more frequently and in greater measure the derivatives contracts in comparison to the American enterprises: 53.1%, of respondents affirmed that they used derivatives. This result compared to 26.5% (1995) and 17.5% (1996) of the respondents in the US surveys underline with evidence the conclusions of the authors.

The data showed that in NZ, 100% of the firms with market value of equity greater than \$250 million used derivatives, compared to 65% in the US. Of the firms with market value lower than \$50 million. 36% of NZ firms used derivatives, compared to 12% of US firms. The survey showed, finally, that the most used financial tools, mainly to hedge foreign and interest rate risks, and largely from the great enterprises, were the Forward Rate Agreement followed by the Interest Rate Swaps.

Alkebäck and Niclas (1999) provided survey evidence on the use of derivatives among Swedish non-financial Firms¹¹. The results were directly compared with those presented in

⁹ They sent questionnaires to 124 public companies listed on the New Zealand Stock Exchange (NZSE) and received a total of 79 useable responses, which represents a response rate of 63.7%.

¹⁰ The comparison was done with recent surveys by Bodnar, Hayt, and Marston (1996); Bodnar, Hayt, Marston and Smithson (1995); and Phillips (1995) presented descriptive evidence on the use of derivatives by US non-financial firms.

¹¹ *"Although derivatives have a long history, the past two decades have witnessed a substantial increase in the variety and complexity of derivatives. The vast number of derivatives available has increased the possibility for firms to reduce their financial exposure. However the same instruments have also increased the possibility for risk taking by firms. Thus, the task of overseeing financial activities within firms has become more complicated. Consequently, knowledge about firms' derivative practices has increased in importance to shareholders,*

Bodnar et al. (1995, 1996), without controlling for differences in size and industry classification. The Swedish survey found that lack of knowledge about derivatives within the firm is the main concern for Swedish corporations.

The questionnaire was mailed to the financial directors of all non-financial firms listed on the Stockholm Stock Exchange. The 213 usable responses have given the survey a reasonable 76,53% response rate¹².

In accordance with Bodnar et al. (1995, 1996) and Berkman et al. (1997) they found that firms' derivative hedging activity was primarily concentrated in foreign exchange and interest rate exposure. In addition, swaps were the most commonly used instruments for interest rate exposure, whereas swaps, futures and OTC forwards were the dominating instruments for foreign exchange exposure. The frequent use of futures to manage foreign exchange exposure was in contrast with Bodnar et al. (1995, 1996) and in particular Berkman et al. (1997).

Loderer and Pichler (2000) "surveyed the currency risk management practices of Swiss industrial corporations. The aim of their research was twofold: first, to examine if the non-financial societies quantified their risk profile and, second, to analyze if and how they managed the currency risk that, again, would have been able to threaten their economy¹³.

The questionnaire was sent to all 165 firms listed in the Zurich Stock Exchange (ZSE) in 1996 except for banks and insurance companies. For comparison purposes, the same survey was sent to 165 non-traded firms randomly selected from the 1994 and 1995¹⁴. The main

creditors, regulators, and other interested parties." in Per Alkeback and Niclas Hagelin, 1999. This study was undertaken in response to this problem.

¹² The response rate was ampler than the American studies (26.5% in 1995 and 17.5% in 1996) but in line with that New Zealand (63.7% in 1997).

¹³ The leitmotiv of their investigation is to seek in a recent past: *"Between 1978 and 1996, the Swiss franc experienced dramatic swings in relation to major currencies such as the U.S. dollar, the Italian lira, and the British pound. Comparing highest and lowest exchange rate levels, the U.S. dollar depreciated by 60% vis à vis the Swiss franc, the Italian lira by 70%, and the British pound by 62%. Moreover, although not as high as those observed in the equity markets, annual currency rate volatility of the U.S. dollar, e.g., has exceeded 12%."* in Loderer and Pichler, 2000.

¹⁴ The results show a greater adhesion from listed companies with a 36.36% answer rate in opposition to the 21.82% of the not rated, but, in average, they conducted to 29.09% answer rate, in line with the previous investigations.

conclusion of Loderer and Pichler was that industrial firms did not have the abilities to define the risk of the value's profile of their company.

De Ceuster et al. (2000) sent a questionnaire to 334 large corporations operating in Belgium. This population consisted of 221 Coordination Centres and 123 largest firms ranked by turnover¹⁵. The global response rate was 21.9% that was in line with the previous analysis. The data shows that 65.7% of the 73 respondents reported that they used derivatives, 22% never used them and 12.3% gave up using them. The authors, besides, tried to determine the reasons why some of them did not use these financial tools or had stopped doing it. The results showed that 50% of non-users considered like principal motivation the policy restrictions imposed upon the treasurers by the board of directors. Other often-cited reasons are the risk of the products, the significance of the exposure and the existence of other hedging alternatives. When the authors asked about their intentions of using derivatives in the futures, only one fifth of non-user said that they were willing to consider derivatives for hedging purposes in the futures.

