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Price Volatility, Information Flows, and the Norwegian Experience: Managing Expectations in Globalized Oil and Gas Markets

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Abstract

The paper outlines and explores the primary factors that determine, refine, and exacerbate oil and gas prices over three different structural networks, i.e., global markets, political factors, and leveraged speculation. The influence of these networks on oil and gas volatility is explored. Increased volatility has formed such a trend that it is being considered by some as the 'new normal', with little hope of attaining stability. The paper then delves into the implications of volatility on energy security.

For the efficient management of resources, effective delivery of energy services, and implementation of sustainable energy practices, a common assumption is that increasing energy flows between producers, between consumers and producers, and between governments and producers will lead to a more efficient and more transparent marketplace. However, resource management and delivery are also inherently political concerns. Mechanisms for pricing transparency and predictability should not only address the 'nuts and bolts' of implied costs, prevention against corruption, and other transparency measures, but also take in to account the social costs and benefits of both the broader market (climate change) and the localized conditions of extraction (environmental issues, corruption, violence) that can exist. The paper next explores how energy information flows influence policy and livelihoods.

Given the tenuous relationship of resources to governments to people, scholars and policymakers have naturally attempted to find solutions to mitigate the negative effects of new-found resource wealth while at the same time encourage positive effects to bloom. For example, Cavalcanti *et al* (2012) argues strongly in favour of Sovereign Wealth Funds (or at the very least mitigation funds for hedging) in order to reduce the negative consequences of volatility. Further, interventionist policies to either reduce oil shocks or mitigate undesirable impacts of volatility need to carefully consider which set of supply/demand variables the host country is attempting to influence. These issues will be explored in detail in the second section, which uses the Norwegian experience of oil discovery, social integration, and a sovereign wealth fund to illustrate the success story and the remaining present and future challenges.

The report ends with highlighting further avenues of research relating to oil price volatility including changing demand-supply dynamics.

Price Volatility, Information Flows, and the Norwegian Experience: Managing Expectations in Globalized Oil and Gas Markets

Oil and Gas Price Volatility[1]

Volatility is the measure of the variation at which prices rise and fall over a period of time. These fluctuations can be studied in the context of any product or service. As such, there are many major and minor factors that can influence the price volatility of a product. We have focused on price volatility as a core component of this study as it can create and exacerbate negative pressures upon economic growth (Ramey and Ramey, 1995), investment and/or human capital activity (Gylfason, 2001), and state capital accumulation (Papyrakis and Gerlagh, 2004). This section briefly explains what price volatility comprises, the industrial and political ramifications of increased volatility, and how the relationship between volatility and supply/demand fundamentals is shifting as new players enter the market.[2]

This report studies price volatility in particular relation with oil and gas prices. Oil and gas price volatility is defined by the degree of price variation in the market (percentage shifts in day-to-day prices), not in the broader long-term relationship to historical prices (Mastrangelo, 2007). If there is a general increase in oil and gas prices due to inflation supply/demand curves or other longer macro concerns, it does not necessarily provide an indication about market price volatility. For example, commodities can enjoy high appreciation with little volatility or have little appreciation with high volatility. Due to the lack of fixed parameters, it is essential to study in detail the factors responsible for price volatility, the actors who play a role in determining prices, the implications of volatility for countries' energy security, and the mechanisms that can encourage transparent pricing.

A comprehensive and well-studied example of these debates can be found in the discussion amongst policymakers in USA and EU about the causes of the dramatic increase in intraday changes (and eventual substantial overall spike) in the oil prices between 2003 and mid-2008 (Hamilton, 2009a). Subsequent studies have attempted to determine whether the rise in prices could be attributed to speculative trading, OPEC's withholding of oil supplies from the market, peak global oil production, or to the unexpectedly high demand of oil by Asian economies (Kilian and Murphy, 2010). However, while 'volatility' was often described as a peripheral player in these discussions, it was rarely considered a catalyst. We feel that relegating volatility to such a minor role may understate the forward role of volatility (exposure to derivatives market) in oil prices.

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[1] Special thanks to Priyanka Vij with assistance for this section.

[2] While 'the market' is often used as a catch-all term, we use it here to apply specifically to the energy futures trades at major trading exchanges. For oil, for example, this consists primarily of the New York Mercantile Exchange (NYMEX) and Intercontinental Exchange (ICE). While there are obvious and substantial variations and differences in the West Texas and Brent trades, for the purpose of this report their relationship to political factors and volatility can be considered similar enough to employ them as merely two elements of the broader 'oil market'.

While gas prices have historically been linked to oil (Nassif, 2013), since 2007 there has been a widespread decoupling related to geographic elements, new findings, and the changing global economy. The block contract dynamics, used largely in Europe, carry a dampening long-term effect on speculation, thus performing a stronger role in fundamental based market activity, even though speculation (in the guise of 'long-term analysis') still plays a role. We have outlined and explored the primary factors that determine, refine, and exacerbate oil and gas prices over three different structural networks, i.e., global markets, political factors, and leveraged speculation. Each section analyses the influence of each factor on oil and gas volatility.

Global Markets, Local Debates

Although distinct markets, both oil and gas futures trade alongside many similar energy products, within broader commodity baskets, and are subject to the price action and volatilities that are common to the commodity sector and distinctly inherent within the energy-specific realm. First conceived as a price action signifier (and tradable element) during the 1973 oil crisis after the formation of OPEC and further refined and studied after the 1986 global crash in oil prices, volatility of the oil market is a near-permanent feature of oil trading. It is approximately 95 percent more volatile than similarly traded products either under the commodity umbrella or in terms of Producer Price Index (PPI) (Plourde and Watkins, 1998). The percentage change in oil prices is depicted graphically in Figure 1.

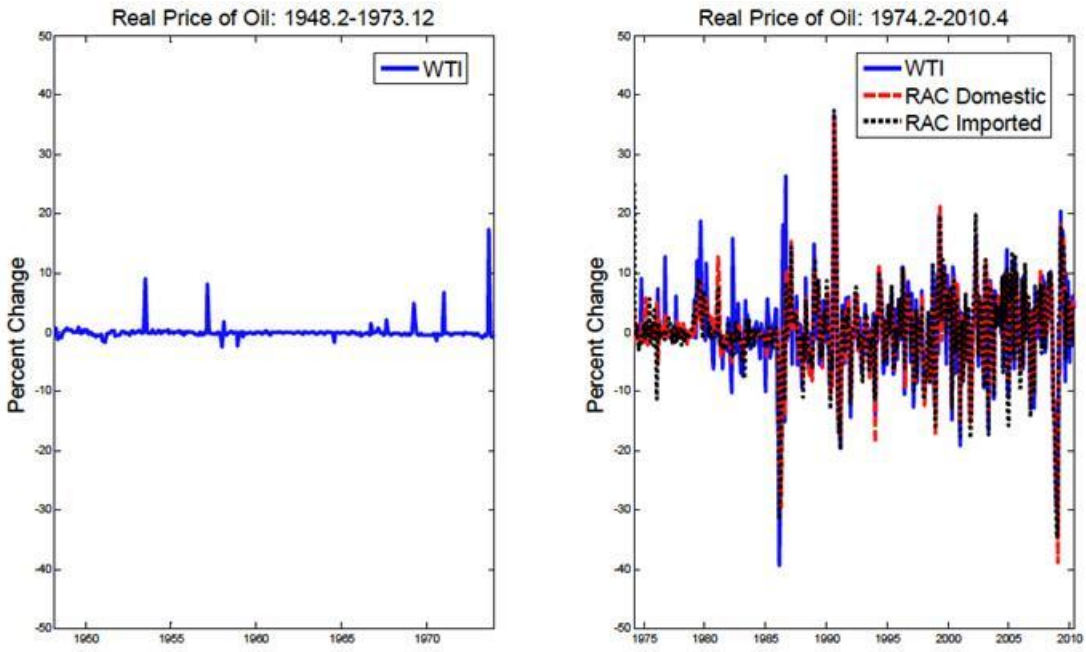

Figure 1: Percentage Change in Oil Prices

What remains unclear, however, is the ability of states and companies, which are highly sensitive to this volatility at both the micro- and macroeconomic levels, to successfully employ hedges or policies that carry sufficient net value in terms of ensuring either overall profitability or mere economic stability. The policy discussion is complimented by new debates amongst researchers about the

influence of supply shocks on the real price of oil relative to speculative demand shocks and business cycle-driven demand shocks (Hamilton, 2009a). Growing economies increase oil demand and spike prices, while a weak global economy (such as today's economy in the post-financial crisis period) usually shows the opposite effect. For example, China as a growing economy has significantly raised its consumption levels. China's consumption of oil doubled in the first decade of the 21st century, from around 4.5million barrels per day (bpd) in 2000 to over 9 million bpd in 2010 (Image Mundi). Though the figures show an upward growth, they are partially counteracted by decreasing oil production in United States and extensive Chinese efforts to employ renewables (Hamilton, 2009a, Tan and Mathews, 2010).

The market has also increasingly started to accept increasing price volatility as the 'new normal'. While businesses and states have only limited capacity to evade the effects of the fluctuation in oil and gas prices, recognition of the way that speculation and trading influences prices beyond 'fundamentals' can actually help suppliers, consumers, and governments to manage risk. One example lies in the airlines sector. This sector relies heavily on oil prices to set flight prices. A sudden rise in oil prices can deeply affect the profitability of the airline if this risk is not accounted for, either through fuel surcharges (which risk alienating passengers), or through price hedging which is equally damaging to profitability if bets are made rashly (Alquist *et al*, 2011). In order to better understand the causes of price volatility, an examination of the factors that play dominant roles in influencing price volatility in the industry is necessary.

Historically significant factors of oil-gas price volatility are coupled with new factors that exacerbate price swings. Thus, some essential determinants in oil and gas pricing, such as supply/demand of oil are now less purely deterministic, particularly in short-term price exploration. Even though the supply/demand balance continues to drive market fundamentals over the long term, rapid price increases that are not underpinned by demand shocks (such as the 2007 oil spike) merit further study. Among many such analyses, the Yardeni Research Institute argued that the hike in both oil and gas prices during the period was owed more to Wall Street speculators and traders than to the more commonly stated reasons including an overheated US economy, demand or supply shifts caused due to economic development in Asia, and/or political unrest in the Middle East (CBS news, 2012).

But more than just the work of who are often portrayed as shadowy, 'nefarious' traders that are at times unfairly blamed for spikes and crashes in all markets, interconnecting social, economic and political factors also influence price volatility. A wide range of social issues such as varying environmental regulations, laws mandating social responsibility for oil companies, and economic factors that alter oil demand, encourage the oil industry to prepare for unexpected and unforeseen price volatility. Notably, this activity is generally *reactive* and *industry-wide* in nature, which means that after a given macro event finishes, trades become significantly one-sided in nature as both, producers and traders seek to quickly hedge or open positions.

