Abdulaziz M. Al-Dukheil

SAUDI GOVERNMENT REVENUES AND EXPENDITURES

A Financial Crisis in the Making

Saudi Government Revenues and Expenditures

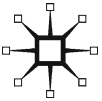
This page intentionally left blank

Saudi Government Revenues and Expenditures

A Financial Crisis in the Making

Abdulaziz M. Aldukheil

palgrave
macmillan



SAUDI GOVERNMENT REVENUES AND EXPENDITURES

Softcover reprint of the hardcover 1st edition 2013 978-1-137-34602-5

First published in 2013 by
PALGRAVE MACMILLAN®
in the United States—a division of St. Martin's Press LLC,
175 Fifth Avenue, New York, NY 10010.

Where this book is distributed in the UK, Europe and the rest of the world, this is by Palgrave Macmillan, a division of Macmillan Publishers Limited, registered in England, company number 785998, of Houndmills, Basingstoke, Hampshire RG21 6XS.

Palgrave Macmillan is the global academic imprint of the above companies and has companies and representatives throughout the world.

ISBN 978-1-349-46677-1 ISBN 978-1-137-34292-8 (eBook)
DOI 10.1057/9781137342928

Library of Congress Cataloging-in-Publication Data

Aldukheil, Abdulaziz M.
Saudi government revenues and expenditures : a financial crisis in the making / Abdulaziz M. Aldukheil.
pages cm
Includes bibliographical references.

1. Saudi Arabia—Appropriations and expenditures. 2. Revenue—Saudi Arabia. 3. Finance, Public—Saudi Arabia. 4. Financial crises—Saudi Arabia. 5. Saudi Arabia—Economic policy. I. Title.

HJ2152.7.A43 2013
336.538—dc23 2013020507

A catalogue record of the book is available from the British Library.

Design by Newgen Knowledge Works (P) Ltd., Chennai, India.

First edition: November 2013

10 9 8 7 6 5 4 3 2 1

To
The Future Generations Of
Saudi Arabians

This page intentionally left blank

Contents

This page intentionally left blank

Figures and Tables

Figures

Tables

Acknowledgments

This book is a product of many years of critical analysis on the Saudi economy, past, present, and future.

I want to thank the people of the Al-Dukheil Financial Group for providing me with financial support during the three years of my research, as well as the Oxford Institute for Energy Studies for the invaluable time I spent there as visiting research fellow. I am also grateful to the Suleiman Olyan Business School at the American University of Beirut for the time I spent with them as visiting scholar. I thank my friend Professor Hossein Askari for his valuable comments and suggestions, and Mr. Ali Issaaoui, senior consultant at APICORP, for his comments. I would like to thank Dr. Mohammed Kazemi for his help in early drafts, Mrs. Roula Tannoura for her typing and graph work, and Salman Al-Dukheil for his invaluable editing.

My gratitude to all of those who had the patience and interest to listen to my arguments and discussions—friend, scholars, government officials, and students. I learned a lot from you, and I am eternally grateful.

Introduction

When the Kingdom of Saudi Arabia was founded in 1932, it was one of the poorest countries in the world. Relying on limited revenue from agriculture and pilgrimage, it was in an area that most of Europe considered the middle of nowhere. In 1938, government revenue was only SR25 million ($7 million), 50 percent of which was from import customs, and the rest from religious pilgrims. Only about $267,000 of the Saudi government's revenue came from oil royalties.[1] In 1938, oil was discovered in the eastern region of the country, but full-scale exploration and development of Saudi Arabia's oil began only in 1941. With oil revenue pouring into the kingdom's treasury like the desert heat, the kingdom extended its spending in various political and social arenas.[2]

Today, as illustrated in the government's 2012 budget, Saudi Arabia's economy is heavily dependent on oil; in fact, oil accounts for 93 percent of its revenue.[3] Wealth derived from oil has transformed Saudi society from its previous state of poverty to one of lavish consumerism and consumption (both on the individual and government level). A high rate of annual population growth of 2.4 percent,[4] coupled with scarce natural resources outside of oil, raises growing concern about the country's future for many. Can there ever be alternative sources of income to replace oil as the major source of government income?

The Saudi government is aware of the likely long-term decline of its oil reserves; however, it does not seem terribly concerned.[5] Analysts in the West have warned that Saudi Arabia may not be able to supply the world's oil forever, and alarms bells have sounded off in relation to potential oil crises in the near future.[6] If industrialized nations that are dependent on Saudi oil are worried and are seeking to prepare for an oil crisis, then similarly, Saudi Arabia should also be anxious. But this does not seem to be the case, as the Saudi government is increasing its expenditures in consumption without any clear and effective economic strategy to ensure welfare sustainability for current and future generations.

In 1933, before the discovery of oil, King Abdulaziz, the founder of the kingdom, faced a serious shortage of cash[7] that, according to the then American vice consul, may have led to his "prompt downfall." This financial crisis of sorts was due to a sharp drop in government revenue due to a similar plummet in the number of pilgrims to Mecca, as a result of the global economic recession beginning in 1929.

In 1951, Saudi Arabia, which spent more than the income it generated, was on the verge of bankruptcy. The Saudi currency, the Riyal, lost much of its value, and the government was unable to pay salaries to its staff. Aramco, the American oil company that dominated the Saudi oil industry at that time, along with the US government's aid agency, Point Four, rushed to help the financially ailing kingdom. An IMF team was then commissioned to put government finances in order.[8]

According to Mordechai Abir, the more the revenue generated from oil by the kingdom in this period during the reign of King Saud, the eldest son of King Abdulaziz (1953–1964), the more the government managed to squander it, and the kingdom's financial situation did not improve.[9]

In 1981, Saudi oil revenue reached a record level of $87.6 billion, yielding a surplus in the budget of $29.6 billion, which was 20.4 percent of the gross domestic product (GDP). Five years later, oil revenue dropped 87 percent from the 1981 levels to $11.3 billion, leading to a budget deficit of $21.6 billion, which itself was 25.3 percent of the GDP. The economy went into recession, and the government had to borrow internationally and locally to sustain desired spending.[10]

Can history repeat itself, leaving Saudi Arabia with another financial crisis due to overspending and/or a dramatic drop in oil revenue? To be sure, modern Saudi Arabia is different and more complex than it was before; the Saudi population is much larger, government expenditures are much higher, and the long-term trend of oil revenue is on the decline. But all of this and more do raise the possibility of a potential financial crisis, if the status quo remains. Such a crisis will be beyond the government's control and will lead to economic, political, and social instability.

My hypothesis in this book is as follows: if the situation remains on its current trajectory, by the years 2030–2050, government will be unable to cope with the debt due to rising expenditures over revenues, thus leading to the possibility of bankruptcy and in turn undermining the country's political and economic stability. I have tested this hypothesis by running regression analyses of the government's actual expenditures and revenues over the period 1970–2010 to trace the behavior

of the main variables over time: revenues and expenditures. Following this analyses, I extrapolated the future behavior of these variables based on certain assumptions, in order to gauge the gap between government revenues and expenditures. After measuring the gaps between revenues and expenditures over two sample periods (2010–2030 and 2030–2050), I examined the financial resources that would then be available for the government to finance its debt. I conclude that government debt becomes drastically larger than the combination of available financial resources and the government's ability to borrow.

I have also tested the government's ability to sustain its future supply of public goods and services to society by applying the theory of "genuine savings" (or the genuine savings theory), after modifying it to fit an oil-dependent economy such as Saudi Arabia's. The result confirms that government expenditures are unsustainable in the future.

In the final chapter of the book I raise the question: Is a government financial crisis inevitable? My answer is that it is not inevitable if Saudi Arabia decisively undertakes reforms—both political and economic. Chapter 7 presents details on these recommended reforms.

My interest in the oil industry and its connection to Saudi Arabia dates back to the early 1970s, culminating in my PhD dissertation in 1974, *An Optimum Base for Pricing Middle Eastern Crude Oil*.[11] Over a period beginning in 1974 to the present, the Saudi economy has become increasingly dependent on oil as the government has failed to diversify and build non-oil sources of revenue.[12] Thus my interest in this subject has actually increased, leading to this research endeavor.

The main purpose of this work is to send a wake-up call to policy makers in the kingdom and to demonstrate that if nothing is done, a financial crisis that may lead to government bankruptcy is in the offing.

The book is divided into the following chapters.

Chapter 1—Anatomy of the Saudi Economy

Governments in resource-rich countries play an important role in the structure and dynamics of their economies. Saudi Arabia is an example of such a country because of the nature of its economy and the history of its economic and political development. In this chapter I analyze the structure of the Saudi economy and show that Saudi government size as measured by its GDP contribution is much more than what government statistics show. The government wants to minimize its role and magnify the private sector's contribution to GDP for purposes of claiming

a higher level of economic diversification. I also explain in this chapter that GDP is a misleading indicator for measuring economic development and growth in a natural resources–dependent country such as Saudi Arabia. The genuine savings theory, according to which oil and other natural resource depreciations are accounted for, is a better indicator of the state of the economy and its likelihood for future evolution.

Chapter 2—Government Expenditures and Revenues, 1960–2010

In this chapter I analyze government expenditures and revenues over a 50-year period (1960–2010), as classified and presented in the official budget (Budget), and I will identify various cycles of government expenditure and revenues over this period. Regression estimates will be used with the goal of shedding light on the trend of expenditures and revenues over time and the correlative value that expenditures have with certain independent variables.

Chapter 3—Forecasting Government Expenditures, Revenues, and Gaps, 2011–2030

In this chapter I use various scenarios to forecast future government expenditures and revenues over a period beginning in 2011 and ending in 2030. Each scenario is based on certain assumptions related to expenditure and revenue. This forecast will allow me to determine the gap between expenditures and revenues for each year in the referenced period.

Chapter 4—Forecasting Government Expenditures, Revenues, and Gaps, 2031–2050

The forecast for 2031 through 2050 will build on the outcome determined in chapter 3 and illustrate a likely result for 2050 on prevailing policies. The forecasts of both expenditures and revenues for the periods 2011 through 2030 and 2031 through 2050 will allow us to determine the gap between government expenditures and revenues over this entire period.

Chapter 5—Financing the Gaps

In this chapter I analyze the government's ability to finance its accumulated debt. I assume that government financial reserves will be used

in the first instance; when exhausted, the government will likely resort to borrowing locally and internationally. The magnitude of government debt relative to its financial resources and credit standing in financial markets will determine the government's ability to avoid financial and political bankruptcy.

Chapter 6—Are Saudi Government Expenditures Sustainable? (The Genuine Savings Criterion)

In this chapter I test the sustainability of government expenditures in a different way. I apply the genuine savings theory with modifications to fit an oil-dependent economy, such as Saudi Arabia. Subsequently, I run an empirical test on the actual data from the Saudi government economy for the period of 1990 through 2010 to measure what I call "government genuine saving."

Chapter 7—Is a Saudi Financial Crisis Inevitable?

In this chapter I propose a model of political, legal, administrative, and economic reforms that, if applied, will offer a chance for Saudi Arabia's government to avoid possible future crises. While the proposed strategies will aim at correcting economic and financial maladies, it is imperative that they are accompanied by political, legal, and management reforms to ensure efficient implementation of the economic reforms.

CHAPTER 1

Anatomy of the Saudi Economy

The Saudi economy is large in size but simple in structure. It is best described as a government economy within the frame of a market economy. The government owns and manages the oil and gas sector, the principal driver of the economy. The government provides a variety of public goods and services, including education, healthcare, housing, utilities, loans, subsidies, etc.[1] Moreover, the government owns major equity shares in private sector mega joint-stock companies, such as the Saudi Basic Industries Corporation (SABIC) and the Saudi Electricity Company (SEC).[2]

The private sector is heavily influenced by government subsidies, price controls, and government expenditures. The IMF has repeatedly noted in its country reports on Saudi Arabia that there is a robust relationship between government expenditures and the rest of the economy.[3]

In this chapter, I show the government's classification and measurement of the Saudi GDP; I then introduce some amendments to the government's segmentation of GDP between government and nongovernment economy to illustrate the actual size of government GDP relative to the rest of the economy. Government GDP data leans toward underestimating government's share of GDP and overestimating the private sector's share of GDP thereby hiding the enormous size and role of the government in the economy and exaggerate the role of the private sector in the economy. At the end of this chapter, I critique the government's use of GDP as a criterion to determine the status and growth of the Saudi oil-dependent economy instead of the genuine savings theory, which is more suitable to the Saudi economy.[4]

Saudi National Accounts Classification of GDP

The Trilateral Classification

The National Accounts System[5] of the Saudi government divides the country's GDP into three main sectors: oil and gas sector GDP, private sector GDP, and government sector GDP.

In algebraic form, the GDP at time t is:

$$Y_t = OY_t + GY_t + PY_t$$

where Y_t is GDP at time t, OY_t is oil and gas GDP at t, GY_t is government GDP at t, and PY_t is private GDP at t.

Figure 1.1 shows the composition of the Saudi GDP in 2010, according to the three-sector classification:

1. Oil and gas sector GDP . . . . . $220,682 million (51.2 percent)
2. Private sector GDP . . . . . $127,416 million (29.57 percent)
3. Government sector GDP . . . . . $82,834 million (19.22 percent)

The Flow Process

The three major components of the Saudi GDP are highly interdependent; the oil and gas sector owned and operated by the government

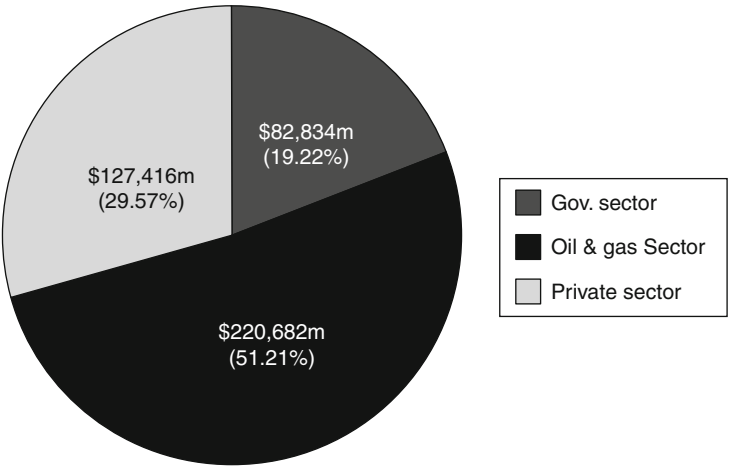


Figure 1.1 Composition of the Saudi GDP in 2010.

provided 93 percent of government revenues in the Saudi budget for the year 2012.[6] The government uses this revenue to finance its expenditures on public goods and services. Government expenditures are the driving force behind private sector economic activity and have direct and strong stimulus effects on private sector production levels. Figure 1.2 depicts the "flow" of goods and services between the three sectors. Oil and gas exploitation is the initial process, which can be said to start off the economic chain of events in most cases. Crude oil constituted 85.8 percent of total exports in 2010, and 93 percent of government revenues in 2012, and it is the catalyst of the flow process.[7]

The government uses its oil and non-oil revenue to pay for its current and capital expenditures in local and international markets. The private sector supplies the government with the goods and services it demands, either from local production or imports (amounting to $106,9 billion in 2010).[8] Thus the dynamic of the economic flow in the Saudi economy starts by excavating resources (crude oil and gas) and then spending the revenue earned from the sale of these resources on public and private consumption and investment. While this is a simplified version of the Saudi economy's flow process, it presents the essential structure.

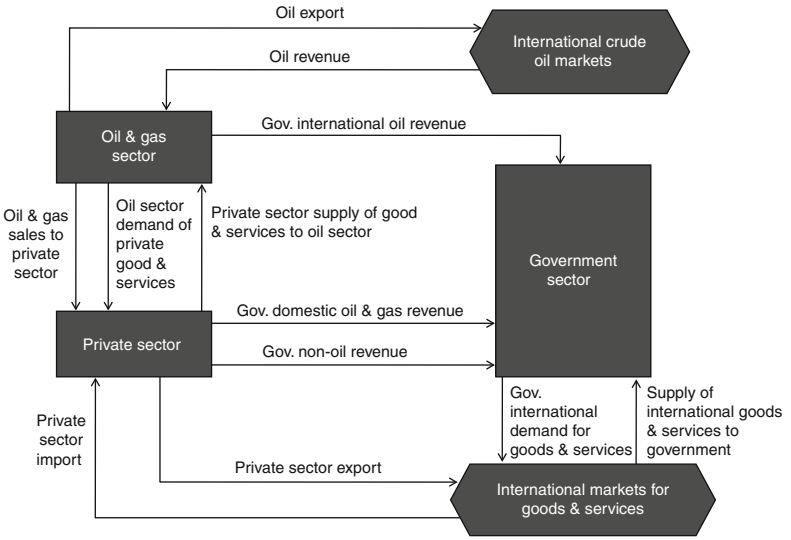


Figure 1.2 Flow of goods and services.

The Dual Classification of GDP

The National Accounting System also divides the country's GDP into two categories[9]: oil and gas GDP and non-oil GDP.

In algebraic form, Saudi GDP (Y_t) at time t is:

$$Y_t = OY_t + NOY_t$$

where OY_t is oil and gas GDP at t and NOY_t is non-oil GDP at t.

The government's reasoning behind the dual classification system is to create the image of an enhanced non-oil GDP by adding government GDP to private sector GDP. In this way the government can claim that the non-oil GDP (including import duties) is equal to or larger than oil and gas sector GDP. Such a classification is misleading, as it gives the impression that the economy has achieved a high level of diversification, while it essentially remains an exceedingly oil-dependent one.[10] Non-oil GDP in Saudi Arabia is basically government GDP plus private sector GDP, and both are heavily dependent on oil revenues.[11]

Oil extraction is erroneously labeled oil production and included in the GDP, while it is actually depletion of an existing stock of oil.[12] "Capital theory" rather than "production theory" provides the proper theoretical basis for dealing with capital stock depreciation, especially when natural resource capital is a major component of the economy.[13]

Figure 1.3 shows Saudi GDP, including import duties, pursuant to the dual classification system (year 2010).

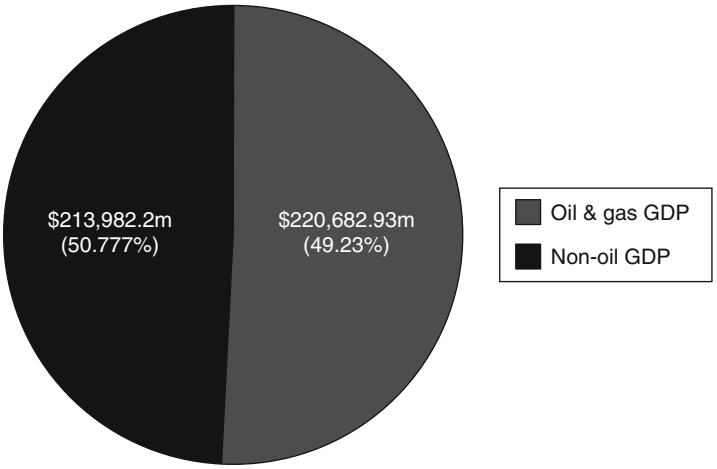


Figure 1.3 Saudi GDP, including import duties.

The GDP dual classification system does not affect the flow process. It only combines the private sector GDP and government GDP together as one group, which is labeled non-oil GDP.

Government Sector GDP

My aim in this chapter is to illustrate the actual size of the government sector in Saudi Arabia by adjusting economic figures to reflect the actual contribution of the government to GDP. I will trace various contributions of the government to the economy, as well as its ownership of loans and equities, in both the oil and private sectors. To this end, I examine the following factors: government ownership and management of the oil and gas sector, government expenditures and its contribution to private sector GDP, government ownership of loans and equity in the private sector, and government subsidies to the private sector.

Government Ownership of the Oil and Gas Sector

The Saudi government legally owns all oil and gas reserves in the country (discovered or not yet discovered), and Aramco, the Saudi government oil and gas giant, operates all oil and gas facilities, including refineries. Aramco is also charged with the domestic and international sale of all petroleum and gas products, crude or refined. The company reverted to full government ownership in 1980.

Government Expenditure and Its Contribution to Private Sector GDP

The government's direct expenditures cover many parts of the economy, including defense and security, education, health, transportation, agriculture, trade and industry, housing, and communication. As a result, the Saudi government materially influences the Saudi economy in both the public and private sectors. To assess the relationship between government expenditures and private sector GDP, the IMF undertook a cointegration analysis in 1998. The cointegration analysis sought to model this relationship using "time-series" for the period between 1969 and 1997.[14] The study was based on official data with respect to private sector GDP using 1970 prices applied constantly, and actual budget expenditures at constant prices, deflated by the implicit GDP deflator for the non-oil sector. The main conclusion of the analysis was that "for the entire period 1969–97, growth of non-oil private GDP in Saudi

Arabia seems strongly and positively correlated with budget expenditure. An increase of 1 percent in total government expenditure may generate about 0.5 percent increase in private sector GDP."[15] In 2005, another IMF report asked the same question: Is government expenditure driving private sector non-oil growth? The answer was the same: that government expenditure continues to have a significant impact on private sector growth. The report adds that the effect of government expenditures on private non-oil activity is both indirect, through wages and salaries for government employees, and direct, through the government's procurement of goods and services and public investment projects carried out by private sector companies.

It is indisputable that government expenditures have a strong direct effect on private sector GDP and its growth. While it is common for government expenditures to affect private sector economic activity, in Saudi Arabia, the correlation between the two variables (as illustrated by these two IMF studies) is high, indicating both that the government sector dominates the rest of the economy and that private sector GDP is inflated in size and growth by government expenditures.

Many other reports, including the IMF Article IV country report, have observed the high correlation between government expenditures and private sector GDP.[16] [17] The government depends largely on the private sector for the supply of goods and services needed for both consumption and investments. Accordingly, it is assumed that 40 percent to 60 percent of private sector GDP is a product of current and past government expenditures and should be deducted from private sector GDP and added to government GDP for statistical purposes.

Government Ownership of Equity and Loans in the Private Sector

The industrial sector is the main "private" contributor to private sector GDP; this sector includes petrochemicals, refineries, cement, iron, minerals, etc. The government owns sizable shares in all of these subsectors. Ownership is in the form of holding part of the respective sectors' loans and equity, which entitles the government to appoint the chairmen and some of the board members, who are usually senior government employees. In SABIC, for example, the Saudi petrochemical conglomerate with affiliates in the downstream petrochemical and iron sectors, the government holds 75.3 percent equity.[18] In the telecommunications sector, the government owns 83.6 percent of the largest telecommunications company, the Saudi Telecom Company

(STC). Thus, it is not only on the expenditures side that the government influences private sector production, but as owner of equity capital and soft loans, the government holds and controls a substantial part of the production facilities in the non-oil private sector. Tables 1.1 and 1.2 list government ownership of equity in private sector corporations.

As of 2011, the government holds over 11.11 billion shares out of 26.76 billion shares of 46 private sector companies or entities.[19] The preceding tables list the companies or entities in which the government has more than 50 percent equity holding; as one can observe, this averages 75.3 percent equity holding by the government for the six companies. The total shares issued by these six companies account for 38.7 percent of the total shares of the 46 private sector companies surveyed. These facts unambiguously confirm the significant role of government in support of the private sector. As far as loans are concerned to the private

Table 1.1 Saudi government's shares in the private sector (companies in which the government entities together hold more than a 50 percent share)

		Percentage Share				
Entity/ Company Name	*Sector Name*	*General Investment % (PIF)**	*General Social Insurance % (GOSI)*	*General Retirement Fund % (PPA)*	*Other Gov. Bodies %*	*Total Gov. Ownership %*
Saudi Telecom	Telecomm	70.0	7.00	6.60		83.60
Saudi Basic Industries Corp	Petrochemical	5.30	70.00			75.30
Saudi Electricity Company	Energy & Utilities				74.30	74.30
Saudi Arabian Mining Company	Industrial Investment	50	9.6	7.2		66.80
Saudi Real Estate Co.	Real Estate	64.5				64.50
Southern Province Cement Co	Cement	37.50	15.40			52.90

Source: Tadawul, Saudi Stock Market Authority 2011
*PIF is the Public Investment Fund

Table 1.2 Saudi government's shares in the private sector (estimated shares held by government entities)

Entity/Company Name	*Issued Shares Total (A)*	*Floated Issued Shares Total*	*% Gov. Ownership (B)*	*Shares Held by the Govt. (A) × (B)*
7010 – Saudi Telecom	2,000,000,000	325,275,767	83.60	1,672,000,000
2010 – Saudi Basic Industries Corp	3,000,000,000	652,794,103	75.30	2,259,000,000
5110 – Saudi Electricity Company	4,166,593,815	715,804,529	74.30	3,095,779,205
1211 – Saudi Arabian Mining Company	925,000,000	306,258,578	66.80	617,900,000
4020 – Saudi Real Estate Co.	120,000,000	36,771,864	64.50	77,400,000
3050 – Southern Province Cement Co	140,000,000	59,274,865	52.90	74,060,000
Total(Above 6 Companies)	10,351,593,815	2,096,179,706	75.31	7,796,139,205
All Other Entities/ Companies	16,410,642,771	9,091,438,125	20.21	3,316,669,978
Total (All 46 Entities/ companies)	26,762,236,586	11,187,617,831	41.52	11,112,809,182

Source: Tadawul, Saudi Stock Market Authority, 2011

sector, the government has financed not only a large part of the petrochemical industry, but also most of the other private sector industries. These include agriculture companies, real estate development companies, and hospitals, all through five specialized credit institutions. These institutions disbursed a total credit amount of $56.96 billion during the period 1987 through 2010, as table 1.3 demonstrates. The magnitude of credit disbursement would be much higher if one added disbursements made prior to 1987. As of 2010, the total outstanding government loans to these private institutions stood at $51.12 billion. Of these outstanding loans, the Real Estate Development Fund (REDF) has disbursed the largest share of about $20.69 billion, followed by $13.573 billion in loans made by the Public Investment Fund (PIF), and $6.613 billion by the Saudi Industrial Development Fund (SIDF).[20]

The foregoing demonstrates that government capital, either in the form of equity or in the form of loans, contributes generously to private

Table 1.3 Government specialized credit institutions (credit disbursements in USD Million)

Year	*ADF*	*SCSB*	*PIF*	*SIDF*	*REDF*	*Total*
1987	185.07	72.80	101.87	144.53	1,059.20	1,563.47
1988	167.20	76.80	34.67	117.33	903.73	1,299.73
1989	173.60	86.40	672.00	220.80	794.13	1,946.93
1990	177.07	73.07	97.07	177.87	652.00	1,177.07
1991	160.27	73.60	11.73	280.00	464.00	989.60
1992	184.00	74.67	5.33	314.40	714.13	1,292.53
1993	205.07	88.27	1.60	281.33	862.67	1,438.93
1994	145.87	75.47	0.00	357.60	1,269.60	1,848.53
1995	96.80	78.93	31.47	534.93	995.20	1,737.07
1996	69.87	84.00	80.00	533.87	640.27	1,408.00
1997	114.67	89.87	144.53	536.53	594.13	1,479.73
1998	161.33	94.13	248.00	512.53	435.47	1,451.47
1999	184.27	81.07	316.00	332.27	604.00	1,517.60
2000	210.67	85.60	287.47	288.80	501.60	1,374.13
2001	294.40	84.80	469.07	257.33	595.20	1,700.80
2002	352.00	92.80	1,430.40	325.33	603.73	2,804.27
2003	177.33	136.53	360.53	349.87	602.93	1,627.20
2004	173.87	120.53	224.27	471.47	472.80	1,462.93
2005	260.53	130.93	688.53	574.93	670.93	2,325.60
2006	192.80	196.27	485.33	786.93	1,057.33	2,718.67
2007	177.33	277.33	1,868.27	1,131.73	948.80	4,403.20
2008	164.27	2,450.67	2,866.67	1,348.27	1,330.13	8,160.00
2009	160.80	1,766.93	4,133.87	1,242.40	1,407.73	8,711.73
2010	165.87	1,172.27	2,490.67	1,733.87	1,800.27	7,362.93
Total	4,354.93	7,563.47	17,049.33	12,855.20	19,979.47	61,80187

Source: SAMA Annual Report, 2011

sector capital and its production base, ultimately becoming the essential factor to private sector GDP. Needless to say, the government's low-cost capital contribution that finances the capital base of the private sector is manifest; in all cases, I have assumed standard return on government equity and loans to the private sector, via dividend distribution, which ultimately becomes part of the government's annual income and GDP.