This study, also, reported data on large typologies of covered risks (interest rate risk, and the commodity risk) and the principals derivatives instruments used by companies (Forwards Rate Agreement followed by Interest Rate Swaps¹⁶, by options OTC and, finally, by structured contracts).

Bodnar and Gebhardt (1999) provided comparative evidence of German vis-à-vis US firms. The questionnaire was mailed to 368 firms and 126 of them answered (with an answers rate 34.24%)¹⁶. Bodnar and Gebhardt limited their analysis to three typologies of derivatives instruments, to hedge of foreign exchange risk, interest rate risk and commodity price.

¹⁵ Also in this study the turnover was used as a selection criterion, and were ranked the firms with an average turnover of 26.2 billion BEF.

¹⁶ To create a group of US firms that are structurally comparable to the German respondents from which the responses to the questionnaires be compared, the authors dropped 150 US respondents with sales below \$133.3 million. In addition, to improve the matching on the industry structure side, they eliminated three US companies in the gold mining industry, as there are no comparable companies in Germany.

Results showed that German firms are more likely to use derivatives than US firms, with 78 percent of German firms using derivatives compared to 57 percent of US firms.

As pointed up by Bodnar and Gebhardt, the explanation of this substantial difference lies in the politics of control and monitoring that were substantially more urgent for German enterprises in comparison to the most permissive Americans rules¹⁷.

The general pattern of usage across industry and size suggest that the general tendency to use derivatives was driven by economic issues such as operational activities and firm characteristics. While firms in both countries indicated that they used derivatives mostly for risk management, differences appeared in the primary goal of using derivatives, with German firms focusing more on managing accounting results whereas US firms focusing more on managing cash flows.

Mallin et al. (2001) put on an analysis related to the use of derivatives instruments, to the kind of covered risks and to the methodologies adopted for their evaluation comparing data with those in Bodnar et al (1995). The questionnaire was mailed to 800 UK non-financial firms that were randomly selected from Hemmington Scott's Corporate Register, which lists companies on the London Stock Exchange¹⁸.

The data showed that of the 231 respondents, "62.1% reported using at least one derivative instrument. As can be seen from answers, the analysis of the usage of derivatives related to company size as measured by turnover shows a significant relationship with larger companies using derivatives instruments more likely than smaller companies".

These responses supported previous surveys in that large firms but, in comparison to Bodnar et al. (1995) they showed lower derivatives usage among smaller firms.

The authors asked firms to indicate the reasons they did not use derivatives. Predominantly, the most important reason was the lack of significant exposure to financial risk, followed by

¹⁷ Another valid explanation is the risks exposure of the international operations. In the specific one, the German societies mainly operated through international operations that, from a side, had the advantage to define an inside monetary market ampler but, from the other side, determined a greater exposure to potential risks that was managed with a greater employment of derivatives products.

¹⁸ Some 231 replies were received from sample of 800, a response rate of 28.9%, which is slightly more than the Bodnar et al. response rate of 26.5%.

the cost of derivatives program, the third most frequently chosen factor was the fact that the exposure can be managed by other means.

The mostly utilized derivatives instruments by UK non-financial firms were the Forwards Rate Agreement OTC, the OTC options.

Bodnar et al. (1998) report the results of the third of a series of surveys¹⁹ on financial risk management practice and derivatives use by non-financial corporations in United States. Dealing with a comparison among the three Wharton surveys, so to define the evolution of derivatives usage in the time.

The analyzed sample consisted of the original randomly 2000 publicly traded firms used in 1994 plus the remaining 154 non-financial Fortune 500 firms added in 1995²⁰.

The obtained response rate was of 20.7%.

The very notable results show that the derivatives users rate was in continuous growth passing from 35% in 1994, to 41% in 1995, up to 50% in survey in matter.

The authors were interested in determining whether there was any change in the intensity of usage among firms that use derivatives; of derivatives users, 42% indicated that their usage had increased over previous year, compared to just 13% who indicated a decrease. These "response, in substance, wanted to underline as there was a greater proportion of risk managers that considered more important the benefits than the consequential costs from the use of these products.

Another characteristics of American firms were figured out by the analysis of the firm size; the most greater derivatives users resulted the large firms (83%) followed by the medium-sized firms (45%) and, finally, from the small ones (12%).

A good response rate was obtained from the analysis managed by Fatemi and Glaum (2000) in Germany. It was mailed to 153 great non-financial firms listed on the Frankfurt Stock Exchange²¹, and it received responses from 71 of these firms (answers rate of 46.41%).

¹⁹ The first and the second surveys were conducted in 1994 and 1995, respectively.

²⁰ Specifically, due to mergers, buyouts and bankruptcies since 1994, the sample consisted of 1928 firms.

²¹ With a minimum 1997 sales volume of DM 400 million, as discriminatory criteria.

The researchers carried out an analysis that could consider all the typologies of risks the German enterprises should have managed and that could describe the derivatives usage by their risks managers.

The questionnaire was designed to elicit the respondents' assessments of how different goals rank in terms of their importance for risk management; "ensuring the survival of the firms" turned out the most important goal and "increasing the market value of firms" ranked as the second most important goal²². Other remarkable purposes, in order of importance, that were indicated in the answers were: to increase the profitability, to reduce cash flow volatility and to reduce earnings volatility.

