

# THE VEGA FACTOR

OIL VOLATILITY  
and the NEXT GLOBAL CRISIS

KENT MOORS

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Global Crisis*



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*To My Wife Marina:  
The True Love of My Life—First, Last, and Always*

# Preface

**F**utures contracts in oil (as with other commodities) were introduced to stabilize trading in forward consignments, open the market to a broader sourcing of liquidity, and lessen the control exercised by major producers and distributors. From the standpoint of these considerations, their introduction was largely a beneficial development.

Less than 30 years later, however, the trading is giving way to pronounced volatility, shaking traditional market pricing mechanisms and threatening to destabilize large areas of both developed and developing economies. Such a result arises from the pervasive presence of energy. In turn, that energy presence remains predicated upon the positioning and pricing of oil.

I may well prefer some other fuel reliance: a low-carbon approach, one that emphasizes alternative and renewable sources. But that will not happen for several decades. Whether we like it or not, oil remains the mainstay of the energy mix. That means the volatility hitting crude has a widening economic impact. That effect is intensifying and the instability resulting is beginning to erode the dynamics of exchange. More established considerations such as supply, demand, currency valuations, stockpiles, production estimates, and a range of financial and support

elements—the foundation on which the market has determined oil pricing until recently—will serve merely to accentuate this crisis.

This is not because peak oil is upon us (although it seems poised on the horizon), or that OPEC is using crude as a bargaining chip, or that rentier states have decided to magnify short-term immediate profits, or even that some major geopolitical event has radically changed the availability or distribution of oil. All of these could, of course, add to the volatility. Yet, the rapidly approaching crisis is emerging within the oil trading system itself.

The way the market trades oil is making it progressively more difficult to price it. The rise of crude as both a commodity and an asset has introduced a new and unsettling element into the pricing equation. The relationship between paper barrels (futures contracts) and wet barrels (actual oil consignments for delivery) results in two overarching developments: (1) profit from driving the “paper price” higher (not axiomatically a bad thing, since market are predicated upon the profit motive) in turn is creating a greater strain on the real market pricing of the underlying commodity; and (2) a rising inability to price options upon which futures contract traders rely to hedge their bets has already introduced new concerns over the use of collateralized and synthetic asset and debt obligations to bridge the difference between the paper and wet barrels.

This is not simply a new development in market pricing arising from the usual suspects (supply, demand, forex, etc.). It is something intensified by the process of futures contract trading itself. It is what I refer to as *oil vega*. And it threatens to produce a far more protracted crisis than the aftermath of the subprime mortgage mess.

There are two principal objectives to this book. The first considers how one approaches the structure of, and changes in, the oil market. The second involves the nature of this unfolding oil vega crisis. The combination of these two leads to one inescapable conclusion. Oil instability will intensify; more traditional concerns over supply, demand, currency values, and infrastructure will augment the volatility, but the trade in futures contracts will remain the primary driver.

Chapter 1 introduces the concept of oil vega, along with a general description of how I intend to approach and employ the concept. That brief overview is then followed by four chapters discussing basic

market factors and the ways in which they are undergoing accelerated alteration in a rapidly changing environment. In each case, I demonstrate how traditional notions of how the market operates, or the way in which players position themselves within it, will no longer provide adequate offset to the crisis. Here, we consider the relationship between oil vega and elements of risk (Chapter 2); how oil pricing has been approached and why that is changing (Chapter 3); the impact of oil trading and its connection to the value of the dollar, credit, and liquidity (Chapter 4); as well as significant changes in the relationships among the production, processing, and distribution sectors of the oil market, the positioning of companies and their impact, or, as I call it, the upstream/downstream tradeoff (Chapter 5).

Chapter 6 addresses the impact of government action in attempts to combat oil vega. The conclusion here is rather direct—there is very little that the public sector can do to attenuate the crisis. It can, however, make matters much worse. The primary governmental approaches considered in this chapter will largely worsen an already deteriorating climate, Chapter 7 will advance an initial framework of how oil vega should be approached in an attempt to mollify its impact. But it is also a rather frank assessment on how difficult that process will be. This essentially follows from its origin. Oil vega does not result from fraud, illegal activity, or an onslaught from a foreign power. It results from the very process utilized in an attempt to introduce forward stability into the futures trading of oil.

I need also to make some comments on the structure of this book. Given that I intend this work to begin a serious discussion of an accelerating crisis, it is written to address two audiences. The first comprises general readers, while the second considers those interested in greater detail, along with an emphasis on the research, scholarly, and analytical dimensions. Therefore, I have attempted to make the text accessible, while reserving to the endnotes additional explanations and references to approaches that the researcher or specialist would find of interest. These sources have been selected with some care to provide a more complete and accessible introduction to the broader range of considerations emerging from a number of quarters. Wherever possible, I have indicated where works not generally available, especially unpublished papers and monographs, can be retrieved electronically. Each citation,

therefore, provides an opportunity for the reader to engage herself with the fuller debates while not detracting from the argument advanced in the text.