This element is perhaps most visibly seen in political events incorporating major oil producers. Political factors, such as wars, tensions in oil and gas production areas, mismanagement of resources (as seen in Venezuela), and terrorist acts are often reactive determinants of price volatility. The world oil and gas market is a capital-intensive environment, defined by complex interactions between actors dealing with a variety of products. Peripheral issues, such as transportation, storage, and exploration bind disparate companies through various laws and socioeconomic dynamics. Even though each of these issues may not have a great deal of individual influence upon the price volatility of oil and gas, when taken as a whole, or when multiple triggers exist in a short period, markets can move swiftly. These and other non-traditional factors influencing price regulations breed concern beyond supply and demand projections.

While we will discuss OPEC more broadly later in this report, it is worth noting that OPEC is usually at the centre of supply-side price fluctuation policies. non-OPEC suppliers are the price 'takers'. They have only one choice, either offer product at market price or reject sale (Smith, 2009). OPEC is known for manipulating oil prices, which needn't be upward-leaning or meant for profit-maximization. OPEC members (especially Saudi Arabia) have often increased oil production to stabilize prices and prevent overheated market spikes, usually after supply shocks or wars in large producing states. But, while OPEC attempts to create a more stable price regime for the benefit of consumers and producers, other volatile factors are less controllable, exposing OPEC's inability to control oil prices at times due to lack of data or dynamic factor movements led by large market bets that continues to erode OPEC's pricing power.

Perhaps obvious, price volatility also plays an outsize role upon the deep effects that price shocks have on economies dependent on oil and gas for economic development. When oil prices suddenly rise (or fall), the cost of production from each aspect changes in a near exponential manner.3 Production cuts generally lead to unemployment and economic downturn until the recovery of the market begins. However, this recovery may not necessarily lead to a 'business as normal' atmosphere as internal political factors can lead to permanent shifts and increased pressure upward each time a price shock takes place (Metcalf and Wolfram, 2010). In this time supply may reduce along with a reduction in demand of other sector-specific products, for example in the dramatic reduction in sport utility vehicles (SUV) sales in the USA in 2008 (Hamilton, 2009a).4 Increased frequency of spikes and crashes further contribute to the political and business instability created.

Over time, increasing demand for oil and gas from the emerging markets has had dramatic effects on the global oil and gas industry, both as an added source of demand and as a buffer against economic crises in traditional demand centres. This awareness has ushered in a systematic change in the choices and policies of international oil and gas companies and the lobbying done by their related organizations.[5] Further, oil and gas prices also play crucial roles in other policy aspects of domestic governments, such as subsidy policy, foreign relation policy, environmental policy, and business development policy.

Merging the two elements, global market activity is strongly linked to price volatility. Interlinked global markets and industries can suffer or gain tremendously due to changes in oil and gas prices. For example, higher crude oil prices lead to higher gasoline prices, increasing demand for corn ethanol as a substitute for gasoline, in turn increasing corn ethanol price due to higher demand (Tyner, 2010). Hamilton explains the interactive effect through the relationship between the oil price shock and the housing market in the US, and the global financial crisis (Hamilton, 2009b). When oil prices fell, economic production fell, cascading through to layoffs. This led to a decline in income, eroding the ability to pay off (in many cases overextended) mortgages, popping the housing bubble. The resulting financial problems converted the mild recession that the US had been experiencing up

[3] For example, if oil at $100 costs $80 for a state or company to produce, a 20 percent swing in the oil price will have a 100 percent swing in profitability.

[4] Hamilton explains how the market for the SUV sales began to plunge but rebounded when the gas prices began to fall in August only to fall again in September through December.

[4] Notably, while USA, UK, and French oil firms remain sensitive to potential environmental damage or socially irresponsible activities regardless of operations, developing country producers operating in developing countries and selling primarily to developing countries have a limited insulation from these types of resistances, most particularly state-run firms.

until 2007 into a large-scale economic downturn 2008 and 2009 that reverberated across the globe. While oil prices didn't 'cause' the financial crisis, their ability to trigger crises through rapid price swings coupled with the necessity of oil illustrates the importance of understanding the role of volatility.

Further, continued integration between the commodity markets and financial markets has boosted volatility transmission. Volatility from a single commodity or currency market can affect other commodity and currency markets, which can be defined as a "meteor shower" (Engel *et al*, 1990). Analysts and economists have their share of concerns as well, such as noted by Canadian senior economist Robin Wiebe, who states that "Oil prices move closely with the International Monetary Fund (IMF) estimates of world economic GDP. IMF's forecasts of decent global growth are positive for the (North American) economy and housing markets, but a US recession, or greater-than expected slowing in China, or an economic meltdown in Europe could rapidly sour this outlook." (Tonqguzzi, 2013).

However, the notion of volatility *itself* constituting a financial or political risk remains under-explored, and this is the focus of this chapter. Volatility can wreak havoc on not only economies, but also on producers. Jin and Jorion (2006) studied the value of hedging on oil and gas producers in USA. They found that while hedging may insulate producers from price shocks, it does not carry much value for oil and gas production companies, as these entities most likely aggressively hedge for stability. Volatility exacerbates the boom-bust nature of the production cycle, further decoupling the market, and exacerbating the decoupling from the 'fundamentals' equilibrium to which all markets eventually return.

Supply and Demand Fundamentals

Though multiple factors dramatically influence price volatility, the relationship between demand and supply remains the most pertinent and reliable source to predict the long-term price trends of a commodity. The prices that consumers pay are the result of worldwide supply/demand factors in both physical commodity and futures markets (Sockiny and Xiongz, 2013). Still, hikes in oil or gas prices can lead to increasing volatility in oil markets, as economies waver under the burden of excessive oil prices, resulting in slow growth and lower demand in a cyclical pattern. As a visible recent example, global demand for oil increased sharply until 2007, till the global economic downturn. The high oil prices reduced the oil demand for two consecutive years (Rosenfeld *et al*, 2009). As slow recoveries have begun in many parts of the world, demand (and price) has started increasing although at a more measured pace.

Oil and gas demand from the developing countries is predicted to increase with time despite sustained high prices (McKay, 2012). China has begun to develop alternative measures hoping to reduce oil consumption habits. The International Energy Agency (IEA) highlights a similar trend, explaining that while OPEC crude oil supply in December continues to gradually diminish (currently on lower output from Saudi Arabia and Iraq), world projection for oil consumption is following a gradual upward path (1 percent expected y/y increase in 2013).[6] These diverging trends illustrate the long-predicted heightened expectations that the demand from China is relatively inelastic and is increasing despite the fact that the oil prices have maintained historically high levels that have continued into 2013 (Oil Market Report, 2013 and OPEC, 2013a). Stability in rising prices, despite continued economic struggles in the developed world, has encouraged both developed and developing countries to change their demand trend outlooks and adjust to the growing demand from countries

[6] See the January 2013 IAEA energy trend report at: http://wwwpub.iaea.org/MTCD/publications/PDF/P1475_web.pdf

including China, India, and Brazil, hence influence price discovery (Trading Today, 2013). While discussions on 'peak oil' and other long-term supply concerns have long been visible in developed country energy policy, the recognition that it will be the most influencing demand dynamic has encouraged a re-think over forward supply/demand roles in the 21st century.

As the single most influential actor on global supply, the Organization of Petroleum Exporting Countries (OPEC) consortium aims to coordinate the petroleum policies of its member countries (constituting 40 percent of global production) for universal application and standardization of oil prices. It is also its self-assigned duty to ensure oil price stability in order to secure an efficient and regular supply of oil to consumers at constant and predictable rates. It endeavours a balanced and fair return to the producers along with an appropriate return to investors of the petroleum industry (OPEC, 2013b). It is a functioning (but increasingly inefficient) cartel that through its actions and statements, can influence the world oil prices across the globe (US Energy Information Administration, 2013).

Saudi Arabia has traditionally been OPEC's lynchpin, controlling its marginal oil quantity which in turn allows OPEC to control the oil market supply and extend the price even as other countries come online (American Petroleum Institute, 2013). However, OPEC has lost market share and is no longer a decision maker for oil pricing due to non-OPEC countries' increasing oil production, increasing demand for energy conservation and energy efficient fuels, and the influence of powerful financial players acting in the oil sector who have no intrinsic need for the product (Omondude, 2002). Thus, future trends of oil-gas volatility will depend less on OPEC policies alone and more on the complex workings of the international market.

Beyond OPEC, the discovery of oil and gas, particularly in developing states, not only erodes OPEC's intrinsic global power but also serves as a domestic economy boost due to the gigantic financial resources accumulated from resource development.[7] As an extended example, large crude reserves have recently begun to be extracted off the shores of Ghana in the Eastern Atlantic. The reserves of this field amount to about 490 million barrels, with commercial exploitation justified if barrel oil prices exceed US$30. At its peak (now until mid-2016), some 120,000 barrels of oil per day will be extracted and Ghana will be a net oil exporter for two decades. Ghana can be equated to neighboring Cameroon (400 million barrels) and above Côte d'Ivoire (100 million barrels), but far below Nigeria's production (36,200 million barrels) (Dessus, 2009).

However, Ghanaian oil is generally perceived by both, the politicians of the country and the companies extracting it, as a limited, finite resource that will temporarily spur development and kick-start development within the country. This is not a long-term resource that can be extracted for benefit of the population at large. Oil in this case is the spark of economic development, not the engine. This philosophy can vary dramatically from producer to producer. Part two of this report explores the Norwegian experience in this regard.

For the newly producing state, oil discovery means a significant lag in price changes between such discovery and production, and opportunity costs are of significant import. Exacerbating matters is the fact that the price for crude oil is in a period of decoupling, as noted from the analysis and news about oil scarcity, and consequently remains on a level higher than the optimal price path (Leinert, 2010). Further, publicity regarding oil field discoveries renders more precise the idea about the availability

[7] This erosion is of course limited to those areas in which natural gas and oil are exchangeable as energy sources, primarily in Eastern Europe and the United States, in terms of heating and other non-transportation sectors (Darkwah, 2010).

of crude oil in the nearer future. It further clarifies the opportunity cost of using oil today rather than tomorrow. This is especially the case in developing countries, where a 'bird in the hand' philosophy is both pervasive and, depending on terms, imminently justifiable.

While considering price discovery, the influences of new findings and production on the supply side can be matched conceptually with the notion of elasticity on the demand side. Price elasticity indicates the reaction of consumers to the changing prices of a commodity, projecting the willingness of consumers to buy oil and gas for various needs despite rising prices. If price elasticity is high then the consumer is unwilling to purchase oil and gas at high prices and reduces consumption. On the contrary, low price elasticity indicates that the consumer is willing to purchase despite the high rate. Empirical studies attempting to understand oil price effects on aggregated economic activity suggest that oil price variation has a remarkable inverse impact on economic development. Estimates of oil price elasticity are as high as 0.29 suggesting that a 10 percent increase in the oil price translates into a 2.9 percent decline in real GNP (Gross National Product) (Hoffman, 2012). However, the correlation between oil prices and economic activity has diminished where the impact of price shocks can be isolated. A 10 percent increase in the oil price would result in a decline of about 0.2 percent and 0.5 percent of real GDP in the first year and second year, respectively (Hoffman, 2012). While the influence of such individual shocks may be diminishing, their frequency has dramatically increased, keeping price elasticity knowledge as a crucial factor for speculators, governments, and consumers to determine oil and gas volatility trend lines.

