

I Introduction and overview

This brief introductory chapter has two objectives. First, it elaborates why, in our view, the chosen subject is of sufficient significance to warrant a book. And second, the chapter provides an overview of the book's structure so as to help orient the reader about the content that follows.

THE SIGNIFICANCE OF OIL AND ITS PRICE EVOLUTION TO THE WORLD ECONOMY

A number of reasons have motivated our choice of oil, along with its past and expected future price evolution, as the subject in focus for the present book.

A *first* reason is the importance of oil in the world economy. In the early 2010s, the annual production value of this commodity, when measured at international prices, could be assessed at between \$3500 and \$4000 billion. World oil exports were reported in a range of \$2200 and \$2800 billion. As is clear from Table 1.1, oil dwarfs other leading primary commodities in the service of humanity. Oil's dominance among commodities was apparent already before its spectacular price rises after 1972. In 1970–1972, oil alone represented an export value equal to the aggregate of the next nine largest commodities (Radetzki, 1990).

Oil's importance is not limited to the primary commodity universe. It also stands out in the global macroeconomy. The value of oil production in 2013 corresponded to 4.8 percent of global GDP, while the export value it generated was equal to some 12 percent of global goods trade.

A *second* reason why an investigation of oil and its price evolution has special significance is the “indispensability” of this

2 INTRODUCTION AND OVERVIEW

Table 1.1 *Values of output and trade in 2013 for some major primary commodities, \$ billion*

	Oil	Natural gas	Coal	Iron ore	Wheat	Copper	Cotton
Output	3550	1330	470	400	220	184	52
Exports	2700	404	112	176	50	132	22

Sources: IMF, UNCTAD and USGS on the web.

commodity. It is hard to replace in the short and medium term (i.e., there is no clear alternative to oil in the foreseeable future), so the volumes demanded in its major uses are not much affected even by large price shifts. The price increases experienced in the past have resulted in shrinking demand in some markets, most importantly power generation, where oil has been successfully replaced by expanded usage of coal, gas, nuclear and renewables. The dominant market segment for oil – as a fuel for transport on roads, in the air and across the seas – continues to persevere despite the price changes. So far, at least, large-scale substitutes to oil in these markets are conspicuous by their absence. This makes the global economy highly vulnerable to oil supply disruptions.

A *third* reason why oil and its price evolution make it worthy of special attention is the exceptional nature of the price changes over the past several decades (see Chapter 2). The almost tenfold real price increase for this commodity between the early 1970s and the most recent years has few matches, if any. Metals and minerals in aggregate, a group of materials which like oil are exhaustible and were sold in unchanged qualities over time, saw much less than a doubling of their prices in constant money over the period.

Fourth and perhaps most important is the observation that we are likely to experience a turnaround from accentuated scarcity and increasing prices into a new era characterized by relative abundance and price falls as two just emerging revolutions mature and spread

internationally. The two revolutions are based on recent technological progress perfecting the combination of horizontal drilling and fracking to release oil. The first, the shale revolution, has until now by and large been limited to the US, where it led to an impressive output increase. The second revolution, barely begun, is the conventional revolution where horizontal drilling and fracking permits a fuller utilization of conventional oil deposits by greatly improving upon traditional enhanced recovery efforts. As they develop and expand internationally, the two revolutions in combination will have an overwhelming impact on global oil supply. They will also have a strong price depressing impact, either by preventing a rebound from price levels observed after the sudden drop in late 2014, or by pushing prices back to these levels if an early upward reaction is to follow the dramatic declines of late 2014.

A BRIEF GUIDE TO THE BOOK'S CONTENT

Having determined the importance of the subject to which the book is devoted, we now turn to a brief summary of the parts that follow, pointing the reader to the major findings that emerge from our analyses.

Part I covers history, and its purpose is to understand the causes behind oil's exceptional price performance.

Chapter 2 provides succinct observations on the price evolution, and discards a few factors; e.g., financial speculation or explosive consumption growth often alleged to be behind the rising prices. Basic economics see demand and supply as key determinants of price in unregulated markets. We fully share this view, but note that changes in supply have been far stronger and far more important for the observed oil price rise than changes in demand. The latter progressed with relative stability and at very moderate rates.

Chapter 3 analyzes the role of interventions by the Organization of the Petroleum Exporting Countries (OPEC) to cut supply, and Chapter 4 assesses depletion – the cost raising inadequacy of resources in the ground – as the cause of oil's extraordinary price performance.

4 INTRODUCTION AND OVERVIEW

We conclude that neither provides an adequate explanation of the actual evolution of prices. OPEC's market interventions have at most had a short-run and insignificant price impact. At the same time, we fail to find a consistent upward price push due to depletion. Resources in the ground have remained plentiful, and the high profitability of virtually all oil production through the past 40 years strongly suggests that resource inadequacy cannot have played a significant role for the observed upward price push.

