PRICING RELATIONSHIP BETWEEN OIL AND NATURAL GAS

Arjun Mittal*

It is expected that the prices of different fuels are linked. High prices for one fuel should create incentives to substitute towards relatively less expensive other fuels. Natural gas and crude oil prices should be related as natural gas and crude oil are substitutes in consumption and also complements, in production. This paper provides an in-depth review of literature of papers studying this relationship which shows that the two fuel prices are in a long run equilibrium until 2009 after which this relationship seem to have decoupled. The paper further conducts an empirical analysis comprising daily data files of Spot prices of natural gas and crude oil traded in New York Mercantile Exchange (NYMEX) within the period from January 2006 to December 2014. It concludes that the correlation between the two has become negative after 2009 and shows absence of any long term relation between the two prices, as in the last decade the price of natural gas relative to crude oil has dramatically deviated from its historical norms. Such deviations in relative prices have important economic consequences as it can indicate potentially profitable investment strategies for firms, provide industry participants and policymakers important information for decision making about commodity prices and fuel choice.

INTRODUCTION

Energy markets are those specific commodity markets that deal with the trade and supply of energy. Energy markets refer to an electricity market, but may also refer to other sources of energy. There has been a shift from oil to natural gas and some other renewable sources such as nuclear and hydro in the last 4 decades. However, oil, natural gas and coal combined contribute to over 80% of total primary energy supply as of 2013. (IEA, 2015)

Gas and oil are close substitutes in the long run; these fuel prices should thus form a long-term equilibrium level. The equilibrium level should hover around thermal parity, i.e., the price level at which one million British thermal units (Btu) of oil is sold, for the same

* Assistant Professor, Shri Ram College of Commerce, University of Delhi and Research Scholar, Department of Financial Studies, University of Delhi

price as one million Btu of natural gas.(Brown & Yücel, 2008)

An increase in crude oil prices motivates consumers to substitute natural gas for petroleum products in consumption, which increases natural gas demand and hence prices. Oil and natural gas are competitive substitutes primarily in the electric generation and industrial sectors of the economy.

As crude oil prices increase because of increase in crude oil demand, it may increase natural gas production as a co-product of oil, which would decrease natural gas prices. Natural gas and crude oil operators require similar economic resources such as labor and drilling rigs therefore increase in crude oil prices because an increase in crude oil demand might increase the costs of natural gas production and development, pressing the natural gas prices in upward direction. Further, increase in crude oil prices because of an increase in crude oil demand may lead to more development of natural gas projects, thereby increasing production and decreasing natural gas prices.

A benchmark crude or marker crude serves as a reference price for buyers and sellers of crude oil. There are three primary benchmarks, West Texas Intermediate (WTI), Brent Blend, and Dubai Crude. West Texas Intermediate is used primarily in the U.S, Brent Crude is the benchmark used primarily in Europe and Dubai Crude, also known as Fateh is produced in the Emirate of Dubai, part of the United Arab Emirates. (American Petroleum Instutute, 2014) The National Balancing Point (NBP) in the UK, Zeebrugge (ZEE) in Belgium, The Title Transfer Facility (TTF) hub in the Netherlands, NetConnect Germany (NCG), The Henry Hub (HH) in US are the natural gas pricing benchmarks used as a reference price for buyers and sellers.(American Petroleum Institute, 2014) (Energy Information Administration, 2014)

Oil price spikes in 1990 following the invasion of Kuwait, the oil price collapse from the supply glut in 1999, dramatic oil price increases after 2003, substantial natural gas regulatory reforms, significant supply shortages in cold winters, the natural gas supply bubble for most of the 1990s, big increases in natural gas prices in 2001, sudden increase in the shale gas production in North America, natural gas supply disruptions from Russia in 2006, The 2008 crisis, Interruptions in gas supply in 2008, Gas import disturbances from Russia in January 2009 (Russian – Ukrainian gas dispute), Lybian supply shortfall in Spring 2011, withheld Russian exports in February 2012 (Nick & Thoenes, 2014)

Iraq, Iran, Syrian civil war, the negative oil price shock toward the end of 2014 due to weakening of global demand are some of the historical events that have affected the prices of oil and natural gas and thereby impacting the relationship.