The answers' analysis relative to financial instruments usage show some very interesting data. The majority of respondent, 88%, indicated that they used derivatives instruments. This is a much higher proportion than reported by Bodnar et al (1998) for US firms either in their 1995 survey (41%) or in their 1998 survey (50%). It is also higher than the 78% rate that Bodnar and Gebhardt (1998) reported for their sample of German firms²³.

Among the users, 75% used only the so-called plain vanilla instruments (mainly Forwards Rate Agreement and Interest Rate Swaps) and the remaining 25% utilized more complex instruments.

Bodnar et al (2003) study derivative usage in the Netherlands. They gathered data from a questionnaire sent to 167 non-financial listed firms producing 84 usable responses (responses rate of 50.3%).

The results show that 60% of Dutch firms used derivatives versus 44% of US; the difference among the two countries decreases with the dimensional increase of the societies²⁴.

²² "The dominance of the survival goal over the market value goal can be seen as a manifestation of the German socio-political system. Within this system, the firms is often regarded as an entity, in and of itself, which is held accountable to a broad set of constituents. Shareholders are one of these, albeit (arguable) the most important one. Therefore, it should not come as a surprise that the survival of the firms ranks as the most important goals for the corporate risk management." in Fatemi and Glaum, 2000.

²³ As a matter of fact, the sample used by Bodnar and Gebhardt also considered the small enterprises; this, considering the evidence shown by the results of the previews surveys, that the employment of the derivatives is directly proportional to the dimensions of the societies, makes the results of the two German surveys very closed.

²⁴ In fact, the data show that the 42% of the small Dutch enterprises were derivatives users against only 12% of those American; for the medium sizes societies the difference is of 11 percentages points (46% American firms

Moreover, risks managers hedge activity is mainly tense to the minimization of the cash flow volatility. The comparative analysis on financial instruments mainly employed by risks managers shows that for the monetary risk hedge activity in both Countries OTC Forwards contract are preferred the, followed by options OTC and, in contrast to American societies, any Dutch firm used the futures contracts; while, the interest rate risks were covered resorting to the IRSs.

Pramborg (2005) compares derivative usage in Sweden and Korea. The sample was constituted of 250 Swedish firms listed on the Swedish Stock Exchange and 387 Korean firms listed on the Korean Stock Exchange²⁵. The response rate was different between the two countries (42.2% Swedish and 15.5% Korean sample), with a total response rate of 26%.

The questionnaire contained questions regarding: the respondent's exposure to foreign exchange rates and whether the respondent firm hedges; the respondent's use of foreign currency derivatives (types of instruments, frequency of use, concerns); the respondent's use of other foreign exchange risk management methods (foreign debt, internal techniques); and the respondent's control and reporting procedures (decision making process, evaluation).

The results suggest both similarities and divergences between the two countries. The most peculiar difference was the purpose of risks managers: Korean risk managers were more likely to focus on minimizing fluctuations of cash flows, while Swedish risk managers favoured minimizing fluctuations of earnings or protecting the appearance of the balance sheet.

Swedish firms were characterized by higher levels of FX exposure for revenues, costs, and net assets as compared to Korean firms; also, the percentage of firms that indicated no exposure is similar in both countries. However, the proportion of Korean firms that used derivatives was significantly lower. This result, as the author explains, may be due to the higher fixed costs incurred by Korean firms initiating derivatives programs. These higher

against 57% Dutch firms) while the great enterprises showed a similar use rate (82% United States against 88% the Netherlands).

²⁵ Utilities were excluded in both countries.

costs could result from the relative immaturity of Korean derivatives markets and, perhaps more importantly, from Korean authorities' heavy regulation of OTC derivatives use.

Finally, another resemblance is the large proportion of firms in both countries used a profit-based approach to evaluate the risk management function.

EI-Masry (2003) gathered data from a questionnaire sent to 401 non-financial firms listed on London Stock Exchange and 173 among them completed the questionnaire (response rate was 43.14%). In this study, corporate treasurers were asked a number of questions relating to the following areas: derivatives use, currency derivatives, interest rate derivatives, options contracts, and control and reporting policy.

The main results can be considered as a confirmation of some analyses previously effected in UK26. Out of 173 respondents who returned the questionnaires, 116 (67%) gave details they were using derivatives; in the size, usage was heaviest among large firms at 56.25%, it dropped to 33% for medium-sized firms and to 10.0% for small firms²⁷; in the ownership dimension, derivatives usage was greatest among public companies at 56.25% and the derivatives use rate dropped to 6.25% for private firms.

Among the reasons for which some firms did not use derivatives instruments, data indicate that 50% of firms did not use derivatives because their exposures were not significant; also, the most important reasons were: concerns about disclosures of derivatives activity required under FASB rules; concerns about the perceptions of derivatives use by investors, regulators, analysts or the public; and costs of establishing and maintaining derivatives programmes exceed the expected benefits. This is followed by: exposures which are more effectively managed by other means such as risk diversification or risk shifting arrangements, lack of knowledge about derivatives and then difficulty pricing and valuing derivatives.