The IMF Article IV country report has pronounced this link between the Saudi government and private sector. The 2005 report stated: "The boundaries between the private and public sectors in Saudi Arabia are not always clear-cut. Majority state-owned companies as well as public-private partnership are recorded as part of private sector, because the majority of these enterprises (e.g. SABIC) are run on a commercial basis."[21]

The Effect of Government Subsidies on Private Sector GDP

The government has used input subsidies and price controls to enhance private sector production. Subsidies and price controls are used with the goal of increasing private sector production and profit. As a result of these heavy subsidies, private sector production capacity has expanded. Government's direct and indirect interventions to influence profit margins in the private sector have included capital and credit subsidies, raw material subsidies, utility subsidies, land subsidies, and procurement price control.

Substantial financial and other resources have been extended to the industrial sector by the government through the PIF and the SIDF in the form of concessional loans, low-cost energy subsidies, and low rents on industrial land in modern industrial zones that were developed under government auspices. The SIDF provides loans of up to 50 percent of the total cost of approved projects on concessionary terms. The PIF finances up to 30 percent of the capital requirement for projects that are supported by the SIDF. The PIF has also contributed equity to mega petrochemical projects. The manufacturing sector expanded at about 8 percent per year in real terms from 1980 through 1989, mainly due to government financial and nonfinancial support. In addition, the growth rate slowed down to 2 percent a year from 1992 through 1997, reflecting a sharp reduction in government incentives, including a reduction in the volume of concessional loans from the PIF and the SIDF and the adverse impact of tighter fiscal policies.[22] Driven by the establishment of the two industrial cities of Jubail and Yanbu, the share of manufacturing (excluding refinery manufacturing) increased threefold from 4 percent of non-oil GDP in 1995 to 12 percent of non-oil GDP in 2004.[23]

The government introduced a wheat support price in 1979 and increased it to SR3.5 ($.93) per kilogram in 1980. A big profit margin was created in the agriculture sector, and particularly in wheat production, due to government price control and other subsidies to the sector from the Saudi Agriculture Bank (SAB). The agriculture sector's production also expanded, driven by government subsidies for machinery, fertilizers, etc., in addition to price control. Government support to the agriculture sector reached $2.346 billion in 1992. However, when the government dropped its price control, wheat production fell from 4.1 million metric tons in 1992 to 1.2 million metric tons in 1996.[24]

The construction sector has also benefitted from government construction and infrastructure projects. For example, the Saudi government required all foreign companies awarded government projects to subcontract 30 percent of their contracts to Saudi contractors[25].

REDF, one of the government's special credit institutions, provides long-term housing loans to the public. Electricity and water are provided by the government to the private sector and to the public at a price that is significantly below production costs. The government heavily subsidizes the SEC through credit facilities from the SIDF and the PIF, and by providing low-cost oil and gas for its generators. The desalination organization, which provides most of the water supply, receives substantial credit support from the government, and is charged a low rate for the oil and gas it uses to run its plants.

All government subsidies are translated into low-cost tariffs at the concessionary rate for capital and loans from the government. For example, the cost of production of desalinated water was estimated at SR2.79 ($.74) per cubic meter in 1996, but water was sold to the private sector at SR0.12 ($.032) per cubic meter.

With the government's strong efforts to create a robust business environment with high profit margins, private investments increased from an average of about 6 percent of GDP from 1980 through 1981, to about 12 percent of GDP from 1992 through 1997. A large share of private investments went to agriculture, manufacturing, and services. These investments were financed by long-term loans from government special credit institutions, (such as the PIF, SIDF, SAB, and REDF, as discussed) at below-market interest rates. The private sector expanded at about 10 percent a year in real terms from 1980 through 1984.[26]

It must be said that the strong, fundamental participation of the government in supporting the private sector's production base for such a long period of time results in a sign of weakness in the foundation of the Saudi private sector. To demonstrate the latter weakness, I set out the result of an IMF model that tested private sector investment productivity below.[27] The model investigated the contribution of factors of production capital (K) and labor (L) and a residual representing total factor productivity (TFP). The model is based on the standard Cobb-Douglas production function:

(1) $Y_t = AK_t^{\alpha} L_t^{(1-\alpha)}$

(2) $$\frac{\Delta Y_t}{Y_{t-1}} = \frac{\Delta A_t}{A_{t-1}} + \frac{\alpha \Delta K_t}{\Delta K_{t-1}} + \frac{(1-\alpha)\Delta L_t}{\Delta L_{t-1}}$$

(3) *TFP is measured by:* $$\frac{\Delta A_t}{\Delta L_{t-1}}$$

where Y_t is the non-oil GDP at factor cost at t, K_t is the non-oil capital stock at t, and L_t is the labor employed in the non-oil sector at t.

Table 1.4 Non-oil GDP growth and factor contribution to growth (1975–2004, average contribution to gross in period, in percentage points)

Period	*Non-Oil GDP*	*Capital*	*Labor*	*TFP*
1975–2004	4.1	1.4	2.5	0.2
1975–81	7.1	–0.1	3.7	3.5
1982–95	1.1	2.4	2.7	–4.0
1996–2004	3.8	1.0	1.2	1.5

Sources: SAMA and Fund Staff calculation

Level of Total Factor Productivity

The test covered the period from 1975 through 2004 and shows that variations in total productivity in nominal GDP reflect changes in factor utilization, which is in turn related to fluctuation in oil income rather than technical change (see table 1.4). Thus, overall growth relied primarily on factor input growth. The low contribution of TFP and its long-term decline indicate that investment in the Saudi non-oil economy has not been, on average, very efficient.

Adjusting Government Sector GDP

The interplay between three main factors has contributed to the inflation of private sector GDP and the deflation of government sector GDP: government expenditures, government subsidies, and government ownership of loans and equity in the private sector.

The last factor is partly made up by dividends and payments of interest by the private sector back to the government, though as mentioned, the repayment is made at a concessionary government rate. I have performed an analysis below that does not add the contribution of these factors to government GDP or subtract it from private sector GDP. I have adjusted government sector GDP by subtracting the contribution of government expenditures from private sector GDP and adding it to government GDP, as well as adding oil and gas sector GDP to government GDP. Cumulative government expenditures in a particular year result in the addition of 50 percent to private sector GDP in that same year. Accordingly, the adjusted government GDP for 2010 is:

SR827,561 million + SR310,628 million + SR238,905 million = SR1,377,094 million ($367.2 billion).

Thus government GDP accounts for 85.2 percent of the Saudi economy instead of the 19.2 percent indicated by government data.

Adjusting Private Sector GDP

If oil and gas sector GDP is part of government GDP, private GDP is the difference between total GDP and government GDP, which is:

SR1,615,999 million – SR1,377,094 million = SR238,905 million ($63,708 billion)

Thus adjusted private sector GDP actually equals one half of government reported private sector GDP.

Private sector GDP accordingly represents 14.8 percent of Saudi GDP in this sample, and not the 29.6 percent as shown by government national accounts.

Figure 1.4 shows adjusted government GDP and adjusted private sector GDP.

Adjusting GDP

Oil and gas extraction makes up a portion of Saudi GDP according to government statistics. The issue of treating mineral depletion as stock

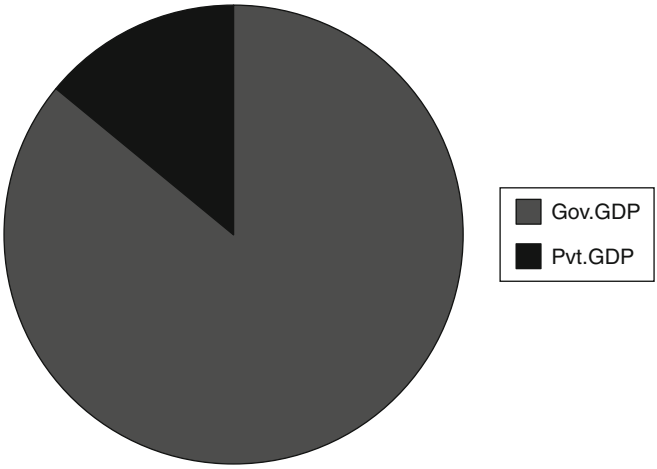


Figure 1.4 Adjusted government GDP and adjusted private sector GDP.

depreciation in economic literature was first articulated by Lewis C. Gray in 1914 and then by Harold Hoteling in 1931.[28]

After the Brundtland Commission in 1987 and the Earth Summit in 1992, all countries were encouraged to pursue programs of "sustainable development." Economists were central to these projects of sustainability and provided the theory and policies for the attainment of long-term economic sustainability. Oil and other natural resources extraction was treated as depreciation of national wealth and not just a mere production of goods. The genuine savings theory was introduced to replace GDP to measure the state of an economy and its future development, especially in natural resource–dependent countries, such as Saudi Arabia.

The GDP, NDP, or NNI of Saudi Arabia is inflated by the value of oil and gas rent. I have assumed that the rent value of oil and gas is equal to 90 percent of its market value, with the remaining 10 percent representing the cost of extracting a barrel of crude oil.

Saudi government statistics erroneously inflate the size of the economy by labeling the extraction of oil and gas as production and adding it to GDP. Such a classification of oil-wealth depletion as a form of production presents a misleading picture to the public and decision makers within Saudi Arabia and may lead to counterproductive economic plans and policies.

For purposes of the below analysis, I will restructure the classification of oil and gas sector GDP by allowing only 10 percent of its value to be classified as production, representing the cost of extracting a barrel of oil. The rest of reported oil and gas sector GDP in government data will be taken out of the total value Saudi Arabian GDP. The new GDP is a so-called green GDP for Saudi Arabia:[29]

Oil and gas production (2010) = $220,682 million (10%) = $ 22,068 m
Oil and gas depletion (2010) = $220,682 million – $22,068mmillion
= $ 198,614 million.

Accordingly, Saudi Arabian green GDP in 2010 was the total GDP reported by government, $430,933 million, minus the oil and gas extraction value of $198,614 million:

$ 430,933 million – $198,614 million = $233,319 million.

As seen in table 1.5 and figure 1.5, the adjusted total green GDP is 54 percent less than that which was reported by the government.

Table 1.5 Adjustments in GDP 2010 (USD Million)

			Effect of Government Expenditure on Pvt. GDP					
Sources	*GDP*	*%*	*40%*	*%*	*50%*	*%*	*60%*	*%*
Oil & gas GDP	220,683	51.2	220,683	51.2	220,683	51.2	220,683	51.2
Government non-oil GDP	82,834	19.2	82,834	19.2	82,834	19.2	82,834	19.2
Pvt.GDP due to Gov. Exp	0	0	50,966	11.8	63,708	14.8	76,450	17.7
Total Government GDP	303,517	70.4	354,483	82.3	367,225	85.2	379,967	88.2
Private non-oil GDP	127,416	29.6	76,450	17.7	63,708	14.8	50,966	11.8
Total GDP*	430,933	100	430,933	100	430,933	100	430,933	100

*Total GDP excluding import duties

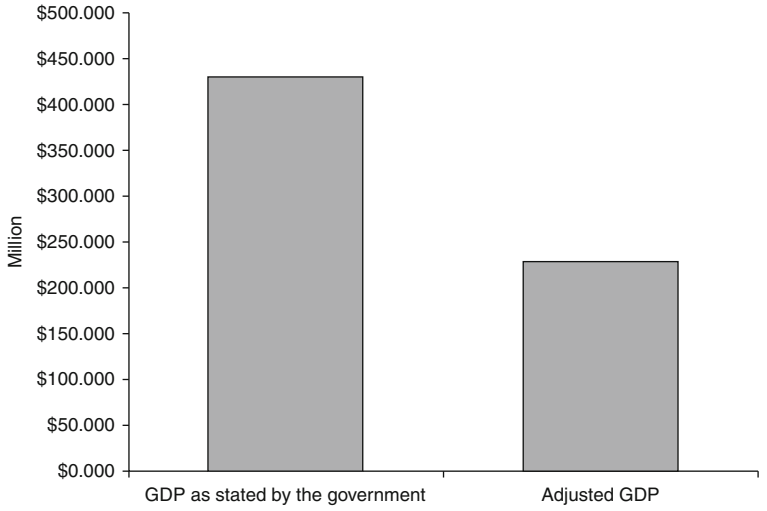


Figure 1.5 2010 GDP.

Conclusion

GDP figures reported by official Saudi statistics minimize government GDP and maximize private sector GDP by not adding oil and gas sector GDP to government GDP. This results in the perception of a more

robust private sector presence than that which exists. The oil and gas sector is owned and operated by the government, and it should clearly be part of government GDP in any honest analysis. The result increases government GDP and decreases nongovernment GDP in equal, massive amounts. The government's motive of emphasizing its success in building a private economy is ultimately misleading. This chapter unambiguously shows that the size of the government in the Saudi economy is much larger than what government statistics show, which makes the Saudi economy highly dependent on the government's fiscal conditions. Government expenditures are highly dependent on oil revenues, and oil is an exhaustible nonrenewable commodity, with its long-term future subject to many changing forces. Thus it is strategically dangerous to leave the fate of future generations of Saudis to this diminishing source of income, while misleading statistics threaten to keep policy makers complacent in their development of important private sector economies.

In the following chapters, I will analyze government expenditures and revenues over a 50-year period (1960–2010) in order to help shed light on the historical evolution of the government's economy and its fiscal policy. With this understanding, one may predict future trends of government expenditures and revenues, which will in turn lead us to gauge the gap between the two, and ultimately see whether the government will be able to sustain its expenditures over a long period of time.

CHAPTER 2

Government Expenditures and Revenues, 1960–2010

Part A: Expenditures

Government expenditures play an integral role in Saudi Arabia's social and economic development. When the kingdom was established in 1932, there were no modern amenities. Roads, schools, and hospitals did not exist, and electricity was scarce. Indeed, Saudi Arabia was among the world's poorest countries.[1] The *hijaz*, or the western portion of Saudi Arabia, was slightly better off due to income generated from pilgrims visiting the holy cities of Mecca and Medina.[2]

When oil was discovered in 1938, the oil fields along with the revenues they generated were owned in their entirety by the Saudi government. Unsurprisingly, as demonstrated, government expenditures became the source and tool of economic development. In our analysis of long-term government fiscal sustainability, government expenditures are a main variable in the model. In reality, government expenditures are the main fiscal tool in Saudi Arabia; there is no effective tax system in place. Saudis do not pay income tax or any indirect tax; they only pay a discretionary Islamic tax, which is left to the individual's will and not levied by the government.

In this chapter, I will analyze government expenditures and revenues during the reference period of 1960 through 2010. Regression equations will be used to explain the correlation between government expenditures and revenues, certain dependent variables, and a number of independent variables. The analysis will show four economic cycles that I have identified in the reference period, reflected through cycles of government expenditures and revenues. The regression analysis will allow us to make certain rational assumptions for the purpose of forecasting future government expenditures and revenues in Saudi Arabia.

Methodology

I will subject government expenditures and revenues during the reference period to linear regression analysis using a number of specifications; however, I will first examine the four aforementioned cycles, and then proceed to examine the reference period as a whole.

Regression Analysis

Denoting the dependent variable in time "t" by Y_t and the independent variables in t (time) by X_ts, the following types of specifications are considered for the analysis:

i. Linear Time Trend: $Y_t = \alpha + \beta.t$
ii. Semi-log Time Trend: $\text{Ln}(Y_t) = \alpha + \beta.t$

The latter is the linear transformation of the exponential equation $Y_t = A.e\beta t$ in which β represents the instantaneous growth rate and $\alpha = \text{Ln}(A)$. The equation also represents, $Y_t = a.bt$, where $\alpha = \text{Ln}(a)$ and $\beta = \text{Ln}(b)$, b denoting $(1 + g)$, g being annual compound growth rate:

iii. Linear Relationship: $Yt = \alpha + \beta 1 \times 1t + \beta 2 \times 2t + \ldots$
iv. Autoregressive Relationship: $Yt = \alpha + \beta 1 \times Yt\text{-}1 + \beta 2 \times 1t + \ldots$

Government Expenditures (1960–2010): Four Economic Cycles

Shortly after the end of World War II, Saudi oil exports increased, and oil revenues began to fill the Saudi government's empty pockets with hard currency.[3] The government, whose main concern at the time was managing what little income trickled into the kingdom in order to meet its needs, suddenly found itself with more money than it ever expected. The kings began spending in every area imaginable.

King Abdulaziz and his eldest son King Saud actually finished by spending more than what government revenue could sustain. In 1952, the King Saud–led government was on the verge of bankruptcy. This financial crisis was contained with the help of an IMF team that was charged with implementing discipline into the government's fiscal system. In 1960, the IMF stabilization system was already showing positive results and government fiscal system began to function.[4]

The government's expenditures over the reference period are listed in table 2.1, which will be our "database" for analyzing expenditures

Table 2.1 Government actual expenditure (USD Million)

	Expenditure				*Expenditure*		
Year	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*	*Year*	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*
1960	325	151	476	1986	26,372	10,274	36,646
1961	381	196	578	1987	35,845	13,467	49,312
1962	439	215	654	1988	31,009	6,553	37,562
1963	556	160	716	1989	31,547	9,751	41,299
1964	627	203	830	1990	44,645	11,270	55,915
1965	682	374	1,056	1991	55,943	18,122	74,065
1966	882	458	1,340	1992	43,293	20,437	63,730
1967	744	573	1,317	1993	49,301	803	50,104
1968	884	592	1,476	1994	43,035	639	43,674
1969	1,027	580	1,607	1995	39,674	6,711	46,385
1970	1,064	614	1,678	1996	45,669	7,162	52,831
1971	1,268	900	2,168	1997	58,368	638	59,006
1972	1,508	1,201	2,709	1998	45,643	5,039	50,683
1973	2,259	2,700	4,959	1999	44,585	4,439	49,024
1974	4,055	5,289	9,344	2000	57,855	4,897	62,753
1975	10,115	11,548	21,663	2001	59,602	8,435	68,037
1976	19,632	14,574	34,206	2002	54,267	8,000	62,267
1977	19,045	17,768	36,813	2003	59,608	8,925	68,533
1978	22,263	17,182	39,446	2004	66,040	10,014	76,053
1979	27,319	22,207	49,526	2005	75,779	16,614	92,393
1980	35,376	27,758	63,135	2006	85,976	18,910	104,886
1981	30,303	45,604	75,907	2007	92,586	31,746	124,333
1982	27,266	38,044	65,310	2008	103,690	34,995	138,685
1983	33,081	28,302	61,383	2009	111,092	47,957	159,049
1984	32,452	25,245	57,697	2010	121,345	53,025	174,369
1985	31,964	17,104	49,068				

Source: SAMA, 47th Annual Report, 2011

over this period.[5] I have identified four periods, or cycles, during the reference period. Government expenditure patterns in each one of the four cycles will be presented, and ultimately, an analysis of the behavior of government expenditures over the entire reference period will be hypothesized. Regression analysis with government expenditures as the dependent variable, and a set of independent variables, will be used to determine the correlation between expenditures and those independent variables that have an effect on expenditures over the reference period.

The official exchange rate used for this analysis is $1 = SR3.75.

The graph in figure 2.1 depicts the movements in total expenditures during the reference period.

The reference period is of course replete with domestic, regional, and international events of both political and economic significance that had material implications for the Saudi economy. The single biggest event that drastically changed the economic scenario in Saudi Arabia, transforming the traditional economy into a modern welfare state, is the formation of Organization of the Petroleum Exporting Countries (OPEC) in 1960 and the resulting increase in oil prices. This rise in oil prices began in 1971 and increased in late 1973.[6]

Actual government expenditure (as referenced in table 2.1) gradually but persistently rose from $0.48 billion in 1960 to $2.72 billion in 1972,

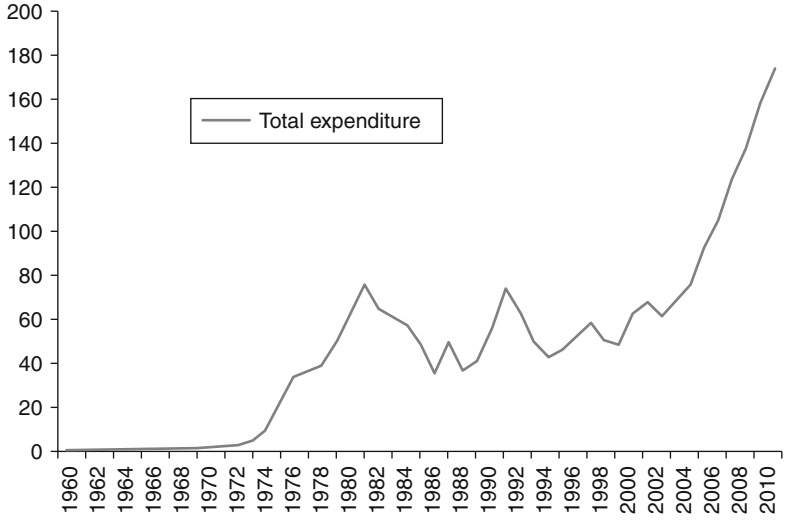


Figure 2.1 Government total expenditure 1960–2010 (USD Billion).

with the exception of a brief period in 1967 when they fell slightly. In 1973, when oil prices rose as a result of regional conflict, government expenditures jumped to $4.96 billion and continued to rise until they reached a peak of $75.92 billion in 1981. Soon after, they began to decline again, reaching a low of $37.573 billion in 1988. In the years of 1990 through 1991, there was another price peak, less dependent on economic factors but more a function of the invasion and liberation of Kuwait. Declining oil prices continued through 1995, while government expenditures rose sharply because of the Kuwait war. As a result, government debt rose, reaching 103.5 percent of GDP in 1999.[7] In subsequent years, there was a slight but consistent increase in the price of oil, with substantial oscillations throughout. Since 2002, a strong positive trend has set in and a steep rise in government expenditure has taken place, increasing from $62.266 billion in 2002 to $174.373 billion in 2010. The kingdom planned to spend $184 billion in the year 2012.[8]

Four budgetary periods can be clearly identified during which certain variables depict markedly different behavior. They are denoted in table 2.1 by double lines between periods. These periods are discussed below. The data was published in Saudi Riyal denomination, and I have converted it to US dollars for comparison.[9]

1960–1972: Moderate Expansion Cycle

This cycle saw moderate expansion in government revenues and expenditures. During this period revenues grew at a moderate pace until 1969 after which they exhibited steep increases. The moderate pace of expenditure growth continued until 1970 after which it also showed a sharp upturn. The relevant data for this analysis period are presented in the table 2.2.

A graphic representation of budgetary variables for the period 1960–1972 is presented in figure 2.2 to illustrate the path of the main budgetary variables in this period.

1973–1982: The Boom Cycle

This is the cycle in which the kingdom was transformed from a traditional economy into a modern welfare state. During this period, there was a surge in government revenues as a result of the steep rise in crude oil prices. Revenues peaked in 1981. Concurrently, there were major expansions in the government and a large number of

Table 2.2 In USD Million, 1960–1972

	Expenditure		
Year	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*
1960	325	151	476
1961	381	196	578
1962	439	215	654
1963	556	160	716
1964	627	203	830
1965	682	374	1,056
1966	882	458	1,340
1967	744	573	1,317
1968	884	592	1,476
1969	1,027	580	1,607
1970	1,064	614	1,678
1971	1,268	900	2,168
1972	1,508	1,201	2,709

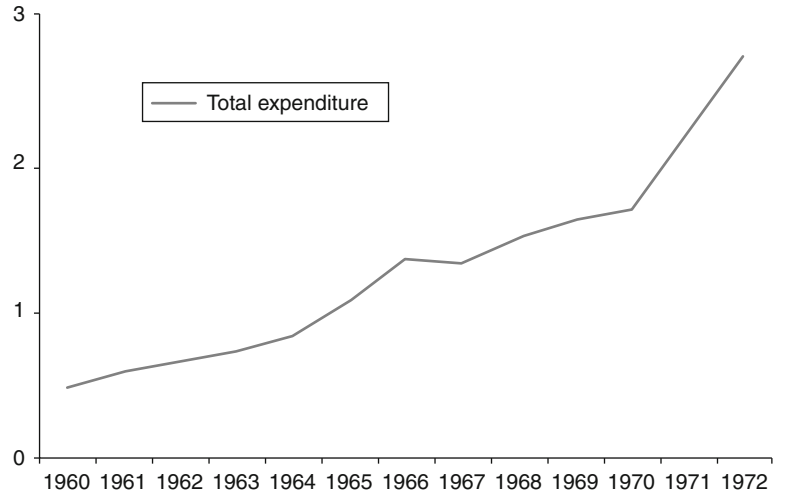


Figure 2.2 Government total expenditure 1960–1972 (USD Billion).

infrastructure projects were undertaken.[10] As a result, both current and capital expenditures also expanded. Expenditures in this period are outlined in table 2.3 and a graphic representation is demonstrated in figure 2.3.

Table 2.3 In USD Million, 1973–1982

	Expenditure		
Year	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*
1973	2,259	2,700	4,959
1974	4,055	5,289	9,344
1975	10,115	11,548	21,663
1976	19,632	14,574	34,206
1977	19,045	17,768	36,813
1978	22,263	17,182	39,446
1979	27,319	22,207	49,526
1980	35,376	27,758	63,135
1981	30,303	45,604	75,907
1982	27,266	38,044	65,310

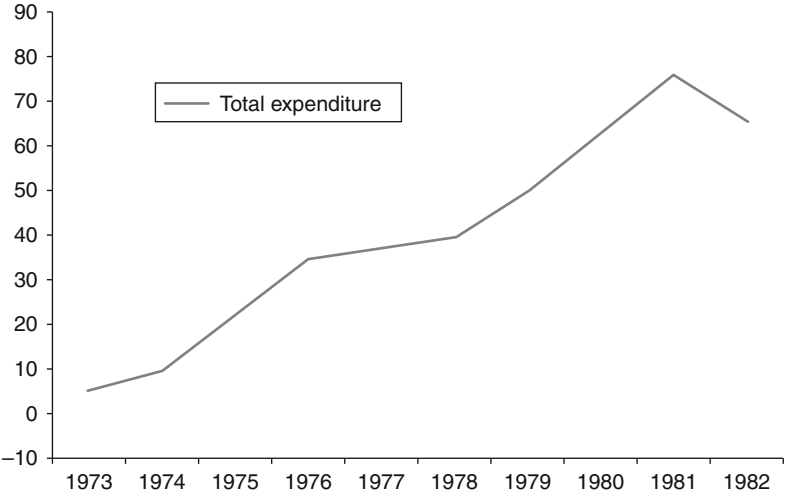


Figure 2.3 Government total expenditure 1973–1982 (USD Billion).

1983–2002: The Deficit Cycle

During this cycle, oil prices dropped precipitously resulting in much lower revenues and thus much lower expenditures. This period was marred by budgetary deficits with the exception of the budget of year 2000 when there was a relatively small surplus of $5.466 billion. During this period as well, government reserves that were accumulated in the previous period were exhausted, and the government had to resort to

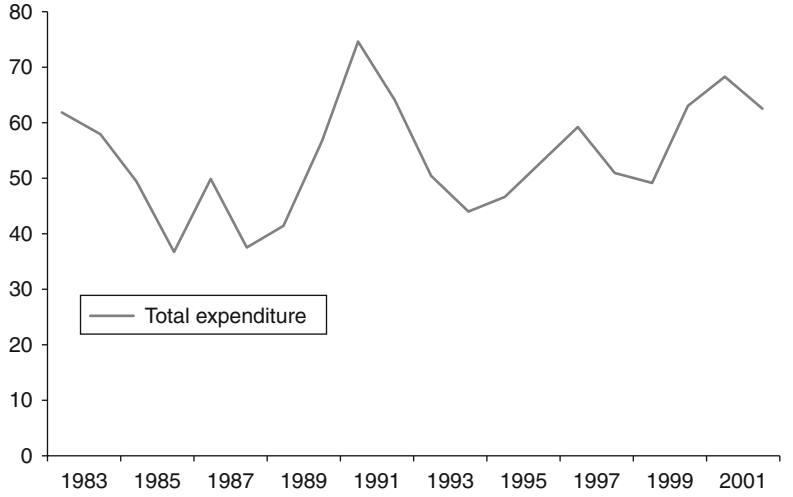


Figure 2.4 Government total expenditure 1983–2002 (USD Billion).