The three regions namely North America (US plus Canada), EU (Europe excluding Russia) and Asia (Pacific-Asia plus Russia) import oil and natural gas from OPEC. Europe also imports oil and natural gas from Russia as well as former Soviet states and oil is imported from the US. North America imports oil from Europe, Russia and OPEC, and it imports LNG from OPEC, Norway and Pacific Asia, occasionally on a netback basis. Europe does not export natural gas to Pacific Asia; however, if there were a significant price difference between the two continents, arbitrage would be possible on a netback basis. Higher US prices attract LNG shipments on a netback basis that lowers the US gas price to a level that equals the European or Asian price plus freight to the US. On the other hand, if the US price level is lower than the Asian and European prices, natural gas prices decouple from oil prices. Currently, there are administrative obstacles that are against natural gas exports from the US and even without restrictions, US does not have sufficient LNG export capacity to allow natural gas outflow in large quantities. (Erdő, 2012)

REVIEW OF LITERATURE

(Villar & Joutz, 2006) find a cointegrating relationship relating Henry Hub prices to the WTI and trend capturing the relative demand and supply effects over the 1989-through-2005 period. Dynamics of the relationship suggest a 1-month temporary shock to the WTI of 20 percent has a 5-percent contemporaneous impact on natural gas prices, but is dissipated to 2 percent in 2 months. While, a permanent shock of 20 percent in the WTI leads to a 16 percent increase in the Henry Hub price. While oil prices influence the natural gas price, impact of gas prices on the oil price is negligible. The model developed has been criticized due to the finding of a statistically significant trend term.

(Bock & Gijón, 2011) using monthly data from 1990 to 2010 (20 years) show that US natural gas prices have decoupled from oil prices after substantial institutional and technological changes. It then examines how this interrelationship has evolved in Europe using data for Algeria, one of Europe's key gas suppliers. After taking into account total gas exports and cyclical conditions in partner countries, Bock & Gijon observe that gas prices remain linked to oil prices, though the nexus has loosened. For counties like Algeria, with a significant share of natural gas exports, this paper shows the dangers of relying on a limited basket of exports and the importance of a tradable sector that is diversified.

(Ramberg & Parsons, 2012) uses 20 years of real weekly spot prices of WTI and Henry Hub from 1991 to 2010 provides evidence that natural gas prices are not affected by natural gas prices and should thus be treated as weakly exogenous. They also try to capture the impact of seasonality and unseasonably cold or warm winters on demand of natural gas and therefore its price. The two series are tightly coupled and only decouple sometimes, although decoupling does not last long, less than one season after which the old relationship is reestablished. Further, due to technological and economic forces the cointegrating relationship has shifted downwards over time.

(Erdős, 2012) uses The spot HH, NBP and WTI price series for the period from January 1994 to December 2011 and applies vector error correction models that show that oil and natural gas prices decoupled around 2009. Prior to 2009, US and UK gas prices had a long-term equilibrium with crude prices as gas prices always reverted after exogenous shocks. The US and UK gas prices adjusted to oil price individually, and departure from the equilibrium gas price was visible on both the continents. It took 20 weeks for the adjustment between US and UK gas prices after an exogenous shock, and this convergence was mediated mainly by crude oil with a necessary condition that arbitrage across the Atlantic. After 2009, the UK gas price remained integrated with oil price, but because of an oversupply from Shale gas production in US and the halting of the Atlantic arbitrage, the US gas price decoupled from oil price and the European gas prices.

(Asche, Misund, & Sikveland, 2013) use monthly prices of long term supply contracts from Germany and spot gas prices from UK, Zebrugge and TTF and the oil price measured by Brent blend from October, 1999 to March, 2010. The results show the presence of three cointegration vectors in this system of four price series. Hence, the prices share the same common trend, and the market is integrated. In the long run also the prices are determined by the oil price. The results indicate that there is a highly integrated market for natural gas in Western Europe, this being independent of whether the gas price is determined in a spot market or in a contract. There is no evidence of independent price determination process in any of the gas markets as all the gas prices are determined by the oil price.