Results reveal that centralised risk management activities were overwhelmingly most common and that, for firms using derivatives, foreign exchange (FX) risk was the risk most

²⁶ See Judge (1995) e Mallin, Ow-Yong and Reynolds (1997).

²⁷ Large-sized firms are so much more likely to use derivatives because of the economies-to-scale argument for derivative use.

commonly managed with derivatives. Interest rate (IR) risk was the next most commonly managed risk.

The data, finally show that the most important reason for using hedging with derivatives was to manage the volatility in cash flows at 37% of the responding firms.

Anand and Kaushik (2007) analyse the derivatives usage in India, focusing on foreign exchange risk management. The questionnaire was mailed to 640 companies, which were common across two most widely used Indian stock market indices²⁸ having foreign exchange exposure. 55 responses were received leading to a response rate of 8.59%.

Answers show that 70.4% of the respondents firms explained that they used foreign exchange risk management plan or policy or programme because risk managers had acquired the awareness that these activities not only mitigate the risks but also allow the reduction of the volatility in profits and in the cost of the capital, therefore increasing, the value of the firms. Also, the firms with high debt ratio were more likely to use foreign currency derivatives.

The authors, finally, classified the finalities to which the risks managers tended in their activity: the major objective of using derivatives is hedging the risk for arbitrage purpose and price discovery; the speculation as objective of using foreign currency derivative is the least preferred option.

An important survey, about the risk management policy adopted by corporations was conducted by "Tufano and Servaes (2007). It deals with a "global" study that does not consider one or more specific risks neither a particular country in which to define the investigation; the survey, in fact, has been structured to consider a plurality of risks, then brought back to three macro-sample: the market risks²⁹, the commercial risks³⁰ and the external event

²⁸ Namely S&P CNX 500 and BSE 500 firms.

²⁹ These risks relate to price movements in financial markets and include interest rate risk, foreign exchange risk and commodity price risk as well as possible pension fund shortfalls. They can usually be managed through the use of financial derivatives.

³⁰ These are risks intrinsic to the firm and, to a certain extent, under its control. They include failures of internal processes as well as actions by competitors. They are typically difficult to manage, especially with financial contracts.

risks³¹. The sample contains the Deutsche Bank's corporate customers in 39 different countries³². The analysis of the answers by the 334 societies define many important results. Data show that 73% of the interviews firms used one of the typologies of scenery analysis (as the stress test), from 36% to 45% utilized the measures at-Risk (id est: the VaR, the CaR and the EaR), and only 6% employed an analysis considering the shareholders' value, for example the "shareholder value analysis" (SVA).

The answers about the instruments utilized in risk management activity display that the most common instruments were: the assurance tools, the derivatives instruments to hedge the foreign risk and the interest rate risk³³.

5. The energy derivatives and the deviations from the mainstream assumptions

One of the main issues to explain the role of energy derivatives within the process driving to the crisis is the pricing uncertainty. The real world experiences many factors deviating from the neoclassical expectations, such as: mismatch in asset/hedge maturities: long maturity of assets vs. short maturity of hedges; mismatch in granularity: fine (daily, hourly) granularity of assets vs. coarse (monthly, quarterly) granularity of hedges; mismatch in underlying commodity, "dirty" hedges; rejection of normality hypothesis (table 3); fat tails (figure 7).

³¹ These risks are not necessarily firm specific, and relate to non-market external events, such as natural catastrophes or changes in tax or regulatory policies. Events like litigation are a blend of these risks and commercial risks. External event risks can sometimes be managed using insurance contracts.

³² The sample contains listed and not listed companies; particularly: conglomerates, industrial firms and utilities.

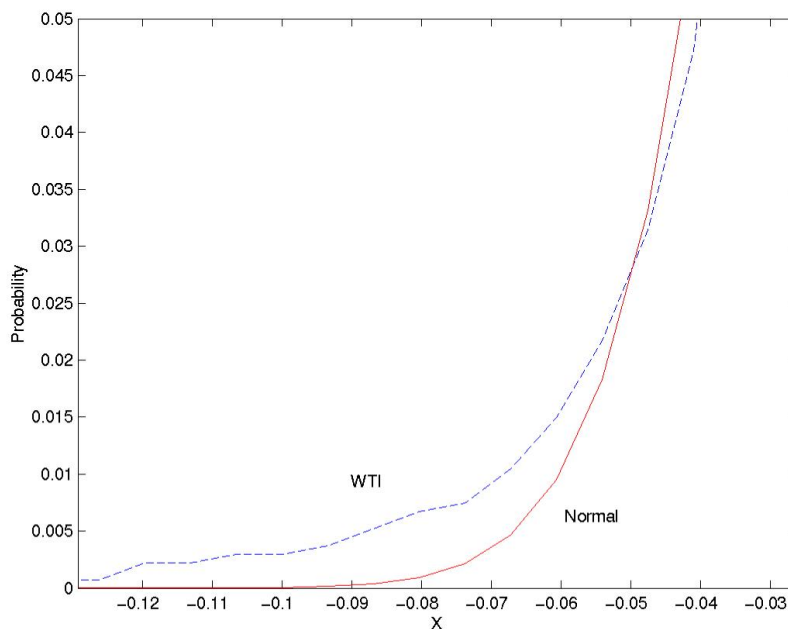
³³ They were chosen by 83%, 82% and 79% of interviews, respectively.