I have benefited greatly from the professional expertise of the superb staff at John Wiley & Sons, especially Editorial Director Debra Englander, Senior Editorial Manager Emilie Herman, and Editorial Program Coordinator Adrianna Johnson. I also wish to thank Mike Ward, the Publisher of Money Map Press, who encouraged me to write the book, and for the support and encouragement of Alex Williams, the Editorial Director at my advisory publications *Oil and Energy Investor* and *Energy Advantage*. I also acknowledge with great appreciation the receipt of a Duquesne University Presidential Scholarship Award, providing some very welcome time to devote to writing.

As with all things in my life, however, I thank most of all my wife Marina, whose support and encouragement, along with the occasional strategic use of the verbal whip, made this book possible. My life would mean little without her.



# Contents

Preface		ix
<b>Chapter 1</b>	The Meaning of Oil Vega	1
<b>Chapter 2</b>	How Oil Volatility Relates to Strategic Risk	15
<b>Chapter 3</b>	Determining Oil Prices	37
<b>Chapter 4</b>	Dollars, Credit, Financial Crises, . . . and the Oil Connection	57
<b>Chapter 5</b>	Oil Companies and the Upstream/ Downstream Tradeoff	101
<b>Chapter 6</b>	How Government Action Increases Volatility	141
<b>Chapter 7</b>	Is There a Response?	179
<b>Appendix A</b>	World Proved Oil Reserves (Billion Barrels)	197
<b>Appendix B</b>	Exxon CARM per Gallon (January 3, 2000 to December 31, 2007)	209
<b>Appendix C</b>	Exxon ARM per Gallon (January 3, 2000 to December 31, 2007)	221
<b>Appendix D</b>	Shell CARM per Gallon (January 3, 2000 to December 31, 2007)	241

<b>Appendix E</b>	Shell ARM per Gallon (January 3, 2000 to December 31, 2007)	253
<b>Appendix F</b>	BP CARM per Gallon (January 3, 2000 to December 31, 2007)	273
<b>Appendix G</b>	BP ARM per Gallon (January 3, 2000 to December 31, 2007)	285
Notes		305
About the Author		421
Index		423

# Chapter 1

## The Meaning of Oil Vega

**T**here is unprecedented volatility entering the oil market, transforming pricing and increasing instability. It will place a premium on setting prices via futures contracts without due regard for the actual market value of the underlying crude oil consignments. Increasing usage of synthetic derivatives will augment the problem in a manner reminiscent of the subprime mortgage disaster, but having an even more pronounced impact. Neither the way in which oil companies are structured or operate will temper this oncoming wave, while governmental action worldwide will only exacerbate the crisis.

In short, there is a perfect storm developing in the energy sector and it's going to be a nasty one.

The pages to follow detail what that storm looks like. This book results from years of analysis, consulting and practice in a very changing oil sector. Often such activity has ended being more about broader

political, economic, or financial matters than directly related to the underlying raw material itself. Such a focus is hardly surprising, given the endemic position of crude oil, the impact its supply and pricing has on modern ideas of technology and lifestyle, and the new world of regarding oil as both a commodity and an asset. In addition, based on holding a doctorate in political science, having personally experienced the economic transitions in what suddenly became a post-Soviet area, and spending some three decades teaching about the relationships between theory and practice, my view is that the transitions may have come about more easily than I first realized.

One conclusion has clearly emerged from these experiences. The ongoing situation surrounding oil will encompass an increasingly volatile mixture (no pun intended) of market, investment, and political ramifications. For several years, it has been my intention to write down some extended thoughts about this tripartite connection and the volatility emerging as a consequence. I had always intended that the product would bring a broad variety of studies to bear on an accelerating problem in a way that would allow both the interested general reader and the specialist to gain some benefit from the treatment.

Such an idea has been an ongoing work in progress for the past five years. As both an academic and a consultant, I had observed the rising concerns on the oil question expressed by researchers and practitioners. The nature of oil volatility provided the focus for what I intended to write. Only recently, however, has my project also obtained an immediacy of purpose.

That immediacy resulted from two occasions some five weeks apart. Both confirmed my analysis but also telegraphed that the threat was advancing much faster than I had anticipated. The first was an early August 2009 meeting held in The City, London's financial center. In attendance was a select group of hedge-fund directors, investment bankers, market analysts, and risk managers, along with the usual support coterie of numbers crunchers and model builders. The subject was oil and the prognosis was both unanimous and extraordinary.