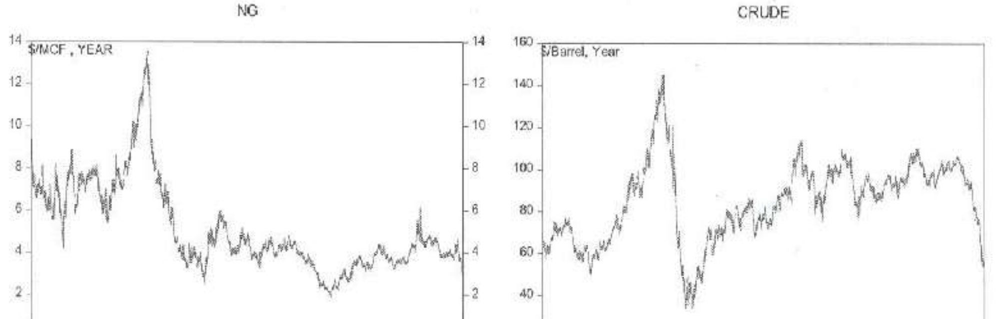
(Nick & Thoenes, 2014) use weekly data from January 2008 to June 2012 and develop a structural vector autoregressive model (VAR) for the German natural gas market. The paper shows the usefulness of this approach by disentangling the effects of different fundamental influences on gas prices during recent supply interruptions: The Russian Ukrainian gas dispute of January 2009, Libyan civil war in 2011 and withheld Russian exports in February 2012. Results show that in short term, the natural gas price is affected by temperature, storage and supply shortfalls, while natural gas is closely tied to both crude oil and coal prices in long run, capturing the economic climate and the substitution between the energy commodities.

(Asche, Oglend, & Osmundsen, 2015) use weekly data from 1997 to 2014 and applies regime switching model to infer whether pricing is oil-driven (integrated) or gas-specific (decoupled). It is found that UK natural gas (ICE) and oil (Brent) are cointegrated for the majority of the sample. Gas prices tend to decouple during fall and early winter, when they increase relative to oil consistent with heating demand for natural gas creating gas-specific pricing. Using the model to infer relative values when evidence favors integrated markets, the industry 10-1 rule-of-thumb holds, meaning that the value of one barrel of oil is 10 times the value of one MMbtu of natural gas.s, 2012)

DATA

Our data set comprises daily data within the period from January 2006 to December 2014. It consists of spot prices of natural gas price[1] and crude oil[2] price traded at NYMEX stated in USD. The starting point was chosen as January 2006 as it was not available prior to that. The Units of Crude Oil Prices are $/Barrel and that of Natural Gas is $/mcf.

Figure 1 – Graphical Representation of Crude Oil & Natural Gas prices



[1] http://in.investing.com/commodities/natural-gas

[2] http://in.investing.com/commodities/crude-oil

The prices of both crude oil and natural gas show a steep fall in 2008 at the time of Global Economic Crisis. It is also seen that crude prices started recovering in 2009, however no such effect was seen in natural gas prices. (Figure 1)

OBJECTIVE OF STUDY

The study aims to find a long run relationship between oil and natural Gas prices. It further aims to find lead and lag relationships along with the error correction path.

METHODOLOGY

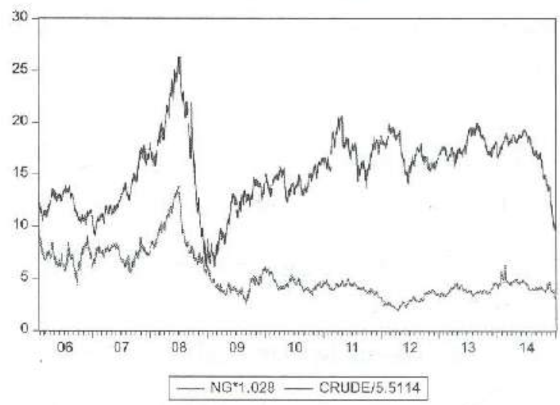
The price series is converted to energy equitant terms in $/MMBtu and graphical analysis has been carried out. Graphical analysis on 10-1 rule of thumb is performed on the data for the sample period. Next Crude/Natural Gas Ratio Analysis is carried out after log transformation of the variables, the Log HH, Log Crude price series is then tested for stationarity using augmented dickey-fuller (ADF) test and structural breaks are then identified using the Breakpoint Unit Root Test. Correlation analysis for full period, pre, during and post crisis period is performed to show how strongly are the two series related and in what direction. Since the series are found to be I(1) Johansen Cointegration test is used to find the existence of long term relation. In case long term relationship is found VECM and Granger Causality will also be carried out.