Table 3 - Distribution Parameters in European Electric Markets

	Annual Volatility	Skewness	Kurtosis
Nord Pool	182%	1.468	26.34
NP 6.p.m.	238%	2.079	76.82
DAX	23%	0.004	3.33

There are many liquidity constraints such as: price may depend on the volume; execution time may depend on the volume; wider bid/ask spreads; higher hedging costs; distributions are hard to calibrate because of biases due to liquidity constraints; implication: different hedging strategies may produce different option values.

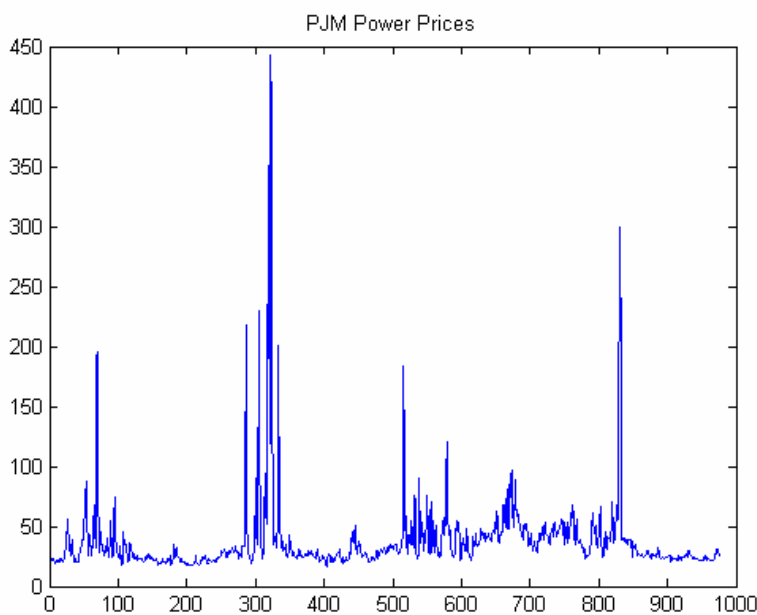
Figure 7 - Crude Oil fat tails



The most important issue appears to be the unpredictable volatility, which seems to be affected by the diffusion of energy financial contracts. Unlike cashflows of financial products,

the cashflows of energy assets are determined by complex operating strategies: dispatch strategy for power plants or injection / withdrawal strategy for gas storage. Hedges are “dirty” resulting in residual cashflow variance. Therefore, the time horizon of such instruments is short (figure 8).

Figure 8 - PJM West Electric Power Market volatility



The increased oil-futures market activity of index trading activity in near-dated contracts, and that of hedge funds and other financial traders at further-out maturities, has had a major impact on the relationship between crude oil futures prices at different maturities.

Specifically, these two developments led to the emergence of a strong and stable relationship between the prices of “short-dated and long-dated crude oil futures. After controlling for changes in physical-market fundamentals, Büyüksahin, Haigh, Harris, Overdahl and Robe (BHHOR 2011) provide evidence that the growth in the market presence of those two (but not other) types of traders helps explain the emergence after 2003 of a cointegrating relationship between the near-term, one-year-out and two-year-out crude oil futures. This new relationship has survived the market dislocations brought about by Lehman Brothers”

demise in September 2008. The development previously described is economically significant. A critical issue, for many energy market participants, is whether a long-term relationship exists between the prices of some contracts even though these contracts' prices may diverge in the short run. Such long-run co-movements are precisely the ones that the cointegration analysis identifies. One implication is that long-term oil-price hedging strategies should be more effective when they are based on cointegrated futures contracts, i.e., when nearby and backdated contracts are not segmented. In the same vein, a lack of market integration across contract maturities could be deleterious to energy traders who might otherwise rely on its existence for price discovery or hedging purposes.

A debate is ongoing as to whether the co-movements between returns on equity and energy (i.e., commodity) investments, and between the returns on different commodities, have strengthened amid the financialization of commodity-markets. The debate focuses on two issues: whether there has been a secular increase in those correlations and, in the affirmative, the date and causes of the structural break.

Büyüksahin, Haigh and Robe (2010) and Büyüksahin and Robe (2010, 2011) provide evidence that those correlations increased massively after Lehman's collapse in 2008. In 1991-2008, in contrast, the strength of commodity-equity linkages fluctuated substantially around a mean close to zero.

In line with economic intuition (Gorton and Rouwenhorst, 2006), return data from 1991 to 2010 show that physical-market and macroeconomic conditions are important drivers of the observed commodity-equity correlation patterns. Still, after controlling for those fundamentals, statistical tests show that the dynamic conditional correlation between returns on energy-futures and equity indices increased amid greater activity by one type of financial traders (hedge funds).