Table 2.4 In USD Million, 1983–2002

	Expenditure		
Year	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*
1983	33,081	28,302	61,383
1984	32,452	25,245	57,697
1985	31,964	17,104	49,068
1986	26,372	10,274	36,646
1987	35,845	13,467	49,312
1988	31,009	6,553	37,562
1989	31,547	9,751	41,299
1990	44,645	11,270	55,915
1991	55,943	18,122	74,065
1992	43,293	20,437	63,730
1993	49,301	803	50,104
1994	43,035	639	43,674
1995	39,674	6,711	46,385
1996	45,669	7,162	52,831
1997	58,368	638	59,006
1998	45,643	5,039	50,683
1999	44,585	4,439	49,024
2000	57,855	4,897	62,753
2001	59,602	8,435	68,037
2002	54,267	8,000	62,267

both domestic and international borrowing. This period also witnessed the Iran-Iraq war and the Iraqi invasion of Kuwait. Expenditure data for this period are presented in table 2.4.

A graphic representation of government expenditures during the deficit cycle is in figure 2.4.

2003–2010: The Second Boom Cycle

During this cycle oil prices began to rise once again, riding the wave of strong demand for crude oil, particularly from the emerging economies of India and China. Consequently, oil revenues increased sharply, peaking in 2008 despite the financial crisis that emanated from the West and pulled down the global economy. Some countries, however, including Saudi Arabia, India, and China, experienced relatively lower levels of financial adversity.

As a result of the increase in oil revenues during this period, budgetary expenditures in Saudi Arabia also increased, nevertheless leaving a total surplus of $0.373 trillion. Every year in the second boom cycle witnessed a budgetary surplus, except in 2009 when there was a deficit of $23.093 billion. Toward the latter part of this period, the government undertook measures to prevent the global crisis from adversely affecting the Saudi economy. This was done through an economic stimulus that involved spending $400 billion over five years to boost economic activity in the kingdom. Several large infrastructure projects were undertaken as well, such as the construction of many economic cities and districts. Additionally, government sector salaries were substantially increased, and a huge one-time allowance was paid under an expenditure account. The data for the period are presented in table 2.5.

Table 2.5 In USD Million, 2003–2010

	Expenditure		
Year	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*
2003	59,608	8,925	68,533
2004	66,040	10,014	76,053
2005	75,779	16,614	92,393
2006	85,976	18,910	104,886
2007	92,586	31,746	124,333
2008	103,690	34,995	138,685
2009	111,092	47,957	159,049
2010	121,345	53,025	174,369

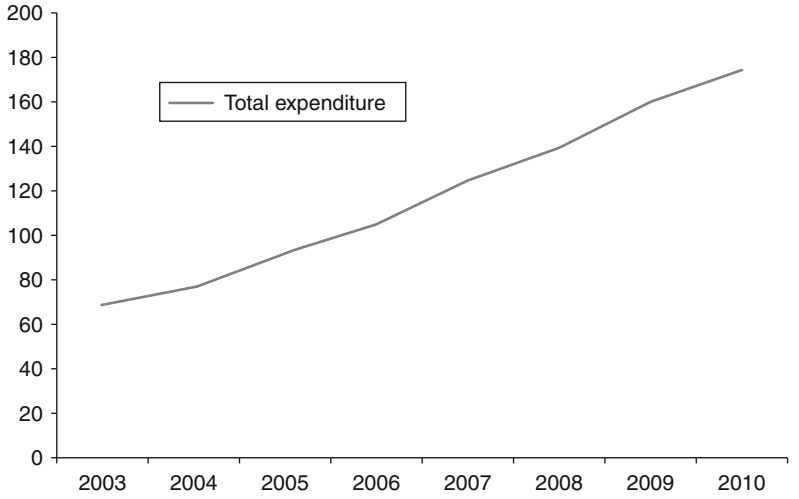


Figure 2.5 Government total expenditure 2003–2010 (USD Billion).

A graphic representation of government expenditures during the period 2003–2010 is given in figure 2.5.

Further Intercycle Analysis: Four Economic Cycles

During the period starting 1960 through 1969, there was a slow increase in revenues and expenditures that was accompanied by constant budgetary deficits. Beginning in 1970, however, there was a steep increase in revenues and, in turn, expenditures, but a budgetary surplus remained. When revenues fell from 1976 through 1978, deficits again surfaced in 1977 and 1978. After 1978, there was a rapid increase in revenues and expenditures, with revenues rising much faster than expenditures, until 1981, leading to huge surpluses. However, in 1982, when both revenues and expenditures dropped sharply, the drop in revenue was steeper than expenditures, indicating the Saudi government's inability to quickly adjust to lower revenues on a year-to-year basis. The deficit cycle continued to witness budgetary deficits throughout, despite revenues oftentimes rising from the previous year. The only exception was in 2000. During the second boom cycle, both expenditures and revenues rose on average. While increases in expenditures were without any dips at all, there was often serious fluctuation in revenues year to year. The movement in revenues affects the explanatory power of some equations.[11]

During the period 1960 through 1972, the annual increase in total expenditures was over $162 million ($88 million in current expenditures and $74 million in capital expenditures) as per the linear time trend equations. Current expenditures registered an annual compound growth rate (ACGR) of over 12 percent, whereas capital expenditures had an ACGR of over 18 percent during the same time period. These moderately high growth rates may be attributed to a small base. During the period 1973 through 1982, current expenditures registered a very high ACGR of 30.5 percent, whereas capital expenditures rose at a comparably high rate of 30 percent. However, in the period 1983 through 2002, current expenditures registered a low ACGR of 3.5 percent, whereas the growth rate for capital expenditures was statistically not different from zero. Current expenditures registered a high ACGR of 10.8 percent, whereas the growth rate for capital expenditures was even higher, 31.6 percent from 2003 through 2010.

Both current and capital expenditures changed by about one third of a Saudi Riyal (the former by 35 *hellas* and the latter 32 by *hellas*) in response to a one Saudi Riyal change in oil revenues from 1960 through 1972.

Total expenditures and its components (current and capital expenditures) were strongly correlated with total revenues and its components (oil and non-oil revenues) during the moderate expansion cycle and the boom cycle, whereas during the deficit cycle, this relationship was weak. During the second boom cycle, current and total expenditures were moderately correlated to oil revenues as well as to total revenue.

Capital expenditures were substantially more elastic compared to current expenditures, with elasticity of the former being around 0.95 percent whereas that of the latter was above 0.65 percent. For total expenditures, this elasticity aggregated at over 0.75 percent for the moderate expansion cycle. Similarly, during the boom cycle the elasticity of various components of government expenditures with respect to both oil revenues and total revenues were very high, being around 1.25 percent, suggesting that the government spent liberally during this period under both current and capital headings. During the recessionary period of 1983 through 2002, the elasticity of total and current government expenditures with respect to both oil revenues and total revenues were moderate, whereas they were statistically indifferent from zero with respect to non-oil revenues.

Capital expenditures exhibited no linear relationship with total revenues or its components during the moderate expansion cycle, which

indicates the government was more concerned during that time with current expenditures and not capital expenditures.

As mentioned, the second boom cycle witnessed budgetary surpluses throughout, except in 2007, when there was a deficit of $23.093 billion.

Regression Analysis of Government Expenditures for the Entire Reference Period

Government Expenditures as a Linear Function of Time: 1960–2010

A time trend analysis of government expenditures is useful, both current and capital (see figures 2.6 and 2.7), during the period of 1960 through 2010. Linear and semi-log specifications are used for the analysis, as in the case of our earlier periods.

Government Current Expenditures (CurX)
Linear: Cur$X = \alpha + \beta.t$

On average, the annual increase in current government expenditures was $1.973 billion, as depicted by the slope coefficient of the equation that is significant at a 1-percent level. The explanatory power of the

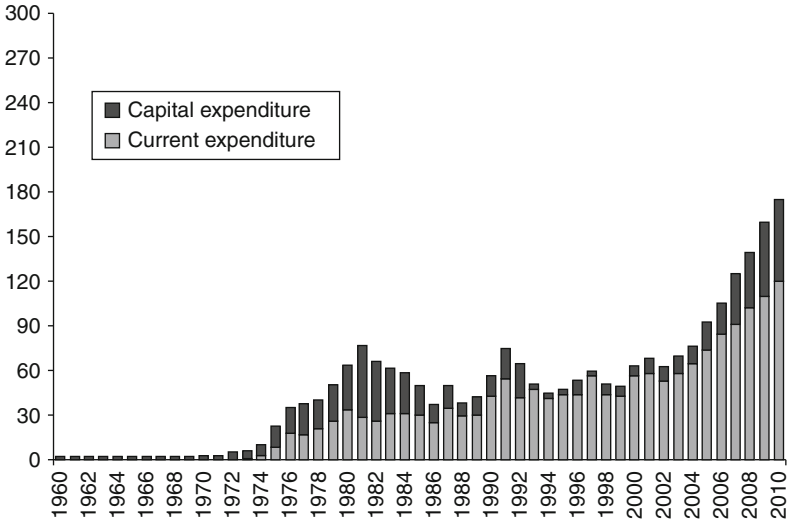


Figure 2.6 Current and capital expenditure and oil revenue: 1960–2010 (USD Billion).

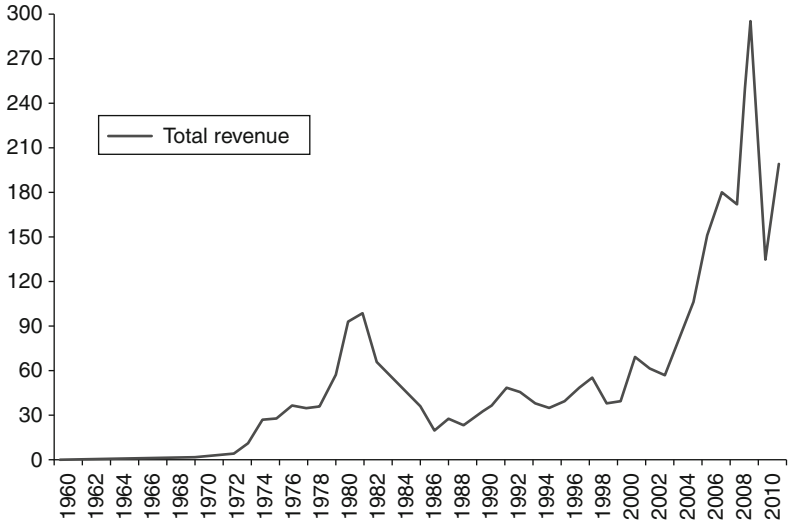


Figure 2.7 Government total revenue 1960–2010 (USD Billion).

equation is 87.6 percent, which is significant at a 1-percent level. Given the degrees of freedom (49), this amounts to high explanatory power and is indicative of a strong positive trend despite many major ups and downs in expenditures as discussed earlier under various periods.

Government Capital Expenditures (CapX)
Linear: Cap$X = \alpha + \beta.t$

Both the explanatory power and slope coefficient are statistically significant at a 1-percent level, though the magnitude of the explanatory power, 22 percent, is quite low compared to that of the corresponding equation for current expenditures. Capital expenditures increased by $1.61 billion per year, on average. However, the estimates should be used with caution due to the low explanatory power of the equation.

Total Government Expenditures (TotX)
Linear: Tot$X = \alpha + \beta.t$

Since specifications are linear with the same explanatory variable, that is time, the regression coefficients of current and capital expenditures together add up to those of total expenditures. The equation shows that the total expenditures during the period increased at $2.4 billion per year ($1.973 billion current and $0.426 billion capital

expenditures). Both the high explanatory power (74.7 percent) and the slope coefficient are statistically significant at a 1-percent level, confirming a positive trend in total expenditures.

Natural Logs of Government Expenditures as a Linear Function of Time: 1960–2010

Current Government Expenditures (CurX)
Semi-log: $\text{Ln}(\text{Cur}X) = \alpha + \beta.t$

The instantaneous growth rate of current expenditures was 0.1153 during this period. This instantaneous growth rate yields a corresponding ACGR of 12.2 percent per year on average. This is a high growth rate by any standard. The R^2 and slope coefficients are statistically significant at a 1-percent level, and the explanatory power of the equation is 83.3 percent. The significance of the slope coefficient and the high explanatory power suggests a strong positive time trend.

Government Capital Expenditures (CapX)
Semi-log: $\text{Ln}(\text{Cap}X) = \alpha + \beta.t$

Capital expenditures registered an impressive instantaneous growth rate of 0.0778 that is statistically significant at a 1-percent level. The equivalent ACGR is 8.1 percent. The explanatory power turns out to be a moderate 42.2 percent and is significant at a 1-percent level.

Total Government Expenditures (TotX)
Semi-log: $\text{Ln}(\text{Tot}X) = \alpha + \beta.t$

This equation yields an instantaneous growth rate of 0.1067 with a corresponding ACGR of 11.3 percent per year for total expenditure. The slope coefficient is statistically significant at a 1-percent level. The explanatory power of 76.7 percent, statistically significant at a 1-percent level, is very high given the high degrees of freedom (49).

Government Expenditures as a Linear Function of Oil Revenues: 1960–2010

Current Expenditures (CurX) and Oil Revenues (OR)
Linear: $\text{Cur}X = \alpha + \beta.\text{OR}$

The explanatory power of the equation as shown by the coefficient of determination is 71.7 percent, which is statistically significant at a 1-percent level. The slope coefficient turns out to be 0.497685, which is statistically significant at a 1-percent level, and suggests that on average

a one Saudi Riyal change in oil revenues resulted in a 49.77 *halalah* change in current expenditures.

Capital Expenditures (CapX) and Actual Oil Revenues (OR)
Linear: Cap$X = \alpha + \beta$.OR

The explanatory power and slope coefficients for this equation are statistically significant at 1 percent. The slope coefficient suggests that during our entire reference period capital expenditures increased by 18.14 *halalah* for every one Saudi Riyal increase in oil revenues.

Table 2.1 shows a comparison of current expenditures and capital expenditures during the reference period.

Total Expenditures (TotX) and Oil Revenues (OR)
Linear: Tot$X = \alpha + \beta$.OR

The explanatory power and slope coefficients of this equation are statistically significant at a 1-percent level. The slope coefficient suggests that for every marginal Saudi Riyal increase in oil revenue, the total expenditure increased by 67.91 *halalah* and vice versa.

Government Expenditures as a Linear Function of Total Revenues: 1960–2010

CurrentExpenditure (CurX) and Total Revenue (TR)
Linear: Cur$X = \alpha + \beta$.TR

This equation suggests that a marginal increase of one Saudi Riyal in total revenues resulted in a 0.46 Saudi Riyal increase in actual current expenditures. All parameters of the equation are statistically significant at a 1-percent level.

Actual Capital Expenditures (CapX) and Actual Total Revenue (TR)
Linear: Cap$X = \alpha + \beta$.TR

The estimates of slope coefficient and R^2 are statistically significant at a 1-percent level. The slope coefficent suggests that for every one Saudi Riyal of marginal increase in total revenues, there was a 0.165 Saudi Riyal marginal increase in capital expenditures during this period.

Total Expenditures (TotX) and Total Revenues (TR)
Linear: Tot$X = \alpha + \beta$.TR

Both the slope coeffcient and the explanatory power (80.5 percent) turn out to be statistically significant at a 1-percent level. This equation suggests that during our reference period, total expenditures increased

by over 0.62 *halalah* in response to an increase of one Saudi Riyal in total revenue.

Government Expenditures in Autoregressive Analysis Framework

In this section I analyze the components of the government's budget in an autoregressive framework, with a one-year lag, using the data for the reference period.[12]

Here government expenditures as a budget component have been analyzed in an autoregressive framework. This analysis was carried out because the values of budgetary variables are affected by the size of the same variable in the preceding year. The relationship is expected to be stronger in the case of current expenditures as compared to capital expenditures because downward adjustments in the former are very difficult, if not impossible under normal cirucmstances, on account of basic sociopolitical as well as economic factors.

Government Expenditures as a Function of Their Respective Lagged Values

Government Current Expenditures (CurX)

Specification: $\text{Cur}X_t = \alpha + \beta.\text{Cur}X_{t-1}$

The above equation indicates that, on average, a year's current expenditures are equivalent to 105.4 percent of current expenditures in the previous year. For example, if current expenditures last year were $106.666 billion, then current expenditures this year would be $112.453 billion.

The coefficients β and R^2 are statistically significant at a 1-percent level. In all observable respects, the correlative relationship is very strong, with an explanatory power of 96.4 percent, which is also reflected in the very high *t*-value for β and the F-statistic.

Government Capital Expenditures (CapX)

Specification: $\text{Cap}X_t = \alpha + \beta.\text{Cap}X_{t-1}$

Both the explanatory power R^2 and slope coefficient β are statistically significant at a 1-percent level. The explanatory power is 81.4 percent; this is not as high as it is in the case of current expenditures. This was expected in light of the fact that capital expenditures bear the brunt of the reduction in government revenues, as current expenditures cannot be easily reduced for the reasons already mentioned.

Total Government Expenditures (TotX)
Specification: $\text{Tot}X_t = \alpha + \beta.\text{Tot}X_{t-1}$

The equation shows that the total expenditures in a given year is 1.074 times the value in the previous year. Thus, if in the previous year total expenditures were $120 billion, on average, they are expected to be $128.88 billion in the current year. Both the high explanatory power (95.7 percent) and the slope coefficient are statistically significant at a 1-percent level, confirming a strong positive relationship between current and lagged total expenditures.

Summary and Conclusion: Government Expenditure Analysis 1960–2010

In this chapter, we investigated the various factors that may have influenced the magnitude of government expenditure over the last 51 years. We have used regression analyses to determine actual expenditure regression overtime and to determine the correlation between government expenditure as a dependent variable and the independent variables of government revenue and previous year government expenditure. We divided the total reference period into four economic cycles. We also investigated the statistical correlation between government expenditure and the listed independent variables to see whether various economic cycles do have strong and structural effects on government fiscal policy. The executive and essential conclusion is that these results did not show any major change in government spending behavior.

In times of need, the government resorted to foreign and local borrowings to maintain its spending inclinations. During contraction periods, for example, from 1983 through 2002, the government drastically reduced capital expenditures, but not current expenditures. The government's political sensitivity toward protecting the general level of public consumption from declining was behind declining capital expenditure during this period. With the rise of government oil revenue in 2003, total government expenditure, both current and capital, started rising again.

The degree and strength of correlation between government expenditure and the aforementioned independent variables did not change very much whether the period of observation was the various cycles or the period as a whole. This implies that the correlation is strong over any period in spite of changes from cycle to cycle.

All statistical coefficients and correlations are summarized in a series of tables for the reference period, for easy comparison. Despite four clearly identifiable cycles, the budgetary data for the entire period of 51

depict long-term trends and relationships. The linear trend and semi-log trend equations for total expenditure and its components (current and capital expenditure) are tabulated in table 2.6.

It may be noted in table 2.6 that slope coefficients and R^2s of all equations are statistically significant at a 1-percent level. The R^2s are higher for current expenditure compared to those for capital expenditure. This is due to the fact that whenever there are bad revenue years, capital expenditure bears the brunt of expenditure cuts. Thus, its relationship with time, linear or semi-log, is distorted. However, the fact remains that there are long-term upward trends in expenditure.

Linear Relationships: 1960–2010

The linear regression estimates of equations are given in table 2.7. Like in table 2.6, all slope coefficients and R^2s are statistically significant at 1-percent level. The equations suggest that the expenditures—current, capital, and total—are strongly related to total revenue and its various components (oil and non-oil revenue).

Log-Linear Relationships: 1960–2010

The log-linear regression estimates of equations are given in table 2.8. Similarly, all slope coefficients and R^2s are statistically significant at a

Table 2.6 Linear and semi-log trends (data used:1960–2010)

			Independent Variable			
Dependent Variables	*N*	*Intercept*	*Time*	*R*	R^2	*F-Stat*
Current Expenditure (*t*)	51	−60956.90	7401.87	0.936	0.876	346.539*
		(−5.131)*	(18.616)*			
Capital Expenditure (*t*)	51	5051.05	1611.09	0.469	0.220	13.794*
		(.39)	(3.714)*			
Total Expenditure (*t*)	51	−55905.85	9012.97	0.864	0.747	144.811*
		(−2.498)**	(12.034)*			
Ln (current Expenditure [*t*])	51	7.847965	0.115346	0.912	0.833	243.661*
		(35.547)*	(15.61)*			
Ln(Capital Expenditure[*t*])	51	7.749841	0.077801	0.651	0.424	36.103*
		(20.032)*	(6.009)*			
Ln (Total Expenditure [*t*])	51	8.452268	0.106681	0.876	0.767	161.513*
		(33.701)*	(12.709)*			

Note: Figures in parentheses are *t*-values.*,**,*** respectively denote statistical significance at 1%, 5%, and 10% levels

Table 2.7 Linear relationships (data used:1960–2010)

			Independent Variables					
Dependent Variables	*N*	*Intercept*	*Oil Rev*	*N-Oil Rev*	*Total Rev*	*R*	R^2	*F-Stat*
Current Expenditure (*t*)	51	50526.44 (4.415)*	0.497685 (11.145)*			0.847	0.717	124.211*
	51	3032.61 (.274)		3.91313 (15.001)*		0.906	0.821	225.017*
	51	41583.13 (3.813)*			0.459863 (12.426)*	0.871	0.759	154.416*
Capital Expenditure (*t*)	51	17421.60 (2.646)**	0.181443 (7.062)*			0.710	0.504	49.875*
	51	6589.58 (.765)		1.229141 (6.065)*		0.655	0.429	36.781*
	51	14737.93 (2.192)**			0.164704 (7.218)*	0.718	0.515	52.103*
Total Expenditure (*t*)	51	67948.04 (4.972)*	0.679127 (12.738)*			0.876	0.768	162.248*
	51	9622.20 (.649)		5.14227 (14.724)*		0.903	0.816	216.808*
	51	56321.07 (4.357)*			0.624567 (14.241)*	0.897	0.805	202.809*

Note: Figures in parentheses are *t*-values.*,**,*** respectively, denote statistical significance at 1%, 5%, and 10% levels

Table 2.8 Log-linear relationships (data used:1960–2010)

			Independent Variables					
Dependent Variables	*N*	*Intercept*	*Ln (Oil Rev)*	*Ln (N-Oil Rev)*	*Ln (Total Rev)*	*R*	R^2	*F-Stat*
Ln(Current Expenditure [t])	51	−0.00041 (−0.01)	0.985404 (21.608)*			0.951	0.905	466.926*
	51	1.867808 (9.324)*		0.95101 (45.756)*		0.988	0.977	2093.599*
	51	−0.307161 (−.72)			0.993538 (26.499)*	0.967	0.935	702.181*
Ln(Capital Expenditure [t])	51	0.255694 (.35)	0.864547 (13.189)*			0.883	0.780	173.953*
	51	2.499109 (3.761)*		0.770366 (11.172)*		0.847	0.718	124.821*
	51	0.119081 (.162)			0.85988 (13.344)*	0.886	0.748	178.050*
Ln(Total Expenditure [t])	51	0.572437 (1.475)	0.967796 (27.818)*			0.970	0.940	773.838*
	51	2.565272 (13.978)*		0.917283 (48.171)*		0.990	0.979	2320.450*
	51	0.307326 (1.021)			0.972564 (36.732)*	0.982	0.965	1349.272*

Note: Figures in parentheses are *t*-values.*,**,*** respectively denote statistical significance at 1%, 5%, and 10% levels

1-percent level. The equations suggest that the expenditure—current, capital, and total—are strongly related to total revenue and its various components (oil and non-oil revenue).

We may draw a general inference that there exist statistically significant long-term mutual relationships between expenditures and revenues, without getting involved in the characteristics of the trend or relationships, that is, whether the relationship is linear or log-linear.

Autoregressive Equations: Variables as a Function of Their Own Lagged Values

In these equations, the dependent variable with a one-year lag appears as an independent variable, solely or along with total revenue. Table 2.9 demonstrates this.

The autoregressive specifications may be said to have an implied framework within which there are variables that have a sort of inertia and thus they attempt to self-propagate into the future. In other words, in a first-order autoregressive scheme such as ours, the value of a variable in the previous year has a role to play in determining its value in the current year. In addition to this, there may be other variables that influence the value of the variable under study. In the equations summarized in table 2.8, both these forms have been used, that is, expenditure in a year being determined solely by their value in the previous year, and in addition to total revenue in the current year.

Again, the R^2s and slope coefficients are statistically significant at 1 percent for all equations. Like the earlier specifications, these equations also lead to an inference that expenditures behave in a systematic manner in the long run.

The Importance of Government Expenditure in the Saudi Fiscal Policy

Government expenditures are the principal tools in Saudi fiscal policy. Taxes on both income and consumption, direct or indirect, are negligible. Thus, government expenditure is an essential determinant of future fiscal sustainability with oil revenue. Our analyses of government expenditure trends over the past 50 years allow us to predict government expenditure behavior over the next few decades.

Based on our study of the historical pattern of government expenditure, and our knowledge and understanding of the Saudi fiscal system,

Table 2.9 Autoregressive equations (data used:1960–2010)

			Independent Variables						
Dependent Variables	*N*	*Intercept*	*Current Expend (t-1)*	*Capital Expend (t-1)*	*Total Expend (t-1)*	*Total Revenue (t)*	*R*	R^2	*F-Stat*
Current Expenditure	50	2306.81	1.054148				0.982	0.946	1272.648*
		(.472)	(35.674)*						
	50	3520.46	0.910833			0.083775	0.986	0.971	794.852*
		(.800)	(18.792)*			(3.534)*			
Capital Expenditure (*t*)	50	4495.28		0.987933			0.902	0.814	209.72*
		(1.033)		(14.482)*					
	50	298.33		0.815214		0.059079	0.925	0.855	138.848*
		(.074)		(10.608)*		(3.672)*			
Total Expenditure (*t*)	50	538.21			1.074021		0.979	0.957	1081.225*
		(.075)			(32.882)*				
	50	5082.67			0.861965	0.156868	0.986	0.972	802.433*
		(.849)			(16.693)*	(4.818)*			

Note: Figures in parentheses are *t*-values.*,**,*** respectively denote statistical significance at 1%, 5%, and 10% levels

we postulate that government total expenditure GTE_t in a given year is determined by:

- government quantum in the previous year (GTE_{t-1}),
- government total revenue in the current year (GTR_t),
- government net foreign assets at the end of previous year (NFA_{t-1}),
- government debt at the end of previous year (GD_{t-1}), and
- Royal Decisions in the same year (RD_t)

This leads us to formulate a government expenditure function as: $GTE_t = f(GTE_{t-1}, GTR_t, NFA_{t-1}, GD_{t-1}, RD_t)$

However, net foreign assets and government debt are correlated to government total revenue, the former being positively related and the latter negatively. When total revenues decline below a certain limit, that is, below government expenditure, then special actions are taken to fund the deficit: either government debt increases or net foreign assets decrease, or both occur, depending on the government's decision. The opposite happens when, rarely, total revenue exceeds total government expenditure. Thus, we may conclude that total revenue is sufficient to represent all three of the variables discussed. In statistical terms, the inclusion of known, strongly correlated variables and dependent variables in the same equation lead to multicollinearity problems. Hence, we can justifiably drop two from the equation, namely, net foreign assets and government debt, to avoid multicollinearity.

"Royal" decisions to spend are neither taken in a systematic way, nor can their magnitude be determined in advance. For example, in 2011, government employees were paid salaries for two months extra; a decision was taken to spend $400 billion spread over five years. While such decisions are usually taken outside the planned budgetary framework, such spending is included in the actual government expenditure data. However, it is impossible to predict when and what decision will be made until it is announced. Under these circumstances we drop such extraordinary, "royal" decisions from our original specification and confine the government expenditure function to $GTE_t = f(GTE_{t-1}, GTR_t)$.