For governments, oil and gas price discovery is crucial for the prediction, planning, and development/growth objectives of both developed and developing states. Broadly, price volatility influences both industrial economies and small developing economies. For smaller developing countries or countries where there are significant time lags between the domestic oil product price and international oil price accessibility due to geography or other limiting factors, speculation can exacerbate disturbances in the domestic oil product market and demand (Feng and Bao-sheng, 2010). Price changes can also be transmitted to government through direct oil acquisition or through public sector units. In cases of high prices or in heavily subsidized markets, governments at times borrow from the domestic market to tighten the funding available for domestic companies and leads to higher funding costs. This is transmitted into the system in the form of lagged inflation, pressuring downward both household expenses and overall consumption. In short, time lags stimulate speculation and disturb domestic markets, and this effect is more noticeable from the physical markets that a given state lies.

A brief note on contagion and backwardation is also relevant. When a commodity is in *contango*, the futures price[8] of a commodity is higher than the spot (current) price. Since the futures price will eventually converge on the spot price as the time differences narrow, contango implies that futures prices will fall over time (or the spot price will rise over time) as new information brings the two in line. Thus, investors or producers may put the commodity into storage waiting for the prices to improve before selling either for additional profit or to minimize losses. The market then moves into contango as the current prices at given times don't reflect the actual value of the commodity. Since contango is often driven by speculation, there is substantial risk in following this model and holding back inventories.

[8] Here, the right to buy a given amount of a commodity at a given price in the future. For example, buying x barrels of oil at x price on January 2014. Options futures bets can leverage this bet, in that case buying the right to purchase (or sell) the product at a given price in a future date.

Oil markets can also exhibit backwardation. Backwardation is the opposite of contango, i.e., futures contracts are traded at lower prices than spot contracts which is a sign of an expected price deflation. For example, when the 2005 hurricanes hit the Gulf Coast of the United States, there was a massive backwardation in the natural gas market as the demand for natural gas supplies soared, leading to immediate supply shortages as investors and speculators continued to price forward contracts in expectation of a return to normalcy (Market Data Questions). Normal backwardation is a condition that is desirable for speculators who are "net long" in their positions, they want the futures price to increase. Therefore, normal backwardation implies that the futures prices are increasing. Backwardation is positively related to implied volatility (Litzenberger and Rabinowotz, 1993). Traders often make contracts assuming normal backwardation to make profit. States can do the same to hedge.

Although both oil and gas markets are subjected to the fluctuations and various market forces described above, the markets have several key differences that are important to highlight as the terms are often lumped together in the media (and in this report) when discussing state energy policies, causing confusion. Two major differences between oil and gas markets are that oil *has greater fungibility* and *more sophisticated supply-side control*.

Oil is cheap and easy to both store and transport, making it a favourite for speculators and investors as a proxy for a host of other economic indicators including everything from bullish bets on China's growth to bearish bets on the US dollar due to debt monetization. The fluctuations in oil prices can easily influence price volatility in the world market. Natural gas is much more difficult to store and transport over long distances and over long periods of time than oil. Since oil can be transported in various forms and by various means, it is much more accessible to consumers. On the other hand, the cost of gas transportation is extremely high due to elaborate pre requisites of infrastructure. The low density of natural gas makes it hard to store and converting it into a liquefied gas is often an added burden. The BP Statistical Review of 2011 shows a chart of the natural gas pipelines throughout the world (BP, 2012)). While there has been improvement in both capacity and technology of gas transportation, oil still holds a significant advantage.

In the terms of price volatility, there is a different kind of differentiation that is taken into consideration regarding the fungibility of oil and gas, including the organizational trading structures that support its sale and price value in the market. Fungibility is the ability of a product to be substituted by another product. As one barrel of crude oil[9] can be replaced by another barrel from any other source in the world, hence oil is fungible. Related but unique is the conception that oil itself is fungible with other energy source like gas for given needs, such as heating. However, this type of fungibility refers to the *function* of oil, not the product itself. A primary distinction with gas in this realm is in the difficulty of storage and exchange of gas. While Russian natural gas may be theoretically fungible with gas from North Dakota for the residents of California, it is not practically fungible due to many logistical and transportation concerns, as we will illustrate.

Given OPEC's longstanding success, the world's major gas exporting countries are hoping to form a parallel oil cartel to OPEC. The OEGC (Oil and Gas Exporting Countries) aspire consist of the world's large gas exporters, working to control large sources of the world's gas resources. Expected members would include those involved in the Gas Exporting Countries Forum which control about 70 percent of the natural gas reserves as well as 85 percent of the LNG production. These countries, such

[9] Oil of course comes in many different grades, types, sources, and qualities, but for the purposes of this report (and the oil market in general) we may consider it as perfectly fungible.

as Algeria, Iran, Bolivia, Qatar, and Egypt are important gas dealers. However, the odds of a successful OEGC are low due to the lack of a leading country that could serve as a global release valve for supplies (as Saudi Arabia does), vast reserves, and strong abilities to manipulate a global spot market (Media Centre, 2012). Seeing the production and capability trends, Russia or Iran could be contenders, but neither has the capability or global reach to take the task on. Seeing the first signs of a shift towards hub-based pricing, it is highly unlikely a global LNG cartel will form (Elston, 2012).

While gas prices have historically been tied to oil for various reasons including producer risk management, oil/gas equivalency, and non-gas competitiveness, secrecy and collusion have been several of the more opaque considerations behind gas market fixation, particularly in Europe (Stern, 2007). This has further restricted the potential for true gas fungibility. Gas in general is more difficult to transport and store than oil. This fact has given rise to regional marketization effects as well as heavy political tensions over gas networks and distribution, most notably between Russia and Ukraine over the past decade. Even before the 2007 oil spike and USA gas supply bonanza, many scholars have argued for the elimination of the gas/oil price tether, for the good of *both* the oil and gas industries (Mauro and Peri, 2011).

While the idea of a gas cartel is unlikely at the moment, it still carries potential in the medium- to long-term future, even though there is little short-term likelihood for change occurring in the market dynamics of energy fuels. As Liquefied Natural Gas (LNG) gains popularity, the global pipeline and transportation networks required to increase fungibility, access, and price elasticity will expand. This shift also comes at a time when the world is increasingly favoring moving towards natural fuels amidst environmental concerns – at times by taking money from the oil and gas industry and giving it directly to renewables.[10] Natural gas is gaining preference over the use of crude oil since it emits lower levels of potentially harmful byproducts into the air. Regardless, these trends mean that a greater decoupling of the oil and gas markets is likely, constituting significant positive effects in the eyes of governments, consumers, and producers.

Political Factors

This section outlines and explores the primary factors that determine, refine, and exacerbate oil and gas price moves over three different structural networks, viz., domestic factors, international factors, and long-term energy policy. While domestic factors (including subsidization, strikes, nationalization, and protectionism) and broader international or internationalized factors (including war and sanctions) are indeed important, they have been studied extensively and are well-discussed. However, the third network, i.e., long-term energy policy is less well developed in the policy and academic literature, especially in terms of interaction effects between the domestic, corporate, institutional, and international as concerns policy, and thus bears further examination.

In the realization that mandating less energy use at the individual or corporate level directly is often too politically crippling to be implementable, most governments have elected to follow a path first initiated by climate change advocates that encourages a reduction of dependence on extractive fossil fuels through a more balanced approach that incorporates renewables. While the renewable energy market still only supplies a scant 10 percent of global energy needs as of January 2013, the sector is

[10] See for example the recent initiative by US President Barack Obama to shift $2 billion USD that is currently allocated for oil and gas development and give it instead to the renewable sector.

undergoing explosive growth.[11] Although there are notable exceptions (some US states come to mind), the global trend is towards more efficiency, usage of renewables wherever possible, and urban planning that reduces per capita energy consumption. As several renewable energy technologies – notably solar - have reached grid parity faster than anticipated, their small but rapidly growing outputs may serve to alleviate price pressure on oil in particular (in addition to coal in the case of India) as the engine of economic production.

Solar production deserves a special note. Solar energy production has been growing at a clip of 50 percent/year in many suitable areas, and is the one renewable that has the greatest potential to disrupt oil and gas price pressures. Solar price/MW has been cut by up to 85 percent over the past 15 years as technology capacity has increased exponentially, i.e.,- from 10 percent efficiency in 1985 to more than 40 percent in 2012, and the retail cost of solar products both large and small have plummeted due to technological advancement and manufacturer price wars. Prices for solar are now at parity with traditional energy sources in many regions. With continued technological improvements, prices for solar will begin to fall below current parity levels, potentially creating dramatic downward pressure on other global energy markets that would ripple beyond electricity, influencing all energy sectors. Solar capacity alone constitutes nearly five times of existing global energy needs.

Speculation

The greater question remains—does speculation significantly impact oil (and gas) prices? Speculators (along with short sellers) are often blamed in times of price crisis, and pilloried by both politicians and pundits as examples of what is 'wrong' with the financial system. Buyuksahin and Harris (2011) tackled this question directly, and perhaps counter-intuitively found that there is little evidence that either hedge funds or non-commercial (speculator) positions drove price changes in either direction, but in fact they acted as actors who initiated or closed positions driven by the price changes themselves. As Hamilton (2009a) confirms, global supply and demand remain oil price kingmakers even in the periods of price shock, such as the 2007–08 period.

However, while increased speculation and leveraged betting by hedge funds and other price speculators may not greatly influence the direction of oil market moves, they can exacerbate the magnitude of the shifts. Speculation itself has steadily increased in the oil futures market since 1973, and since 2000 in particular (Buyukshain and Harris, 2011). While this has led for cries to eliminate all speculation-based financial products in the marketplace, as suggests, "(a)rguments justifying interventions to reduce oil price volatility should therefore be based on the volume of oil consumed, and its role as an input to so many activities and a major expense for consumers, not on its volatility." As futures contracts provide both risk transfer and price discovery abilities, they have become favoured mechanisms as trading vehicles for both oil-sensitive industries as well as for speculators who often use oil as a proxy for global economic growth. Sustained net long bias has led to persistent overhang in oil as demand is consistently propped up by speculation.