In contrast, trader-level data show that the positions of other kinds of commodity-futures

market participants (including, notably, commodity index traders) have little or no explanatory power. Instead, the explanatory power can be traced to a subset of hedge funds, those that trade across futures markets.

The studies we have briefly summarized together establish that who trades helps explain several aspects of the distribution of prices and returns in energy-markets, though not the level of those prices and returns. We now use the question of what (beyond physical fundamentals) does drives energy-market returns, to illustrate the importance of devoting additional attention to data granularity and maturity issues.

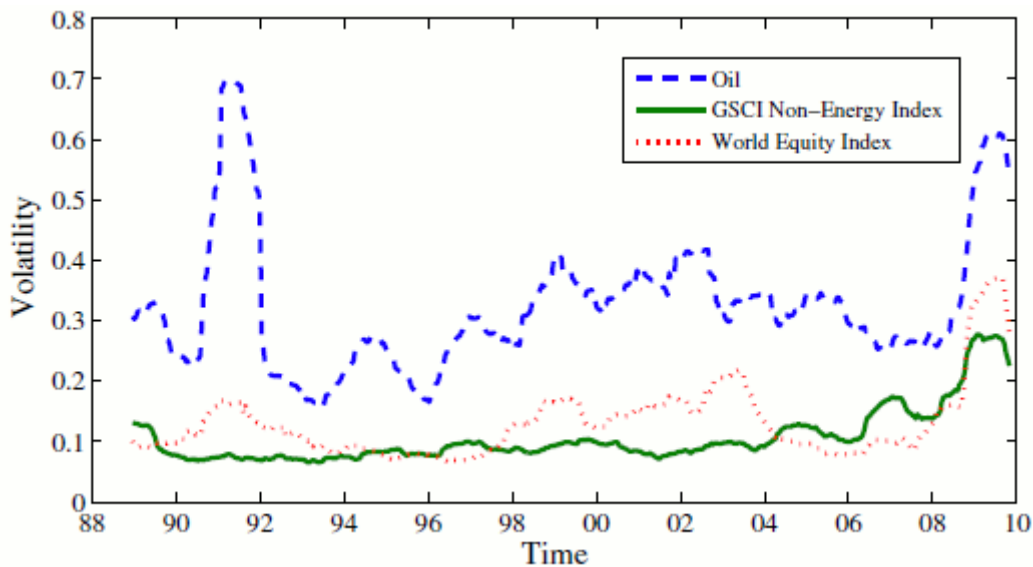
An extensive theoretical and empirical literature asks whether returns in energy derivatives (especially futures) markets are related to commodity-specific risk (reflected in hedging pressures) or systematic risk (measured by some macroeconomic variables). The majority of the extant empirical studies find evidence that idiosyncratic risk is priced, with futures prices biased downward (upward) in commodity markets where hedgers' net position is short (long)".

The volatility of energy markets consequently (figure 9). This can be summarized with the following rationales:

1. It is not possible to store electricity in any significant quantity so there is a need to match instantaneous demand with instantaneous generation.
2. The demand and supply are inelastic. This causes energy prices being characterized by extremely high volatility, seasonal jumps and daily effect. These huge price changes cannot be controlled using inventories.

Therefore, the time horizon of such instruments must be short and pulls up the uncertainty and the consequent price volatility.

Figure 9 – Energy prices volatility (1988 – 2010)



This conclusion denies the usual consideration that the rise of derivatives usage eases to reduce the price volatility. On the contrary, the financialization of the commodity and energy markets appears to be highly correlated with a jump in volatilities, as previously explained.

6. Conclusions

This paper presents the analysis of financial innovations written on energy underlying. Their introduction among investors and companies has been driven by hedging purposes, but the growing volatility observed during the last two decades is essentially explained by the increasing role of speculators.

Not only we observed higher volatilities and correlations (Gabbi, WP7.13) but also many features which deviate from the market efficiency theory and the neoclassical assumptions, such as mismatch in asset/hedge maturities: long maturity of assets vs. short maturity of hedges; mismatch in granularity: mismatch in underlying commodity, “dirty” hedges; rejection of normality hypothesis and distribution fat tails.

The growth of innovative products written on energy commodities, along with the role of financial players, shows how these markets have been highly financialized.

The pricing of energy contracts is inevitably based on the removal of arbitrage opportunities which require perfectly efficient markets, but the empirical evidence demonstrates that most of these assumptions are inconsistent.

Hedging is concretely difficult to execute because of the volatility jumps in most of the liberalized markets (especially for the electricity exposures).

Because of the stochastic dynamics assumptions and the physical and geopolitical elements which affect energy prices, the time horizon of speculators (and hedgers) necessarily must be very short.

Regulation is "*coherently*" designed to promote a process towards the realization of the theoretical assumptions of efficient markets.