ANALYSIS

To make the prices of oil and natural gas comparable, the prices are now converted into $/MMBtu – Thermal parity. Crude oil price is divided by 5.5514 as one barrel of oil contains 5.55136522 MMBtu. The price of natural gas is multiplied by 1.028 as one million cubic feet equals .97276 MMBtu[3]

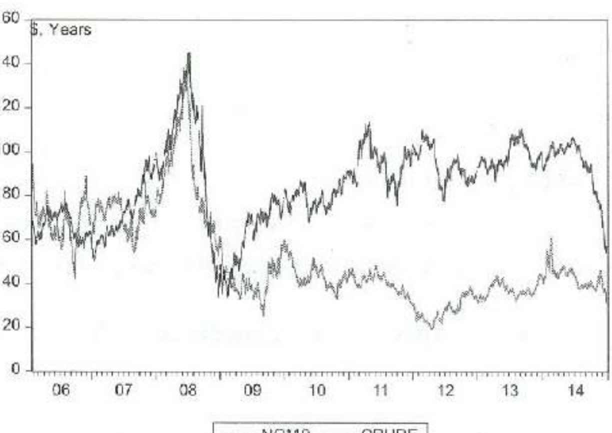
[3] (MMBtu equals 1,000,000 British thermal units (Btu) (One Btu is the heat required to raise the temperature of one pound of water by one degree Fahrenheit.)
https://www.energyvortex.com/energydictionary/british_thermal_unit_%28btu%29__mbtu__mmbtu.html

Figure 2 : Prices of Oil and Natural Gas $/Mmbtu



It seems natural that the price of oil and the price of natural gas would tend to rise or fall in tandem with each other. They both are energy carriers, with one barrel of crude oil having approximately the same energy content as six million Btu (mmBtu) of natural gas. This rough logic would argue that the price of a barrel of crude oil should equal six times the price of an mmBtu of natural gas[4]. If the price of natural gas rises by $1/mmBtu, then the price of crude oil should rise by $6/bbl.The Graphical analysis (Figure 2 : Prices of Oil and Natural Gas $/MMbtu) shows that the two price series have reached energy equilibrium/ Thermal Parity only in December 2008. However, the prices seem to diverge from the equilibrium as the natural gas prices did not recover probably due to the excess supply of natural gas from Shale, administrative restrictions for export of gas and lack of LNG export capacities.

Figure 3 : 10:1 Pricing Rule of Thumb



[4] Precisely, one barrel of Crude oil contains 5.825 mmBtu.

The two fuels differ in costs of production, transportation, processing and storage. They also serve different portfolios of end uses with only a little overlap. The two fuels also differ in environmental costs. Therefore, one should expect these factors to enter into the determination of any relationship between the prices of the two commodities, and the equilibrium relationship is unlikely to match the energy content equivalence ratio. For this reason, the industry press contains a variety of other rules-of-thumb, including the simple 10-to-1 ratio.

Graphical analysis (Figure 3 : 10:1 Pricing Rule of Thumb) on the basis of this ratio, also reveals similar findings that the prices seem to follow 10-1 thumb rule till the end of 2008 after which crude prices recovered and natural gas prices stayed low.

Figure 4 : Ratio of Crude/ Natural gas prices

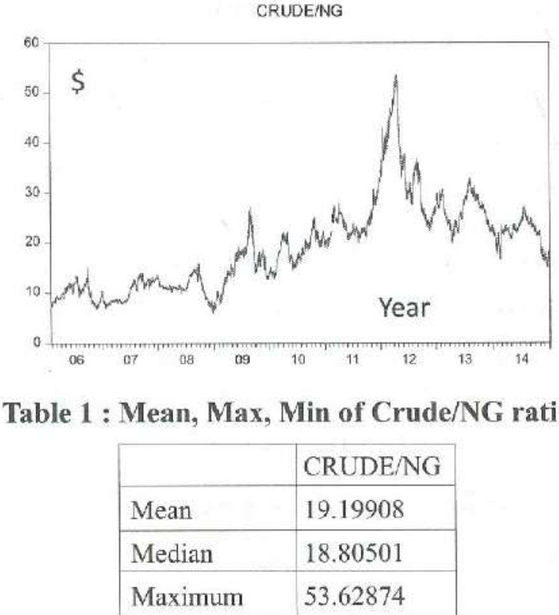


Table 1 : Mean, Max, Min of Crude/NG ratio

	CRUDE/NG
Mean	19.19908
Median	18.80501
Maximum	53.62874
Minimum	5.981387

However, the ratio of Crude/ Natural Gas varies from 5.98 to as high as 53.628 showing signs of decoupling of the relationship after the end of 2008. If equated in energy terms, the ratio should hover around 6 (thermal Parity) or 10 as per rule of thumb.