Many other investors took long positions in oil without ever intending to take delivery, what Masters (2008) calls the 'financialization' of commodities. In effect, the growing gap between retail speculator (who typically takes only one side of the trade) is pitted against large investment banks or other financial interests, who are often betting on both sides of the trade (as a bookmaker would) or even privately leveraged in one direction as they suggest a trade in the opposite direction to their

[11] See for example US International Energy Administration, How much of world energy consumption and electricity generation is from renewable energy?. Image mundi. [Online]. Available: http://www.eia.gov/tools/faqs/faq.cfm?id=527&t=1. Some calculations reach as high as 16 percent.

retail customers.[12] As financial investment firms increasingly use mathematical modelling and complicated speed algorithms (such as high frequency trading) to influence trading and outsmart competitors, all stocks and commodities are susceptible to rapid price movements. As a particularly popular commodity, oil is subject to numerous exotic trading elements that employ creative elements of futures and derivatives so that day traders and others can place massive leveraged bets without ever intending to take delivery. The significance of players who will never intend to own a single barrel of oil has made the oil market fundamentally more complicated.

In addition, macroeconomic monetary issues in major economies (including USA, EU, and China) have led to a rush to commodities as a hedge. As the world shifts from a USD-based narrative of oil price to Yuan, Euro, or (most-likely) a currency-weighted basket for oil, predictability in real (as opposed to nominal) oil prices may also increase (Alquist *et al*, 2011). Be it for purposes of a hedge against inflation, debt monetization, or other fears, the cyclical and generational trend regarding commodities has been bullish for the last decade. As mentioned previously, oil and gas have decoupled from their longstanding positive correlation with other commodity markets. Tyner (2010) illustrates how the dependence of commodities like corn and other grain staples on hydrocarbons for processing are reducing their subservience to oil prices as a function of technological advances and corporate hedging. This shift illustrates both positives and negatives of how speculation increases volatility. Negative in the sense that varied non-energy actors create and sustain instability and (at least as of now) high consumer prices, but also potentially positive in that new net long positions of those same actors that are based upon varied factors (hedging, etc.) have encouraged massive investment and innovation in alternative energy that is based as much on the economics of oil as on the greater concern of climate change. A sustained high oil price for the last decade that is for all intents and purposes decoupled from the 'fundamentals' has arguably done more to encourage the development of renewable energy than all other climate change initiatives put together.

Implications of Volatility on Energy Security

Although solutions to volatility run the gamut from policy prescriptions to outright bans on financial trading, most scholars and policymakers have come to terms with the understanding that increased volatility is the 'new normal' and the relatively stable pricing conditions from periods such as the 1960s are unlikely to return in the near future. Even in large diverse economies, oil price shocks can flip economic indicators from growth to recession or vice versa (Hamilton, 2009a), thus rendering oil (and to a lesser extent gas) unique among commodities in its ability to shape global economic engines.

Small price corrections can be moderately predicted through futures contract risk models, but are still highly driven by uncertainty (Alquist and Kilian, 2010). However, as Alquist *et al* (2011) noted:

> *"Oil price volatility measures commonly used to characterize predictive densities for the price of oil are not adequate measures of the risks faced by market participants. We demonstrated how appropriate risk measures can be constructed. Those risk measures, however, are only as good as the underlying forecasting models and would not have provided any advance warning of the collapse of the real price of oil in late 2008."*

For policymakers, the inherent unpredictability of large shocks – the very events that risk-managing actors would most wish to mitigate – is highly concerning. Cavalcanti *et al* (2012) argue that it is

[12] On the latter, the conservative-libertarian leaning financial website www.zerohedge.com has exposed many of these trades at major US investment banks and brokerage houses since 2008.

volatility itself, not the overall net value, abundance, or income generation ability of certain commodities that determine the degree of 'resource curse' of negative influence that is visible in many developing states.

Monetary policy by states that are susceptible to oil price shocks (those who are either heavy net importers or exporters) was also a topic of significant discussion after the 2007 financial crisis began. Jean-Marc Natal at the Federal Reserve Bank of San Francisco (USA) outlined the difficulty faced by central banks in these situations, where 'cures' that are suggested or attempted to counteract oil price shocks are often viewed (justifiably) as more severe or politically unviable than the price action itself. Natal (2009, 2012) suggests that policy responses that banks currently use to fight inflation can also be employed favourably against oil price shocks, in an effort to generate more quickly a price equilibrium that is palatable on both producer and consumer sides.[13]

Perhaps more worryingly for traditional oil importers, the landscape of consumption continues to change rapidly, in turn diminishing the effective policy-based ability of any one core demand-based region (such as the USA, EU, or China) to enact change. According to Dargay and Gately (2010), faster-growing and less price-responsive regions (developing states) will increasingly drive the brunt of the demand side both in overall share and growth capacities as consumer and industrial demand creep upwards to match those of current OECD countries. With no single country capable of dramatically altering global demand economics (as USA is conceivably able to do today), demand-side policies enacted at the state level will carry increasingly diminishing returns through 2030. Complicating matters, oil futures markets (or their equivalents) have proven to contain little to no predictive value for policymakers, despite their continued proxy for exactly that end (Alquist *et al*, 2011).

Given the tenuous relationship of resources to governments to people, scholars and policymakers have naturally attempted to find solutions to mitigate the negative effects of new-found resource wealth while at the same time encourage positive effects to bloom. For example, Cavalcanti *et al* (2012) argues strongly in favour of Sovereign Wealth Funds (or at the very least mitigation funds for hedging) in order to reduce the negative consequences of volatility. Further, interventionist policies to either reduce oil shocks or mitigate undesirable impacts of volatility need to carefully consider which set of supply/demand variables the host country is attempting to influence. These issues will be explored in detail in the second section, which uses the Norwegian experience of oil discovery, social integration, and a sovereign wealth fund to illustrate the success story and the remaining present and future challenges.

[13] This solution, of course, implies that bank actions and target state monetary policies are transparent and elastic to begin with. The calculus of options differs dramatically in weak or otherwise unorganized economies.

How Energy Information Flows Influence Policy and Livelihoods[14]

For the efficient management of resources, effective delivery of energy services, and implementation of sustainable energy practices, a common assumption is that increasing energy flows between producers, between consumers and producers, and between governments and producers will lead to a more efficient and more transparent marketplace. However, resource management and delivery are also inherently political concerns, as noted in the previous section. Mechanisms for pricing transparency and predictability should not only address the 'nuts and bolts' of implied costs, prevention against corruption, and other transparency measures, but also take in to account the social costs and benefits of both the broader market (climate change) and the localized conditions of extraction (environmental issues, corruption, violence) that can exist.

Transparency and social development programmes that have been instituted to secure local rights and profit sharing with regards to oil and gas extraction have thus far been a mixed bag. The extractive industry sector is traditionally vulnerable to socioeconomic strains from access rights to the distribution of profits. Often, it is not a lack of stated compliance but unfulfilled government promises and corrupt local officials that damage the implementation of extractive projects in developing states. Policy debates on extraction in fragile states favour 'post-political' policies with 'good governance' as a cornerstone of resource management.[15] Mommer (2002) argues that for corporations, extraction efforts should gauge corruption, rent-seeking, and (non-liberal) development as 'risks' to their ultimate goal of profit. While much has been done to convince companies and states to see the value in the commons, breaking the perception among MNCs that they cannot and should not examine the politics of conflict and peace beyond their own sphere of influence remains a challenge.

Extractive governance and sustainability policies are interrelated mechanisms that also have unique sub-sectoral characteristics that complicate the ability of overarching singular resource policies to meet 'good governance' goals. The inefficiency of governance mechanisms around the world illustrates the shortcomings of current frameworks of governance and also the difficulties of establishing a unitary global CSR framework itself. As mineral extraction is increasingly securitized, the methods by which governments ensure access to resources despite local socioeconomic concerns illustrate the functioning of human security.

In many developing countries with resource capabilities, there is a yawning gap between intentions and practices regarding disclosure and performance indicators and responsible sustainability mechanisms designed to protect the most vulnerable in extractive zones. Although, responsible management of resource networks at the 'macro-commons' level is encouraging, local implementation of these guidelines often constitutes merely 'greenwashing' by both domestic and international players. Other states have explored and implemented international governance mechanisms and sustainability initiatives. Given that large states often have fundamentally different relationships to extractive policy than their smaller (and often mono-resource) counterparts, India's efforts towards implementation and adherence compared to other BRIC states (Brazil, Russia, and China) are a potential avenue for progress. Of particular interest is the Extractive Industries Transparency Initiative (EITI), which contains the strongest principles of socioeconomic development amongst similar housings. But despite efforts to bring all BRIC states under the EITI umbrella, none have as yet become signatories.

[14] This section contains several elements from Miklian 2012.

[15] See f.ex. Swyngedouw 2007; Bridge 2008

Why is this so? Perhaps we are witnessing a change in standards for assessing the performance of both governments and MNCs. Just as governments are increasingly supposed to protect and provide for citizens (through international mandates such as the Responsibility to Protect), Corporate Social Responsibility standards reflect changing norms for corporations from mere profit-makers to shouldering responsibility for the welfare of populations and their environments. CSR policies are then framed outside of these concerns as they are assumed to be the state's responsibility. As Yakoleva and Vasquez-Brust (2012, 20-21) note:

> *Although civil society stakeholders have strong views on ethical and environmental responsibilities of mining companies, (the companies) maintain the same emphasis on ethical dimension (which is a positive sign from a normative perspective), but negotiate a reduction in emphasis on environmental responsibilities influenced by a low weight given by the host government.*

As the community engagement, CSR and environmental programmes of most global oil and gas companies constitute different in-house entities; this reduction of emphasis can be intentional. Guidi (2008) argues that these 'constraints' hampering engagement with elites in local communities are employed as reductive mechanisms to dilute local social concern through a series of controls and audits that merely project the appearance of participation.

Governments that compound mining problems instead of mediating challenges constitute a global concern. Bebbington (2009) analyzed several Latin American governments which privatized the 'national interest' to support pro-mining policies that were justified to fund the pro-poor policies upon which the leaders were elected. Bebbington (2009, 12-13) excerpts Peruvian President Alan Garcia, who angrily blames NGOs for having "created the image of the 'non-contact jungle native'…Enough is enough. These peoples are not monarchy, they are not first-class citizens. Who are 400,000 natives to tell 28 million Peruvians that you have no right to come here?" Neighboring Ecuadorean President Rafael Correa agreed, attacking environmentalists as nothing more than "extortionists, terrorists, infantile leftists and romantic ecologists." (Bebbington, 2009, 18)

While the linguistic jujitsu performed by leftist leaders on their previous supporters might be dismissed as pure politics, discourse matters, and MNCs are indeed held to a higher standard. While mandating 'development' advances by MNCs has attraction in theory, the realities present a mixed bag. Campbell (2009)[16] notes the challenges (and failure) of attempts in Trinidad and Tobago when natural gas firms were asked for 'contributions' to the development programmes in exchange for access. The firms saw the payments as just another tax, the funds were not secured or legally binding to be spent for development projects, and eventually companies refused to pay because the monies were being diverted to politicians' coffers.