Therefore, for all these reasons, regulation should be re-designed not to ensure transparency, but to avoid speculation

The concrete solution can be as follows:

- 1) Banning any naked position (the same with pseudo-naked positions);
- 2) Imposing a clearing scheme for all the OTC contracts;
- 3) Forcing clearing houses to get physical collateralization from clearing members (and the same for the non-clearing members involved in the trade);
- 4) Authorizing to become market makers only to those players able to guarantee the maintenance of bid-ask spreads within a regulatory level. This means a liquidity buffer requirements calibrated on the minimum volume of their cumulated trade. Their exposures could remain naked within a pre-determined period of time, after which a physical energy position to hedge the derivative exposure must be taken;
- 5) Regulators are expected to monitor the volatility prices and given "non conventional" tools to suspend derivative trades and provide penalties to non-compliant agents.

References

- Alkeback, P. and Hagelin, N., "Derivatives usage by non financial firms in Sweden with an international comparison", *Journal of international financial management and accounting* Vol. 10, n°2 (1999).
- Anand, M. and Kaushik, K. P., "Management Motivations for Use of Foreign Currency Derivatives in India", IIML Working Paper Series, (2007).
- Berkman, H. and Bradbury, M. E., "Empirical evidence on corporate use of derivatives", *Financial Management* Vol. 25, n°2 (1996), pp. 5-13.
- Berkman, H.; Bradbury, M. E. and Magan, S., "An international comparison of derivatives use", *Financial Management* Vol. 26 n°4 (1997), pp. 69-73.
- Block, S. B. and Gallagher, T. J., "An empirical study of the utilization of futures and options by corporate management", (1986).
- Bodnar, G. M. and Gebhardt, G., "Derivatives Usage in Risk Management by US and German Non-Financial Firm: A comparative Survey", *Journal of International Financial Management and Accounting* 10:3 (1999).
- Bodnar, G. M.; De Jong, A. and Macrae, V., "The impact of Institutional Differences on Derivatives Usage: a Comparative Study of US and Dutch Firms", *European Financial Management* vol. 9, No. 3 (2003), pp. 271-297.
- Bodnar, G. M.; Hayt, G. S. and Marston, R. C., "1998 Wharton survey of financial risk management by US non-financial firms" *Financial Management* vol. 27, n°4 (1998), pp. 70-91
- Boyd, N.E., B. Büyüksahin, M.S. Haigh, and J.H. Harris (2010). "The Prevalence, Sources and Effects of Herding". Working Paper, CFTC, July 2010.
- Brunetti, C., B. Büyüksahin and J.H. Harris (2011). "Speculators, Prices and Market Volatility." Working Paper.
- Büyüksahin, B. and J.H. Harris (2011). "Do Speculators Drive Crude Oil Futures Prices?" *Energy Journal*, 32 (2), pp. 167-202.
- Büyüksahin, B. and M.A. Robe (2010). "Does It Matter Who Trades? Hedge Fund Activity and Commodity-Equity Linkages." Working Paper, American University, November.
- Büyüksahin, B. and M.A. Robe (2011). "Does Paper Oil Matter?" Working Paper, American University, July.
- Büyüksahin, B., M.S. Haigh and M.A. Robe (2010). "Commodities and Equities: Ever a "Market of One"?" *Journal of Alternative Investments*, 12 (3), pp. 75-95.
- Büyüksahin, B., M.S. Haigh, J.H. Harris, J.A. Overdahl and M.A. Robe (2011). "Fundamentals, Trading Activity and Derivative Pricing."
- De Ceuster, M. J. K.; Durink, E.; Laveren, E. and Lodewyckx, J., "A survey into the use of derivatives by large non-financial firms operating in Belgium", *European Financial Management* vol. 6, n° 3 (2000), pp. 301-318.
- Dolde, W., "The trajectory of corporate financial risk management", *Journal of Applied Corporate Finance*, Vol. 6, n° 3, (1993).
- El-Masry, A., "A survey of derivatives use by UK non financial companies", *Social science research network Manchester Business School* 455, (2003).

