

**Book of Abstracts**  
*of*  
**the 1<sup>st</sup> International Symposium on Energy and  
Finance Issues (ISEFI-2013)**

*organized by EconomiX (University of Paris West Nanterre La Défense) and  
IPAG Business School, in partnership with Energy Studies Review*

9:00am-19:00pm | March 1, 2013

**IPAG Business School**  
*184, Boulevard Saint-Germain, 75006 Paris*

## SCIENTIFIC PROGRAM

09:00am – 09:15am **Opening and Welcome Note**

09:15am – 10:30am **Invited Session**

Session Chair: [Anna Creti](#), *University of Paris West Nanterre La Défense & Ecole Polytechnique*

“Probabilistic Electricity Outlooks”, by [René Aid](#), *FIME-University of Paris Dauphine & EDF*

“Nonlinear Modelling of Power Price Risk”, by [Derek Bunn](#), *London Business School*

“Asset Value and Power Prices”, by [Alberto Ponti](#), *Head of Research - Société Générale*

10:30am – 11:00am **Coffee Break**

11:00am – 12:30am **Session “Oil and Financial Markets”**

Session Chair: [Valérie Mignon](#), *University of Paris West Nanterre La Défense*

**11:00am – 11:30am** **Heterogeneous beliefs, regret, and uncertainty: the role of speculation in energy price dynamics**

[Marc Joëts](#), *IPAG Business School & University of Paris West Nanterre La Défense*

**11:30am – 12:00am** **Does the SP500 index mirror the crude oil dynamics? A complexity-based approach**

[Catherine Kyrtsov](#), *University of Macedonia, University of Strasbourg, University of Paris West Nanterre La Défense, and ISC Paris*

[Christina Mikropoulou](#), *University of Macedonia*

[Angeliki Papana](#), *University of Macedonia*

**12:00am – 12:30am** **Oil price impact on the financial markets: exporter country versus importer country**

[Anna Creti](#), *University of Paris West Nanterre La Défense & Ecole Polytechnique*

[Zied Ftiti](#), *University of Tunis*

[Khaled Guesmi](#), *IPAG Business School & University of Paris West Nanterre La Défense*

12:30am – 14:00pm **Lunch**

14:00pm – 15:30pm **Session “Electricity and Gas Markets”**

Session Chair: [Duc Khuong Nguyen](#), *IPAG Business School*

**14:00pm – 14:30pm** **Hold-up problems in international electricity trade**

[Liam Wren-Lewis](#), *Paris School of Economics*

**14:30pm – 15:00pm** **Temperature shocks and natural gas trading**

[Alan O’Brien](#), *University of Limerick*

[John Garvey](#), *University of Limerick*

[Judah Cohen](#), *Atmospheric and Environmental Research (AER)*

**15:00pm – 15:30pm** **Measuring risk in electricity forward returns**

[Jörg Laitenberge](#), *Martin Luther University Halle-Wittenberg*

[Christian Lau](#), *Martin Luther University Halle-Wittenberg*

15:30pm – 16:00pm **Coffee Break**

**16:00pm – 17:30pm Session “Carbon Market”**

Session Chair: [Julien Chevalier](#), *University of Paris 8*

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**16:00pm – 16:30pm Evidence of a nonlinear effect of the EU ETS on the electricity-generation sector**

Ibrahim Ahamada, *University of Paris 1*

Djamel Kirat, *Paris School of Economics & University of Paris 1*

**16:30pm – 17:00pm Supply versus demand determinants of EUAs prices**

Maria Mansanet Batallera, *University of Valencia*

María-Eugenia Saninb, *University of Montpellier 1 & Ecole Polytechnique*

**17:00pm – 17:30pm Market efficiency in the European carbon markets**

Amélie Charles, *Audencia Nantes, School of Management*

Olivier Darné, *University of Nantes*

Jessica Fouilloux, *University of Rennes 1*

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**17:30pm – 18:00pm Coffee Break**

**18:00pm – 19:00pm Session “Energy Issues in Emerging Markets”**

Session Co-Chairs: [Frédéric Teulon](#), *IPAG Business School* and [Khaled Guesmi](#), *IPAG Business School & University of Paris West Nanterre La Défense*

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**18:00pm – 18:30pm Measuring contagion effect between energy and stock markets in MENA using copulas**