We see in table 2.7 that this function has a very high explanatory power of 97.2 percent. This suggests that only 2.8 percent of variations in total government expenditure are not explained by the variations in the explanatory variables. The *t*-values of the coefficients of both the explanatory variables are statistically significant at a 1-percent level. The same equation may be written in explicit form as

$GTE_t = 5082.67 + 0.861965\ GTE_{t-1} + 0.156862\ GTR_t$
(.849) (16.693)* (4.818)*
$R = 0.986$ $R^2 = 0.972$ F-Statistic = 802.433*

In light of economic reasoning and statistical goodness of this fit, we conclude that the equation is suitable for forecasting purposes.

Part B: Revenues

One of the most telling stories for purposes of my thesis revolves around Saudi Arabia's revenue dynamics. This chapter analyzes government revenue during our reference period, from 1960 through 2010 (see figure 2.7 and table 2.10). Base data used for the analysis are the same as that used previously.

Methodology

Our methodology for analyzing government revenue is similar to that of government expenditures: we will subject government revenues to linear regression analysis using various specifications for our reference period. The specifications for the regression equations are the following:

The dependent variable in time t is denoted by Y_t and independent variables by t (time) or X_ts.

Linear Time Trend: $Y_t = \alpha + \beta.t$
Semi-log Time Trend: $\text{Ln}(Y_t) = \alpha + \beta.t$

The semi-log is the linear transformation of the exponential equation $Y_t = A.e\beta^t$in, in which β represents instantaneous growth rate and $\alpha = \text{Ln}(A)$. This equation also represents: $Y_t = a.b^t$, where $\alpha = \text{Ln}(a)$ and $\beta = \text{Ln}(b)$, b denoting $(1+g)$, and g representing annual compound growth.

Autoregressive Relationship: $Y_t = \alpha + \beta_1.Y_{t-1} + \beta_2.X_{1t} + \ldots$

This equation may or may not include explanatory variables other than the lagged dependent variable.

Our analysis in this chapter will be presented in three parts. First, the two time-trend regression equations (linear and semi-log) will be estimated for oil, non-oil, and total revenues for the reference period. Next, autoregressive equations for the two components of revenues and

Table 2.10 In USD Million

	Revenue				*Revenue*		
Year	*Oil Revenue*	*Non-Oil Revenue*	*Total Revenue*	*Year*	*Oil Revenue*	*Non-Oil Revenue*	*Total Revenue*
1960	367	89	455	1986	11,324	9,076	20,399
1961	440	95	535	1987	17,975	9,708	27,683
1962	511	93	604	1988	12,907	9,653	22,560
1963	600	101	700	1989	20,240	10,320	30,560
1964	685	105	790	1990	27,026	9,186	36,212
1965	838	126	964	1991	38,653	9,572	48,225
1966	1,052	135	1,187	1992	34,344	10,895	45,239
1967	937	147	1,084	1993	28,260	9,458	37,719
1968	1,119	188	1,307	1994	25,468	8,930	34,398
1969	1,365	146	1,511	1995	28,194	10,873	39,067
1970	1,899	218	2,117	1996	36,262	11,494	47,756
1971	2,583	383	2,965	1997	42,663	12,137	54,800
1972	3,595	503	4,098	1998	21,333	16,429	37,762
1973	10,476	645	11,121	1999	27,853	11,469	39,321
1974	25,117	1,577	26,694	2000	57,180	11,638	68,817
1975	24,928	2,641	27,569	2001	49,044	11,798	60,842
1976	32,318	3,938	36,255	2002	44,293	12,507	56,800
1977	30,411	4,431	34,842	2003	61,600	16,533	78,133
1978	30,687	4,381	35,068	2004	88,000	16,611	104,611
1979	50,479	5,840	56,319	2005	134,544	15,945	150,489
1980	85,148	7,679	92,827	2006	161,192	18,457	179,649
1981	87,625	10,510	98,135	2007	149,916	21,497	171,413
1982	49,602	16,047	65,649	2008	262,232	31,366	293,598
1983	38,699	16,346	55,045	2009	115,845	20,103	135,948
1984	32,359	13,376	45,736	2010	178,737	19,027	197,764
1985	23,580	12,037	35,617				

the total revenues will be presented. Finally, various regression equations involving variables related to revenues are presented. These regression equations are estimated using data for a slightly reduced period beginning in 1970 through 2010. This period, the era of planned development of the Saudi economy, began with the "First Development Plan" in 1970–74. It has been chosen due to a lack of comparable data on certain variables for earlier periods.

Government Revenues as a Function of Time: 1960–2010

In this section, we will explore a time trend analysis of government expenditures during the reference period. Linear and semilog specification are used, as in the case of regression analysis of government expenditures. The analysis covers total revenues as well as its two components, oil and non-oil revenues.

Government Oil Revenues (OR)

Linear: $OR = \alpha + \beta.t$

The slope coefficient of the equation above suggests that the annual increase in government oil revenues was SR 9.47 billion ($2.525 billion). The coefficient is statistically significant at the 1-percent level. The moderate explanatory power of equation, 49.6 percent, is significant at the 1-percent level. The explanatory power suggests that there are factors other than just time that influence oil revenues, and that time explains only less than half the total variation in oil revenues.

Government Non-Oil Revenues (NOR)

Linear: $NOR = \alpha + \beta.t$

Both the explanatory power and the slope coefficient are statistically significant at the 1-percent level in this equation. Non-oil revenues increased on average by SR 1.64 billion ($0.437 billion) per year.

Total Government Revenues (TR)

Linear: $TR = \alpha + \beta.t$

The equation shows that total revenue during the reference period increased at the rate of SR 11.11 billion per year ($2.962 billion, $2.525 billion in oil revenues and $0.437 billion in non-oil revenues). Both the modest explanatory power (55 percent) and the slope coefficient are statistically significant at the 1-percent level, confirming an overall

positive trend in total revenues. It should be pointed out that time explains only 55 percent variations in total revenue; as a result, we may infer that there are factors other than time that affect variations in total revenue.

Natural Logarithms of Government Revenues as a Linear Function of Time

Government Oil Revenues (OR)

Semi-log: $\text{Ln}(OR) = \alpha + \beta.t$

The instantaneous growth rate of oil revenues was 10.47 percent during the reference period. This instantaneous growth rate yields a corresponding ACGR of 11.04 percent per year. This is a high growth rate by any standard. The R^2 and slope coefficient are statistically significant at the 1-percent level and the explanatory power of the equation is 73.6 percent. The significance of slope coefficient and the high explanatory power suggests a strong positive time trend.

Government Non-Oil Revenues (NOR)

Semi-log: $\text{Ln}(NOR) = \alpha + \beta.t$

The non-oil revenues registered an instantaneous growth rate of 11.6 percent, statistically significant at the 1-percent level. The equivalent ACGR is 12.3 percent. The explanatory power turns out to be a high 78 percent that is also significant at the 1-percent level. The high growth rate of non-oil revenue may be attributed to elasticity due to its relatively small size.

Total Government Revenues (TR)

Semi-log: $\text{Ln}(TR) = \alpha + \beta.t$

This equation yields an instantaneous growth rate of 10.69 percent with a corresponding ACGR of 11.28 percent per year for total revenues. The slope coefficient is statistically significant at the 1-percent level. The explanatory power (75.5 percent) is statistically significant at the 1-percent level.

Autoregressive Equations: Government Revenues as Function of Their Own Lagged Values

These equations are based on a one-year lag. The equations assume that values of revenues are determined by their own value in the preceding

year. In other words, there is inertia of motion in revenues that continues in the same direction unless some major economic event accelerates or decelerates their motion. It should be pointed out that due to the introduction of a one-year lag, estimates are based on 50 total observations.

Government Oil Revenues (OR)

Autoregressive: $OR_t = \alpha + \beta.OR_{t-1}$

The slope coefficient of the equation suggests that, *ceteris paribus*, an increase of one Saudi Riyal in government oil revenues in the previous year results in a 87.76 *halalah* increase in the current year. The coefficient is statistically significant at the 1-percent level. The explanatory power of the equation is moderately high (67.1 percent) and is significant at the 1-percent level. Based on this, it may be inferred that 32.9 percent of the variation in oil revenues are caused by certain variables that are not actually included in the equation.

Government Non-Oil Revenues (NOR)

Autoregressive: $NOR_t = \alpha + \beta.NOR_{t-1}$

The slope coefficient and R^2 are statistically significant at the 1-percent level. The magnitude of the slope coefficient and the explanatory power (85.9 percent) suggest that non-oil revenues have a stronger tendency to continue their trend as compared to oil revenues, obviously due to government control of non-oil revenues to a great extent. An incremental change in non-oil revenues of one Saudi Riyal in a year leads to a 93.24 *halalah* incremental change in the subsequent year. In the case of non-oil revenues, only 14.9 percent of variations can be attributed to omitted variables as compared to the 32.9 percent mentioned for oil revenues.

Government Total Revenues (TR)

Autoregressive: $TR_t = \alpha + \beta.TR_{t-1}$

The explanatory power of the equation (70.8 percent) is high and statistically significant at the 1-percent level. The slope coefficient is also significant at the same level. The slope coefficient suggests that, on the average, a one Saudi Riyal change in total revenues in the previous year leads to 89.13 *halalah* change in total revenues in the current year.

Concluding Remarks

Our data show a major break in the trend of oil revenues in 1982, when prices and subsequent revenue dropped sharply from SR 328.6 billion ($87.626 billion) to SR 186 billion ($49.6 billion); this amounts to a 43.4 percent drop.

Since oil revenues make up the majority of total revenues, a decline in oil revenues can also be observed in total revenue.

The decline in revenues continued for the next few years and was then followed by oscillations in revenue. With the exception of 1990, annual average oil prices remained under $20 per barrel during the period of 1986 through 1999, with minor fluctuations. With a recovery in oil prices, total revenues also increased, reaching an all-time high of SR1.1 trillion ($0.293 trillion) in 2008.

Despite many rises and falls, revenues showed, on average, a strong positive time trend irrespective of type of relationship, that is, linear or semi-log.

Revenues are strongly related to their lagged values as shown by autoregressive equations.

As can be expected, oil revenues are strongly related to oil production and the average annual price of "Arabian Light." The annual price of Arabian Light depicts a strong positive time trend. However, oil exports did not confirm the time trend, due to oscillations in their values over time.

On the average, domestic oil consumption shows a strong positive time trend. This may be attributed to industrialization of the country, population growth, higher GDP, and heavily subsidized fuel prices generating demand for transport and oil-based products.

Non-oil revenues and their components (including import duties) are strongly correlated to private sector GDP in both the linear as well as the double-log frameworks.

Private sector GDP elasticity of non-oil revenues showed an almost percent to percent relationship: in other words, elasticity is in the vicinity of one for components that are greater than one, whereas for total non-oil revenues, they are slightly less than one.

CHAPTER 3

Forecasting Government Expenditures, Revenues, and Gaps, 2011–2030

In this chapter I will attempt to assess future trends of government expenditures (comprising current expenditures and capital expenditures), government revenues (comprising oil revenue and non-oil revenue), and, lastly, examine the gap between government revenues and expenditures.[1]

I will present various scenarios of government expenditures and revenues for the period starting 2010 through 2030 (the "future period") under different assumptions. The scenarios have been generated at current prices, and wherever the need to convert constant price data to current prices has arisen, we have used forecast values of "implicit price deflators for GDP."

Government Expenditures in the Future Period

I have used my own forecast of government expenditures, as well as readily available forecasts *mutatis mutandis,* for this analysis. The sections that followpresent three estimates of government expenditures: the author's estimate, the Ministry of Economy and Planning (MOEP) case,[2] and the Bourland and Gamble (B&G) case.[3]

The Author's Estimate

My estimate of current expenditures and capital expenditures is based mainly on published government data[4] available in the Ninth Development Plan of Saudi Arabia (2010–14). The forecast for the two types of expenditures are made using different sets of assumptions that are given along with the forecast tables. Total expenditures have been produced by simply adding current and capital expenditures.

Current Expenditures

Actual current expenditures of $121.345 billion for the year 2010 is our base year value for the forecast. We assume that current expenditures will grow at least at the rate of the sum of population growth rate[5] (2 percent), the inflation rate (6 percent)[6], and a premium rate (2 percent).[7] Thus, current expenditures will grow at 10 percent total per year.

Capital Expenditures

Capital expenditures are the other major component of government expenditures. Capital expenditures are the most pivotal part of total national investment for both short-term and long-term economic development as they lead to infrastructural development, which in turn has the most direct impact on the generation of economic activity. However, due to the rigidity of current expenditures for downward adjustment, capital expenditures usually face the axe whenever financial conditions are tight. Because of the relatively comfortable financial climate of the past decade in the kingdom, capital expenditures have actually been increasing.

Capital expenditures of $53.025 billion in 2010 is our base year value for the forecast. We assume that capital expenditures will grow until 2015 at an ACGR of 22.66 percent, the rate for the past decade. Beyond 2015, we assume that they will increase at 5 percent per year during our sample period.

Total Expenditures

The forecast for total expenditures is the sum of current and capital expenditure forecasts given in table 3.1 and table 3.2, respectively.

The growth of current, capital, and total expenditures are graphically compared in figure 3.1. Capital expenditures exhibit a change of sorts in 2015 due to our assumption of a drop in the rate of growth from 22.7 percent to 5 percent per annum. We assume this change since major ongoing projects, such as the development of economic and scientific cities, are estimated for completion by 2015. Afterward, capital expenditures are estimated to comprise mainly maintenance and other small projects. The change has been picked up, however, by total expenditures, as demonstrated in table 3.3.

Table 3.1 Forecast current expenditure: Our growth rates based, 2010–2030 (USD Billion)

2010	**121.3**	**2020**	**314.7**
2011	133.5	2021	346.2
2012	146.8	2022	380.8
2013	161.5	2023	418.9
2014	177.7	2024	460.8
2015	**195.4**	**2025**	**506.9**
2016	215.0	2026	557.6
2017	236.5	2027	613.3
2018	260.1	2028	674.7
2019	286.1	2029	742.1
		2030	**816.3**

Table 3.2 Forecast capital expenditure: Our growth rates based, 2010–2030 (USD Billion)

2010	**53.0**	**2020**	**187.9**
2011	65.0	2021	197.3
2012	76.8	2022	207.2
2013	97.9	2023	217.5
2014	120.0	2024	228.4
2015	**147.2**	**2025**	**239.8**
2016	154.6	2026	251.8
2017	162.3	2027	264.4
2018	170.4	2028	277.6
2019	179.0	2029	291.5
		2030	**306.1**

Table 3.3 Forecast total expenditure: Our growth rates based, 2010–2030 (USD Billion)

2010	**174.4**	**2020**	**502.6**
2011	198.5	2021	543.5
2012	226.6	2022	588.0
2013	259.4	2023	636.4
2014	297.7	2024	689.2
2015	**342.7**	**2025**	**746.7**
2016	369.6	2026	809.4
2017	398.8	2027	877.7
2018	430.5	2028	952.3
2019	465.1	2029	1,033.6
		2030	**1,122.4**

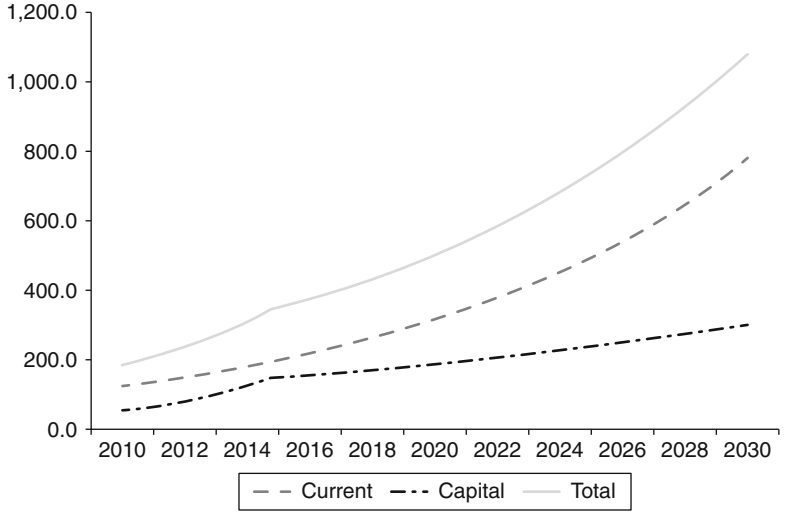


Figure 3.1 Current, capital, and total expenditure: 2010–2030 (USD Billion), our growth rate based.

MOEP Macroeconomic Forecast-Based Scenario

The Ninth Development Plan of Saudi Arabia does not give any forecast of government revenues and expenditures as such. However, there is a five-year set data (quinquennium data) on GDP based on expenditure items for the period 2004–2024, at constant 1999 prices. In these data, public consumption and public investment forecasts are also available.

Current Expenditures

Current expenditures based on data available in the Ninth Plan have been forecast as follows, based on the following assumptions: Public consumption stated under expenditure on GDP can be considered a proxy for government current expenditures; during the years of a quinquennium, public consumption will grow at ACGR; public consumption will grow at ACGR of the previous quinquennium; and, the implicit price deflator for GDP will continue to grow after 2010 at the ACGR for the period 2005 through 2010.

Adjustments in MOEP Data

We interpolate government consumption values for intervening years if data are unavailable (using ACGR) for each of the five-year periods.

To forecast the period starting 2024 through 2030, we used the ACGR for the previous quinquennium (2019–2024). The 1999 constant price values were converted to current prices by multiplying them by (1) the actual implicit price deflator for GDP for the years 2009 and 2010 and (2) our forecast of the implicit price deflator for GDP for the period after 2010. The forecast was made using 2005–2010 ACGR for the deflator.

Capital Expenditures

Analogous to current expenditures, we have considered the public investment forecast given in the Ninth Development Plan of Saudi Arabia as representative of capital expenditures. Here, we assume public investment stated under expenditure on GDP can be considered a proxy for government capital expenditures; during a quinquennium, public investment will grow at its ACGR; public investment will grow at the ACGR of the previous quinquennium and, the implicit price deflator for GDP will continue to grow after 2010 at the ACGR registered during the period starting 2005 through 2010.

Adjustments in MOEP Data

Public investment values were interpolated for intervening years and beyond 2024 using a methodology identical to that used for forecasting public consumption given above.

Total Expenditure

Forecasted total expenditures in our MOEP scenario is nothing but the sum of current and capital expenditures. Accordingly, there are no additional assumptions for the forecast of total expenditures. Total expenditures inherit the assumptions of current and capital expenditures stated above.

A graphic comparison of current, capital and total expenditures based on MOEP data has been presented in figure 3.2. The figure suggests that as per MOEP assumptions, current expenditures are expected to grow at a faster rate compared to capital expenditures. It is evident from the MOEP forecast data that MOEP has not considered the quantum increase in capital expenditures due to the commissioning of various large projects in the country that appear to be outside the process of planned development. Tables 3.4, 3.5, and 3.6 provide more insight.

Table 3.4 Forecast current expenditure: MOEP data based, 2010–2030 (USD Billion)

2010	**121.3**	**2020**	**434.7**
2011	146.8	2021	475.1
2012	177.7	2022	519.1
2013	215.0	2023	567.3
2014	260.2	2024	620.0
2015	**283.3**	**2025**	**677.5**
2016	308.4	2026	740.4
2017	335.7	2027	809.1
2018	365.4	2028	884.2
2019	397.8	2029	966.2
		2030	**1,055.9**

Table 3.5 Forecast capital expenditure: MOEP data based, 2010–2030 (USD Billion)

2010	**53.0**	**2020**	**85.1**
2011	55.1	2021	95.8
2012	57.4	2022	107.8
2013	59.7	2023	121.4
2014	62.0	2024	136.7
2015	**64.5**	**2025**	**154.0**
2016	67.1	2026	173.4
2017	69.8	2027	195.2
2018	72.6	2028	219.8
2019	75.5	2029	247.5
		2030	**278.7**

Table 3.6 Forecast total expenditure: MOEP data based, 2010–2030 (USD Billion)

2010	**174.3**	**2020**	**519.8**
2011	202.0	2021	570.8
2012	235.0	2022	627.0
2013	274.7	2023	688.7
2014	322.3	2024	756.7
2015	**347.8**	**2025**	**831.5**
2016	375.5	2026	913.7
2017	405.5	2027	1,004.3
2018	438.0	2028	1,104.0
2019	473.3	2029	1,213.7
		2030	**1,334.6**

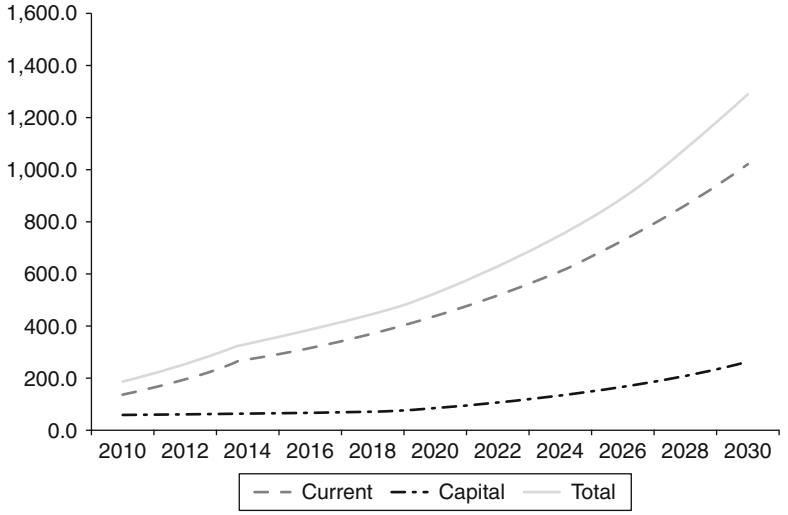


Figure 3.2 Current, capital, and total expenditure: 2010–2030 (USD Billion), MOEP data based.

B&G Forecast Based Estimate

In this section, we have made a forecast of time series for the period 2010–2030 based on data presented in B&G.

Current Expenditures

The B&G paper provides a quinquennial forecast of total expenditures for the period of 2005 through 2010, as well as a bar diagram for annual capital expenditures from 2000 through 2030. We make use of the approximate values of capital expenditures from the bar diagram here. We also use these in estimating B&G based current expenditures. Table 3.7 demonstrates this.

For this analysis, we assume current expenditures are the difference between total and capital expenditures, and that B&G assumptions regarding capital expenditures are valid.[8]

Capital Expenditures

As mentioned, approximate values of capital expenditures have been taken directly from the B&G paper for the years 2012, 2014, 2015,

Table 3.7 Forecast current expenditure: B&G data based, 2010–2030 (USD Billion)

2010	**121.3**	**2020**	**279.2**
2011	128.6	2021	302.2
2012	136.2	2022	326.8
2013	158.7	2023	352.9
2014	168.3	2024	380.9
2015	**192.8**	**2025**	**410.7**
2016	209.6	2026	448.0
2017	226.5	2027	488.7
2018	243.8	2028	532.8
2019	261.3	2029	580.7
		2030	**632.8**

Table 3.8 Forecast capital expenditure: B&G data based, 2010–2030 (USD Billion)

2010	**53.0**	**2020**	**26.7**
2011	57.0	2021	25.5
2012	61.3	2022	24.4
2013	51.6	2023	23.3
2014	55.5	2024	22.3
2015	**45.3**	**2025**	**21.3**
2016	40.8	2026	21.3
2017	36.7	2027	21.3
2018	33.0	2028	21.3
2019	29.7	2029	21.3
		2030	**21.3**

2020, and 2025. The value for the year 2010 is the actual capital expenditure in that year, as demonstrated in table 3.8.

We assume here that B&G assumptions regarding capital are valid. Capital expenditures for intervening years have been interpolated from values immediately preceding and following the intervening years. The values for the period of 2025 through 2030 are held constant.

Total Expenditures

The quinquennial forecast data on total expenditures has been taken from the B&G paper. The values for intervening years for which data are unavailable has been interpolated for each of the five-year periods in table 3.9.

Figure 3.3 graphically summarizes the growth paths of current, capital, and total expenditures. It may be noted that the B&W assumption

Table 3.9 Forecast total expenditure: B&G data based, 2010–2030 (USD Billion)

2010	**174.4**	**2020**	**305.9**
2011	185.6	2021	327.7
2012	197.5	2022	351.2
2013	210.2	2023	376.3
2014	223.7	2024	403.2
2015	**238.1**	**2025**	**432.0**
2016	250.4	2026	469.4
2017	263.2	2027	510.0
2018	276.7	2028	554.1
2019	290.9	2029	602.0
		2030	**654.1**

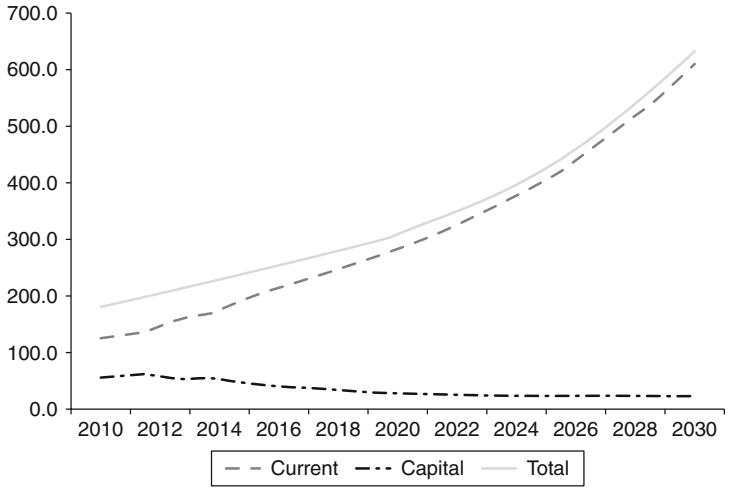


Figure 3.3 Oil export, current, capital, and total: 2010–2030 (MBPY), various estimates.

of declining and subsequent stabilizing capital expenditure brings current and total expenditures closer to each other, as total expenditures is the sum of both.

Government Revenues in the Future Period

Forecasts of the two main components of government revenue (oil revenues and non-oil revenues), along with total revenues, are discussed in this section.

Oil Revenues

We will estimate oil revenues using one of the following equations:

$OR_t = OX_t \,.\, PX_t$ when oil exports are directly available.
or
$OR_t = (OY_t - OC_t) \,.\, PX_t$ when oil exports are not directly available,

where OR_t = oil revenue in year t in $billions; OY_t = oil production in year t in MBPY; OC_t = domestic oil consumption in year t in MBPY; and PX_t = export price of crude oil in $per barrel.

The equation will be applied to future estimates of the required variables available from major data sources, such as the International Energy Agency (IEA), OPEC, US Department of Energy (DOE), and British Petroleum (BP).

IEA Oil Export Data

Oil Exports IEA = Production IEA[9] – Consumption Majed[10]

To estimate Saudi oil exports, we began by using IEA average daily production data (in millions of barrels per day, or MBPD) from 2010 to 2035 for every fifth year. These data were converted to annual production, or millions of barrels per year (MBPY). The data for the intervening years were interpolated to complete our time series analysis for the period 2010 through 2030. Similarly, the time series analysis for Saudi domestic consumption of oil was generated from the numbers available in Majed (also in MBPD) for the years 2010, 2015, and 2030. The difference of the two series gives us an estimated series of Saudi oil exports 2010–2030 that is presented in table 3.10.

Table 3.10 Oil exports 2010–2030 (IEA data) (MBPY)

Year	*IEA*	*Year*	*IEA*
2010	**2920.0**	**2020**	**2801.6**
2011	2919.2	2021	2791.1
2012	2918.5	2022	2777.7
2013	2914.9	2023	2761.2
2014	2909.4	2024	2741.4
2015	**2901.8**	**2025**	**2718.1**
2016	2886.6	2026	2715.4
2017	2869.1	2027	2708.8
2018	2849.2	2028	2698.3
2019	2826.8	2029	2683.6
		2030	**2664.5**

Table 3.10 reveals that Saudi oil exports show a decline over time. The overall compound growth rate turns out to be under one-half of 1 percent (–0.46 percent). This decline is due to the fact that the production capacity is not increasing to keep pace with increasing domestic demand, leaving a relatively lower quantity of exportable surplus. This is the reality of Saudi oil production. Main domestic demand originates from large downstream petrochemical industries for both feedstock requirements and energy needs. In addition, electricity generation, water desalination, and the transportation sector generate substantial demand.