More constructive would be to encourage a qualitative shift in how companies in conflict zones view their CSR potential. Companies could see peacebuilding as a CSR mandate – although few do so now (Jamali and Mirshak, 2010). There is increasing interest in the role of MNCs as conflict mitigators and peace builders in their own right. Wolf *et al* (2007) and Feil *et al* (2008) consider the benefits of wrapping CSR into MNC security policy, but CSR is still seen as reputational, for the benefit of the company and their customers. Others suggest using the Kimberly Process for sustainable diamond production as a model for business operations in conflict zones[17], but the recent fracturing and

[16] Campbell 2009 http://www.eclac.cl/publicaciones/xml/3/32653/L.155rev1a.pdf#page=277

[17] Boege et al. 2005; Ballentine 2005; Haufler 2009

possible breakup of Kimberly Process backers due to compliance difficulties suggests that ‘one size fits all’ solutions remain only as powerful as the institutions that enforce them.

The Norwegian Experience[18]

Constituting the northern boundary of Europe, the Norwegian continental shelf covers one and a half million square kilometers, almost five times the size of the mainland (see Figure 2).[19] The first drilling on the shelf started in 1965 and the first production was initiated in 1971. To date, most production has taken place in the North Sea and the Norwegian Sea. Following the recent resolution of a long-standing dispute over the sea border with Russia, activities have now also started in the Barents region. There also remain vast areas of potential value that are not yet opened for activity. In some cases this is for environmental protection purposes, as is the case for the region around the Lofoten islands. In other sites, cost-benefit calculations are not yet favourable, as in many deep-water areas. Till now, production of oil and gas has amounted to more than 5 billion standard cubic meters of oil equivalents (Sm^3 OE), while proven reserves amount to 4 billion Sm^3 OE, and it is estimated that another 3 billion is still undiscovered.

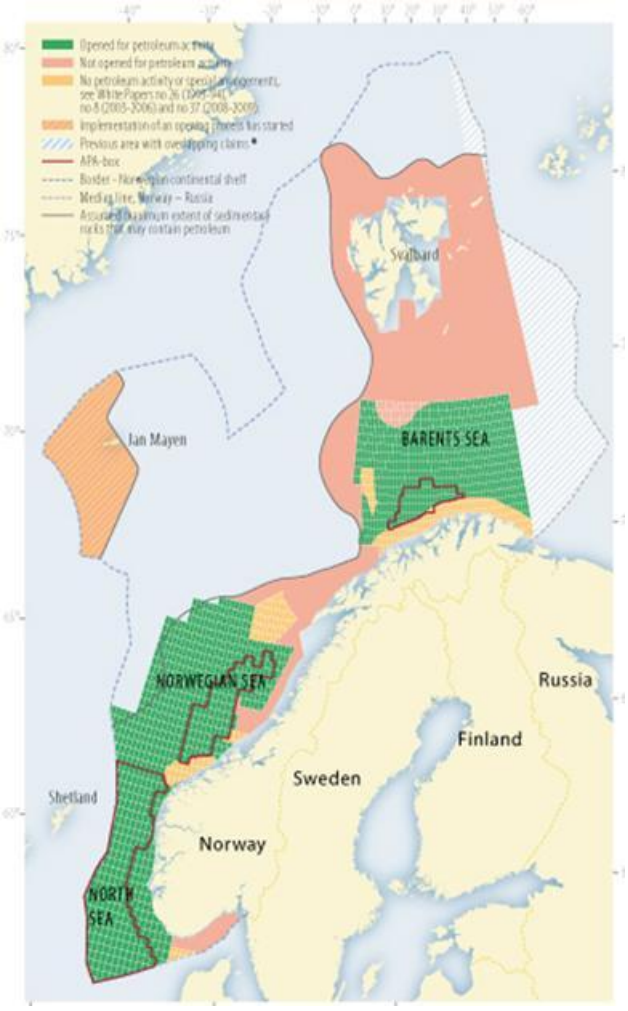

Figure 2: The Norwegian continental shelf
Source: *http://www.npd.no/Publikasjoner/Faktahefter/Fakta-2011/Kap-5/*

[18] Elements of this section adapted from Andersen (2012)

[19] Norway's long coast and lack of neighbouring states in proximity provides it with solid claims to the entire shelf per existing international law.

Norway is commonly described as one of the few resource-abundant countries that have also consistently performed well in economic, political, and social terms. A combination of incidental factors and 'best practices' has led to inclusive growth and wealth acquired from its hydrocarbon resources, while avoiding the pitfalls that often befall other natural resource-intensive national economies.

In terms of consumption, Norwegian per capita energy consumption is among the world's highest, mainly due to transport and heating. However, with only 5 million inhabitants, the overall consumption of energy is relatively low, and hence more than 90 percent of the produced oil and gas is exported. Norway is currently the world's fifth largest producer and the second largest exporter of gas after Russia. Norway is also the world's sixth largest exporter of oil with slightly more than 2 million barrels per day. Its largest market is the EU to which it supplies 15 percent of the total gas consumed in the EU. The yearly export of petroleum products amounts to some 75 billion euros. Figure 3 shows oil and gas production per year since 1971. The production is consistently trending towards gas since the late 1990s.

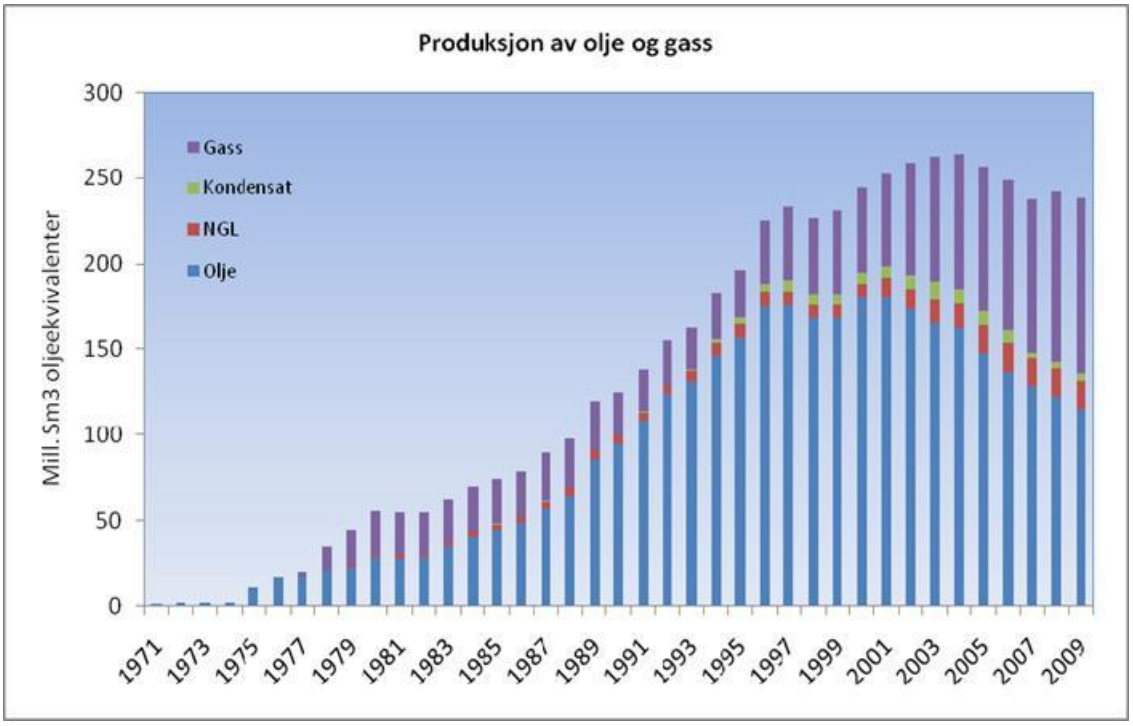

Figure 3: Production of gas, condensate, natural gas liquids, and oil per year (unit: million standard cubic meters of oil equivalents)

Source: The Norwegian Oil Directorate, *http://www.npd.no*

These activities are tremendously powerful influences on the Norwegian economy, noting that in 2008 the petroleum sector was responsible for 25 percent of Norway's GDP, generating approximately one third of the total annual public revenue (mainly through taxes and direct engagement by firms partially owned by the state). Petroleum products represent slightly more than half of Norway's total exports. The dimension of public revenue generated by the sector fluctuates greatly with the market price for oil and gas. Norway's net cash flow from the petroleum activity (in terms of taxes collected as well as revenue from direct engagement) did in fact drop from over 50 billion euros in 2008 to about 35 billion euros in 2009, with a 2010 and 2011 rebound. The average

break-even oil price (i.e., the production cost) on the Norwegian shelf is around $20 per barrel,[20] but can vary greatly depending on the distance from the shore, the success rate, costs of drilling, size of the oil field (smaller fields have higher per-barrel costs of production), quantity of the field's resources extracted (costs normally increase towards the end of a field's life cycle), weather conditions, viscosity, and general quality characteristics of the product.

The Norwegian Experience of Managing Energy Revenues[21]

The involvement of the state

From its inception, the Norwegian petroleum sector has always played an active role as owner, decision-maker, licenser, and developer. With limited domestic competence, most actors on the shelf during the early period of exploration and extraction were foreign-owned entities. However, they were required by law to establish Norwegian subsidiaries for their operations, mandating national residence and taxation, with a minimum of 50 percent state ownership was prescribed for such subsidiaries.[22] The state also set up the public entity *Statoil* in 1972 for direct engagement. In the early 1990s, 50 percent law was lifted and the state simultaneously started to scale down its direct engagement. This also included a privatization of *Statoil* into a public-private hybrid, with the Norwegian state retaining the majority of the shares. A new vehicle named *Petoro* was established in 2001 for the remaining direct engagement of the state.

Despite the general relaxation of ownership into hybrid models, exploration and production activity remains heavily regulated. At occasional intervals, the Oil and Gas Ministry of the Norwegian Government announces that new blocks are opened for exploration. Licenses are then put out to tender. In those cases where the subsequent drilling yields findings, the actor may obtain an extension of the license, allowing it to engage in production.[23] The tender criteria include not only a plan for technical and financial sustainability of the activity, but also strict rules for safety and environmental protection.

The tax regime

While the ordinary tax rate for corporate as well as for personal income is 28 percent in Norway, the petroleum sector is subject to a special corporate tax rate of 78 percent. The argument for such a high tax rate is that the Norwegian hydrocarbon resources don't belong to British Petroleum or whichever other actor that manages to come up with a convincing plan for profitable and safe operation. They are seen as part of the natural heritage of you and me, *the people*, who are represented by the government. It is thus considered only fair when the corporate actor is rewarded for the work it performs, the main share of the revenue go back to the people, especially given the large operational margins that exist in the sector.

Thus, because one is speaking of a limited natural resource, which is defined by the state as belonging to the people and where the margins in production are particularly large (especially recently), the extraordinary tax rate is viewed as justified and there is wide consensus about it across the Norwegian political spectrum. Further, all actors on the shelf are required to be Norwegian residents for tax

[20] This figure can be as low as $5 in some on-shore fields in the Middle East.