The assembled were not there to announce the demise of the oil age—at least, not yet. But they were holding a wake of sorts. Crude oil would remain a commodity bought and sold on exchanges worldwide, with the benchmark prices issued each trading day from

New York and London largely determining the price. The catch was this. Sketched in their facial expressions and couched in carefully chosen words that morning was a startling revelation. Nobody in the room still believed they could either control oil volatility or, for that matter, provide adequate estimates of it. Oil was their lifeblood, a main source of their revenue and influence, the asset around which they had constructed a mighty edifice of financial power. And they no longer had a clue where it was headed.

That the gathering occurred in London, rather than Vienna (where OPEC, the preeminent producers' group meets) or New York (the location of most daily trades in the product), tells one much about how oil investment has changed. More money is raised for international oil projects within a three-mile radius of the Liverpool Street rail station than any other single place on earth. Wells may be spud in the Saudi desert, the Russian tundra, the Nigerian delta, or the jungles of New Guinea. Futures may trade the extracted product on stock exchanges throughout the world. However, funding for the drilling, service, and wellhead operations, and the pipelines and processing facilities, progressively comes from the London Stock Exchange (LSE) or, in particular for the companies emerging in response to the rapidly changing market, the LSE's Alternative Investment Market (AIM).

In late September 2009, the second meeting took place. This time the location was the new convention center in Pittsburgh and the venue was a meeting of the G20 heads of state—the 19 dominant global economies with the European Union as an organizational entity thrown in for good measure. The public usually receives only two views of such meetings—the staged press conferences and the unrest in the streets. Neither actually says much about what is really going on. In far less public sessions agendas are set, consensus is forged, and common statements of purpose are developed. These may be multilateral exercises or bilateral agreements. Either way, the gathering facilitates, but hardly concludes, the process. The success of the meetings is determined at sessions taking place elsewhere after it has ended. The G20 in Pittsburgh followed such a format.

The formal proceedings in Pittsburgh lasted less than two days. The agenda-setting meetings away from public view, however, transpired over a five-day period. At one of those sessions, advisors attached to

various national delegations discussed the state of the oil market. They reflected the same concerns addressed by the London bankers five weeks earlier. Only this time, in dialogue that intended to set an ongoing agenda for future meetings, they reached a quick agreement on two matters. First, they anticipated a return of the oil market volatility that resulted in a high of \$147.27 a barrel by July 11, 2008, doubling prices in less than a year. Second, this time more pronounced international political consequences would emerge as a direct result of the oil swings.

These meetings in London and Pittsburgh are the most recent indications that we have a major problem developing, one involving financial and political consequences directly resulting from what takes place in the oil market. Volatility remains the catalyst. However, one aspect has changed. We can no longer regard it as something likely to occur in the remote future. It is fast approaching.

This book is not a call to arms on energy security, a demand for a renewed commitment to alternative energy, or an argument for resurgence in international oil dialogue. All of these are certainly necessary, but not the primary focus of this treatment. None of these will realize much success unless we come to grips with the underlying issue. As we progressively remove ourselves from the worst financial crisis in three generations, as this long slow process of recovery unfolds, a fundamentally different, less stable, and far less predictable oil market will be there to greet us. It is toward an understanding of this altered state of affairs that the following analysis directs attention. Make no mistake. While the changes will first manifest themselves in the trading markets, it will be the political playing field that will ultimately decide matters.

What I call *oil vega* will be the single most pervasive and disturbing element of the energy market moving forward. It speaks of rising volatility, an inability to predict pricing changes or impact, deteriorating policy alternatives, and the probable global political consequences. Instability in both the market and governmental responses to it will likely result in intensified and repetitive cycles of crises, producing increasingly dangerous political consequences.

I have borrowed the concept of *vega* from option<sup>1</sup> traders to label this new environment. As traders use it, vega relates to the way in which the price of an option changes with the change in volatility.

Of course, things are never quite that easy. Traders need to determine a value for the option and be able to revise their estimates on that value as market changes take place in the futures contract on which it is based. For that they need a pricing model. The volatility component in their pricing model, from which one determines a theoretical value for the option against which a trader calculates the option's market price, is called *implied volatility*. Vega represents the rate of change in the theoretical value of an option as it relates to a change in implied volatility.

Vega is, therefore, a "second order" or derivative concept to the actual change in the value of a security. It measures the amount by which the price of an option changes when volatility changes.<sup>2</sup> Volatility is simply the measurement of how often and by what amount a market factor revises. Usually, that factor is price, and is represented by another "Greek"—*delta*.<sup>3</sup> Now this translates into the presence of a higher vega, indicating greater fluctuations in the underlying prices of actual contracts.