Before conducting other tests, time series are modified by logarithmic transformation (LNCRUDE and LNOIL)[5].

[5] The logarithmic transformations are used to remove the scale effects in the variables and reduce the possible effect of heteroscedasticity. Also, logarithmic transformations allow the analysis to proceed on variables in the same units. (Lütkepohl & Xu, 2012). For the sake of brevity, the terms price and logarithm of price will be used interchangeably.

To check whether fuel prices are integrated at the same order, unit root and stationarity tests are performed on the level and first differences of HH, NBP and WTI prices: The WTI and NBP prices are integrated at order one, i.e., price levels include a random walk component, while the first differences are stationary. Table 2 : Augmented Dickey Fuller 1979 Stationarity test & associated p-values reports the results. The ADF test has a null hypothesis of unit root, The Augmented Dickey Fuller Breakpoint Selection on the basis of minimize Dickey-Fuller t-statistic on differenced series suggests a breakpoint of 22/08/2008 in the crude series and 29/09/2008 in the Natural Gas series.

Table 2 : Augmented Dickey Fuller 1979 Stationarity test & associated p-values

Commodity	Period	Augmented Dickey Fuller (1979) LEVEL		FIRST DIFFERENCE		Break-Date Suggested FIRST DIFFERENCED DATA
		t-stat	p-value	t-stat	p-value	Break Selection: Minimize Dickey-Fuller t-statistic
NG	FULL	-2.71371	0.231	-50.9229	0.0000*	29/09/2009
OIL	FULL	-1.72067	0.742	-49.7382	0.0000*	22/09/2008*
NG	PRE	-2.8966	0.1642	-25.6796	0.0000*	NA
OIL	PRE	-1.92991	0.6376	-26.6506	0.0000*	NA
NG	DURING	-3.75641	0.0216*	-13.091	0.0000*	NA
OIL	DURING	-2.3201	0.4202	-13.7085	0.0000*	NA
NG	POST	-2.49828	0.329	-42.5819	0.0000*	NA
OIL	POST	-1.00072	0.9421	-38.4904	0.0000*	NA

*Suggests rejection of null hypothesis of unit root

According to World Crisis (2009), the global financial crisis became prominently visible on the global markets in September, 2008 with the collapse of several large United States-based financial firms. The breakpoint suggested coincides with this theory. (–Figure 1 Graphical Representation of Crude Oil & Natural Gas prices) shows that the natural gas and crude prices started to fall by the end of 2008. Hence, the series was divided into 3 parts. 30.04.2009 has been considered as the world economy had by then started shown some signs of recovery. (IMF, World economic outlook, 2009). The analysis is now divided into three parts Pre, During and Post-crisis.

From 26/01/2006 to 21/09/2008 – Pre-crisis period
From 22/09/2008 to 30/04/2009 – During Crisis
From 01/05/2009 to 31/12/2014 – Post Crisis

Table 3 : Correlation between Oil and Natural Gas

PERIOD	FULL DATA	PRE	DURING	POST
	-0.091	0.7162	0.58	-0.17

Correlation is a statistical technique which shows whether and how strongly two variables or processes are related. Table 3 shows the degree of correlation between natural gas and oil prices. The coefficient for the full sample period is weak negative. For the full period, the value of correlation coefficient - 0.091, for the Pre-Crisis period the degree of correlation has been found to be strongly positive i.e. + 0.7162, for the During crisis period the value is positive i.e. + 0.58 and for the post-crisis period it turned out to be negative i.e. - 0.17. There is therefore a limited positive correlation between crude oil and natural gas prices. It is logical that there would be a positive correlation between the commodities, especially because natural gas is often a by-product when drilling for crude oil. At times, crude oil and natural gas have had a positive correlation, the markets for each commodity are substantially different and subject to differing fundamental forces. Further, statistical analysis shows that there are periods of positive correlation but the correlation is generally limited. This negative correlation in the post-crisis period can be explained by low natural gas prices due to excess supply due to increased natural gas production from Shale, not matched by equal increase in its consumption. (International Energy Agency, 2015)

The tests results reported in Table 2 indicate that while the price series in levels are nonstationary (with an exception to natural gas during the crisis period); all prices are stationary in first differences. Hence the data series seem to be integrated of order one and cointegration test is the appropriate econometric approach.