Majed Oil Export Data

The daily oil export forecast is directly available for 2010, 2015, and 2030. Data for the intervening year were interpolated to complete the series.

Similar to the oil export series generated from IEA/Majed data, the Majed-based oil export series (table 3.11) also shows a decline in oil exports over the time period. The overall average compound rate turns out to be –0.69 percent, suggesting an even more rapid decline.

DOE Oil Export Data

DOE numbers for 2010 and 2030 for Saudi oil production and domestic oil consumption were used to generate two-time series analyses used to estimate oil exports, as presented in table 3.12.[11]

The series depicts an upward trend with a 2010 through 2030 compound growth rate of over 1 percent (1.16 percent), including an annual production of 2.66 billion barrels in 2010 increasing to 3.36 billion barrels in 2030. The direction of oil production presented by the DOE

Table 3.11 Oil exports 2010–2030 (Majed data) (MBPY)

Year	*Majed*	*Year*	*Majed*
2010	**2390.8**	**2020**	**2259.2**
2011	2383.4	2021	2240.7
2012	2376.1	2022	2222.3
2013	2968.8	2023	2204.0
2014	2361.5	2024	2186.0
2015	**2354.3**	**2025**	**2168.0**
2016	2334.9	2026	2150.2
2017	2315.8	2027	2132.6
2018	2296.8	2028	2115.1
2019	2277.9	2029	2097.7
		2030	**2080.5**

Table 3.12 Oil exports 2010–2030 (DOE data) (MBPY)

Year	*DOE*	*Year*	*DOE*
2010	**2664.5**	**2020**	**2992.5**
2011	2695.7	2021	3027.3
2012	2727.3	2022	3062.5
2013	2759.2	2023	3098.0
2014	2791.4	2024	3134.0
2015	**2824.0**	**2025**	**3170.3**
2016	2857.0	2026	3207.1
2017	2890.3	2027	3244.2
2018	2924.0	2028	3281.7
2019	2958.1	2029	3319.7
		2030	**3358.0**

conflicts with our two earlier sets of statistics and paints a relatively optimistic picture.

BP Oil Exports

Similar to DOE numbers, BP data for 2010 and 2030 for Saudi oil production and domestic oil consumption were used to generate a time series analysis on oil exports (table 3.13).[12]

The series shows an uptrend at 1.74 percent. The direction of this series also conflicts with both the IEA and Majed analyses and paints an even more optimistic picture than that painted by the DOE time series analysis.

B&G Oil Exports

Data on Saudi oil production and domestic consumption are available for the period 2010–2030 at five-year intervals. The data for intervening years were interpolated to complete work on the two variables. The difference between the two respective series was worked out to obtain estimates of Saudi oil exports (table 3.14).

This series shows a decline at –0.84 percent ACGR that is basically in agreement with the IEA and Majed analyses. However, there is a difference in absolute export volumes, with the earlier four series showing much larger export volumes.

Table 3.15 includes all Saudi oil export scenarios covered in this chapter. Each of these scenarios is based on certain assumptions of oil

Table 3.13 Oil exports 2010–2030 (BP data) (MBPY)

Year	*BP*	*Year*	*BP*
2010	**2664.5**	**2020**	**3165.0**
2011	2710.8	2021	3219.9
2012	2757.8	2022	3275.9
2013	2805.7	2023	3332.7
2014	2854.4	2024	3390.6
2015	**2904.0**	**2025**	**3449.5**
2016	2954.4	2026	3509.4
2017	3005.7	2027	3570.3
2018	3057.9	2028	3632.3
2019	3111.0	2029	3695.3
		2030	**3759.5**

Table 3.14 Oil exports 2010–2030 (B&G data) (MBPY)

Year	*B&G*	*Year*	*B&G*
2010	**2117.0**	**2020**	**2232.6**
2011	2146.2	2021	2194.9
2012	2175.4	2022	2157.2
2013	2204.6	2023	2119.4
2014	2233.8	2024	2081.7
2015	**2263.0**	**2025**	**2044.0**
2016	2256.9	2026	1992.9
2017	2250.8	2027	1941.8
2018	2244.8	2028	1890.7
2019	2238.7	2029	1839.6
		2030	**1788.5**

production and domestic consumption. Based on our time series analyses of these variables from 1969 through 2010, we can conclude that the IEA, Majed, and B&G scenarios are in line with the mostly likely future export picture. Therefore, our further analysis will be confined to these three scenarios.

The five different forecasts of Saudi Arabia's oil exports during 2010 and 2030 shown in table 3.15 have been depicted in figure 3.4. The figure clearly illustrates that the IEA, Majed, and B&G expect a gradual decline in oil exports. However, there are differences in the rates of decline. The IEA scenario expects a slower decline for the first five years, followed by a rapid one. The Majed scenario depicts decline at almost a constant rate. The B&G scenario exhibits an increase trend during the initial five years, followed by a steep decline.

Table 3.15 Oil exports: Comparative table, various estimates: 2010–2030 (MBPY)

Year	*IEA*	*Majed*	*DOE*	*BP*	*B&G*
2010	**2920.0**	**2390.8**	**2664.5**	**2664.5**	**2117.0**
2011	2920.2	2383.4	2695.7	2710.8	2146.2
2012	2618.5	2376.1	2727.3	2757.8	2175.4
2013	2914.9	2368.8	2759.2	2805.7	2204.6
2014	2909.4	2361.5	2791.4	2854.4	2233.8
2015	**2901.8**	**2354.3**	**2824.0**	**2904.0**	**2263.0**
2016	2886.6	2334.9	2857.0	2954.4	2256.9
2017	2869.1	2315.8	2890.3	3005.7	2250.8
2018	2849.2	2296.8	2924.0	3057.9	2244.8
2019	2826.8	2277.9	2958.1	3111.0	2238.7
2020	**2801.6**	**2259.2**	**2992.5**	**3165.0**	**2232.6**
2021	2791.1	2240.7	3027.3	3219.9	2194.9
2022	2777.7	2222.3	3062.5	3275.9	2157.2
2023	2761.2	2204.0	3098.0	3332.7	2119.4
2024	2741.4	2186.0	3134.0	3390.6	2081.7
2025	**2718.1**	**2168.0**	**3170.3**	**3449.5**	**2044.0**
2026	2715.4	2150.2	3207.1	3509.4	1992.9
2027	2708.8	2132.6	3244.2	3570.3	1941.8
2028	2698.3	2115.1	3281.7	3632.3	1890.7
2029	2683.6	2097.7	3319.7	3695.3	1839.6
2030	**2664.5**	**2080.5**	**3358.0**	**3759.5**	**1788.5**

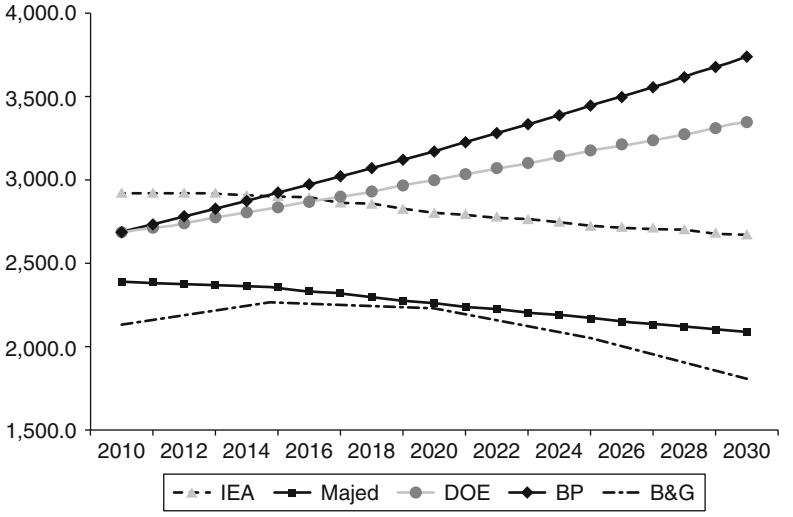


Figure 3.4 Oil export: 2010–2030 (MBPY), various estimates.

Generally, these declines may be attributed to limited production capacity and an increase in domestic demand for oil, originating from the downstream petrochemical industries, as well as the transport and electricity sectors.

Oil Prices

IEA Oil Prices

IEA crude oil import prices, in $ per barrel form, are available from 2010 to 2030 at five-year intervals.[13] These data are used to generate a time series analysis by interpolating oil prices for the intervening year. The IEA expects that in 2030 nominal oil prices will average $184.9 per barrel.

As shown in table 3.16, IEA crude oil import prices show an increase in the price of oil at the same time as a declining growth rate. During the first quinquennium of our sample period, they increase at a compound rate of 7.91 percent per year, which then drops to 3.60 percent for the next quinquennium, only to dip further to 3.22 percent and 2.96 percent in the two subsequent five-year periods. For the entire 2010 to 2030 period, the rate is 4.40 percent.

OPEC Oil Prices

With regard to an OPEC oil price forecast (as seen in table 3.17), "It is assumed that the ORB[14] price, in nominal terms, eventually settles in the range of $85–95/b for this decade, but rises over the long-term to reach $133/b by 2035."[15] Based on this, we settle on an average price of

Table 3.16 IEA oil prices (nominal) 2010–2030

Year	*US/B*	*Year*	*US/B*
2010	**78.1**	**2020**	**136.4**
2011	85.3	2021	141.1
2012	92.6	2022	145.8
2013	99.8	2023	150.4
2014	107.1	2024	155.1
2015	**114.3**	**2025**	**159.8**
2016	118.7	2026	164.8
2017	123.1	2027	169.8
2018	127.6	2028	174.9
2019	132.0	2029	179.9
		2030	**184.9**

$90 per barrel for "this decade" (2010–2020). From this and the 2035 forecast value of $133, we computed a growth rate (1.97 percent) that was used for generating price series data from 2010 through 2030. Of course, our method assumes that the growth rate will remain constant over the entire period.

It may be noted that the IEA based analysis starts at a lower value than OPEC, but surpasses OPEC in 2011, and continues to ultimately end up much higher (over 1.5 times higher, in fact) than the 2030 value of the OPEC based series (figure 3.5 demonstrates this).

Table 3.17 OPEC oil prices (nominal) 2010–2030

Year	*USD/B*	*Year*	*US/B*
2010	**81.6**	**2020**	**99.2**
2011	83.2	2021	101.2
2012	84.9	2022	103.2
2013	86.6	2023	105.2
2014	88.3	2024	107.3
2015	**90.0**	**2025**	**109.4**
2016	91.8	2026	111.6
2017	93.6	2027	113.8
2018	95.4	2028	116.0
2019	97.3	2029	118.3
		2030	**120.6**

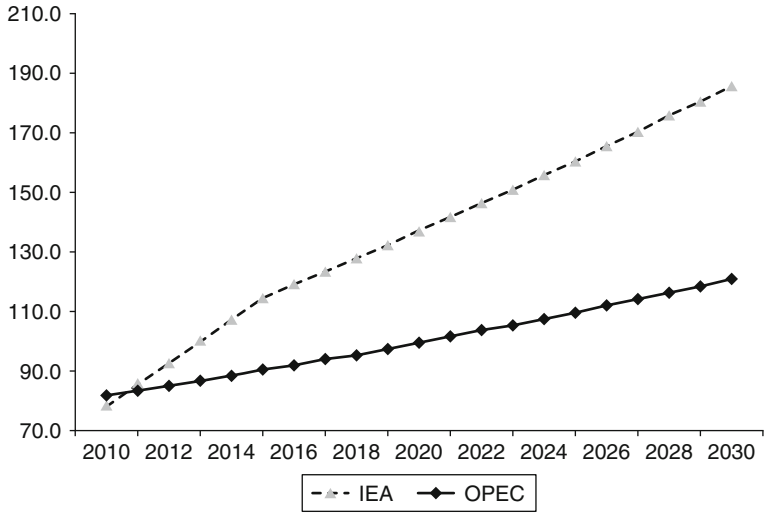


Figure 3.5 Oil prices: 2010–2030 (USD/Barrel) IEA and OPEC forecasts.

Oil Revenues

We have estimated oil revenue by simply multiplying oil exports and oil prices. This has been done for both IEA based oil prices (table 3.18) and OPEC based prices (table 3.19) for each of the three Saudi oil export forecasts that we settled on: IEA, Majed, and B&G export forecasts.

Estimates of Oil Revenues as per IEA Prices

It may be recalled that all three oil export forecasts show an overall declining trend in barrels during the period of 2010 through 2030. However, the rapid increase in the IEA oil price forecast more than compensates for the downward trend in oil exports, leading to positive growth in all three oil revenue cases (see figure 3.6). All three oil revenue forecasts have steep increases until 2015; after 2015, the rate of increase declines but revenue remains positive. In the case of the B&G

Table 3.18 Oil revenue

		USD Billion		
Year	*IEA Oil Price*	*Majed*	*DOE*	*BP*
2010	**78.1**	**228.1**	**186.7**	**165.3**
2011	85.3	249.2	203.4	183.2
2012	92.6	270.2	220.0	201.4
2013	99.8	291.0	236.5	220.1
2014	107.1	311.5	252.8	239.2
2015	**114.3**	**331.7**	**269.1**	**258.7**
2016	118.7	342.7	277.2	267.9
2017	123.1	353.3	285.2	277.2
2018	127.6	363.4	293.0	286.3
2019	132.0	373.1	300.6	295.5
2020	**136.4**	**382.1**	**308.2**	**304.5**
2021	141.1	393.8	316.1	309.7
2022	145.8	404.9	323.9	314.4
2023	150.4	415.4	331.6	318.8
2024	155.1	425.2	339.1	322.9
2025	**159.8**	**434.4**	**346.4**	**326.6**
2026	164.8	447.5	354.4	328.5
2027	169.8	460.1	362.2	329.8
2028	174.9	471.8	369.8	330.6
2029	179.9	482.7	377.3	330.9
2030	184.9	492.7	384.7	330.7

Table 3.19 Oil revenue

Year	OPEC Oil Price USD/B	USD Billion		
		IEA	Majed	B&G
2010	**81.6**	**238.4**	**195.2**	**172.8**
2011	93.2	243.1	198.4	178.6
2012	84.9	247.7	201.7	184.6
2013	86.6	252.3	205.0	190.8
2014	88.3	256.8	208.4	197.2
2015	**90.0**	**261.2**	**211.9**	**203.7**
2016	91.8	264.9	214.3	207.1
2017	93.6	268.5	216.7	210.6
2018	95.4	271.9	219.2	214.2
2019	97.3	275.1	221.7	217.8
2020	**99.2**	**278.0**	**224.2**	**221.5**
2021	101.2	282.4	226.7	222.1
2022	103.2	286.6	229.3	222.6
2023	105.2	290.5	231.9	223.0
2024	107.3	294.1	234.5	223.4
2025	**109.4**	**297.4**	**237.2**	**223.6**
2026	111.6	302.9	239.9	222.3
2027	113.8	308.2	242.6	220.9
2028	116.0	313.0	245.4	219.3
2029	118.3	317.5	248.2	217.6
2030	120.6	321.4	251.0	215.7

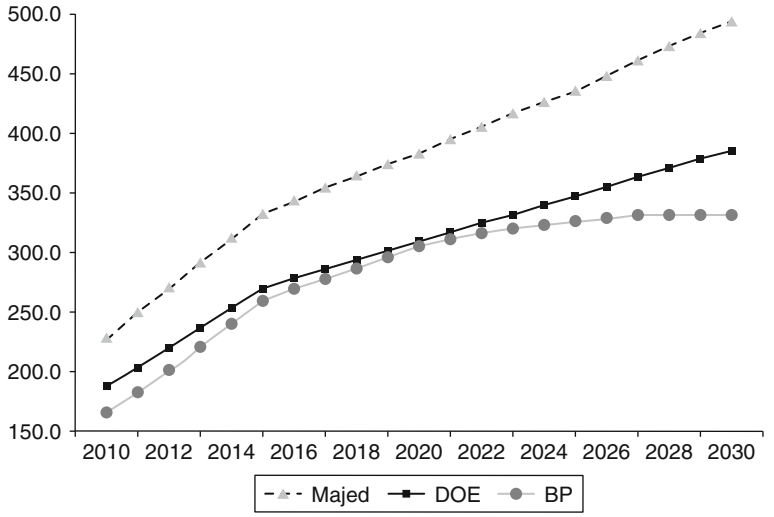


Figure 3.6 Oil revenue: 2010–2030 (USD Billion), based on IEA, Majed, and B&G oil exports and IEA oil prices.

data, oil revenues appear to asymptotically approach a limit of $330 billion.

Estimates of Oil Revenues Based on OPEC Prices

Oil revenue forecasts using OPEC-based oil prices present a slightly different picture (see figure 3.7). Both IEA and Majed show an increasing trend from 2010 through 2030, with IEA-based oil revenues increasing at a slightly faster rate than Majed-based oil revenues. However, B&G-based oil revenues increase at a faster rate than the two other cases until year 2015, after which the rate of increase starts declining. In 2025 the B&G-based revenues peak at $223.6 billion and then gradually decline to $215.7 billion in 2030.

Non-Oil Revenues

Here, we analyze two forecasts for non-oil revenue: one is based upon the relationship between non-oil revenues and GDP, and the other is based on B&G assumptions with respect to non-oil revenues.

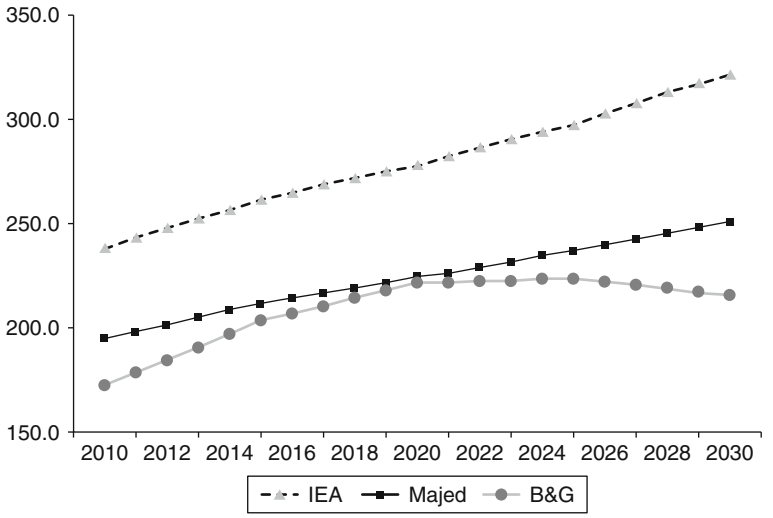


Figure 3.7 Oil revenue: 2010–2030 (USD Billion), based on IEA, Majed, and B&G oil exports, and OPEC oil prices.

A Non-Oil Revenue Equation

Non-Oil Revenues = f (GDP)
The above function was estimated from historical data on non-oil revenues (NOR) and GDP, both in SR billions, for the period of 1970 through 2010. The estimated regression equation is:

$$NOR = 11.36167 + 0.051088\ GDP$$
$$(3.801)^* \qquad (12.184)^*$$
$$r = 0.890 \quad R^2 = 0.792 \quad F\text{-}Statistic = 148.443^*$$

The equation is logically sound and all tests indicate the parameters to be statistically significant at a 1-percent level, suggesting the equation's acceptability on statistical grounds as well.

The GDP forecast values based on MOEP data were plugged into the above equation to forecast non-oil revenues in SR billions for the period of 2010 through 2030; this was converted to billions of dollars and is presented in table 3.20.

Figure 3.8 presents a telling representation in graph form. Since non-oil revenues have been considered as a linear function of GDP, their estimated values will directly follow the movement in GDP that is also evident from the shape of the curve. The non-oil revenues that were a mere $19 billion in 2010 are expected to reach over $100 billion in 2030 under the *ceteris paribus* condition and GDP, ultimately recognizing the growth path predicted by MOEP in the Ninth Development Plan of Saudi Arabia.

Table 3.20 Non-oil revenue 2010–2030: Our GDP equation (USD Billion)

Year	*US*	*Year*	*US*
2010	**19.0**	**2020**	**49.7**
2011	26.9	2021	52.9
2012	28.4	2022	55.7
2013	29.6	2023	58.0
2014	33.5	2024	68.2
2015	**35.7**	**2025**	**72.7**
2016	37.5	2026	77.5
2017	39.1	2027	82.7
2018	40.3	2028	88.2
2019	46.0	2029	94.1
		2030	**100.3**

B&G Assumption Based Non-Oil Revenues

We also generated a series of non-oil revenues using a B&G assumption of an 8 percent per year growth rate. This series is given in table 3.21.[16]

The series shows that non-oil revenues will be $88.7 billion in 2030. This figure, and the values for other years, are on the lower end of the forecasts. Therefore, we will proceed to focus on the non-oil revenue forecast based on our GDP equation, putting aside the B&G assumption based forecast.

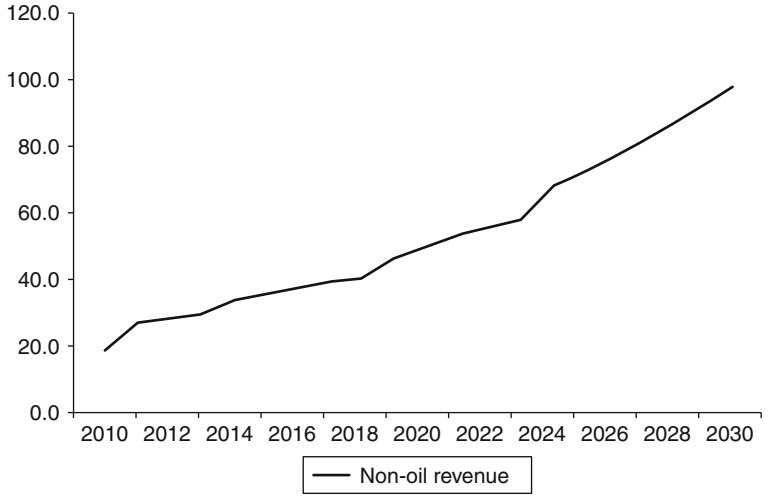


Figure 3.8 Non-oil revenue: 2010–2030 (USD Billion), our GDP equation based.

Table 3.21 Non-oil revenue 2010–2030: B&G Assumption (USD Billion)

Year	*US*	*Year*	*US*
2010	**19.0**	**2020**	**41.1**
2011	20.5	2021	44.4
2012	22.2	2022	47.9
2013	24.0	2023	51.7
2014	25.9	2024	55.9
2015	**28.0**	**2025**	**60.4**
2016	30.2	2026	65.2
2017	32.6	2027	70.4
2018	35.2	2028	76.0
2019	38.0	2029	82.1
		2030	**88.7**

Total Revenues

Total revenue has been computed by adding our estimates of non-oil revenue to each of our three oil revenue estimates, based on IEA oil prices (table 3.22 and figure 3.9).

The same has been repeated for the three oil revenue scenarios using OPEC oil prices (table 3.23 and figure 3.10). This gives us six estimates of total revenues, or three estimates three each for IEA and OPEC oil prices.

Figure 3.9 may be interpreted similarly to figure 3.10, as the dominant component of total revenue is oil revenues, with non-oil revenues still too small to have any substantial influence on total revenues as a whole.

The snapshot of total revenues derived from the OPEC price is not significantly different from that of the oil revenues themselves in these scenarios. This is because the oil revenues are the dominant component of total revenues. However, one may notice slight distortions in the curves of total revenues that are not observable in figure 3.9 This is due to the fact that oil revenues using IEA oil prices are sufficiently higher and able to absorb the effect of non-oil revenues, as compared to OPEC oil prices based oil revenues.

Table 3.22 Total revenue: IEA price based oil revenue (USD Billion)

Year	*IEA*	*Majed*	*B&G*
2010	**247.1**	**205.7**	**184.4**
2011	276.1	230.3	210.1
2012	298.6	248.4	229.8
2013	320.6	266.1	249.7
2014	345.0	286.3	272.7
2015	**367.3**	**304.8**	**294.3**
2016	380.2	314.7	305.5
2017	392.4	324.2	316.2
2018	403.8	333.3	326.7
2019	419.0	346.6	341.4
2020	**431.8**	**357.9**	**354.2**
2021	446.7	369.0	362.6
2022	460.5	379.6	370.1
2023	473.4	389.5	376.8
2024	493.5	407.3	391.1
2025	**507.1**	**419.2**	**399.3**
2026	525.1	431.9	406.0
2027	542.7	444.9	412.5
2028	560.0	458.0	418.8
2029	576.8	471.4	425.0
2030	**593.0**	**485.0**	**431.0**

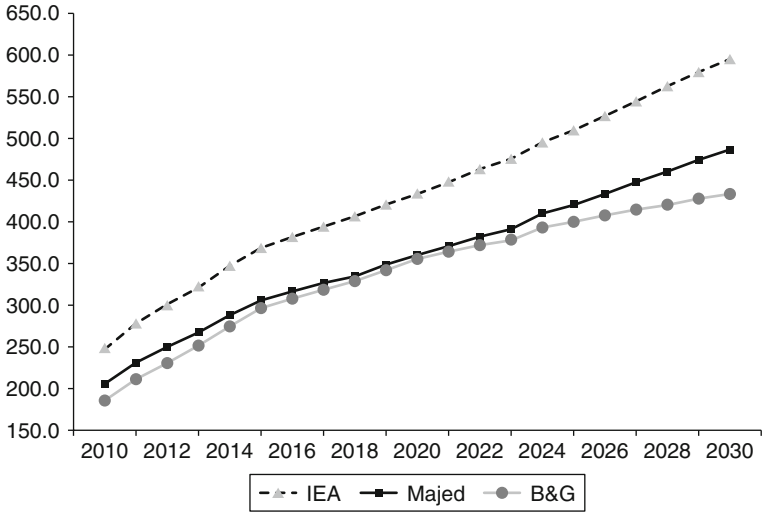


Figure 3.9 Total revenue: 2010–2030 (USD Billion), IEA oil prices, oil exports: IEA, Majed, & B&G based estimates, non-oil revenue: our GDP equation based estimates.

Table 3.23 Total revenue: OPEC price based oil revenue (USD Billion)

Year	*IEA*	*Majed*	*B&G*
2010	**257.4**	**214.2**	**191.8**
2011	270.0	225.3	205.6
2012	276.1	230.1	213.1
2013	281.9	234.6	220.4
2014	290.3	241.9	230.7
2015	**296.8**	**247.6**	**239.3**
2016	302.4	251.8	244.6
2017	307.6	255.8	249.7
2018	312.2	259.5	254.6
2019	321.0	267.6	263.8
2020	**327.7**	**273.9**	**271.2**
2021	335.4	279.7	275.0
2022	342.3	285.0	278.2
2023	348.5	289.0	281.0
2024	362.3	302.7	291.6
2025	**370.1**	**309.9**	**296.3**
2026	380.5	317.4	299.9
2027	390.8	325.3	303.6
2028	401.2	333.5	307.5
2029	411.5	342.2	311.7
2030	**421.8**	**351.3**	**316.1**

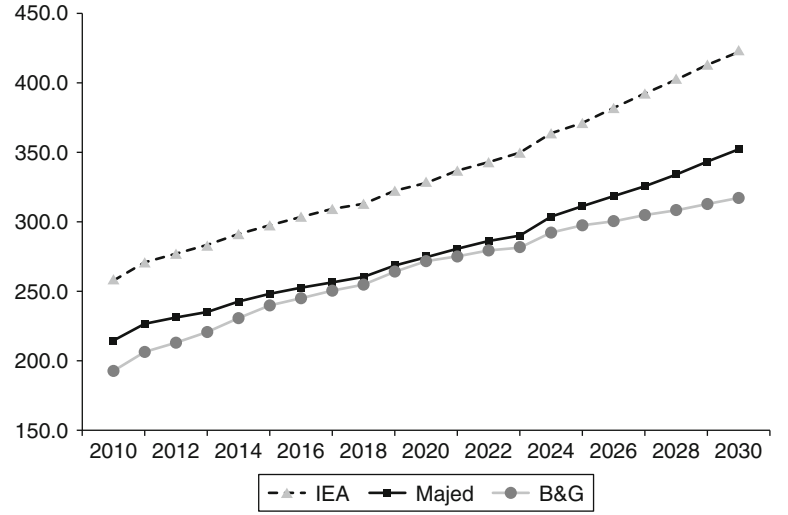


Figure 3.10 Total revenue: 2010–2030 (USD Billion), OPEC oil prices, oil exports: IEA, Majed, & B&G based estimates, non-oil revenue: our GDP equation based estimates.