- Fatemi, A. and Fooladi, I., "Credit risk management: a survey of practices", *Managerial Finance* Vol. 32, n°3, (2006).
- Fatemi, A. and Glaum, M., "Risk management practices of German Firms", *Managerial Finance*, (2000).
- Fenn, G. W., Post, M. and Sharpe, S. A. "Does corporate risk management create shareholders value? A survey of economic theory and evidence", in R. B. Walsh, *Financial Risk and Corporate Treasury* (London: Risk Publications, 1977), pp. 13-31.
- Gorton, G. and K.G. Rouwenhorst (2006). "Facts and Fantasies about Commodity Futures". *Financial Analysts Journal*, 62(2), pp. 47-68.
- Ghosh, Heintz, and Pollin, *Speculation on Commodities Futures Markets and Destabilization Of Global Food Prices: Exploring the Connections*, PERI WP Series 269, October 2011
- Hakkarainen, A; Kasanen, E. and Puttonen, V., "Interest rate risk management in major Finnish firms", *European Financial Management* Vol. 3, No. 3 (1997), pp. 255-268.
- Hamilton, J.D. (2009). "Causes and Consequences of the Oil Shock of 2007-08", *Brookings Papers on Economic Activity*, Spring, pp. 215-259.
- Irwin, S.H. and D.R. Sanders (2012). "Testing the Masters Hypothesis in Commodity Futures Markets", *Energy Economics*, 34 (1), pp. 256-269.
- Jalilvand, A. and Switzer, J., "A global perspective on the use of derivatives for corporate risk management decisions", *Managerial Finance* Vol. 6 n. 3 (2000).
- Jalilvand, A., "Why firms use derivatives: evidence from Canada", *Canadian Journal of Administrative Sciences* Vol. 16, n° 3 (1999), pp. 213-228.
- Judge, A., "Hedging and the use of derivatives: evidence from UK non-financial firms", subsequently published with the title: "Why and how UK firm hedge", *European Financial Management Journal* Vol. 12, No. 3 (2006), pp. 407-441.
- Kilian, L. and B. Hicks (2012). "Did Unexpectedly Strong Economic Growth Cause the Oil Price Shock of 2003-2008?" Forthcoming, *Journal of Forecasting*.
- Kilian, L. and D. Murphy (2011). "The Role of Inventories and Speculative Trading in the Global Market for Crude Oil". Working Paper, University of Michigan, May.
- Loderer, C. and Pichler, K., "Firms, do you know your currency risk exposure? Survey results", *Journal of Empirical Finance* Vol. 7 (2000), pp. 217-344.
- Mallin, C.; Ow-Yong, K. and Reynolds, M., "Derivatives usage in UK non-financial listed companies", *The European Journal of Finance* Vol. 7 (2001), pp. 63-91.
- Pradhananga M., *Financialization and the Rise In Comovement of Commodity Prices*, PERI WP Series 376, February 2015
- Pramborg, B., "Foreign Exchange Risk Management by Swedish and Korean Non-Financial Firms: A Comparative Survey", *Pacific-Basin Finance Journal* vol. 13 (2005), pp. 343-366.
- Servaes, H. and Tufano, P., "The Global Survey of Corporate Financial Policies and Practices". Singleton, K.J. (2011). "Investor Flows and the 2008 Boom/Bust in Oil Prices." Working Paper, Stanford University, 2011.
- Smith, C. "Corporate risk management: theory and practice", *Journal of Derivatives*, Vol. 2, Summer 1995, pp. 21-30.
- Smith, C. and R. Stulz, "The Determinants of Firms' Hedging Policies", *Journal of Financial & Quantitative Analysis*, Vol. 20, n° 4, 1985, pp. 391-405.



- Stoll, H.R. and R.E. Whaley (2010). "Commodity Index Investing and Commodity Futures Prices." *Journal of Applied Finance*, (1).
- Tang, K. and W. Xiong (2010) Index Investing and the Financialization of Commodities. NBER Working Paper No. 16325, September.
- Verleger, P.K., Jr. (2009). "Anatomy of the 10-Year Cycle in Crude Oil Prices". Working Paper, University of Calgary, March.

Financialisation, Economy, Society and Sustainable Development (FESSUD) is a 10 million euro project largely funded by a near 8 million euro grant from the European Commission under Framework Programme 7 (contract number : 266800). The University of Leeds is the lead co-ordinator for the research project with a budget of over 2 million euros.

THE ABSTRACT OF THE PROJECT IS:

The research programme will integrate diverse levels, methods and disciplinary traditions with the aim of developing a comprehensive policy agenda for changing the role of the financial system to help achieve a future, which is sustainable in environmental, social and economic terms. The programme involves an integrated and balanced consortium involving partners from 14 countries that has unsurpassed experience of deploying diverse perspectives both within economics and across disciplines inclusive of economics. The programme is distinctively pluralistic, and aims to forge alliances across the social sciences, to understand how finance can better serve economic, social and environmental needs. The central issues addressed are the ways in which the growth and performance of economies in the last 30 years have been dependent on the characteristics of the processes of financialisation; how has financialisation impacted on the achievement of specific economic, social, and environmental objectives?; the nature of the relationship between financialisation and the sustainability of the financial system, economic development and the environment?; the lessons to be drawn from the crisis about the nature and impacts of financialisation? ; what are the requisites of a financial system able to support a process of sustainable development, broadly conceived?

THE PARTNERS IN THE CONSORTIUM ARE:

Participant Number	Participant organisation name	Country
1 (Coordinator)	University of Leeds	UK
2	University of Siena	Italy
3	School of Oriental and African Studies	UK
4	Fondation Nationale des Sciences Politiques	France
5	Pour la Solidarite, Brussels	Belgium
6	Poznan University of Economics	Poland
7	Tallin University of Technology	Estonia
8	Berlin School of Economics and Law	Germany
9	Centre for Social Studies, University of Coimbra	Portugal
10	University of Pannonia, Veszprem	Hungary
11	National and Kapodistrian University of Athens	Greece
12	Middle East Technical University, Ankara	Turkey
13	Lund University	Sweden
14	University of Witwatersrand	South Africa
15	University of the Basque Country, Bilbao	Spain

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