Table 4 : Johansen (1991) cointegration test applied during different periods

PERIOD	No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value	Prob.
FULL	None	0.002007	8.061986	15.49471	0.4588
	At most 1	0.001557	3.521778	3.841466	0.0606
PRE	None	0.016246	11.55094	15.49471	0.1798
	At most 1	0.001068	0.707591	3.841466	0.4002
DURING	None	0.056732	9.457012	15.49471	0.3248
	At most 1	0.004215	0.637836	3.841466	0.4245
POST	None	0.004543	11.08508	15.49471	0.2063
	At most 1	* 0.003140	4.528280	3.841466	0.0333

Cointegration is similar to integration in that the process of de-trending the nonstationary series involves focuses on the offsetting of the shared attributes of stochastic trends. In some economic applications, it is advantageous to compare two or more-time series for shared stochastic patterns over time. One advantage of cointegration is that it solves the problem of spurious regressions without differencing the data and losing the information about the levels of the time series. Cointegration of economic time series suggests that the economic variables have a long- run structural relationship that can be empirically evaluated. Table 4 reports the results of the Pairwise Johansen (1991) cointegration tests applied for daily time series: these include oil price, the natural gas price. Lag selection is based on the Schwarz Info Criteria. For the full sample period, pre-crisis, during-crisis and the post-crisis period, the cointegrating relationship between oil and natural gas can be rejected, which is likely due to the change in price formation. Cointegration test results clearly indicate that the relationship between the gas and oil markets has changed and the relationship between the gas and oil prices has decoupled.

CONCLUSION

The degree of correlation between oil and natural gas prices shifted from being strongly positive in the pre-crisis period, to moderately positive during the crisis period and to no relationship/ weak negative relationship in the post-crisis period which is mainly due to the excess natural gas production from Shale unmatched by export capacity and consumption. The 10-1 thumb rule and thermal parity energy equivalent rule's graphical analysis also show that two price series have followed the relationship till the end of 2008, have reached energy equilibrium only in December 2008. However, the prices seem to diverge from the equilibrium as the natural gas prices did not recover probably due to the excess supply of natural gas and other factors. This is consistent with literature review showing decoupling of prices post 2009. Further, there was absence of long run relationship in the full data as well as pre, during and post-crisis periods. It may further be noted that the period of study includes 2 major events i.e. the world economic crisis of 2008 and excess natural gas production from shale in US, thereby disturbing the relationship. Over the time, as the excess production is better utilized and US develops sufficient liquidifying and export capacities, it is expected the long run relationship may be re-established and the decoupling may turn out to be temporary. However, the huge gap in the two prices (absence of thermal parity), provide policy makers and industrialists to utilize this low cost and comparatively environmental friendly energy alternative, natural gas as a substitute for oil in the long run by developing engines and machinery that utilize natural gas as a fuel for energy generation. This may finally reestablish thermal parity by increasing demand for natural gas and reducing demand for oil thereby reducing the pricing mismatch and gap.

CRITICISM AND SCOPE FOR FUTURE STUDY

There is a need to include various other factors such as cyclical conditions, number of heating days, number of cooling days, days of no supply, various macroeconomic variables in the analysis. Further, there is no consensus on what all variables to include, and a need to develop an exhaustive list of such variables arises. The empirical results point out towards decoupling of natural gas and oil prices. However, it needs to be studied whether this decoupling is permanent or is temporary. It should also be clarified what is meant when analysts assert that the two prices have "decoupled." This is often vague and open to alternative interpretations (a) prices have temporarily broken away from the usual relationship or (b) prices have permanently broken away from the old relationship and moved into a new relationship, or (c) two prices no longer maintain a relationship at all. Further, the literature review lacks any study from Asian region which should also be examined. Starting from the last quarter of 2014 the oil prices have fallen, its reasons and impact also needs to be explored. Future studies should aim to keep all the technological factors and other factors in mind to deal with the excess supply of natural gas along with a longer time horizon that may depict the relationship / absence of relationship more clearly in the long run.