The Revenues/Expenditures Gaps (2011 – 2030)

Recall that we have three sets of total government expenditures: expenditures based on rationally chosen growth rates, those obtained from MOEP data, and those derived from the B&G paper. The three total expenditures, combined with our six total revenue estimates, result in 18 revenue-expenditure gap scenarios presented in three groups. The gaps may be defined as: gap = total revenue – total expenditure.

The First Group: Scenarios 1–6

Scenarios in this group are based on:

1. Current expenditures: Growth rate data in all cases;
2. Capital expenditures: Our growth rate data in all cases;
3. Non-oil revenue: Based on author's equation;
4. Oil exports: IEA, Majed, and B&G data;
5. Oil prices: IEA oil price and OPEC data; and
6. Oil revenues: Six oil revenues, two oil prices × three oil exports.

These six scenarios are presented in the columns of tables 3.24 and 3.25.

Table 3.24 Revenue-expenditure gap: Our expenditure estimates IEA price based oil revenue; non-oil revenue

	USD Billion		
Year	*IEA*	*Majed*	*B&G*
2010	**72.7**	**31.4**	**10.0**
2011	77.6	31.8	11.5
2012	72.0	21.8	3.2
2013	61.2	6.7	−9.7
2014	47.3	−11.4	−25.0
2015	**24.7**	**−37.9**	**−48.3**
2016	10.6	−54.8	−64.1
2017	−6.4	−74.6	−82.6
2018	−26.8	−97.2	−103.9
2019	−46.0	−118.5	−123.7
2020	**−70.8**	**−144.8**	**−148.4**
2021	−96.8	−174.5	−180.9
2022	−127.5	−208.4	−217.9
2023	−163.1	−246.9	−259.6
2024	−195.8	−281.9	−298.1
2025	**−239.6**	**−327.5**	**−347.4**
2026	−284.3	−377.5	−403.4
2027	−335.0	−432.9	−465.3
2028	−392.3	−494.3	−533.5
2029	−456.9	−562.2	−608.7
2030	**−529.4**	**−637.4**	**−691.4**

Table 3.25 Revenue-expenditure gap: Our expenditure estimates OPEC price based oil revenue

	USD Billion		
Year	*IEA*	*Majed*	*B&G*
2010	**83.0**	**39.8**	**17.5**
2011	71.5	26.8	7.0
2012	49.5	3.5	−13.5
2013	22.5	−24.7	−38.9
2014	−7.4	−55.8	−67.0
2015	**−45.8**	**−95.1**	**−103.3**
2016	−67.1	−117.8	−124.9
2017	−91.2	−143.0	−149.1
2018	−118.3	−171.0	−176.0
2019	−144.0	−197.5	−201.3
2020	**−147.9**	**−228.8**	**−231.4**
2021	−208.2	−263.9	−268.5
2022	−245.7	−303.0	−309.8
2023	−288.0	−346.6	−355.5
2024	−326.9	−386.5	−397.6
2025	**−376.6**	**−436.8**	**−450.4**
2026	−428.9	−492.0	−509.5
2027	−486.9	−552.5	−574.2
2028	−551.1	−618.7	−644.8
2029	−622.1	−691.4	−722.0
2030	**−700.7**	**−771.1**	**−806.3**

The gaps shown in table 3.24 and table 3.25 have been presented graphically along with their respective total revenues and total expenditures in the subsequent figures.

Scenario Number One

Table 3.24, column IEA presents the gap between total revenues estimated from IEA-based oil exports, IEA prices and our GDP-based non-oil revenues, and our growth-rate based total expenditures. Figure 3.11 illustrates that until 2016 there would be surpluses. However, a small gap of $6.4 billion would be introduced in 2017 that would widen over time to more than $529 billion in 2030 if revenues and expenditures continue to increase as presumed in this scenario.

Scenario Number Two

Column Majed of Table 3.24 shows the gap between total revenue estimated from Majed data, IEA oil prices and our GDP equation based non-oil revenues, and our growth-rate based total expenditure. This is depicted in figure 3.12. In this scenario, a gap of $11.4 billion emerges in 2014 that gradually widens to become over $637 billion in 2030.

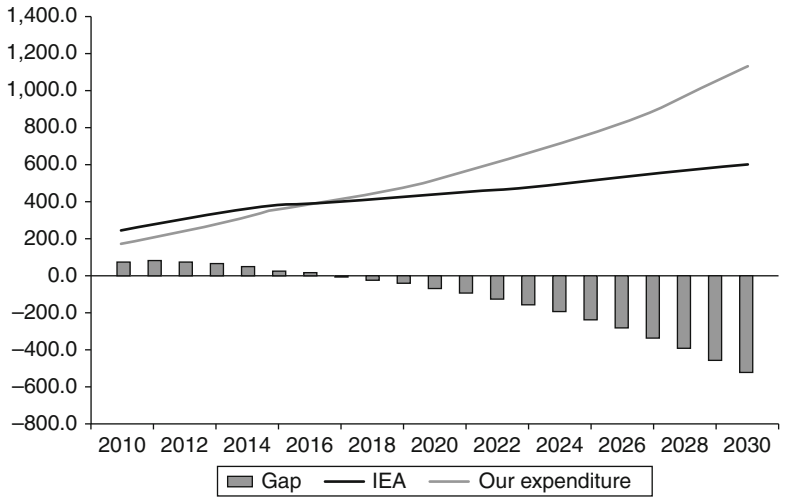


Figure 3.11 Revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: our growth rate, non-oil revenue: our GDP equation based, oil prices: IEA.

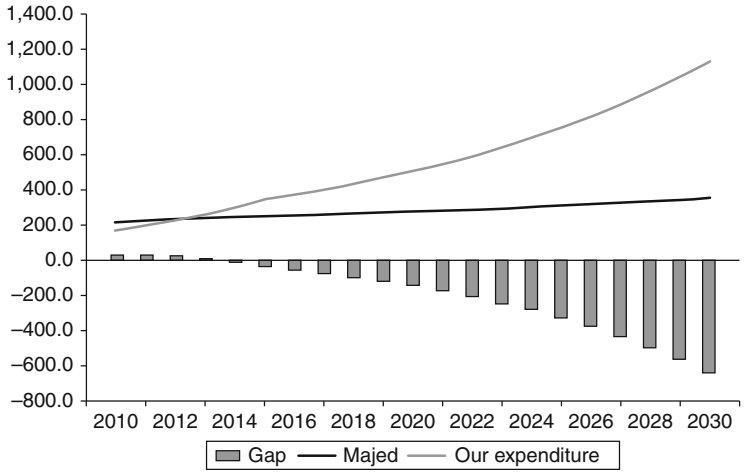


Figure 3.12 Revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: our growth rate, non-oil revenue: our GDP equation based, oil prices: IEA.

Scenario Number Three

The third column of table 3.24, B&G, is based on the same assumptions from Scenarios One and Two, but instead with B&G oil exports. It is graphically represented in figure 3.13. This scenario has a wider gap than that depicted in figure 3.12, since the gap of $9.7 billion emerges as early as 2013 and shoots up to $691.4 billion in 2030.

Scenario Number Four

Table 3.26 depicts Scenarios Four, Five, and Six. These scenarios are based on the same assumptions as Scenarios One, Two, and Three, but with OPEC oil prices instead of IEA oil prices. The corresponding figures for these tables use the total revenues based on OPEC oil prices instead of IEA oil prices. Since expenditures, non-oil revenues, and oil exports are the same in these scenarios, and OPEC oil prices are lower compared to IEA oil prices, we expect the gaps to increase. Indeed, we notice in figure 3.14 that a gap of $7.4 billion appears as early as 2014, which appeared only in 2017 in the corresponding figure 3.11 IEA oil prices. This gap increases to over $700 billion in 2030.

Scenario Number Five

For this scenario based on Majed oil exports and OPEC oil prices, figure 3.15 corresponds to IEA oil price based figure 3.12, with a gap of

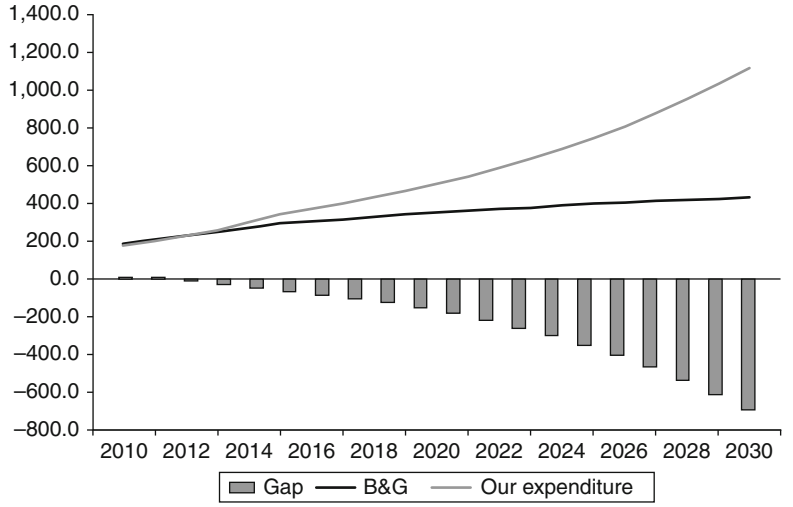


Figure 3.13 Revenue-expenditure gap (USD Billion), oil revenue: B& G data based, expenditure: our growth rate, non-oil revenue: our GDP equation based, oil prices: IEA.

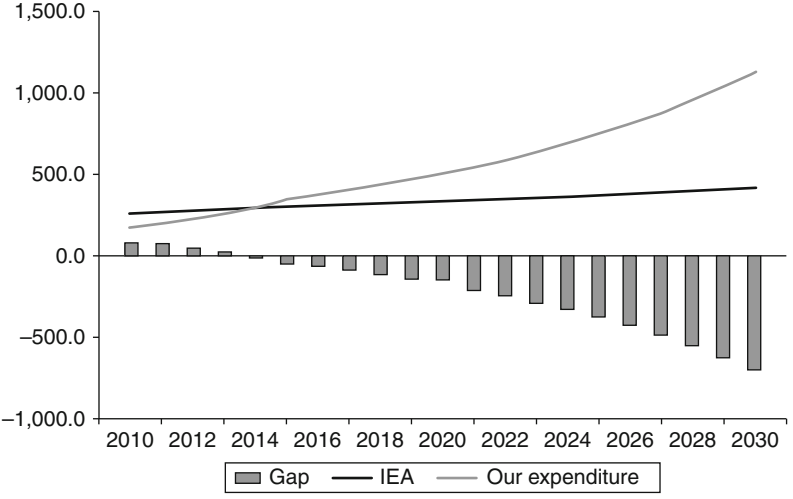


Figure 3.14 Revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: our growth rate, non-oil revenue: our GDP equation based, oil prices: OPEC.

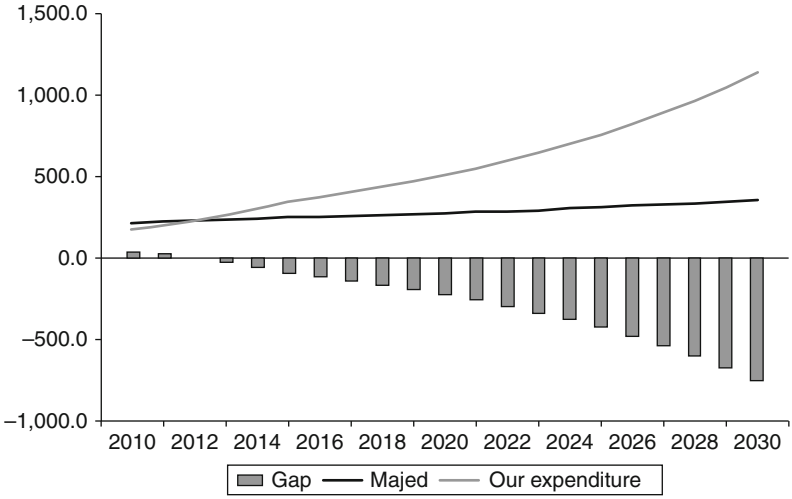


Figure 3.15 Revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: our growth rate, non-oil revenue: our GDP equation based, oil prices: OPEC.

$24.7 billion appearing in 2013 and growing to over $771 billion in 2030.

Scenario Number Six

Similar to Scenarios Four and Five, Scenario Six, using B&G oil exports and OPEC oil prices, sees a gap of $13.5 billion emerging in 2012 and widening to over $806 billion in 2030 (figure 3.16).

Thoughts on Our First Six Scenarios

Scenario One: Based on our expenditure and non-oil revenue estimates, as well as IEA based oil revenue and oil export estimate, there is a projected budgetary deficit of $6.4 billion in 2017, $70.8 billion in 2020, $239.6 billion in 2025, and $ 529.4 billion in 2030.

Scenario Two: Based on the same assumptions of Scenario One, but with Majed oil export assumptions, we see a deficit of $11.4 billion in 2014 increasing to $ 144.8 billion in 2020, $327.5 billion in 2025, and $637.4 in 2030.

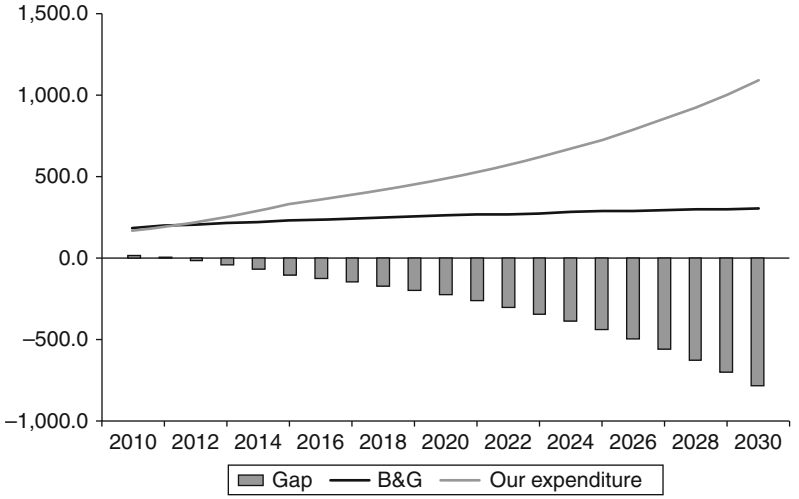


Figure 3.16 Revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: our growth rate, non-oil revenue: our GDP equation based, oil prices: OPEC.

Scenario Three: Using the same assumptions as our first two Scenarios, except with B&G oil export assumptions, we see a deficit of $9.7 billion in 2013, $148.4 in 2020, $347.4 in 2025, and $591.4 in 2030.

Scenario Four: Here, we used different oil price assumptions. In these scenarios, we adopted OPEC oil prices instead of IEA oil price assumptions. This scenario, also based on IEA exports, shows a deficit of $ 7.4 billion in 2014, $ 174.9 billion in 2020, $376.6 in 2025, and $700.7 billion in 2030.

Scenario Five: Using the Majed oil exports assumption, here we see a deficit of $24.7 billion in 2013, $228.8 billion in 2020, $436.8 billion in 2025, and $ 771.1 billion in 2030.

Scenario Six: Finally, using the B&G oil export assumptions, we end up with a deficit of $13.5 billion in 2012, $231.4 billion in 2020, $450.4 billion in 2025, and $ 806.3 billion in 2030.

Summing up we may conclude that according to the above scenarios that are based on our growth-rate based expenditures plus our GDP equation based non-oil revenues along with six different sets of oil revenues, we expect that budgetary gaps of about $500 billion are bound to emerge in the near future rising to over $800 billion by 2030.

The Second Group: Scenarios 7–12.

Scenarios in this group are based on:

1. Current expenditure: MOEP data in all cases;
2. Capital expenditure: MOEP data in all cases;
3. Non-oil revenue: Author's equation [NOR = f(GDP)] in all cases;
4. Oil exports: IEA, Majed, and B&G Data;
5. Oil revenue: Direct multiplication [OR = oil exports × oil prices)]; and
6. Oil revenue: IEA oil price based and OPEC price based.

Scenarios Seven through Twelve are based on the same revenue assumptions as Scenarios One through Six. However, with respect to expenditures, assumptions are based on the MOEP database. The second group scenarios are shown in the columns of table 3.26 and table 3.27. They have been presented graphically, along with total revenues and total expenditures, respectively, in figures 3.17 through figure 3.22.

Scenario Number Seven

The gaps between MOEP expenditure data and total revenues estimated from IEA data, based on our GDP equation, have been presented in the first column of table 3.26. Figure 3.17 presents this data graphically. It is worth noting in the tables and figures that leading up to 2016, there are surpluses, whereas a gap of $13.1 billion is introduced in 2017 that grows to over $741 billion in 2030.

Scenario Number Eight

Using the same variables as in Scenario Seven, but with Majed data, the analysis (figure 3.18) shows that a gap of $8.6 billion emerges in 2013 that gradually widens to become over $849 billion in 2030.

Scenario Number Nine

When using revenue based on B&G data, with all other variables being the same, figure 3.19 shows a small gap of $5.3 billion in 2012 that grows at an alarming rate to $903.5 billion in 2030.

Scenarios Ten through Twelve make use of OPEC oil price data in lieu of IEA data, keeping the other variables the same.

Table 3.26 Revenue-expenditure gap

	MOEP based expenditure estimates IEA price based oil revenue; Our GDP equation based non-oil revenue USD Billion		
Year	*IEA*	*Majed*	*B&G*
2010	**72.7**	**31.4**	**10.0**
2011	74.1	28.3	8.1
2012	63.6	13.4	−5.2
2013	45.9	−8.6	−25.0
2014	22.7	−35.9	−49.6
2015	**19.5**	**−43.0**	**−53.5**
2016	4.7	−60.8	−70.0
2017	−13.1	−81.3	−89.3
2018	−34.3	−104.7	−111.4
2019	−54.3	−126.7	−131.9
2020	**−87.9**	**−161.9**	**−165.5**
2021	−124.1	−201.8	−208.2
2022	−166.4	−247.4	−256.9
2023	−215.4	−299.2	−311.9
2024	−263.2	−349.4	−365.5
2025	**−324.4**	**−412.3**	**−432.1**
2026	−388.7	−481.8	−507.7
2027	−461.5	−559.4	−591.8
2028	−544.0	−645.9	−685.2
2029	−636.9	−742.3	−788.7
2030	**−741.5**	**−849.5**	**−903.5**

Table 3.27 Revenue−expenditure gap

	MOEP based expenditure estimates OPEC price based oil revenue; Our GDP equation based non-oil revenue USD Billion		
Year	*IEA*	*Majed*	*B&G*
2010	**83.0**	**39.8**	**17.5**
2011	68.0	23.3	3.6
2012	41.1	−4.9	−22.0
2013	7.2	−40.1	−54.3
2014	−32.0	−80.3	−91.6
2015	**−51.0**	**−100.2**	**−108.5**
2016	−73.1	−123.7	−130.8
2017	−97.9	−149.7	−155.8
2018	−125.8	−178.5	−183.5
2019	−152.3	−205.7	−209.5
2020	**−192.1**	**−245.9**	**−248.5**
2021	−235.5	−291.2	−295.8
2022	−284.7	−342.0	−348.7
2023	−340.3	−398.9	−407.8
2024	−394.4	−453.9	−465.1
2025	**−461.4**	**−521.5**	**−535.1**
2026	−533.3	−596.3	−613.9
2027	−613.4	−679.0	−700.7
2028	−702.8	−770.4	−796.4
2029	−802.2	−871.5	−902.0
2030	**−912.8**	**−983.2**	**−1018.5**

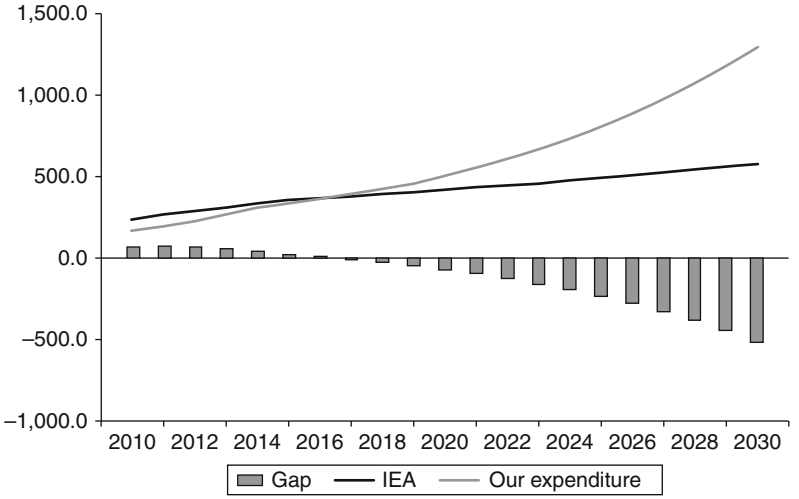


Figure 3.17 Revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: MOEP data based, non-oil revenue: our GDP equation based, oil prices: IEA.

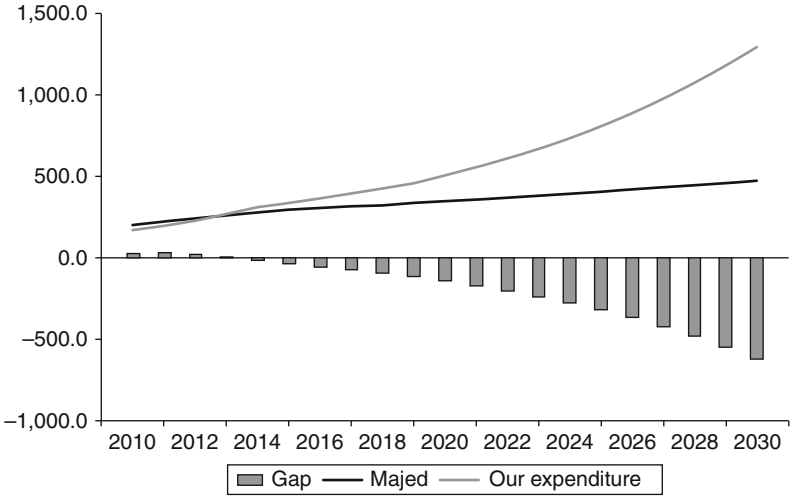


Figure 3.18 Revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: MOEP data based, non-oil revenue: our GDP equation based, oil prices: IEA

Scenario Number Ten

Using IEA oil export data, a gap of $32 billion is shown in 2014 increasing to approximately $913 billion in 2030 (figure 3.20).

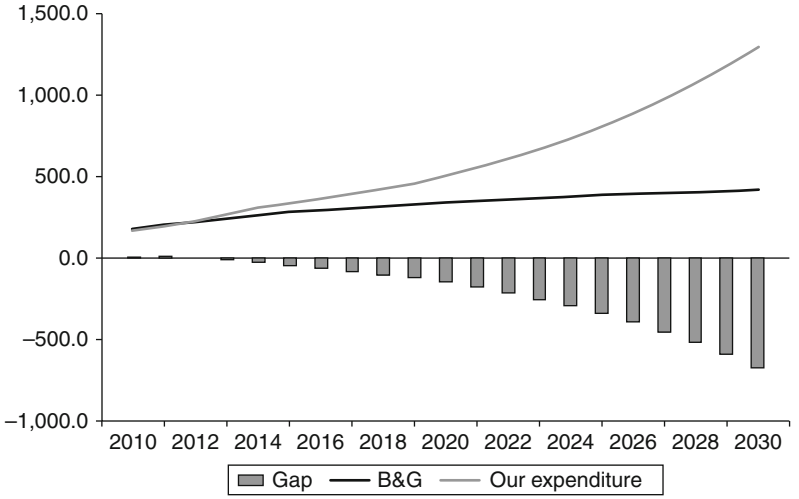


Figure 3.19 Revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: MOEP data based, non-oil revenue: our GDP equation based, oil prices: IEA.

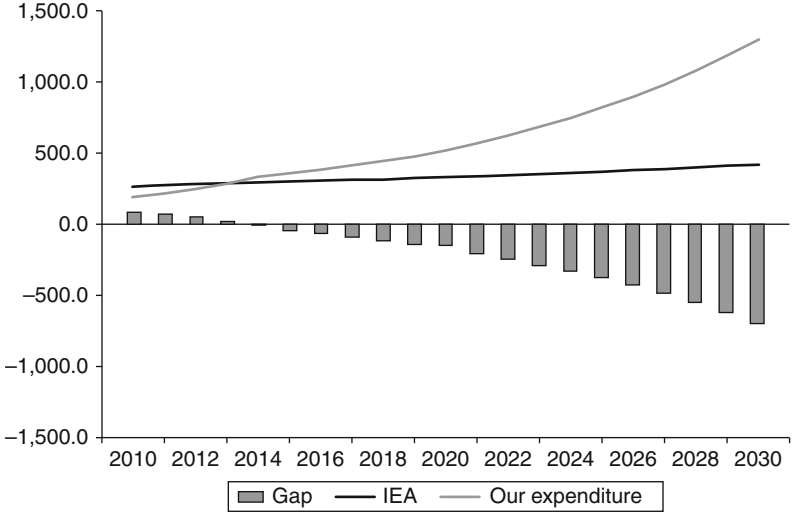


Figure 3.20 Revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: MOEP data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

Scenario Number Eleven

With Majed based data, and all other things remaining the same, we notice a small gap of $4.9 billion as early as 2012 that widens to over $983 billion in 2030 (figure 3.21).

Scenario Number Twelve

Finally, making use of B&G oil export data, the gap soars to over $1.018 trillion in 2030, after starting at only $22 billion in 2012. This is perhaps the most alarming scenario, notwithstanding the fact that gaps in the vicinity of $1 trillion also exist elsewhere (figure 3.22).

Thoughts on Our Second Six Scenarios

Scenario Seven: Based on MOEP expenditure estimates and IEA data, we see a deficit of $13.1 billion in 2017, $87.9 billion in 2020, $324.4 billion in 2025, and $741.5 in 2030.

