

André B. Dorsman, John L. Simpson, and Wim Westerman

Abstract

This chapter provides a preview to the motivation of the book which is to report new research undertaken in energy technology, policy and valuation issues and more specifically to cover this title in three parts to include innovation and shocks, environment and renewables and finally, fossil fuels regulation. The contents of the book provide readers with an international as well as several country specific perspectives which are included to complement to the global nature of the research. The editors trust that the book will be well received and enjoyed by anyone with an academic and/or a business interest in energy and value issues.

Keywords

Energy policy • Energy technology • Valuation

1.1 Introduction

This is the fourth research book published by the Centre for Energy and Value Issues (CEVI). New and exciting areas of research into the financial economics of energy are introduced. New ways of looking at problems such as electricity pricing

A.B. Dorsman
VU University Amsterdam, Amsterdam, The Netherlands
e-mail: a.b.dorsman@vu.nl

J.L. Simpson (✉)
Financial Economics Consultants, Perth, WA, Australia
e-mail: simmojl@iinet.net.au

W. Westerman
University of Groningen, Groningen, The Netherlands
e-mail: w.westerman@rug.nl

and the economic, social, regulatory and environmental costs of alternative energy sources is covered in an era where there is increasingly less reliance on coal for power generation. Oil continues to dominate global energy markets, however natural gas and unconventional gas are making strong inroads. On the domestic housing and to a lesser extent the domestic industrial front investment in the generation of solar and wind power are having a significant effect on conventional power generation. Albeit at different magnitudes and speeds, the developments take place at a global level.

Technology is an ever present but not always apparent driver in the energy world. Technology drives policies and vice versa, bringing about innovations. As is shown in a scene setting chapter, innovation is not autonomous and exogenous. There are gradual developments, but also shocks. Energy sourcing, whether innovative or not, influences the environment. Renewable energy production and consumption is in principle best. However, oil and gas are still major electricity inputs and regulation on fossil fuels remains important. This book thus stresses energy economics and finance aspects of issues on innovation and shocks, environment and renewables and fossil fuels regulation. Energy product, process and governance innovations increasingly lead to market transitions at various levels all across the globe. Moreover, energy innovations on both conventional and non-conventional fuels call for policies on various levels, from the global level down to the local level.

Whilst this book offers a global perspective, some of the chapters deal with specific countries. However, even in these instances a global perspective is offered as the models developed will have application to other countries within similar economic groupings, be they net importers or exporters of energy or be they developed or developing economies. The example of Turkey is one of the countries covered in the book. It is suggested that Turkey as an example, is most relevant as its potential as an important future transit country for oil and gas supply cannot be denied. Turkey is a strongly developing and net energy importing economy. Electricity generation through natural gas imports is very important. One of the chapters discusses the liberalization of the Turkish gas market, but stresses the need to simultaneously have some state control mechanisms in place to promote an orderly freeing up of the market. This issue is of great importance to many economies in the world as they grapple with the problems of energy market liberalization.

1.2 Innovation and Shocks

The first part of the book deals with innovation and shocks in energy markets which includes a reinforcement of the importance of energy markets and new studies into valuation and pricing. The second chapter by Bert Scholtens sets the scene for this book, initially making the point that all human activity from the provision of basic needs to social electronic media requires energy. In economics energy is also a factor of production which when combined with labor and capital plays a key role in

the production and distribution of goods and services with energy costs conditioning and facilitating other economic activities. The downside of energy use is the much debated issues relating to global warming and the expending of resources that are not renewable. The second chapter asks the questions as to what the particular energy sources are that dominate the fueling of an economy and how do combinations of these resources change over time. It also asks what innovations trigger these changes and do they contribute to economic development generally. Furthermore, it argues that it looks as if energy transition might as well be an autonomous and exogenous process. This is not the case. However, it still is not clear what is cause and what is effect. Different views about how the energy transformations evolve point at different factors: entrepreneurial creativity, interplay between institutions and technology, as well as demand for energy-related services.

Chapter 3, by George Filis gets down to some solid empirical analysis and econometrics to examine the time-varying correlation between selected industrial sector indices (oil-intensive, oil-substitutes and non-oil-related) and oil price shocks. The problem is investigated by firstly looking at the indices correlations for both oil-importing and oil-exporting economies using data from 1998 until 2013 and employing a Scalar-BEKK model. In the analysis of this data the following regularities are reported: (1) the correlation between oil price shocks and index returns show some differences depending on whether a country is an oil-importer or an oil-exporter (2) the correlations are industry-specific and shock-specific and (3) the demand-side shocks mainly generate moderate positive correlations, whereas index returns have low to zero correlation with the supply-side shocks.