Heni Boubaker, *University of the Mediterranean*

Nadia Sghaier, *IPAG Business School*

**18:30pm – 19:00pm Climate change, hydro-dependency and the African Dam Boom**

Matthew A. Cole, *University of Birmingham*

Robert J.R. Elliott, *University of Birmingham*

Eric Strobl, *Ecole Polytechnique & IPAG Business School*

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**19:00pm – 19:10pm Closing Note**

## ABSTRACT

### **Heterogeneous beliefs, regret, and uncertainty: the role of speculation in energy price dynamics**

Marc Joëts, *IPAG Business School & University of Paris West Nanterre La Défense*

This paper proposes to investigate the impact of financialization on energy markets (oil, gas, coal and electricity European forward prices) during both normal times and extreme fluctuation periods through an original behavioral and emotional approach. To this aim, we propose a new theoretical and empirical framework based on a heterogeneous agents model in which fundamentalists and chartists co-exist and are subject to regret and uncertainty. We find significant evidence that energy markets are composed by heterogeneous traders which behave differently depending on the intensity of the price fluctuations and uncertainty context. In particular, energy prices are mainly governed by fundamental and chartist neutral agents during normal times whereas they face to irrational chartist averse investors during extreme fluctuations periods. In this context, the recent energy prices surge can be viewed as the consequence of irrational exuberance. Our new theoretical model outperforms the random walk in out-of-sample predictive ability.

### **Does the SP500 index mirror the crude oil dynamics? A complexity-based approach**

Catherine Kyrtsov, *University of Macedonia, University of Strasbourg, University of Paris West Nanterre La Défense, and ISC Paris* | Christina Mikropoulou, *University of Macedonia* | Angeliki Papan, *University of Macedonia*

Complexity, Kyrtsov and Sornette (2012) pointed out that factors such as portfolio optimization, heterogeneous beliefs or options trading can contribute to the formation of feedbacks throughout various trading processes. The effects that these characteristics and techniques may have on prices revive the view of financial markets as dynamical systems made of several interacting components with complex feedback loops. In this line of research, Brock et al. (2010) state that, in the presence of heterogeneous investors, the introduction of hedging instruments may destabilize the market.

Indeed, the way that the consequences of the ongoing crisis have been propagated within the global economic system was an unexpected shock for the mainstream economic theory, advocating the stability and efficiency of financial markets. The reactions of the economic agents around the world, the exorbitance of the different rating schemes, the regulatory gaps as well as the subsequent pronounced character of the financial disturbances that moved very fast and deeply into the real economy have revealed that the financial system is not only subject to external fluctuations but embodies a profound complexity. Its instability, the non-linearity, creates the effects of feedback.

Empirically, there are a noticeable number of research papers trying to identify the resulting feedbacks within financial markets and between the financial system and the real economy. Milani (2009) shows that the changing character of agents' beliefs can explain variations in the effects of oil prices into real activity and inflation. Kyrtsov and Labys (2006) and Kyrtsov and Vorlow (2009) argue that heterogeneity of market participants with boundedly rational expectations, receiving manipulated endogenous information as well as the presence of noise quite often cause price behaviour to deviate from being efficient, instead being complex, chaotic.

On the basis of the aforementioned property of complex systems, namely the nonlinear feedback connectivity, the goal of this paper is to apprehend the interdependences between the financial and energy sectors. To be more specific, we aim to add to the mainstream consideration of crude oil bubble formation, mainly supported by Kilian and Park (2009), according to which “...oil market fundamentals is an important determinant of US stock returns”. In particular, we create a system using three basic energy series (crude oil, gasoline and heating oil), the future-spot price spread for crude oil and the SP500 index and investigate the resulting channels. To this end, we apply entropy-based causality tests.

## **Oil price impact on the financial markets: exporter country versus importer country**

Anna Creti, *University of Paris West Nanterre La Défense & Ecole Polytechnique* |  
Zied Ftiti, *University of Tunis* | Khaled Guesmi, *IPAG Business School & University of Paris West Nanterre La Défense*

The aim of this paper is to study the degree of interdependence between oil price and stock market index into two groups of countries: the importer countries and exporter ones. We attempt to measure the degree of interdependence between oil price and financial market and to compare the specificities of the two groups of countries. To this end, we propose a new empirical methodology allowing a time-varying dynamic correlation measure between the stock market index and the oil price series. We use a frequency approach proposed by Priestley and Tong (1973) and developed by Ftiti (2010), which is the evolutionary co-spectral analysis. This method allows us to distinguish between short-run dependence forms the long-run. We find that interdependence between the oil price and the stock market is higher in importers' markets than the exporters' ones.