[21] This section written by Lars Even Andersen and Jason Miklian.

[22] Note that this is also common to the extent of becoming standard practice in the developing world.

[23] In the interest of pre-empting any corruption or speculations about such, the selection proceedings are fully transparent.. Available at http://www.npd.no/en/Topics/Production-licences/Theme-articles/Licensing-rounds/APA-2010/Offers-for-ownership-interests-in-APA-2010/

purposes, a requirement *not* lifted as opposed to many other economic liberalization measures undertaken in the early 1990s. Tax flight, which can otherwise easily occur (for example, it has become fashionable for some of the wealthiest members of Norway's prodigious shipping corporates and owners to move to Cyprus), is hence not an issue.

Is this special corporate tax rate so high that it unduly puts off investors? The most relevant indicator to examine in that regard is the turnout for license tenders, and such turnout has historically been quite sufficient to cement, rather than to challenge the notion that the tax rate is appropriate. Further, the general perception in the Norwegian community regarding the resources is instructive. Consensus in Norway is that even if turnout drops (leading to subsequent declines in production and revenue), the resources remaining under the ocean would serve as a kind of 'resource bank', where they are safely stored and their extraction is deferred for later generations. The importance of this communal perception should not be understated, as it strongly influences the 'resource race' often found in other resource rich countries, assuming massive first-mover advantages. Similarly, the 78 percent tax rate is also applied when it comes to deduction for costs, notably those of depreciation and drilling, powerfully incentivizing investments in the petroleum sector, as well as exploration, and facilitates a high level of sector activity even with a tax rate that seems formidable at first glance.

Enforcement of distinction

Norway's discriminatory tax regime entails certain practical challenges. Business and individual actors have tax-motivated incentives for 'misplacing' costs or income. A dedicated petroleum tax authority, *Oljeskattekontoret* has been established in order to detect any attempt at such, the most common examples of which are:

- *Transfer mispricing*. The extracting actor on the oil shelf sells its products to an on-shore branch or abroad to a subsidiary at an artificially low price, hence allocating profit for the extracting component of the business outside the 78 percent tax jurisdiction. To prevent this, the *Oljeskattekontoret* establishes norm prices for sales that is applicable to all oil sale transactions, regardless of the price actually paid. The norm prices (and subsequent tax liabilities) are based on the market price. Determining such norm prices for gas is more complicated than for oil, (as noted previously) the value of a gas contract varies due to a number of factors not applicable to oil contracts. Regardless, the authority will in either case investigate if the price of a transaction appears to be fictional.
- *Overpricing of internal services*. Likewise, services can be purchased at inappropriate rates by the shelf actor from a subsidiary on shore, or opposite. This could be technical expertise, accounting services, or other activities. Tax-wise, there exists an incentive to overprice such services delivered to the shelf, and underprice those delivered from the shelf to on-shore subsidiaries. The authority examines whether the services have been delivered as invoiced, that they were genuinely needed, and that the price was reasonable.
- *Debt overfinancing*. A corporate group may choose to present the branch on the shelf as overly financed by debt, while branches subject to lower-tax regimes are financed from the group's net assets. This mechanism operates by allocating interest costs to creative or otherwise inappropriate manners and hence altering the deduction that can be claimed for them. In prevention, the authority examines the extent to which capitalization of the shelf branch is too thin compared to the rest of the corporate group.
- *Overpriced premiums on internal captives*. For corporations that operate in risk-exposed sectors, it is common to have internal insurance arrangements. In an attempt to artificially

lower the profits, the insurance premium is often set unreasonably high for subsidiaries on the shelf.

The obvious incentives to unduly allocate costs on the shelf and income on shore mean that a very thorough, comprehensive, apolitical, and enforceable reporting regime needs to be maintained for the actors in question.[24]

Lessons for Other States with Surplus Oil/Gas Incomes

As is often the case when attempting to compare systems that function efficiently with those that do not, the offering of 'lessons', 'best practices,' or other suggestions for improvement must carry appropriate contextualization for the social, political, and even geo-strategic factors underpinning said systems. That said, there remain several areas where the Norwegian experience is enlightening – for both oil and gas exporters as well as for net importers who wish to understand how energy policies in key exporting countries are undertaken, justified, and enforced. This section explores the role of asset management, government spending profiles, and the overall political environment of energy in Norway before offering suggestions and recommendations.

Asset management

Norway is one of the select few states in the world that not only has zero debt, but a surplus at the government level. While this situation is undoubtedly enviable, there are unique challenges. Figure 4 shows the Norwegian government's net cash flow from petroleum operations on the continental shelf over time. The 22 percent share of revenue retained by corporate actors is not included (Norwegian Petroleum Directorate, 2011). This huge income stream generated by the petroleum adventure necessitates a strategy for its use. The creation of such strategy is anything but uncomplicated, and in fact has become perhaps paradoxically more difficult to manage over time as the fund itself has increased in value and scope.

When considering challenges to substantial government surpluses, the most immediate danger that often comes to mind is that of *Dutch disease*. In 1960s Holland, the government obtained massive earnings from the extraction and export of its offshore hydrocarbon resources. It was decided that the earnings should be used for the purpose of increasing the current welfare level, so all the revenue was immediately added to the general state budget. Two symptoms of what is now commonly called 'Dutch disease' then quickly emerged:

- First, all the earnings, which were demarcated in USD (the former and current global currency for the oil trade), had to be exchanged into domestic currency, which created a large demand for the latter and led to rapid appreciation. Although this was a good news for importers (and consumers of imported goods). Such appreciation was catastrophic for the export industry, which rapidly lost a great deal of competitiveness and experienced a protracted series of immense layoffs and bankruptcies.[25]

[24] For more details on the petroleum tax regime, see: MINISTRY OF FINANCE, 2007.Taxation of Petroleum Activities. Oslo: Ministry of Finance. Online]. Available at:
http://www.regjeringen.no/en/dep/fin/Selected-topics/taxes-and-duties/bedriftsbeskatning/Taxation-of-petroleum-activities.html?id=417318

[25] This scenario has certain exceptions, although often underpinned by unique situations and not necessarily net-positive. For example, if Cyprus sells its hydrocarbon products to the EU, the fixed exchange rate regime obviously functions as a vaccination against currency appreciation caused by expansive spending. In this case, such spending would have an exacerbating effect on the rise in domestic inflation.

- Secondly, as a consequence of the greatly expanded state budget came an increased domestic demand for goods and services. As there was no simultaneous increase in the domestic production as such, inflation rose sharply. While most economists believe that a small to moderate amount of inflation is natural and healthy in the macroeconomic environment, a very high inflation generally provides a discouraging climate for investors, as it leads to a drop in the real value of cash and other monetary items, pushes the interest rate upwards, and affects the balance of trade negatively as exports lose competitiveness on the external market.

Norway is indeed a high-cost country in terms of labour. Recent surveys tend to suggest that the cost of labour in Norway is about 140 percent of the average in EU-27,[26] representing a major obstacle for the competitiveness of Norwegian export agents in the manufacturing sector. The fact that inflation is clearly below the central bank's target of 2.5 percent (currently around 1 percent) (Inflation.eu, 2013), is viewed by some as an indication that the economy is nowhere near overheating. However, this may also be due to the general downturn in the current global economy rather than lack of domestic demand. A careful spending profile has contributed to avoiding undue shocks to exchange rates and price levels since the income stream really started to accelerate towards the end of the 1990s (Figure 4).

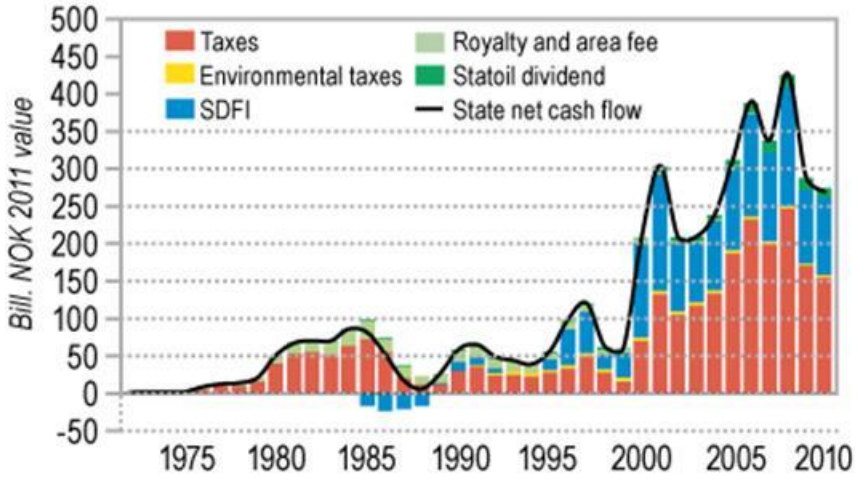

Figure 4: The government's net cash flow from the petroleum sector.[27]
Source: The Norwegian Oil Directorate, *http://www.npd.no*

The sovereign wealth fund

After the establishment of the *Oljefondet* (Norwegian Sovereign Wealth Fund, or Government Pension Fund–Global)[28] in 1990, the Norwegian government prioritized paying off foreign debt while resisting the temptation to rapidly expand the state budget. All debt was eliminated by 1995. Thereafter, a sovereign wealth fund was created. Each year all the state's revenue from the petroleum sector is added to the fund. The fund invests in shares and bonds in foreign countries to avoid driving

[26] See for instance *Eurostat Regional Yearbook 2011*,
http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-HA-11-001-03/EN/KS-HA-11-001-03-EN.PDF
[27] The euro is worth about 7.60 NOK as of February 2012.
[28] Formerly called the Petroleum Fund of Norway or simply *Oljefondet* (Oil Fund).

demand for domestic currency.[29] About 60 percent is currently (as of end 2011) invested in equity instruments, the remaining in fixed income instruments, such as in bonds and money market products. The fund has recently also started to invest in real estate in major metropolitan areas of the world, including the West End of London.

As the dimension of the fund quickly grew, the government set up a professional investment team reporting to the central bank. The team is responsible for the fund's management. The investment team has an ethics section that discusses ethical guidelines for the investment profile, and monitors the fund's compliance with the said guidelines. The fund may sanction companies that for instance engage in the production of illegal weapons or human rights violations.

The Norwegian 'oil fund' now has a market value of 865 billion USD (roughly 130,000 USD per capita), equal to more than one of Norway's full annual GDP (Figure 5). As of end 2011, it became the world's largest individual investor with ownership of over 1 percent of the world's stocks and nearly 2 percent of European stocks. However, it is not an instrument for Norwegian foreign policy and has been defined so that it shall not be used for advancing political or strategic objectives. It takes a long-term perspective on its investments, aiming to maximize its rate of return while minimizing risk through appropriate diversification.