Prominent among the results in Chap. 3 is that oil specific demand shocks have a moderate positive correlation with all indices. The results have important implications. As to the first of the findings, it does appear to make a difference to countries in terms of stock price returns as to whether the country imports or exports energy. For example, for an industrial country, a high energy importing component could weaken the balance of payments current account in the absence of strong growth in the export sector and possibly increase debt on the capital account with the provision of reserves for energy imports. Growth is not promoted in the manufacturing sector, which of course results in lower expected rates of return in that sector of the stock market. The second of the findings are also important as additional evidence that energy affects different stock market sectors differently depending on the dependency of such sectors on imported energy and the prices associated with that energy. Again manufacturing sectors with increased energy costs will incur less profitability as reflected in sectoral returns. The third of the findings supports other evidence that energy demand-side shocks are more important than supply-side shocks in terms of the generation of greater returns across all sectoral indices. It may be that across all sectors greater prices in energy conspire to induce a greater inflation of expected rates of return.

Chapter 4 by Maarten Croese and Wim Westerman deals with a very important question as to whether or not OPEC quota decisions affect the stock prices of European oil firms. In addition the influence on the Brent crude oil price is tested.

The investigation uses an event study methodology, where 51 announcements of quota, increases, decreases and no changes in quota are considered in the period 1991–2012. The results imply that OPEC quota decisions have a direct influence on both crude oil returns and oil firms' stock returns. This influence is either positive or negative and large or small, depending on the type of decision and the size of the firms in terms of market capitalization. However, since the difference between the two small firms is also significant, it is concluded that market capitalization alone is not a determining factor.

Chapter 4 research results show a degree of support for past studies in this area and future research may well focus on whether or not the oil markets and the actual major players in these markets anticipate OPEC production allocations. Future research can also show that even if there is an increase in quotas the oil price and the share prices of the major oil companies rises because the markets perceive that the projected increase in oil supply will be insufficient to satisfy demand. The findings of this and other studies should be of great interest to investors who can position themselves in the market based on expected outcomes of OPEC production allocation meetings. Policy-makers can ask questions about cartel behaviour of OPEC and also about the possible prior knowledge by the major players in oil markets of quotas outcomes.

1.3 Environment and Renewables

In Chap. 5 by Özgür Arslan-Ayaydin and James Thewissen, the focus is on the impact of environmental strengths and concerns on the accounting performance of firms in the energy sector. It is posited that the performance of energy sector firms is affected by the imposition of costs and community attitudes relating to environmental impact. Kinder, Lydenberg and Domini research and analysis data are used to extract environment scores for a sample of both energy and non-energy firms over a period from 1995 to 2011. The important question is asked as to whether or not positive environmental activities add costs or assist in the achievement of greater future profitability. The findings are that environmental concerns are lower than environmental strengths and this difference is greater for energy sector firms than non-energy sector firms. Only the environmental concerns of the energy sector firms have a predictive value in terms of future corporate performance when studied against a group of financial earnings variables. It is an important finding for investors and policy-makers that the reduction in environmental concerns for energy firms improves corporate profitability and it also demonstrates that the data used in the study contains significant information value. It may be that future research in this area is conceivable to ascertain whether or not these results stand-up when sectoral stock market returns are examined with environmental scores data and whether or not such findings have greater or lesser significance when studied with the effect of movements in global energy prices in oil, coal and natural gas.

Chapter 6 by Erdinç Telatar analyzes the relationship between renewable and non-renewable electricity consumption and economic growth for a sample of

countries categorized into four groups based upon the World Bank income classification (high, upper middle, lower middle, and low income). The principal motivation for the study is to discover whether or not the causal relationships change depending on the income level of countries. A panel causality test is utilized by disaggregating electricity consumption into renewable and non-renewable sources and by examining them with economic growth. The author feels that this may provide more information for policy makers to design green economic policies in the context of environmental and sustainable development. The findings are that a conservation hypothesis is supported for high, upper-middle and lower-middle income groups, and a neutrality hypothesis is supported for low-income countries. In addition the important finding is that the causal relationships between electricity consumption and economic growth disappears for lower-income levels. It is concluded that implementing green economic policies in the context of sustainable development is a reasonable choice for developing countries, but it requires support from the developed world. This is a most useful and valid panel data study of a large sample of countries and the policy implications are clear but challenging.

Chapter 7 by Bartjan Pennink, Niek Verkruisje and Wim Westerman deals with a less conventional energy source. The chapter investigates the possibilities of implementing renewable energy in the form of mobile biodiesel with a study in Central Kalimantan, Indonesia. The study may have implications to other similarly placed developing economies. The main research aim is to construct a model in which a local economic development model can be infused with money flows and group entrepreneurship. Large-scale projects have taken place in Indonesia, however few were on a small-scale base and thus can be considered as bringing a technology push in a local situation. The field study results indicate a great lack of technical, managerial, and financial knowledge and skills in the remote villages, resulting in a lack of human capital. Furthermore, the occurrence of frequent electricity blackouts with long durations disturbs the local communities in their daily activities. To address these problems, this study argues for the integration of community empowerment, social capital, social franchising and especially group entrepreneurship in combination with a transparent financial system on the flow of money while introducing a new technology. Although the development of the model is based on empirical results in Indonesia and on the mobile biodiesel idea the chapter authors feel that the model could also be applied in other parts of the world as a useful renewable energy strategy.