Scenario Eight: Based on the same assumptions as Scenario Seven, except using Majed oil exports estimates, we see a deficit of $ 8.6 billion

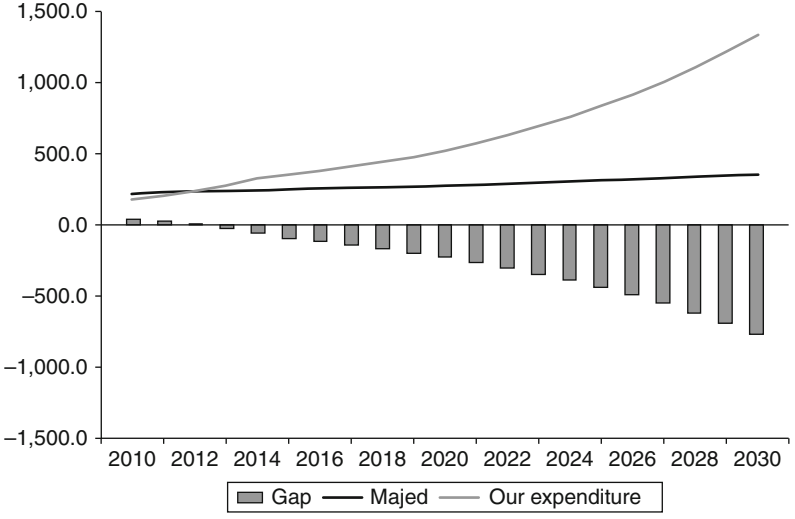


Figure 3.21 Revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: MOEP data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

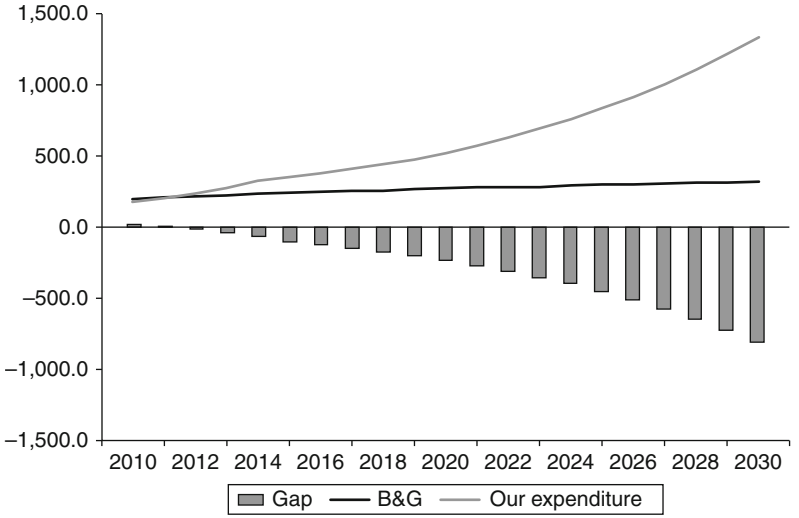


Figure 3.22 Revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: MOEP data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

in 2013, $161.9 billion in 2020, $412.3 billion in 2025, and $849.5 billion in 2030.

Scenario Nine: Based on the same assumptions as Scenario Eight, except using B&G oil export estimates, the model predicts a deficit of $ 5.2 billion in 2012, $165.5 billion in 2020, $432.1 billion in 2025, and $903.5 billion in 2030.

Scenario Ten: Using otherwise identical assumptions as Scenario Seven, except plugging in OPEC price data, we yield a deficit of $32 billion in 2014, $192.1 billion in 2020, $461.4 billion in 2025, and $ 912.8 billion in 2030.

Scenario Eleven: Taking Scenario Ten and instead using Majed oil export estimates, we see a deficit of $4.9 billion in 2012, $245.9 billion in 2020, $521.5 in 2025, and $983.2 billion in 2030.

Scenario Twelve: Taking Scenario Eleven and plugging in B&G oil export data, the analysis indicates a deficit of $22 billion in 2012, $248.5 billion in 2020, $535.1 billion in 2025, and $1,018.5 billion in 2030.

In the case of MOEP data based expenditures, gaps are larger than they are in corresponding scenarios based on growth rate. This is because MOEP data expenditures are, in all cases, higher than our growth-rate based expenditures.

The Last Group: Scenarios Thirteen to Eighteen

Scenarios in this group are based on:

1. Current Expenditure: B&G Data in all cases;
2. Capital Expenditure: B&G Data in all cases;
3. Non-Oil Revenue: Author's equation [NOR = f (GDP)] in all cases;
4. Oil Exports: IEA, Majed and B&G;
5. Oil Revenue: Direct Multiplication [OR=Oil Exports x Oil Prices)]; and
6. Oil Revenue IEA and OPEC Data.

The gaps are shown in table 3.28 and table 3.29, and have been presented graphically with total revenues and total expenditures in figures 3.23 through 3.28.

Scenario Number Thirteen

The scenario shown in figure 3.23 uses IEA based export and price data, and our GDP equation for non-oil revenues, along with B&G data for expenditures. Since the expenditures in the B&G data are smaller than those in our growth-rate based and MOEP based cases, the gap appears quite late: only in 2029 do they first appear, at $25.3 billion, which ultimately grows to $61.1 billion in 2030.

Scenario Number Fourteen

The scenario depicted in figure 3.24 below is similar to that shown in Figure 3.23. Scenario Fourteen uses Majed based oil revenues. In this scenario, a gap of $12.8 billion is observable in 2025 that widens to over $169 billion in 2030

Scenario Number Fifteen

The scenario shown in figure 3.25 bases oil revenue on B&G data. In this scenario, a gap of $12.1 billion is introduced in 2024 that grows to $223.1 billion in 2030.

Scenario Number Sixteen

Scenario Sixteen uses IEA data but OPEC oil prices, with non-oil revenues estimated using our GDP based equation, and expenditures based

Table 3.28 Revenue-expenditure gap

	B&G based expenditure estimates *IEA price based oil revenue* *Our GDP equation based non-oil revenue* *USD Billion*		
Year	*IEA*	*Majed*	*B&G*
2010	**72.7**	**31.4**	**10.0**
2011	90.5	44.7	24.5
2012	101.1	50.9	32.3
2013	110.3	55.8	39.4
2014	121.2	62.6	48.9
2015	**129.2**	**66.6**	**56.2**
2016	129.9	64.4	55.1
2017	129.2	61.0	53.0
2018	127.1	56.6	50.0
2019	128.1	55.7	50.5
2020	**126.0**	**52.0**	**48.4**
2021	119.0	41.3	34.8
2022	109.4	28.4	18.9
2023	97.1	13.3	0.5
2024	90.3	4.1	−12.1
2025	**75.1**	**−12.8**	**−32.7**
2026	55.7	−37.5	−63.4
2027	32.8	−65.1	−97.5
2028	5.9	−96.1	−135.5
2029	−25.3	−130.7	−177.1
2030	**−61.1**	**−169.1**	**−223.1**

Table 3.29 Revenue-expenditure gap

	B&G based expenditure estimates *OPEC price based oil revenue* *Our GDP equation based non-oil revenue* *USD Billion*		
Year	*IEA*	*Majed*	*B&G*
2010	**83.0**	**39.8**	**17.5**
2011	84.4	39.7	20.0
2012	78.6	32.6	15.5
2013	71.7	24.4	10.2
2014	66.5	18.2	6.9
2015	**58.7**	**9.4**	**1.2**
2016	52.1	1.4	−5.7
2017	44.4	−7.4	−13.5
2018	35.5	−17.2	−22.2
2019	30.1	−23.3	−27.1
2020	**21.8**	**−32.0**	**−34.6**
2021	7.6	−48.1	−52.7
2022	−8.9	−66.2	−72.9
2023	−27.8	−86.4	−95.3
2024	−40.8	−100.4	−111.6
2025	**−61.9**	**−122.1**	**−135.7**
2026	−88.9	−152.0	−169.5
2027	−119.1	−184.7	−206.4
2028	−152.9	−220.6	−246.6
2029	−190.5	−259.8	−290.4
2030	**−232.4**	**−302.8**	**−338.0**

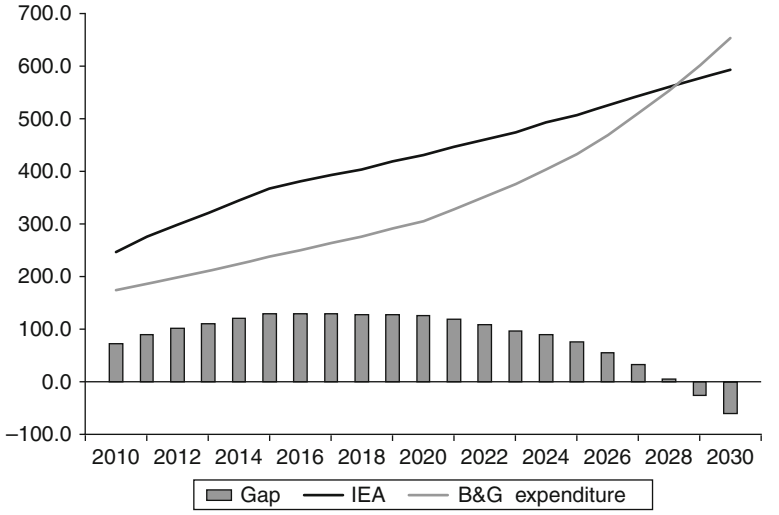


Figure 3.23 Revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: IEA.

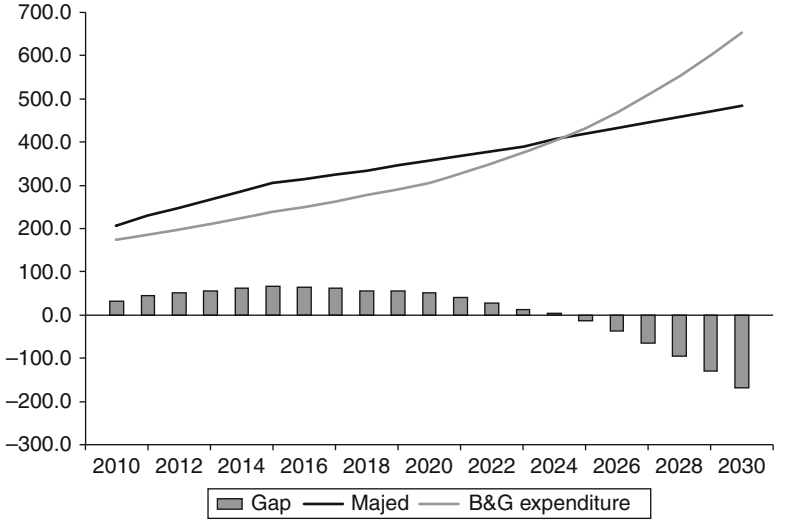


Figure 3.24 Revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: IEA.

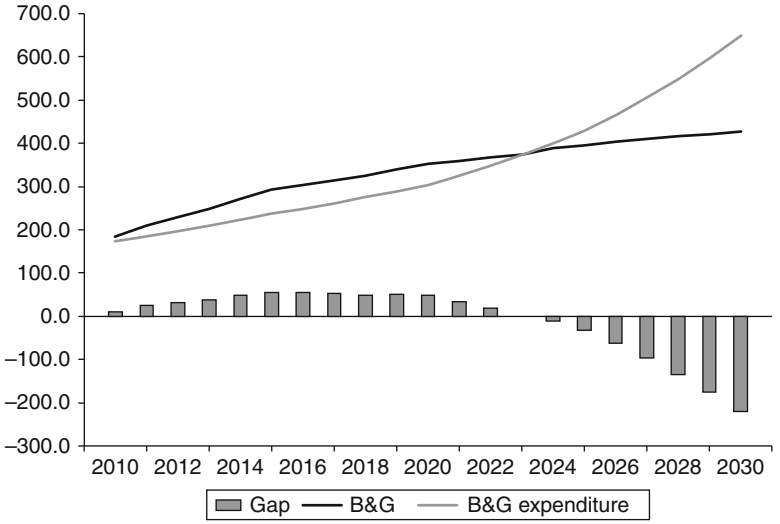


Figure 3.25 Revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: IEA.

on B&G data. In this scenario a gap of $8.9 billion appears in 2022 (as seen in the first column of table 3.29), and swells to $232.4 billion in 2030 (figure 3.26).

Scenario Number Seventeen

The scenario depicted in figure 3.27 is oil revenue based on Majed data and OPEC oil prices, with the other variables being the same as Scenario Sixteen. A gap of $7.4 billion shows in 2017, and increases to $302.8 billion in 2030.

Scenario Number Eighteen

Scenario Eighteen, as depicted graphically in figure 3.28, represents a scenario similar to that shown in Scenario Seventeen, except that the oil revenue in this scenario is estimated using B&G data. In this scenario, the small gap that begins in 2016 as $5.7 billion ultimately soars to $338 billion.

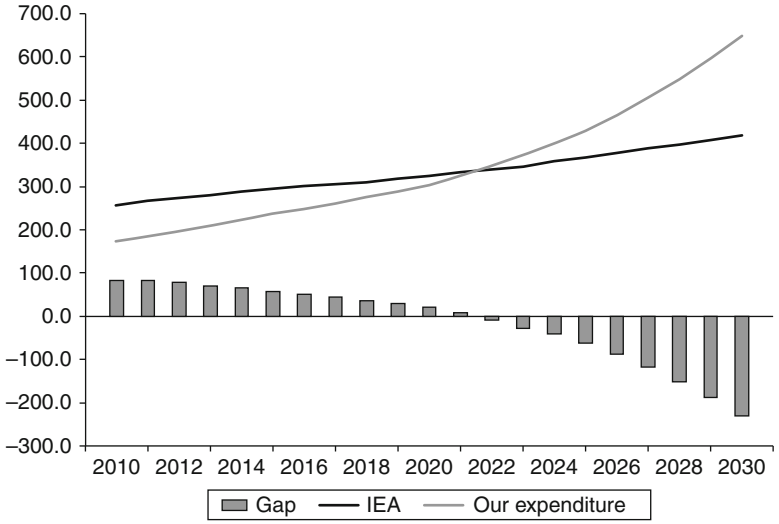


Figure 3.26 Revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

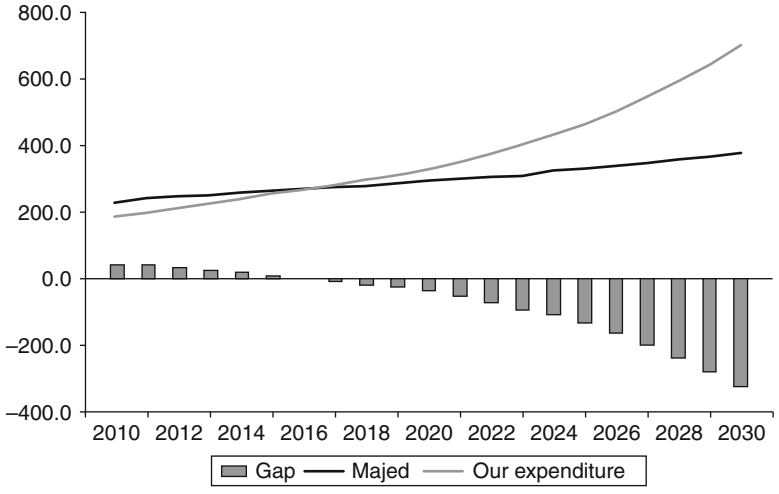


Figure 3.27 Revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: B&G data based, non-oil revenue: Our GDP equation based, oil prices: OPEC.

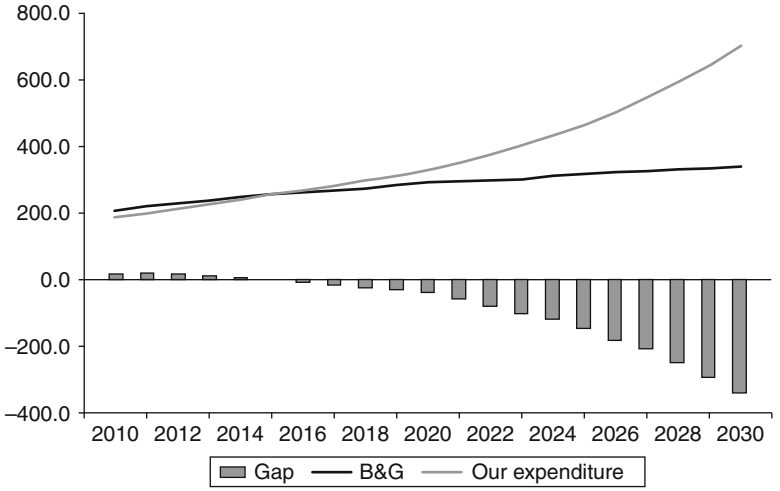


Figure 3.28 Revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

Thoughts on Our Last Six Scenarios

Scenario Thirteen: Based on IEA oil export price data, the gap appears very late in 2029 at $25.3 billion, and at 2030, is already up to $61.1 billion.

Scenario Fourteen: Based on the assumptions from Scenario Thirteen, but with Majed export data, we see a deficit of $12.8 billion in 2025 and $169.1 billion in 2030.

Scenario Fifteen: Based on the assumptions from Scenario 14, except with B&G export data, the analysis shows a deficit of $12.1 billion in 2024, $32.7 billion in 2025, and $223.1 billion in 2030.

Scenario Sixteen: The same as Scenario Thirteen, but with OPEC price data, it shows a deficit of $8.9 billion in 2022, $ 61.9 billion in 2025, and $ 232.4 billion in 2030.

Scenario Seventeen: Using Majed export data and Open price data, we see a deficit of $8.9 billion in 2022, $461.9 billion in 2025, and $ 232.4 billion in 2030.

Scenario Eighteen: Finally, using B&G export estimates and OPEC price data, our analysis yields a deficit of $ 5.7 billion in 2016, $34.6 billion in 2020, $135.7 billion in 2025, and $ 338 billion in 2030.

In the scenarios depicted in figure 3.23 to figure 3.28, gaps appear later than in corresponding scenarios where growth-rate based

expenditures or MOEP-based expenditures are used. These gaps also grow by a smaller magnitude than in those other corresponding scenarios. This is because of B&G expenditure estimates are lower than the two other expenditure estimates.

Conclusion

In this chapter, we sought to demonstrate the gap between expected government expenditures and revenues during a future period spanning between 2010 and 2030. Through the 18 scenarios presented in this chapter, we demonstrated what these likely gaps would be. These scenarios envision a relatively stable situation outside of revenue and expenditure; they exclude political, social, natural, or economic crises that would force the government to allocate further off-budget expenditures to meet such eventualities.

Depending on which scenario one observes, government deficit begins to accrue as early as 2012 (this is observed in Scenarios Three, Five, and Six). The accumulated debt at the end of our future period reaches a level of $1018.5 billion in the most pessimistic scenario, Scenario Six. Fourteen of eighteen scenarios show debt level that can reasonably be interpreted as alarming. Based on our analysis of government spending behavior in chapter 2, it is reasonable to assume that government off-budget spending to financing unexpected political or natural crises, or to financing a new government project, will also take place from time to time aggravating matters.

The magnitude of the government deficit gap in most of the scenarios is high, ranging from $800 billion to 1 trillion dollars. This indicates that the Saudi government will not be able to sustain expenditures without accumulating huge deficits, and thus an unsustainable level of national debt. This situation will subject the country to political and economic risk. In chapter 5, I analyze the government's ability to finance the debt gap.

CHAPTER 4

Forecasting Government Expenditures, Revenues, and Gaps, 2031–2050

In this chapter, we forecast expenditures, revenues, and gaps beyond 2030. This analysis is useful for the purpose of determining the path our variables would take beyond the medium term if our assumed growth rates hold, and further shed some light on the severity of the problem Saudi Arabia may face going forward.

Government Expenditures in the Long-Term Period

In this scenario we have forecast MOEP and B&G based data expenditures for the period of 2031 through 2050 (the "Long Term Period") as per the following assumptions: First, for the base value, we use the estimated 2030 expenditures from our earlier scenarios. Second, we assume that current expenditures grow by 5 percent per year. Lastly, we assume that capital expenditures grow by 10 percent per year.

The Author's Estimate

Current Expenditures

If current expenditures (which were estimated at $816.3 billion for 2030) grow at our assumed growth rate of 5 percent per year, they would reach $2.166 trillion by 2050. This is an increase of more than 250 percent times in a 20-year period. Table 4.1 provides more detail.

Capital Expenditures

We have assumed a growth rate of 10 percent for capital expenditures. This is due to the fact that we do not expect continuation of current

capital expenditures that are mainly related to infrastructure building. Any capital expenditures going forward are likely to be related to upgrading and maintaining existing infrastructure, and in some cases, replacing existing infrastructure. Forecasted capital expenditures are below in table 4.2.

At our assumed rate of 10 percent for capital expenditures, capital expenditure value of $306.1 billion in 2030 is likely to be reduced to $37.2 billion in 2050, according to our analysis.

Total Expenditures

Adding current and capital expenditures to obtain total expenditures, we find that our estimated total expenditures of $1.122 trillion per year would become $2.203 trillion by the end of 2050 in this model (table 4.3).

Table 4.1 Forecast current expenditure: Our scenario 2031–2050 (USD Billion)

2030	**816.3**	2040	1,329.7
2031	857.2	2041	1,396.2
2032	900.0	2042	1,466.0
2033	945.0	2043	1,539.3
2034	992.3	2044	1,616.3
2035	**1,041.9**	**2045**	**1,697.1**
2036	1,094.0	2046	1,782.0
2037	1,148.7	2047	1,871.1
2038	1,206.1	2048	1,964.6
2039	1,266.4	2049	2,062.9
		2050	**2,166.0**

Table 4.2 Forecast capital expenditure: Our scenario 2031–2050 (USD Billion)

2030	**306.1**	**2040**	**106.7**
2031	275.5	2041	96.1
2032	247.9	2042	86.4
2033	223.1	2043	77.8
2034	200.8	2044	70.0
2035	**180.7**	**2045**	**63.0**
2036	162.7	2046	56.7
2037	146.4	2047	51.0
2038	131.8	2048	45.9
2039	118.6	2049	41.3
		2050	**37.2**

MOEP Macroeconomic Forecast-Based Scenario

Current Expenditures

Continuing with our assumption of 5 percent per year growth in current expenditures, we find that estimated expenditures for 2030 of $1.056 trillion will grow to $2.801.6 trillion by 2050. Obviously, since MOEP based data for 2030 are about 20 percent higher than the analogous growth rate based scenario, the 2050 value when using MOEP based data is also higher, as table 4.4 demonstrates.

Capital Expenditures

Applying our assumed growth rate of 10 percent per year to MOEP data on capital expenditures, value decreases from $278.7 billion to $33.9 billion from 2030 to 2050 (table 4.5).

Table 4.3 Forecast total expenditure: Our scenario, 2031–2050 (USD Billion)

2030	**1,122.4**	2040	1,436.5
2031	1,132.6	2041	1,492.3
2032	1,147.9	2042	1,552.5
2033	1,168.2	2043	1,617.1
2034	1,193.1	2044	1,686.3
2035	**1,222.6**	**2045**	**1,760.1**
2036	1,256.6	2046	1,838.1
2037	1,295.1	2047	1,922.1
2038	1,337.9	2048	2,010.6
2039	1,385.0	2049	2,104.2
		2050	**2,203.2**

Table 4.4 Forecast current expenditure: MOEP data based, 2031–2050 (USD Billion)

2030	**1,055.9**	2040	1,719.9
2031	1,108.7	2041	1,805.9
2032	1,164.1	2042	1,896.2
2033	1,222.3	2043	1,991.0
2034	1,283.4	2044	2,090.6
2035	1,347.6	2045	2,195.1
2036	1,415.0	2046	2,304.8
2037	1,485.7	2047	2,420.1
2038	1,560.0	2048	2,541.1
2039	1,638.0	2049	2,668.1
		2050	**2,801.6**

Table 4.5 Forecast capital expenditure: MOEP data based, 2031–2050 (USD Billion)

2030	**278.7**	2040	97.2
2031	250.8	2041	87.2
2032	225.7	2042	78.7
2033	203.2	2043	70.8
2034	182.8	2044	63.8
2035	164.6	2045	57.4
2036	148.1	2046	51.6
2037	133.3	2047	46.5
2038	120.0	2048	41.8
2039	108.0	2049	37.6
		2050	**33.9**

Total Expenditures

The total expenditures forecast based on MOEP data, derived by adding the forecasts of current expenditures and capital expenditures, show that total expenditures will increase from $1.335 trillion in 2030 to $2.835 trillion in 2050 despite an assumed decline in capital expenditures (table 4.6).

B&G Estimate

Current Expenditures

The estimated 2030 value of $632.8 billion for current expenditures based on B&G data becomes $1.679 trillion in 2050, if it grows at our assumed growth rate of 5 percent for current expenditures. Table 4.7 shows the entire trend.

Capital Expenditures

The forecasted value of capital expenditures using B&G data becomes a mere $2.9 billion in 2050, when an assumed rate of 10 percent per year is applied to its estimated value of $21.3 billion in 2030 (table 4.8).

Total Expenditures

B&G based total expenditures data, which again is the sum of forecasted current and capital expenditures, is $1.682 trillion in 2050. It balloons to this amount from its estimated value of $654.1 billion in 2030 (table 4.9).

Table 4.6 Forecast total expenditure: MOEP data based, 2031–2050 (USD Billion)

2030	**1,334.6**	2040	1,817.1
2031	1,359.5	2041	1,893.4
2032	1,389.8	2042	1,974.9
2033	1,425.5	2043	2,061.8
2034	1,466.3	2044	2,154.3
2035	**1,512.2**	2045	2,252.5
2036	1,563.1	2046	2,356.5
2037	1,619.0	2047	2,466.6
2038	1,680.0	2048	2,582.9
2039	1,746.0	2049	2,705.8
		2050	**2,835.4**

Table 4.7 Forecast current expenditure: B&G data based, 2031–2050 (USD Billion)

2030	**632.8**	2040	1,030.8
2031	664.4	2041	1,082.3
2032	697.7	2042	1,136.4
2033	732.5	2043	1,193.2
2034	769.2	2044	1,252.9
2035	**807.6**	2045	1,315.5
2036	848.0	2046	1,381.3
2037	890.4	2047	1,450.4
2038	934.9	2048	1,522.9
2039	981.7	2049	1,599.1
		2050	**1,679.0**

Table 4.8 Forecast capital expenditure: B&G data based, 2031–2050 (USD Billion)

2030	**21.3**	2040	7.4
2031	19.2	2041	6.7
2032	17.3	2042	6.0
2033	15.6	2043	5.4
2034	14.0	2044	4.9
2035	12.6	2045	4.4
2036	11.3	2046	4.0
2037	10.2	2047	3.6
2038	9.2	2048	3.2
2039	8.3	2049	2.9
		2050	**2.6**

Table 4.9 Forecast total expenditure: B&G data based, 2031–2050 (USD Billion)

2030	**654.1**	**2040**	**1,038.2**
2031	683.6	2041	1,089.0
2032	714.9	2042	1,142.4
2033	748.1	2043	1,198.7
2034	783.2	2044	1,257.8
2035	**820.2**	2045	1,319.9
2036	859.3	2046	1,385.3
2037	900.6	2047	1,453.9
2038	944.1	2048	1,526.1
2039	989.9	2049	1,601.9
		2050	**1,681.6**

Government Revenues in the Long-Term Period

Oil Revenues

Since oil production capacity is limited, growing domestic demand for oil from the massive petrochemical industry and the Saudi energy and transport sectors will leave less and less exportable crude oil. Thus we assume rather safely that, absent a totally unexpected discovery and/or fresh production of oil, there will be decline in oil exports. Accordingly, we make oil export forecasts for the long-term period as per the following assumptions: for our base value, we use estimated 2030 oil exports from earlier exercises. Also, we assume that oil exports decline at a rate of 2 percent per year during the long-term period.

IEA Oil Export Data

This model shows export decline at the assumed rate of 2 percent per year, from its estimated annual value of 2,664.5 MBPY in 2030, to 1,778.8 MBPY by the end of year 2050 (table 4.10).

Majed Oil Export Data

The estimates based on Majed data rendered 2,080.5 MBPY in 2030. If exports decline at our assumed rate of 2 percent per year, they would stand at 1,389 MBPY in the year 2050 (table 4.11).

DOE Oil Export Data

If DOE data are used, we see 3,358 MBPY for year 2030, which declining at the rate of 2 percent is reduced to 2,241.8 MBPY by 2050 (table 4.12).

Table 4.10 IEA oil exports, 2031–2050 (MBPY)

Year	*IEA*	*Year*	*IEA*
2030	**2664.5**	**2040**	**2177.1**
2031	2611.2	2041	2133.5
2032	2559.0	2042	2090.9
2033	2507.8	2043	2049.1
2034	2457.6	2044	2008.1
2035	**2408.5**	**2045**	**1967.9**
2036	2360.3	2046	1928.6
2037	2313.1	2047	1890.0
2038	2266.9	2048	1852.2
2039	2221.5	2049	1815.1
		2050	**1778.8**

Table 4.11 Majed oil exports, 2031–2050 (MBPY)

Year	*Majed*	*Year*	*Majed*
2030	2664.5	2040	2177.1
2031	2611.2	2041	2133.5
2032	2559.0	2042	2090.9
2033	2507.8	2043	2049.1
2034	2457.6	2044	2008.1
2035	**2408.5**	**2045**	**1967.9**
2036	2360.3	2046	1928.6
2037	2313.1	2047	1890.0
2038	2266.9	2048	1852.2
2039	2221.5	2049	1815.1
		2050	**1778.8**

Table 4.12 DOE oil exports, 2031–2050 (MBPY)

Year	*DOE*	*Year*	*DOE*
2030	**3358.0**	**2040**	**2743.7**
2031	3290.0	2041	2688.7
2032	3225.0	2042	2635.1
2033	3160.5	2043	2582.4
2034	3097.3	2044	2530.7
2035	**3035.4**	2045	**2480.1**
2036	2974.7	2046	2430.5
2037	2915.2	2047	2381.9
2038	2856.9	2048	2334.3
2039	2799.7	2049	2287.6
		2050	**2241.8**

BP Oil Export Data

Data based on BP estimates render a 2,509.9 MBPY estimate for 2050. This is based on a 2030 MBPY amount of 3,759.5, at our standard 2 percent reduction rate (table 4.13).