While this narrative is certainly appealing, there are certain caveats that should be noted. First, the decision to divest from 'ethically irresponsible' companies is itself a significant political decision given the size of the fund. Second, with such a massive degree of capital available, the fund's very existence could potentially serve as a foreign policy that is an item of interest for other states, even if Norway does not put it on the diplomatic table. Third, the fund's scope and impact on Norwegian society and individual Norwegian wealth has led to significant investment by Norwegians elsewhere in Europe through purchase of second homes, rental properties, and other investments that collectively mark an outsize presence. Finally, these restrictions apply only to the present fund's objectives and allocations, and could at any time be rescinded with a significant shift in government or populist sentiment.

Owing to their diversification, the oil fund's investments are also exposed to the general risk that exists in international markets. For example, it suffered an unrealized loss of over 100 billion USD during the last few months of 2008. Moreover, due to the consistently increasing volume of the fund, it is difficult to find further diversified investments or standard hedging instruments (aside from derivatives) to secure assets when global or regional economic waters are rough. Hence, those who would argue that perhaps the resources would have been safer staying at the bottom of the ocean until the revenue is needed rather than converted into a sovereign wealth fund, have a potential point.[30] However, underpinning the fund is a general desire that the fund will forever enable future generations to harvest a stable share of the resources. The budgetary rule is essential in that regard.

[29] The Norwegian Government operates a second government pension that by design is totally separate from the 'Oil Fund', with Dutch disease (and other elements) in mind.

[30] The extent to which one expects hydrocarbons to be replaced by alternative sources of energy, influencing the future price of oil and gas, must also be factored in when a strategic decision is made on how quickly the resources should be extracted and which activity truly maximizes value for Norway's proverbial 'future generations'.

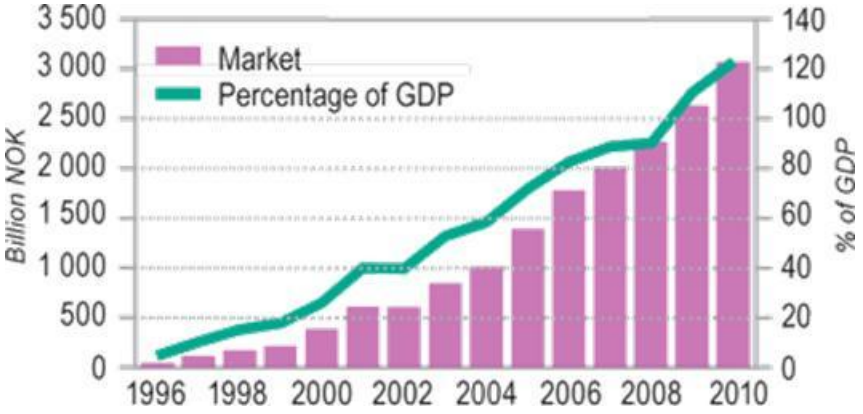

Figure 5**:** The Norwegian oil fund: Market value and size as percentage of GDP.
Source: *http://www.npd.no/Publikasjoner/Faktahefter/Fakta-2011/Kap-3/*

The budgetary rule

Revenue is allocated to investments or consumption as per the following guidelines. Each year, a state budget is created independent of revenue calculation from the petroleum sector, including instead an injection from the oil fund equal to *4 percent of the fund's market value*. This ensures a reasonably stable inflow of revenue into the economy irrespective of fluctuations in the market prices of oil and gas or of the broader market as a whole. This "golden rule" for revenue use is traditionally respected by all responsible political parties and is judiciously followed by all Norwegian government leaders and coalition partners.

Assuming that 4 percent is also a reasonable estimate of the average real (after inflation) rate of return that one can expect to obtain from the fund's investments, this will in principle allow for yearly state budgets to receive stable injections of petroleum revenue forever. The fund in this case operates more like a massive endowment or foundation than a fund that is drawn down, as many other pension funds do. Future generations, that also have ownership of the resources, will thus benefit as much as the current one despite the resources having been fully depleted.[31]

There exists some flexibility to the budgetary rule pursuant to economic cycles. When there is an economic downturn, it is possible for the government in power to take out more than 4 percent. For example, in 2009, the government suddenly found itself obliged to provide stimulation packages, and funded them from the oil fund beyond the budgetary rule. On the other hand, when the general economy is particularly good, less than 4 percent is usually taken out. Hence, the fund *de facto* also functions as a tool for ameliorating the effect of economic cycles. When the net revenue from the petroleum sector thereafter is added to the national accounts at the end of the year, recent years have seen emerging a surplus in the vicinity of 10 percent of GDP.

Distribution of revenue and absence of resource conflict

The basic principle of Norwegian operation and conceptualization of the Oil Fund is simple. All public revenue from the petroleum activity goes to the state level. The general state budget, with

[31] The extent to which one expects hydrocarbons to be replaced by alternative sources of energy, influencing the future price of oil and gas, must also be factored in when a strategic decision is made on how quickly the resources should be extracted and which activity truly maximizes value for Norway's proverbial 'future generations'.

allocation of such revenue as per the budgetary rule, thereafter distributes it to the municipal level as per the agreed degree of (de)centralization in public service provision. There is hence no earmarking of the revenue consequent to the extent to which specific groups or regions have contributed to it; neither are demands for it currently popular, which has the effect of greatly depoliticizing the use of the revenue.[32]

It is easier to get general acceptance for this principle when the resources are situated offshore. When the resources are situated on land, individual municipalities or provinces may have stronger cases for more lopsided distribution. But such ownership can hardly be claimed by anyone when the resources are picked up from the bottom of the ocean hundreds of kilometers away. In addition, the wealth-generating components of the industry already positively influence the nearby provinces, most notably Stavanger on Norway's west coast. As all products are transferred onto the shore through receiving facilities, municipalities hosting such facilities get their reward in the form of employment and associated personal income taxes, as well as the general demand for goods and services generated by the facility, contributing to the local economic activity. Local authorities can also charge a tax on fixed assets, in theory, up to 1 percent of the value of the facility per year, though in practice, individual municipalities hardly ever make use of this option, which is often negotiated before it is decided where the facility is going to be placed.

Contributing to the absence of conflict over the revenue may be the fact that the state budget has traditionally upheld a strong regional profile with significant measures for stimulation of economic activity at the municipal level, including extensive (and expensive) development of infrastructure such as roads and broadband in rural areas that are both mountainous and hosting harsh climates. It should be noted that this entails benefits for the general manufacturing (i.e., non-petroleum) sector, which is often seen to suffer in natural resource intensive economies. An additional factor is that as Norway is ethnically homogenous, no distinct ethnic or indigenous groups claim ownership of any of the resources such as can easily be the case in Sudan, Israel, or Cyprus. There are indigenous people in Norway's north, the *Sami*, but they clearly have no basis for any special claim when it comes to hydrocarbons ownership. Any provisions in the state budget for the special interests of any of these groups are hence negotiated independently of aspects related to hydrocarbons.

Finally, it should be noted that the long-standing positive track record of Norwegian governments when it comes to low levels of corruption as well as transparency efforts, has encouraged a general culture of political trust that generally pre-empts squabbles over resource management and revenue spending. Perhaps not inconsequentially, the low corruption and high degree of social inclusion in Norway were staples of the society before oil was discovered. These features along with Norway's continued efforts to promote transparency and the societal benefit of the resource over potential corruption and personal financial gain are also supported by much academic literature which conceives of resource wealth as not a factor that necessarily creates corruption in society, but more often merely increases its frequency. For instance, if the country at the outset has a high level of corruption or political mistrust, those problems are likely to get worse as revenue pours into the system, effectively raising the stakes. It has also been suggested (Mehlum *et al*, 2006) that the question of resource blessing vs. resource curse greatly depends on the initial conditions and degree of democratization on which the introduction of a significant natural resource sector in the economy will have an amplifying effect. As democratic structures and institutions were of reasonably good

[32] While there have been extensive scholarly discussion about the role of ethnicity and inter-group relationships in the management of natural resources by the state, most would agree that Norway's very homogenous population is a positive contributing factor to this lack of regional demands over the use and share of resource revenue.

quality in Norway already before the resources were discovered and production commenced, these large findings are suitable. As part of ongoing transparency efforts, both the Norwegian state budget and the national accounts are available online in great detail providing information about the oil fund's guidelines and placements (Government Pension Fund Global, 2011). Corruption or theft by officials in charge of oil fund revenues is as of now unheard in Norway.

The spending profile: A view forward

While there is general consensus in Norway about the use and expenditures of the oil fund in a 'if it ain't broke, don't fix it' manner, occasionally Norwegian populist politicians and pundits do argue in the media for a more aggressive spending profile for the oil fund. The demands are normally for larger allocations of the fund that would support lower taxes, infrastructure development, elderly care, and the educational sector. The argument for additional spending is reflected in the fact that the Norwegian government imposed the 4 percent budgetary rule at a time when the size of the fund and the revenue generated constituted figures much lower than today. The size of the fund has increased by much more than the general state budget. However, these figures are also used by other politicians as an argument for lowering the percentage of funds used from the oil fund, as the value of the injection from the oil fund as a portion of the state budget is much greater today, as its contribution towards what some see as Dutch disease symptoms and overheating of the economy.[33] This will become more problematic if the oil fund continues to grow rapidly from extended high prices of oil and the fact that returns on existing funds have averaged much higher than the 4 percent typically extracted from the fund, or even the 4 percent plus inflation figure that would constitute stasis in real terms.

The growth has created increasing concern over Norway's possible over-dependency on the petroleum sector. The sector is responsible for 25 percent of Norway's GDP and employs (directly and indirectly) some 10 percent of the total workforce. At the same time, the conventional export industry and other fields are experiencing a flat to somewhat declining employment trend.[34] While ranking among the world's largest current producers, Norway ranks much lower when it comes to resources not yet extracted. Saudi-Arabia's estimated oil reserves are for example, 25 times larger than Norway's (BP, 2005).[35] The estimated reserves at end of 2010 are 7.3 billion Sm^3 OE, whereas production in 2010 was 250 million, suggesting that with the current production, resources will be depleted within 30 years. Hence, Norway will need to eventually prepare for a reduced income stream from its petroleum industry sooner than most other big producers, notwithstanding the relatively encouraging results of the first exploratory drillings in the Barents region. These facts have served as arguments for continued compliance with the budgetary rule.[36]

There have been several attempts to channel oil funds into other sectors to sponsor innovation, technology, and other 'post-oil' industries, but their track record is mixed at best. The question of

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[33] This is perhaps most notably seen in the housing sector of oil towns along Norway's western coast like Stavanger, which has seen price increase of about 10 percent ever since the last housing bubble crash in 1994. While some commenters in the media (particularly the financial newspaper Dagens Næringsliv) are concerned about the housing bubble across Norway (facilitated by oil largesse), there remains a general complacency amongst the public that is rapidly entering the 'mania' phase that traditionally signifies a bubble's peak.