REFERENCES

American Petroleum Instutute. (2014). Understanding crude oil and product markets, 40. http://doi.org/10.1016/S0022-3913(12)00047-9

Asche, F., Misund, B., & Sikveland, M. (2013). The relationship between spot and contract gas prices in Europe. *Energy Economics*, *38*, 212–217. http://doi.org/10.1016/j.eneco.2013.02.010

Asche, F., Oglend, A., & Osmundsen, P. (2015). Modeling UK Natural Gas Prices when Gas Prices Periodically Decouple from, (2013), 1–20.

Bock, R. De, & Gijón, J. (2011). Will Natural Gas Prices Decouple from Oil Prices across the Pond ? *IMF Working Paper*, (June), 22.

Brown, S. P. a., & Yücel, M. K. (2008). What drives natural gas prices? *Energy Journal*, *29*, 45. Retrieved from http://mail1.dallasfed.org/research/papers/2007/wp0703.pdf

Energy Information Administration. (2014). Natural Gas. *Natural Gas Weekly Update*, 1–18. Retrieved from http://www.eia.gov/naturalgas/weekly/

Erdős, P. (2012). Have oil and gas prices got separated? *Energy Policy*, *49*, 707–718. http://doi.org/10.1016/j.enpol.2012.07.022

Fund, I. M. (1984). *World economic outlook: A survey by the staff of the international monetary fund Occasional Paper No. 27. Washington, D.C.: International Monetary Fund, 1984. 222 pp. ($15.00 6Air-mail9, $12.00 6Surface9) ISSN 0251-6365 paperbound). Journal of Macroeconomics* (Vol. 6). http://doi.org/10.1016/0164-0704(84)90151-4

Gas, I. N., & IEA, 2015. (2015). NATURAL GAS 2015 edition DATABASE.

International Energy Agency, (2015). Key World Energy Satistics Report.

Institute, A. P. (2014). Understanding Natural Gas Markets.

Lütkepohl, H., & Xu, F. (2012). The role of the log transformation in forecasting economic variables. *Empirical Economics*, *42*(3), 619–638. http://doi.org/10.1007/s00181-010-0440-1

Nick, S., & Thoenes, S. (2014). What drives natural gas prices? — A structural VAR approach. *Energy Economics*, *45*(January 2009), 517–527. http://doi.org/10.1016/j.eneco.2014.08.010

Ramberg, D. J., & Parsons, J. E. (2012). The Weak Tie Between Natural Gas and Oil Prices. *The Energy Journal*, *33*(2), 1–24. http://doi.org/10.5547/01956574.33.2.2

Ramberg, D. J. (2010). The Relationship between Crude Oil and Natural Gas Spot Prices and its Stability Over Time by,

Villar, J. A., & Joutz, F. L. (2006). The Relationship Between Crude Oil and Natural Gas Prices. *Energy Information Administration, Office of Oil and Gas, October 2006*, (October 2006), 1–43.

THE INDIAN JOURNAL OF INDUSTRIAL RELATIONS

A Review of Economic & Social Development

CONTENTS	VOLUME 50	NUMBER 2	OCTOBER, 2014

ARTICLES

A Quarterly devoted to dissemination of knowledge in the fields of Industrial Relations and Human Resources, including releveant aspects of labour relations, personeel management and social and econmic issuies. Besides, communications from policy makers, socialand economic thinkers, managers and union leaders and Book reviews are also incorporated.

EDITOR : N.K. NAIR

Subscription Rates : for India - Rs. 1500.00 for one year; 4000.00 for three years; Rs. 6500.00 for five years; and Rs. 375.00 for a single copy. For foreign countries (Air Mail)-$100 for one year; $275 for three years and $375 for five years. For foreign courntires - (Sea mail)- $65 for one year; $175 for three years; and $250 for five years.

SRC

SHRI RAM CENTRE FOR INDUSTRIAL RELATIONS AND HUMAN RESOURCES, ECONOMIC & SOCIAL DEVELOPMENT
Unit No.1078 (F/F), Central Square, Plaza-II, M. L. Khurana Marg
(Barahindu Rao), Delhi-110 006
Ph.: 011-23635815; Telefax: 23635816 e-mail: src@srcirhr.com; www.srcirhr.com