Our basic explanation for the oil price rise is an inadequate development of the capacity to produce. Chapters 5 and 6 are devoted to an analysis of the above-ground hurdles that constrained the ability to invest in new installations to replace existing ones at the end of their life or add to overall production capacity. Chapter 5 deals with two developments. *First*, it describes the explosive expansion of state ownership in the 1960s and 1970s that came to replace the private international corporations as oil producers. This was basically the result of resource nationalism that reigned high at the time. It goes on to analyze the costly deficiencies of the newly established state owned firms, partly because of their inexperience, but also due to the inherent shortcomings of state ownership. *Second*, the chapter reviews the excessive fiscal extraction of both the state owned and the remaining private enterprises in the oil sector. It concludes that the inefficiencies of state ownership, along with insufficient financial resources available to the oil sector, were crucial impediments to capacity build-up. Chapter 6 analyzes the effects of domestic and international conflicts over the oil rent that have characterized developments in many producing countries. These conflicts not only arrested capacity growth but in many cases led to sharp reductions in the ability to produce. In sum, then, we see the above factors as the main reasons behind the extraordinary price rise.

Part II of the book analyzes the fundamental turnaround in the global oil market that will follow with the maturation and spread of two revolutions: the shale oil revolution and the conventional oil

revolution, related to each other by the same technological breakthroughs of horizontal drilling and fracking.

Chapters 7 and 8 are devoted to the shale revolution, so far predominantly confined to the US. The technological advances have made a vast wealth of shale resources economically accessible. Shale exploitation has abruptly turned around a trend of falling oil production since the 1970s into a brisk expansion that increased US oil output by more than 70 percent between 2008 and 2014. The activity has conferred substantial benefits on the US economy in terms of investments, employment, public revenues and reduced import needs. This infant industry is characterized by speedy productivity improvements that by 2014 have made most of the output profitable even after the dramatic price falls of that year. Judging from the growing amount of resources uncovered by ongoing exploration, we deem that the shale revolution in the US will be a long-lasting phenomenon.

In Chapter 9 we analyze the conventional revolution, an even more recent phenomenon that has so far barely reached the media. Yet it has a potential impact on production in the US and elsewhere of a magnitude equal to that of the shale revolution. What is involved is the application of horizontal drilling and fracking to tired old conventional oil fields in order to squeeze out much of the remaining oil that was not accessible with traditional production methods. The conventional revolution is akin to enhanced recovery efforts, but the application of the new techniques makes the enhancement both cheaper and more complete.

Chapter 10 briefly assesses the environmental worries raised by the very intensive drilling required in shale exploitation, and especially by fracking. We note that this activity has indeed caused environmental degradation in the form of water contamination, methane emissions and enhanced seismic activity, among others. We argue that much of this damage is due to the infant and “wild west” character of the industry, and that most of it will be overcome as the industry matures and becomes more tightly regulated by the authorities.

6 INTRODUCTION AND OVERVIEW

Our thesis in Chapters 11 and 12 is that the advantages afforded by the revolutions to the US have been so strong that their international spread is inevitable. Underlying our view are two premises. First, the US geological position is in no way unique, while estimates of the resource wealth in the rest of the world (ROW for short, in the following pages, to denote all countries outside the US) will expand speedily as exploration there gains speed. Second, most of the technology employed is not proprietary and so can be easily transferred across borders. For a number of reasons, however, the revolutions in the ROW will emerge with considerable delay compared with the US, and progress at a much lower speed. Even so, we assess that by 2035, the revolutions' impact on global supply will be overwhelming, and will cause a substantial downward pressure on price – perhaps even from the lower price levels that emerged after the dramatic fall in the second half of 2014.

Part III of the book looks at the major implications from the maturing revolutions in a variety of fields.

Chapter 13 draws on the rich literature to deduce conclusions about the impact of cheaper oil supplies for the global macroeconomy and for trade balances. Basically, a sharp fall in oil prices should stimulate global economic expansion. However, since the progress of the revolutions and their accompanying price depression normally occur gradually over an extended period, the global macroeconomic stimulation may be hardly perceptible. Some oil exporters' economies will face a difficult time as prices fall, but efforts to reduce the reliance on oil exports through economic diversification may ensue.

Chapter 14 notes that a deep climate policy aiming at a severe cut of greenhouse gas emissions could cut oil consumption so much as to stop the revolutions in their bud. However, the cost of such policy is so high, and the confusions and inactions ever since the signature of the shallow Kyoto protocol in 1997 so pervasive, as to make us doubt that a deep policy will be launched. We concur with major public analysts like the International Energy Agency (IEA) and

the US Energy Information Administration (EIA), and with the projections of major oil corporations, showing continued consumption growth in coming decades – and thus assuring the demand for oil generated by the revolutions.

Chapter 15 is highly speculative in its consideration of the political (and military) consequences of a more ample, cheaper and more diversified oil supply. Market management by producers will become more difficult, and the political potency of the “oil weapon” will be diminished. Lower prices might ease the fights over oil rents. Importing nations’ historical diplomatic and military interventions in the Middle East to assure supply will become less meaningful in a world with ample oil supplies.

A very brief concluding Chapter 16 summarizes the main lessons learned. The revolutions are bound to bring both advantages and disadvantages to different constituencies, but overall it is our opinion that an emerging oil rich world is to be preferred to a poor one.

We are truly excited by the book’s agenda and hope that our readers will share, at least in some measure, in our excitement. However preliminary, we believe our findings will be highly useful as a starting point for discussions and analyses to follow in many coming years.

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PART I Oil's extraordinary price history: how can it be explained?

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