[34] Both the high cost level and a strengthening trend of the NOK against euro and other major currencies pose difficult challenges for the conventional export industry. While some claim that this trend is Dutch Disease related, the ongoing Euro crisis and lack of global confidence in the Eurozone (and global monetization of debt) also play large roles.

[35] Figures are taken as proven reserves.

[36] It also shows the need to maintain a decent investment climate and living conditions for other industrial sectors, as these will be gaining importance when the oil rush comes to an end.

'what to do' with the oil money in terms of investment within Norway while avoiding wasteful pet projects, remains one without easy solutions. Norway's demographic curve (Figure 6) may yet force a solution as consequent to high fertility rates in the baby boom 1950s and 1960s, a wave of pensioners will create added budgetary stress over the coming two decades. Ongoing debates over the degree of increase in investments in infrastructure for health and elderly care will occur in Norway over the next decade, likely contingent (if not directly acknowledge) on the scope of future finds as well as oil prices. While investing the sovereign wealth assets into infrastructure projects has a tendency to be less Dutch disease-driving than those used for direct consumption, these factors are also strongly correlated with the value of the local currency itself, contributing less to the demand for, and consequent appreciation of, domestic currency.[37] Further, two challenges emerge if expanded infrastructure is to be applied as a 'solution':

- Dutch disease symptoms would then likely to emerge from the increased level of spending in a different sector at the moment when the oil and gas boom ends and the non-petroleum export industry needs a 'revival'.
- Unemployment levels are currently so low (under 4 percent) (Statistics Norway, 2012) that it might be difficult to find labour for operation of the infrastructure. A transfer of labour from the petroleum sector, as the latter scales down, is intuitive. However, it is worth keeping in mind the nature of this labour where specialization is often achieved 'on the job' and the mobility of this workforce may therefore be somewhat limited.

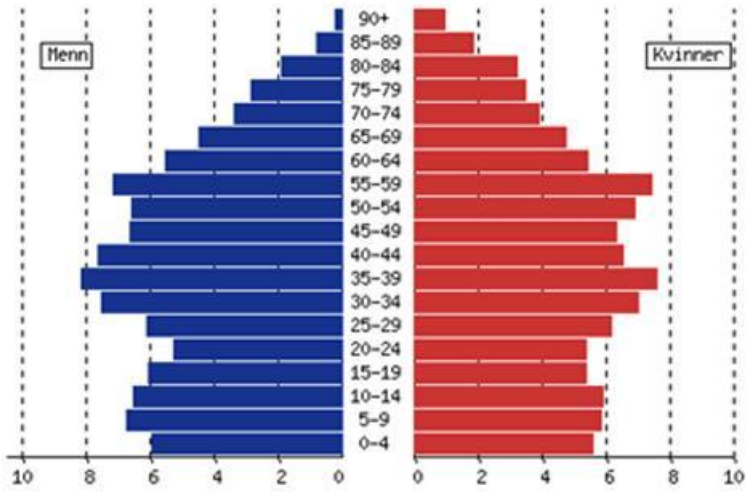

Figure 6: Demographics by gender and age
Source: Statistics Norway

The to-date positive Norwegian petroleum experience has been the result of several interlocking factors:

[37] Given the worldwide trend amongst developed nations to increasingly monetize debt as a way to extract themselves from balance of payments deficits, the Norwegian Central Bank has recently stated that it is not above depreciation of the Norwegian Krone if it sees these efforts as part of a currency war in order to stay competitive. This activity would be in spite of Norway's zero government debt and heretofore responsible economic policy that has withstood the brunt of the financial crisis.

- It was at the outset established that the resources belong to the people, in this case the Norwegian state. No special groups are in the position to claim any particular ownership to the resources and a high corporate tax has ensured that much corporate revenue comes back to the government.
- The level of political trust was high at the outset and has continued to be so, thanks to transparency efforts and absence of corruption incidents. Government servants do not see positions in the oil sector or elsewhere in government as opportunities to extract resources for personal gain. Importantly, healthy and transparent distribution of state revenue requires responsible actors at all levels of government to be effective, including both those employees who acquire funds for the state and those who spend state resources.
- A significant degree of state involvement has ensured compliance with safety and environmental standards, while still allowing robust profitability. This balance has been the hallmark of the Norwegian model and is benefitted by the fact that Norway's resources are offshore and generally easily accessible (no land claims, few environmental risks, and cheap production) in the first generation of exploration.
- The temptation to unduly expand consumption due to increased revenue has been resisted, avoiding contagion of the Dutch disease and maintaining reasonable competitiveness of the non-petroleum export industry. This resistance was supported by the increasing number of smaller finds on Norwegian territory as opposed to one massive initial finding. With a continual assumption that resources may run out within a generation and the resources finite, a long-term approach of saving has been easier to support.
- The consequent accumulated unspent revenue is placed in a sovereign wealth fund for investment abroad. The 4 percent budgetary rule ensures a stable flow of the revenue into the state budget while also functioning as a cushion against economic cycles and shocks.
- Norway is located in a stable part of the world, hosting few conflicts during the period (with the exception of the Cold War) that limit the need for significant defense outlays. It has, a robust free trade network and has good relations with all neighbouring states.

Norway also faces significant medium and long term challenges:

- The country will eventually need to prepare for a scaling down of the petroleum adventure as resources are deplete. As the sector drives a considerable portion of the workforce (over 10 percent) and a quarter of GDP, this will be an immense challenge. The transition into other industries will entail many challenges, not least owing to the country's lack of success in similar initiatives in the past. Given the sheer volume of the energy sector in Norway's GDP, this transition may be extremely difficult.
- An 'elderly wave' will emerge shortly, necessitating an expansion of infrastructure for health- and elderly care. This could have a heating effect on the economy and hands for the operation of this infrastructure may be difficult to find. In terms of impact upon oil policy, it may create a 'domino effect' where revenues are opened up for many different avenues, depleting resources intended for future generations.
- The risk and continued insecurity of international markets is a stress factor for the sovereign wealth fund, with the potential damage of a setback getting ever higher as the fund's market value increases. The sheer size of the fund combined with several notable initiatives to spurn investments in some socially unacceptable sectors means that fund managers have had to invest more or less in everything in order to spend the funds allocated. New ventures into megacity real estate and related untraditional investments may lead to massive losses that the public would be unprepared to accept.
- Even though mismanagement and corruption have not yet been noticeable in the fund, the potential for either (or both) does remain.

- Populist parties may be elected in Norway upon a platform of lower taxes and returning oil wealth to citizens, thus depleting the fund in a much more rapid manner and further overheating the domestic economy. These calls can cause massive losses in the fund due to a market shift, mismanagement, or a combination of the two.

In sum, the Norwegian experience has had a positive impact on companies, the state, and most importantly on the citizens of the state. Given that infrastructure was in place to enable the responsible use of funds, the country has been able to thus far maximize the financial and social value of its resources. In terms of forward value for resource development for other states, the Norwegian experience speaks to the value of an existing anti-corruption framework across government combined with a social ethic that is communal in nature and forward leaning. That said, we recognize that this ordering (reduce corruption, then extract resources) is often not possible or realistic for most developing countries. In these cases, suggesting earmarked funds for future generations as well as spending caps on income paid to the state are more reasonable stop-gap measures that save a portion of extracted wealth for future generations. It is possible that Norway's most valuable lessons are still to come, as the country deals with the potential for an overheated economy in the near term and added pressures on the revenue combined with a diminishing income stream in the longer term.

Forward Research

When considering a forward agenda for understanding oil and gas price volatility, both macro and micro elements should be highlighted. Broader trends that will continue to receive a great deal of attention from both academics and policymakers include:

1) The continued expansion of oil and gas volatility and the increasing decoupling of both markets.
2) Does the USA's downturn in oil consumption signify the early stages of a permanent trend? Have we in fact reached and passed the 'peak demand' for oil in USA? Some countries are looking to be carbon free by 2050. How will this influence prices?
3) Conversely, others (notably the emerging economies) will likely continue to rapidly expand their industrial and consumer consumption capacities. Will these demands be enough for producers to cancel out demand losses in the developed world?
4) The relationship of peak oil and peaking gas to climate change. In addition to traditional macro demand events, two additional factors, two on the supply side (peak oil, gas finds) and the other on the demand side (climate change) will garner increasing importance. The interrelation between these three factors needs further study.

However, for those states that are not in the position to dramatically alter either supply or demand equations, policymaking may be more difficult in terms of oil and gas equations, thus altering three related abilities:

1) **The ability to predict**: Increasing speculation and volatility will make it harder for states to predict price action from fundamentals.
2) **The ability to control**: These same non-traditional actors will hold increasing sway over price action decoupled from supply/demand fundamentals, thus making long term planning challenging.
3) **The ability to understand**: As oil is increasingly used as a proxy for a host of factors, it has increasingly decoupled from other things in the commodity basket such as gas. While markets always 'revert to the mean', governments that have the economics 'right' can still face tremendous pressure or even fall while waiting for what they 'know' are flawed supply/demand economics with such an essential commodity.

While discussing the past and current absence of resource conflict in Norway, natural resources can have an amplifying effect on the initial degree of democratization and climate of political trust in either positive or negative ways. Also, the Norwegian experience may offer valuable lessons for how to transfer resource-related challenges into opportunities if/when the sector undergoes its next cyclical downturn. When considering cross-cutting lessons, what appear to be two disparate issues (volatility and the Norwegian experience) in fact serve as an interconnected experience to illustrate how strength can beget strength. Despite the heavy exposure to oil price fluctuations, through stout planning and long-term perspectives, Norway has been able to dramatically increase its bottom line in terms of oil wealth even during a time of extended 'hyper-volatility'. Where other oil producing states and oil-reliant industries have found this environment both challenging and unpredictable, the ability to negotiate from a long-term perspective in particular has enabled Norway to shield itself from financial pain despite eschewing the significant use of exotic hedges or derivatives.

Of course, the playing field isn't entirely fair. Norway often is able to negotiate and operate its domestic, regional, and international politics and business activities from a position of strength in terms of oil and gas price volatility. As a net exporter that is heavily reliant on a single resource, Norway is conceivably highly vulnerable to increasing vulnerability. However, the large cash surplus as constituted in the Oil Fund provides a natural buffer against day-to-day spikes and related volatility that may otherwise encourage reactive behaviour. The permeation of responsibility over the resource as one that is of the people and for the people of the state – both current and future – is one that also encourages politicians to think long term even in the face of significant global turmoil.

Forward lessons on the Norwegian experience may revolve around how states handle significant changes of fortune, either in the macro environment or in domestic politics. While most analysts expect a continued smooth ride for the Norwegian oil economy, a rapid price decrease or other unforeseen negative pressures could have negative effects on the Norwegian economy as well as on the industries that are heavily reliant on high oil prices. How Norway handles these challenges – much like its measured reply during the 2008 financial crisis – may well constitute the most valuable lessons for policymakers.

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