## **Hold-up problems in international electricity trade**

Liam Wren-Lewis, *Paris School of Economics*

This paper investigates the impact of limited commitment on international electricity trade. We build a model where hold-up problems originating from incomplete contracts decrease countries' willingness to trade. In particular, an inability to commit to future trade reduces the specialization of investment. The paper then uses the model to explore potential policy solutions including deregulation and the liberalization of ownership.

## **Temperature shocks and natural gas trading**

Alan O'Brien, *University of Limerick* | John Garvey, *University of Limerick* | Judah Cohen, *Atmospheric and Environmental Research (AER)*

Consumption of natural gas (either for space heating or generation of electricity) is highly sensitive to temperature variations. This paper examines how temperature and temperature forecasts influence the price dynamics of natural gas in the US. Using a unique dataset of 15-day temperature forecasts we construct a 'temperature forecast shock' variable that captures the

difference between the forecasted temperature and the daily 30-year normal. This variable captures how the expectations of market participants are adjusted on publication of the temperature forecast. A second variable, the 'temperature forecast error' variable, quantifies a daily update to the mean forecasted temperature over the forecast horizon. This variable assumes that the 15-day forecast is incorporated into prices and captures the evolution of realised temperatures across the forecast horizon. As this updated information arrives to the market, it will require a recalibration of expected gas demand and will thus affect trading activity. The influence of both the 'temperature forecast shock' and 'temperature forecast error' on both the conditional mean and conditional volatility of natural gas futures returns is evaluated.

For the first time, we show how temperature forecast error (TFE) - that is, the daily change in forecast information available to traders over a 15 day horizon - has a positive and statistically significant effect on both the conditional mean and conditional volatility of natural gas returns. Furthermore, we show that the temperature forecast shock (TFS) - is statistically insignificant at all levels in both conditional mean and conditional volatility equations. In an update on earlier research, the impact of storage on the conditional mean and conditional variance is shown to have declined over the last decade, presumably down to the onset of shale production and the concurrent increase in gas supply. These results have implications for participants in the natural gas market as they seek to continually refine the volatility assumptions that their hedging and purchasing decisions are based on.

## **Measuring risk in electricity forward returns**

Jörg Laitenberge, *Martin Luther University Halle-Wittenberg* | Christian Lau, *Martin Luther University Halle-Wittenberg*

What is the risk of an investment in electricity forwards? In this paper we compare different ARMA-GARCH models to fit 18 one year and 28 one quarter forward time series from NASDAQ OMX Commodities Europe. A descriptive analysis shows that heavy tails are an important feature while skewness is negligible. An ARMA(1,1)-GARCH(1,1) model with  $t$  distributed innovations gives the best fit for both forwards in terms of the Bayesian Information Criterion. We use this model in order to evaluate the Value at Risk of a buy-and-hold strategy in electricity forwards.

## **Evidence of a nonlinear effect of the EU ETS on the electricity-generation sector**

Ibrahim Ahamada, *University of Paris 1* | Djamel Kirat, *Paris School of Economics & University of Paris 1*

This article compares a linear model of electricity prices, as in Kirat and Ahamada (2011), to a nonlinear threshold model using Hansen's (2000) approach of sample splitting and threshold estimation. Testing for threshold effects depending on the price of carbon is of primary importance in the context of electricity-price models including the carbon price as a regressor. The model that we propose will allow us to see whether there exists a carbon price at which the behavior of electricity producers changes. It relies on threshold models which consider abrupt changes rather than smooth and gradual ones. These models are particularly appropriate and well-tailored for our issue since we expect that electricity producers include immediately the price of carbon emission allowances in their production cost function until the car-