1.4 Fossil Fuels Regulation

Chapter 8 by Cafer Eminoglu deals with regulation in the Turkish domestic gas market. Turkey is not alone when it comes to the need to ensure energy supply security. However, the Turkish domestic gas market, with its current 30 % private sector involvement, is in the early stages of liberalization process. The milestone in the deregulation process of Turkish natural gas market was the enacting of the Natural Gas Market Law (NGML) in 2001, which abolished the monopoly rights of

State owned BOTAŞ, the Turkish Petroleum Pipeline Company. Yet some targets in the areas of innovation and supply security are still not being met and new reforms have been proposed, such as the unbundling of the monopoly rights of the state owned pipeline company and the reducing of its share in the natural gas market. Opposition remains on the basis that due to the strategic economic importance of the gas market it is necessary that a significant government control involvement remains, particularly to support the fact that only 2 % of domestic natural gas demand is being met by domestic resources. Others say that this may be a strength because Turkey occupies a strategic position geographically between industrialized Western Europe and the vast oil and gas reserves of the Middle East. Therefore Turkey could become a natural bridge in terms of oil and natural gas transmission and thereby contribute strongly to supply security in Europe.

In Chap. 9 by Okan Yardimci and Mehmet Baha Karan the discussion focuses on the function and effectiveness of the Turkish Energy Market Regulatory Authority which sets the tariff that determines the revenue requirements of the Turkish natural gas distribution companies by using a popular type of an incentive regulation, price cap method. The chapter posits that incentive regulation improves efficiency and reduces costs and makes the point that Turkish companies may not be willing to increase the service quality in this kind of regulation. The efficiency and service quality of the Turkish natural gas distribution companies are analyzed using both non-parametric and parametric methods (data envelopment and stochastic frontier analysis). In this study similar distribution companies are ranked by the service quality scores that are obtained from the service quality data. The results can be used by policy makers to determine the relationship between efficiency and service quality and to decide the effectiveness of the regulation and to suggest a reward/penalty scheme for the tariff design. Other countries in similar positions to Turkey and at a similar stage of development might, it is suggested contribute also to regional and global supply security. As an editorial comment it is suggested that diversification of supply of natural gas is important. If a large part of the European regional markets are dependent, for example on Russian piped gas, this is not diversification and does not promote supply security. Consideration should be given to a component of liquid natural gas shipped from gas rich countries, such as Australia with the trade-off for the greater cost being less political risk.

In Chap. 10 by John Simpson, it is noted that electricity markets are perceived to be monopolistic or oligopolistic in nature, whether government or private sector owned. Prices, therefore, are subject to government (political) interference and/or monopoly pricing as well as economic factors, such as the supply cost of fossil fuels. This chapter examines a representative sample of larger OECD country and transitional/developing country electricity markets. The study controls for the influence on electricity prices of domestic and international economic factors (measuring the extent of electricity market deregulation and liberalization) and domestic political factors (measuring the extent of regulation). A vector error correction model is specified to investigate long-run equilibrium relationships and short-term exogeneity in monthly time series data. The findings show differing results for each country electricity market in the short-term and long-term.

By the criteria of the study in Chap. 10, there appears a greater degree of long-term efficiency and deregulation in the following markets based on the order of strength of explanatory power and cointegration evidence for Chile, the US, Canada, the Philippines, China, New Zealand, Thailand and Argentina. Where no such stability occurs in the long-term for the remainder of the sampled markets it might be suggested that government interference may yet be distorting those electricity markets. Interesting results are also obtained when short-run dynamics tests reveal that very few of the electricity markets studied are endogenous on a one month lag. Policy implications and recommendations could ensue from the explanatory power of such models, which will reflect market factors and thus show the level of market liberalization more directly with the residual of each relationship indicating idiosyncratic factors such as government interference and political stability.

The final chapter by John Simpson and Abdulfatah Alsameen investigates the future spot gas prices and the relationship with gas futures and oil futures prices. This research is undertaken not only to discover whether or not gas and oil futures prices are good predictors of the future gas price, but also to ascertain whether or not, in the two of the most important OECD economies, an indication may be provided of the extent of gas market liberalization through the breaking of the nexus in gas and oil prices. The authors of Chap. 11 find that there is some progress in US and (less) UK domestic market regulation, since global oil futures prices together with domestic gas futures prices are not very strong predictors of future domestic gas prices. However, they also conclude that there is some distance to go in market liberalization for both of these leading economies. The study furthermore opens the floor for policy researchers to study why one market may exhibit greater liberalization than the other.

As mentioned, some energy technology, policy and valuation issues are assuming greater importance as time goes on and all issues cannot be covered in this book. For example, the inexorable growth of natural gas as a cleaner alternative to oil; the substantially increased use in households of solar panels to generate electricity; the impact of wind power for both household and industrial power; the emergence of Canada and the USA as net energy exporters of unconventional oil and gas; the need in Europe to diversify sources of gas supply from high political risk producers; the continuing debate for energy trading schemes or carbon taxes or direct action or a combination of these steps to strive to reduce carbon gas emissions in an age of climate change. As mentioned it is hoped that these issues will be the focus of future CEVI research books.