Volatility is often regarded as a general measure of the risk in an option (or security, stock share, tradable asset, etc.). It measures anticipated fluctuations over a period of time. One expects that price will change more often for an instrument with higher volatility. The greater the price swing, the greater the volatility. Options for underlying securities having high volatility will cost more than those with low volatility. Several measures are used to gauge volatility. One of the most common is calculating a standard deviation. If the measurement is against a known common index, such as determining stock volatility against the S&P index, the result is a security's *beta*. While not included in the usual "Greeks" applied by option traders, beta obviously does have some use as a measure of the market (nondiversifiable) risk associated with any security. Options, however, do not have a readily available common index against which to gauge changes in price. Also, this may begin with a consideration of price changes, but notice that vega describes the *rate* of the change, not simply the change itself.

This will be important in our usage, since the essential thesis of this book is that the increasing rate (along with the range) of changes will generate instability. This will have a pervasive and serious impact. Simply put, *oil vega will result in the increasing inability to determine the genuine value of crude oil based on its market price.*

That inability will erode the ability to predict, plan and compensate. This will be problem enough for the market. However, given the interconnection between the public and private sectors when it comes to energy policy, the consequences of oil vega will impact most visibly and seriously on the global intergovernmental stage.

This new environment is certain to raise the political heat, shorten international tempers, and make global oil a much more volatile and less predictable commodity. Unless we come to grips with the changes now emerging, none of the moves to make nations more secure, uncover new energy sources, or bring about a global oil consensus will make much difference. A rising tide of uncertainty will engulf the first. The second, while certainly the essential solution in the long term, will not have time to develop before the crisis hits. The volatile nature of crude oil will already have significantly damaged the market well before a weaning from primary dependence upon oil is possible. The third will fall victim to the competing policies of rentier nations, transit states, and end-consuming countries.

We have developing market (dis)order—a pervasive and endemic disequilibrium masquerading as the “new order” in the oil market. It is not that we will suddenly run out of crude oil, although that day is approaching.<sup>4</sup> The gravamen of the situation involves the increasing inability to develop adequate market remedies for expanding volatility. An even more unsettling shortcoming will develop: It will become progressively more difficult to predict the volatility itself.

Supply meeting demand is, of course, a fundamental ingredient in the instability, especially in how participants regard the cycle of volatility as it unfolds. However, it is not the supply-demand relationship itself that causes the problem. Available supply is less the sole driving issue in this new (dis)order. Price fluctuations will result from more than simply the perception of how much crude oil is left.

A simple review of predictions presented prior to the (usually) Wednesday morning release of Energy Information Administration (EIA)<sup>5</sup> weekly figures on oil and oil product inventories indicates current predictive abilities are already suspect. The “actual”<sup>6</sup> figures provided are often quite at variance to the predictions. We also are becoming increasingly concerned about the ability of EIA or the International Energy Agency (IEA)<sup>7</sup> to provide meaningful worldwide demand figures.



Significant demand pressures are underestimated or not considered at all. The IEA has acknowledged this problem, essentially resulting from continued overreliance on demand from developed countries and selected developing markets (e.g., China, India, East Asia) and underestimation of significant demand pressures in producing countries and other less-developed regions of the world.<sup>8</sup>

A clear signal that what I call oil vega is becoming a rising concern was issued by the EIA on October 7, 2009. It has found it necessary to follow a new reporting format.

Energy prices are volatile. They change as market participants adjust their expectations to new information from physical energy markets and markets for energy-related financial derivatives. Futures and options markets are a valuable source of information regarding these changing expectations.

Starting with the October 2009 issue [released October 6, 2009], Energy Information Administration's (EIA) *Short-Term Energy Outlook (STEO)* began tracking crude oil and natural gas futures prices and the market's assessment of the range in which prices are expected to trade. We do this using a measure of risk derived from the New York Mercantile Exchange (NYMEX) Light Sweet Crude Oil Options and Natural Gas Options markets known as "implied volatility." Implied volatility is nothing more than a standard deviation for the expected futures returns embedded in the option's price.<sup>9</sup>

The commodity option-pricing model is derived directly from the Black-Scholes option pricing model, based upon the Black-Scholes equation—the most famous single formula ever articulated for trading options.<sup>10</sup>

The equation itself produces a model that is often quite restrictive in application, given that it involves six major assumptions: (1) there are no dividends on the underlying security during the life of the option, (2) European-style exercise (that is, only at expiry) is followed, (3) markets are efficient, (4) there are no commissions charged, (5) interest rates are constant and known, and (6) returns exhibit lognormal distribution (i.e., providing a normal distribution, allowing thereby the use of standard statistical techniques on the resulting data). This last assumption is very