bon price reaches a certain threshold. When the price of emission permits exceeds the threshold which corresponds to the marginal abatement cost, electricity producers no longer include the price of carbon in their production cost function. The reasoning behind this is that electricity producers compare continuously their marginal abatement cost with the price of carbon emission allowances and thus decide instantaneously whether it is more profitable to buy carbon emission allowances or, conversely, to abate emissions. However, this reasoning holds only away from market equilibrium. Indeed, at equilibrium, economic theory suggests that the marginal cost equals the carbon permit price. Besides, Sijm et al. (2012) establish that changes in the merit order of electricity generation induce changes in the way in which carbon price appear in electricity prices. They rely on the particular shape of the supply curve of electricity producers which take the form of increasing stepwise functions to justify abrupt jumps in the cost function of electricity-generation. It seems thus reasonable to think that abrupt transitions are more suitable than smooth ones in our case. We focus on the French and German electricity markets during the Kyoto commitment period of the EU ETS (2008-2012). The results below reject the null hypothesis of linearity in favor of the alternative of a nonlinear threshold effect in both countries. The in-depth scrutiny of the results reveals that both French and German electricity producers do not include the emission permit price in the cost of electricity generation before 2008. After October 2008, French electricity producers pass through the emission permit price to electricity price in a linear way, while their German counterparts do it non-linearly.

### **Supply versus demand determinants of EUAs prices**

Maria Mansanet Batallera, *University of Valencia* | María-Eugenia Saninb, *University of Montpellier 1 & Ecole Polytechnique*

In this paper we analyse the impact of supply and demand factors on EUA Phase II future prices, with a particular emphasis on the European Commission announcements regarding the organisation of Phase II and Phase III of the European Union Emission Trading Scheme. Using two different methodologies we find strong significance of EC announcements in particular regarding the National Allocation Plans and the cap for Phase III. Our results are especially relevant in the light of the decisions that the regulator will have to take to achieve the 20-20-20 objectives.

### **Market efficiency in the European carbon markets**

Amélie Charles, *Audencia Nantes, School of Management* | Olivier Darné, *University of Nantes* | Jessica Fouilloux, *University of Rennes 1*

In this paper, we study the relationship between futures and spot prices in the European carbon markets from the cost-of-carry hypothesis. The aim is to investigate the extent of efficiency market. The three main European markets (BlueNext, EEX and ECX) are analyzed during Phase II, covering the period from March 13, 2009 to January, 17, 2012. Futures contracts are found to be cointegrated with spot prices and interest rates for several maturities in the three CO<sub>2</sub> markets. Results are similar when structural breaks are taken into account. According to individual and joint tests, the cost-of-carry model is rejected for all maturities and CO<sub>2</sub> markets, implying that neither contract is priced according to the cost-of-carry model.

The absence of the cost-of-carry relation can be interpreted as an indicator of market inefficiency and bring out arbitrage opportunities in the CO<sub>2</sub> market.

## **Measuring contagion effect between energy and stock markets in MENA using copulas**

Heni Boubaker, *University of the Mediterranean* | Nadia Sghaier, *IPAG Business School*

In this paper, we propose to examine the contagion effect between energy and stock markets in the region of MENA using the extreme value theory and the copulas functions. Firstly, we focus on modeling the marginal distribution by applying the extreme value theory to take into account the extreme events. Secondly, we model the dependence structure by Archimedean copulas. We find empirical evidence in favour of nonlinear dependence between energy and stock markets.

## **Climate change, hydro-dependency and the African Dam Boom**

Matthew A. Cole, *University of Birmingham* | Robert J.R. Elliott, *University of Birmingham* | Eric Strobl, *Ecole Polytechnique & IPAG Business School*

Energy consumption and economic development are linked closely. This is particularly evident for the world's poorest continent, Africa, which also has the least access to electricity. However, since Africa possesses an extensive river network, hydropower is increasingly viewed as the solution to the problem of meeting the continent's growing energy demands. The World Bank (2009) has suggested that if Africa made appropriate investments in dam infrastructure and electricity transmission and distribution it could realise an 8 fold increase in electricity supply, thereby providing sufficient access to the entire continent. However, while attractive as a cheap, low carbon, renewable energy source, hydropower is vulnerable to climate-driven variability in rainfall. The river systems that yield water for hydropower production are sensitive to climate change and droughts have, on many occasions, caused considerable power disruptions across Africa. With climate change predicted to increase rainfall variability, the potential economic consequences of an increasing dependence on hydropower become even more significant (IPCC 2008). Given that most aspects of African economies depend directly or indirectly on electricity, understanding the implications of rainfall variability for hydropower supply is of considerable importance, yet has been widely neglected in the literature. In this paper we use a continent wide river flow model and IPCC climate change scenarios to examine the risks associated with the planned boom in African dam building. Our results show current plans for African dam building are remarkably well matched with river flow predictions and that fears that the World Bank is making a series of mistakes is misplaced.



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