B&G Oil Exports

The B&G based data on oil exports give us 1,788.5 MBPY for the year 2030. If they decline at our assumed rate of 2 percent per year, their forecast value for the year 2050 would be 1,194 MBPY (table 4.14).

Table 4.13 BP oil exports, 2031–2050 (MBPY)

Year	*BP*	*Year*	*BP*
2030	**3759.5**	**2040**	**3071.8**
2031	3684.3	2041	3010.3
2032	3610.6	2042	2950.1
2033	3538.4	2043	2891.1
2034	3467.6	2044	2833.3
2035	**3398.3**	**2045**	**2776.7**
2036	3330.3	2046	2721.1
2037	3263.7	2047	2666.7
2038	3198.4	2048	2613.4
2039	3134.5	2049	2561.1
		2050	**2509.9**

Table 4.14 B&G oil exports, 2031–2050 (MBPY)

Year	*B&G*	*Year*	*B&G*
2030	1788.5	**2040**	1461.3
2031	1752.7	2041	1432.1
2032	1717.7	2042	1403.5
2033	1683.3	2043	1375.4
2034	1649.7	2044	1347.9
2035	1616.7	**2045**	1320.9
2036	1584.3	2046	1294.5
2037	1552.6	2047	1268.6
2038	1521.6	2048	1243.2
2039	1491.2	2049	1218.4
		2050	1194.0

Comparative Table of Oil Exports: Various Estimates

It may be recalled that in our forecast exercise for the period of 2010 through 30, we dropped DOE and BP-based oil exports due to our conclusion that they were less helpful than other data points. Here we present them for the sake of consistency; they will not be considered in further chapter analysis (table 4.15).

Oil Prices

OPEC Prices

In our gap analysis forecast for the long-term period, we will not consider IEA forecasts of oil prices. Instead, we will focus on OPEC data. OPEC prices are assumed to remain at their 2030 level of $120.6 per barrel. No change, on average, will be considered in the price of oil. Table 4.16 presents oil prices over our long-term period.

Table 4.15 Oil exports: Comparative table, various estimates, 2031–2050 (MBPY)

Year	*IEA*	*Majed*	*DOE*	*BP*	*B&G*
2030	**2664.5**	**22080.5**	**3358.0**	**3759.3**	**1788.5**
2031	2611.2	2038.9	3290.8	3684.3	1752.7
2032	2559.0	1998.1	3225.0	3610.6	1717.7
2033	2507.8	1958.1	3160.5	3538.4	1683.3
2034	2457.6	1919.0	3097.3	3467.6	1649.7
2035	**2408.5**	**1880.6**	**3035.4**	**3398.3**	**1616.7**
2036	2360.3	1843.0	2974.7	3330.3	1584.3
2037	2313.1	1806.1	2915.2	3263.7	1552.6
2038	2266.9	1770.0	2856.9	3198.4	1521.6
2039	2221.5	1734.6	2799.7	3134.5	1491.2
2040	**2177.1**	**1699.9**	**2743.7**	**3071.8**	**1461.3**
2041	2133.5	1665.9	2688.9	3010.3	1432.1
2042	2090.9	1632.6	2635.1	2950.1	1403.5
2043	2049.1	1600.0	2582.4	2831.1	1375.4
2044	2008.1	1568.0	2530.7	2833.3	1347.9
2045	**1967.9**	**1536.6**	**2480.1**	**2776.7**	**1320.9**
2046	1928.6	1505.9	2430.5	2721.1	1294.5
2047	1890.0	1475.7	2381.9	2666.7	1268.6
2048	1852.2	1446.2	2334.3	2613.4	1243.2
2049	1815.1	1417.3	2287.6	2561.1	1218.4
2050	**1778.8**	**1389.0**	**2241.8**	**2509.9**	**1194.0**

Table 4.16 Oil revenue

Year	OPEC Oil price USD/b	USD Billion		
		IEA	Majed	B&G
2030	**120.6**	**321.4**	**251.0**	**215.7**
2031	120.6	315.0	245.9	211.4
2032	120.6	308.7	241.0	207.2
2033	120.6	302.5	236.2	203.1
2034	120.6	296.5	231.5	199.0
2035	**120.6**	**290.5**	**226.9**	**195.0**
2036	120.6	284.7	222.3	191.1
2037	120.6	279.0	217.9	187.3
2038	120.6	273.4	213.5	183.5
2039	120.6	268.0	209.2	179.9
2040	**120.6**	**262.6**	**205.1**	**176.3**
2041	120.6	257.4	201.0	172.8
2042	120.6	252.2	196.9	169.3
2043	120.6	247.2	193.0	165.9
2044	120.6	242.2	189.1	162.6
2045	**120.6**	**237.4**	**185.4**	**159.3**
2046	120.6	232.6	181.6	156.2
2047	120.6	228.0	178.0	153.0
2048	120.6	223.4	174.5	150.0
2049	120.6	219.0	171.0	147.0
2050	**120.6**	**214.6**	**167.5**	**144.0**

Oil Revenues

We have adopted the same method of forecasting oil revenue for the long-term period as we used for the future period. In other words, we have estimated oil revenues in a given year as the product of oil exports in that year times the average oil price for that year.

Table 4.16 shows that using IEA data for exports and OPEC data for prices, our forecast for oil revenues will drop from $321.4 billion in 2030 to $214.6 billion in 2050. Similarly, basing our forecast on Majed data for exports and OPEC data for prices, we find that oil revenue would be reduced to $167.5 billion in 2050 from its estimated value of $251 billion in 2030. Using B&G data, our forecast suggests that 2030 oil revenues of $215.7 billion will drop to $144 billion in 2050.

Non-Oil Revenues

To forecast non-oil revenue, we have assumed that it will grow at an annual rate of 7 percent over the estimated value of $100.3 billion in

Table 4.17 Non-oil revenue, 2031–2050 (USD Billion)

Year	*USD*	*Year*	*USD*
2030	**100.3**	**2040**	**197.4**
2031	107.4	2041	211.2
2032	114.9	2042	226.0
2033	122.9	2043	241.8
2034	131.5	2044	258.7
2035	**140.7**	**2045**	**276.8**
2036	150.6	2046	296.2
2037	161.1	2047	317.0
2038	172.4	2048	339.2
2039	184.5	2049	362.9
		2050	**388.3**

2030. Accordingly, non-oil revenues are forecast to become $388.3 billion in 2050 (table 4.17).

Total Revenues

Total revenues have been forecast as the sum of oil revenues and non-oil revenues separately for our three oil revenue data sources. They are provided in table 4.18 by separately adding our non-oil revenue to each of these data sources. It may be noticed in the forecast that IEA data suggest revenue, estimated at $421.8 billion for 2030, increases to $602.9 billion in 2050. Majed data suggest an increase to $555.8 billion. B&G data, finally, estimates that total revenues become $532.3 billion in 2050, increasing from $316.1 billion in 2030. On computing ACGR for the three forecast classes, we find that B&G based data has increased at the fastest rate, at 2.61 percent per year, followed by Majed data, and the IEA data last, at 1.80 percent per year.

The Revenues/Expenditures Gaps in the Long-Term Period

Now that we have forecast expenditures and revenues separately, we can take a look at the revenues/expenditures gaps. All in all, we estimate nine gap scenarios that are presented below.

Gaps estimated using the (1) forecast of our growth rate for current expenditure, (2) forecast of our growth rate for capital expenditure, (3) three forecasts of oil revenue computed from IEA, Majed, and B&G data and OPEC prices, and (4) forecasts based on GDP equation for non-oil revenues.

Table 4.18 Total revenue: OPEC price based oil revenue (USD Billion)

Year	*IEA*	*Majed*	*B&G*
2030	**421.8**	**351.3**	**316.1**
2031	422.4	353.3	318.8
2032	423.6	355.9	322.1
2033	425.4	359.1	326.0
2034	428.0	363.0	330.5
2035	**431.3**	**367.6**	**335.8**
2036	435.3	372.9	341.7
2037	440.2	379.0	348.4
2038	445.9	385.9	356.0
2039	452.5	393.7	364.4
2040	**460.0**	**402.4**	**373.7**
2041	468.6	412.2	384.0
2042	478.2	422.9	395.3
2043	489.0	434.8	407.7
2044	501.0	447.9	421.3
2045	**514.2**	**462.2**	**436.2**
2046	528.9	477.9	452.4
2047	545.0	495.0	470.0
2048	562.6	513.6	489.1
2049	581.9	533.9	509.9
2050	**602.9**	**555.8**	**532.3**

A glance at table 4.19 reveals that the $700.7 billion gap in 2030 using our growth rate total expenditures and total revenues, IEA data for oil exports and OPEC prices, along with non-oil revenue estimates, widens to $1.600 trillion by 2050. Similarly, if we replace the IEA data with Majed data, a $771.1 billion gap at 2030 becomes $1.647 in 2050. Using B&G data for oil revenues, all other variables remaining equal, the 2030 gap of $806.3 billion increases to $1.671 trillion by 2050.

Gaps have been estimated using MOEP data for current expenditure and capital expenditure, our three oil revenue forecasts (IEA, Majed, and B&G) with OPEC prices, along with the GDP equation based data for non-oil revenue.

Table 4.20 shows that the IEA data linked $912.8 billion gap in 2030 increases to $2.232 trillion in 2050. Similarly, the Majed gap becomes $2.280 trillion in 2050 from $983.2 billion in 2030, and the B&G gap of $1.019 trillion widens to $2.303 trillion in 2050.

Gaps have been estimated using B&G data for current expenditure and capital expenditure, our three oil revenue forecasts (IEA, Majed, and B&G) with OPEC prices, along with the GDP equation based data for non-oil revenue.

Table 4.19 Revenue-expenditure gap, our expenditure estimates, OPEC price based oil revenue (USD Billion)

Year	*IEA*	*Majed*	*B&G*
2030	**−700.7**	**−771.1**	**−806.3**
2031	−710.3	−779.3	−813.8
2032	−724.4	−792.0	−825.9
2033	−742.7	−809.0	−842.2
2034	−765.1	−830.1	−862.6
2035	**−791.4**	**−855.0**	**−886.9**
2036	−821.3	−883.7	−914.9
2037	−854.9	−916.1	−946.7
2038	−892.0	−952.0	−981.9
2039	−932.5	−991.3	−1020.7
2040	**−976.5**	**−1034.0**	**−1062.8**
2041	−1023.7	−1080.1	−1108.3
2042	−1074.3	−1129.6	−1157.2
2043	−1128.2	−1182.3	−1209.4
2044	−1185.4	−1238.5	−1265.0
2045	**−1245.9**	**−1297.9**	**−1324.0**
2046	−1309.8	−1360.8	−1386.3
2047	−1377.2	−1427.1	−1452.1
2048	−1448.0	−1497.0	−1521.5
2049	−1522.4	−1570.4	−1594.3
2050	**−1600.3**	**−1647.4**	**−1670.9**

Table 4.20 Revenue-expenditure gap, MOEP based expenditure estimates, OPEC price based oil revenue (USD Billion)

Year	*IEA*	*Majed*	*B&G*
2030	**−912.8**	**−983.2**	**−1018.5**
2031	−937.1	−1006.2	−1040.7
2032	−966.3	−1033.9	−1067.8
2033	−1000.0	−1066.3	−1099.5
2034	−1038.3	−1103.3	−1135.7
2035	**−1080.9**	**−1144.6**	**−1176.4**
2036	−1127.8	−1190.2	−1221.4
2037	−1178.9	−1240.0	−1270.6
2038	−1234.1	−1294.1	−1324.0
2039	−1293.5	−1352.3	−1381.6
2040	−1357.1	−1414.6	−1443.4
2041	−1424.8	−1481.2	−1509.4
2042	−1496.7	−1552.0	−1579.6
2043	−1572.9	−1627.0	−165401
2044	−1653.3	−1706.4	−1733.0
2045	**−1738.2**	**−1790.3**	**−1816.3**
2046	−1827.6	−1878.6	−1904.1
2047	−1921.6	−1971.6	−1996.6
2048	−2020.3	−2069.3	−2093.8
2049	−2123.9	−2171.9	−2195.9
2050	**−2232.6**	**−2279.6**	**−2303.1**

Table 4.21 Revenue-expenditure gap, B&G based expenditure estimates, OPEC price based oil revenue (USD Billion)

Year	*IEA*	*Majed*	*B&G*
2030	**−232.4**	**−302.8**	**−338.0**
2031	−261.3	−330.3	−364.8
2032	−291.4	−359.0	−392.9
2033	−322.7	−389.0	−422.1
2034	−355.2	−420.2	−452.6
2035	**−389.0**	**−452.6**	**−484.5**
2036	−424.0	−486.4	−517.6
2037	−460.5	−521.6	−552.2
2038	−498.3	−558.2	−588.2
2039	−537.5	−596.2	−625.6
2040	**−578.2**	**−635.8**	**−664.5**
2041	−620.4	−676.8	−705.0
2042	−664.2	−719.5	−747.2
2043	−709.7	−763.9	−790.9
2044	−756.8	−809.9	−836.4
2045	**−805.7**	**−857.7**	**−883.7**
2046	−856.4	−907.4	−932.9
2047	−909.0	−959.0	−983.9
2048	−963.5	−1012.5	−1037.0
2049	−1020.1	−1068.1	−1092.1
2050	**−1078.7**	**−1125.8**	**−1149.3**

These gaps, as exhibited in table 4.21, show that the first set of gaps (IEA) increases from $232.4 billion to $1.079 trillion in 2050, with the second (Majed) widening from $302.8 billion in 2030 to $1.125 trillion in 2050, and the third (B&G) expanding to $1.149 trillion from $338.0 billion.

CHAPTER 5

Financing the Gaps

Financing Gaps in the Future Period

In chapter 4, we espoused some likely budgetary gaps going forward in Saudi Arabia using reliable data and reasonable assumptions on revenue and expenditures. In this chapter, we turn to the question of how the kingdom can go about financing these gaps. It is assumed that the gaps will be financed either by drawing from the government's Net Foreign Assets (NFA), managed by the Saudi Arabian Monetary Agency (SAMA), or by borrowing. We do not assume here that gap can be financed by printing currency. Further, it is assumed that the government's domestic investment, mainly in equity in the private sector, has become an integral part of private sector corporate structure and GDP; as a result, the kingdom will not liquidate these investments to finance its deficit. If the government does decide to do so, however, the value of these shares is negligible relative to forecasted gaps to be financed, not to mention the fact that withdrawing government financing is likely to bankrupt these institutions.

At the end of 2010, the government was in sound financial condition with over $440 billion in NFA and a comparatively negligible debt of $44.5 billion (a little over 10 percent of NFA). Preliminary data for the year 2011 suggest good fiscal performance during the year. This could further strengthen the NFA position of Saudi Arabia. Our gap financing analysis for this chapter has been carried out on the following assumptions: First, all government debt will be paid at once if NFA funding is available. Second, that all negative gaps will be bridged from NFA, if funding is available in the NFA. Third, all new negative gaps will be met through debt if NFA funding is exhausted. Finally, we assume that all budgetary surpluses will go to the NFA.

Each of the 18 gap scenarios generated in chapter 4 has been examined according to these assumptions for respective "financing scenarios." The first of these scenarios is given in table 5.1.

Table 5.1 Financing the revenue-expenditure gap using our expenditure, oil revenue using IEA price-based oil revenue, and our GDP- equation-based non-oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2010		**440.4**	**−44.5**		**440.4**	**−44.5**		**440.4**	**−44.5**
2011	77.6	473.5	0.0	31.8	427.7	0.0	11.5	407.4	0.0
2012	72.0	545.5	0.0	21.8	449.4	0.0	3.2	410.6	0.0
2013	61.2	606.7	0.0	6.7	456.1	0.0	−9.7	400.9	0.0
2014	47.3	654.0	0.0	−11.4	444.8	0.0	−25.0	375.9	0.0
2015	**24.7**	**678.7**	**0.0**	**−37.9**	**406.9**	**0.0**	**−48.3**	**327.6**	**0.0**
2016	10.6	689.3	0.0	−54.8	352.0	0.0	−64.1	263.5	0.0
2017	−6.4	682.9	0.0	−74.6	277.5	0.0	−82.6	180.9	0.0
2018	−26.8	656.1	0.0	−97.2	180.2	0.0	−103.9	77.0	0.0
2019	−46.0	610.1	0.0	−118.5	61.8	0.0	−123.7	0.0	−46.6
2020	**−70.8**	**539.3**	**0.0**	**−144.8**	**0.0**	**−83.0**	**−148.4**	**0.0**	**−195.0**
2021	−96.8	442.5	0.0	−174.5	0.0	−257.5	−180.9	0.0	−376.0
2022	−127.5	315.0	0.0	−208.4	0.0	−465.9	−217.9	0.0	−593.9
2023	−163.1	151.9	0.0	−246.9	0.0	−712.8	−259.6	0.0	−853.5
2024	−195.8	0.0	−43.8	−281.9	0.0	−994.7	−298.1	0.0	−1151.6
2025	**−239.6**	**0.0**	**−283.5**	**−327.5**	**0.0**	**−1322.3**	**−347.4**	**0.0**	**−1498.9**
2026	−284.3	0.0	−567.8	−377.5	0.0	−1699.7	−403.4	0.0	−1902.3
2027	−335.0	0.0	−902.8	−432.9	0.0	−2132.6	−465.3	0.0	−2367.6
2028	−392.3	0.0	−1295.1	−494.3	0.0	−2626.9	−533.5	0.0	−2901.1
2029	−456.9	0.0	−1751.9	−562.2	0.0	−3189.1	−608.7	0.0	−3509.8
2030	**−529.4**	**0.0**	**−2281.3**	**−637.4**	**0.0**	**−3826.5**	**−691.4**	**0.0**	

Figures 5.1 through 5.4 present graphic representations[1] of the three scenarios given in table 5.1 for each of its columns, that is, IEA, Majed, and B&G.

Financing Scenario One

We notice in figure 5.1 that for the initial six years, that is, 2011 to 2016, there are surpluses (the dotted curve) that enhance the NFA (the solid curve). The introduction of a gap in 2017 leads to the beginning of withdrawals from NFA and completely exhausts NFA by 2024, so much so that the 2024 gap must be partly covered by borrowing $43.8 billion. Beyond 2017, the gap continues to widen, leading to more and more borrowing, adding up to a cumulative debt of $2.28 trillion by the end of 2030.

Financing Scenario Two

The financing scenario portrayed in figure 5.2 is similar to that of figure 5.1, except that the oil revenues component of total revenues is based on oil exports given using Majed data. In this scenario, there

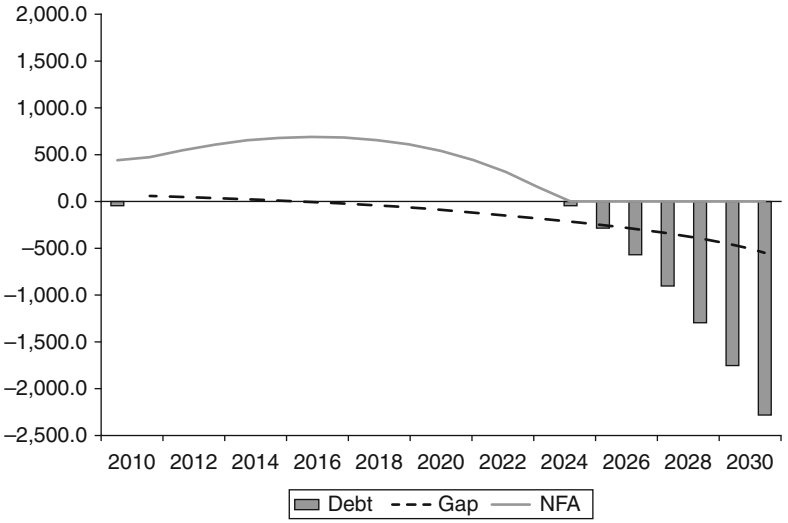


Figure 5.1 Financing the revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: our growth based, non-oil revenue: our GDP equation based, oil prices: IEA.

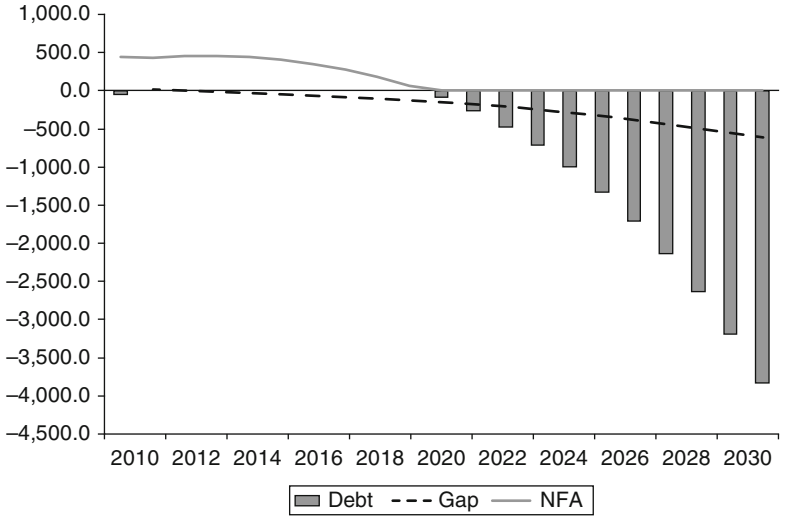


Figure 5.2 Financing the revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: our growth based, non-oil revenue: our GDP equation based, oil prices: IEA

is a slight enhancement of NFA until 2013 as a result of budgetary surpluses. From 2014 onward, however, the NFA begins to shrink due to the introduction of a gap of $11.4 billion that increases to a gap of $637.4 billion by 2030. Cumulative borrowing resulting from these funding of gaps would be $3.83 trillion by the end of 2030.

Financing Scenario Three

The financing scenario presented in figure 5.3 is identical to our previous two scenarios, except that it uses B&G oil exports data. The scenario depicts a small increase in NFA for the two initial years, resulting from budgetary surpluses. In 2013, a gap of $9.7 billion appears that grows to over $691 billion by 2030. At the end of 2030, forecasted cumulative borrowing would stand at $4.20 trillion.

The second batch of financing scenarios is summarized in table 5.2. These models are based on the same information used for the scenarios presented in table 5.1, except that OPEC oil prices are used instead of IEA oil prices. In this set of simulations, the gap situation worsens, with gaps appearing earlier than in the first set of scenarios and widening to

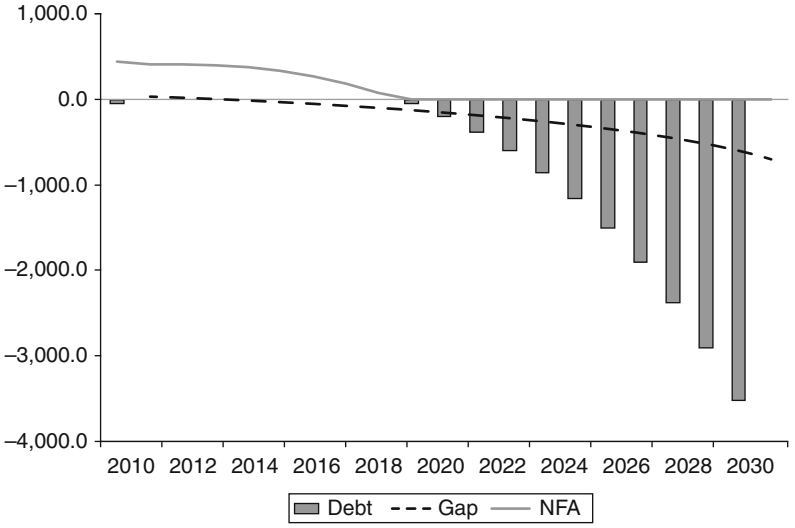


Figure 5.3 Financing the revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: our growth based, non-oil revenue: our GDP equation based, oil prices: IEA.

bigger gaps in the future. The larger gap magnitudes result in bigger cumulative debt at the end of 2030.

Financing Scenario Four

The financing scenario presented in figure 5.4 is most comparable to that presented in figure 5.1; everything else is equal, besides the use of OPEC oil prices in place of IEA data. In this scenario, a gap of $7.4 billion emerges in 2014 that gradually increases to over $700 billion. The successive gaps deplete the accumulated NFA, and leave a cumulative debt of $4.34 trillion by the end of the year 2030.

Financing Scenario Five

Looking at the Majed based oil revenues financing scenario in figure 5.5, one notices that a gap of $24.7 billion appears as early as 2013 and widens to over $771 billion in 2030. The cumulative effect of these gaps on the government's financial position is massive accumulated debt in the amount of $5.47 trillion by the end of 2030.

Table 5.2 Financing the revenue-expenditure gap using our expenditure, oil revenue using OPEC price-based oil revenue, and our GDP- equation-based non-oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2010		**440.4**	**−44.5**		**440.4**	**−44.5**		**440.4**	**−44.5**
2011	71.5	467.3	0.0	26.8	422.6	0.0	7.0	402.9	0.0
2012	49.5	516.9	0.0	3.5	426.1	0.0	−13.5	389.4	0.0
2013	22.5	539.4	0.0	−24.7	401.4	0.0	−38.9	350.4	0.0
2014	−7.4	532.0	0.0	−55.8	345.6	0.0	−67.0	283.4	0.0
2015	**−45.8**	**486.2**	**0.0**	**−95.1**	**250.5**	**0.0**	**−103.3**	**180.1**	**0.0**
2016	−67.1	419.0	0.0	−117.8	132.8	0.0	−124.9	55.2	0.0
2017	−91.2	327.8	0.0	−143.0	0.0	−10.2	−149.1	0.0	−93.9
2018	−118.3	209.5	0.0	−171.0	0.0	−181.3	−176.0	0.0	−269.9
2019	−144.0	65.5	0.0	−197.5	0.0	−378.7	−201.3	0.0	−471.2
2020	**−174.9**	**0.0**	**−109.5**	**−228.8**	**0.0**	**−607.5**	**−231.4**	**0.0**	**−702.6**
2021	−208.2	0.0	−317.6	−263.9	0.0	−871.3	−268.5	0.0	−971.1
2022	−245.7	0.0	−563.4	−303.0	0.0	−1174.4	−309.8	0.0	−1280.8
2023	−288.0	0.0	−851.3	−346.6	0.0	−1520.9	−355.5	0.0	−1636.3
2024	−326.9	0.0	−1178.2	−386.5	0.0	−1907.4	−397.6	0.0	−2034.0
2025	**−376.6**	**0.0**	**−1554.8**	**−436.8**	**0.0**	**−2344.2**	**−450.4**	**0.0**	**−2484.3**
2026	−428.9	0.0	−1983.7	−492.0	0.0	−2836.2	−509.5	0.0	−2993.9
2027	−486.9	0.0	−2470.6	−552.5	0.0	−3388.6	−574.2	0.0	−3568.0
2028	−551.1	0.0	−3021.7	−618.7	0.0	−4007.4	−644.8	0.0	−4212.8
2029	−622.1	0.0	−3643.8	−691.4	0.0	−4698.8	−722.0	0.0	−4934.7
2030	**−700.7**	**0.0**	**−4344.5**	**−771.1**	**0.0**	**−5469.8**	**−806.3**	**0.0**	**−5741.1**

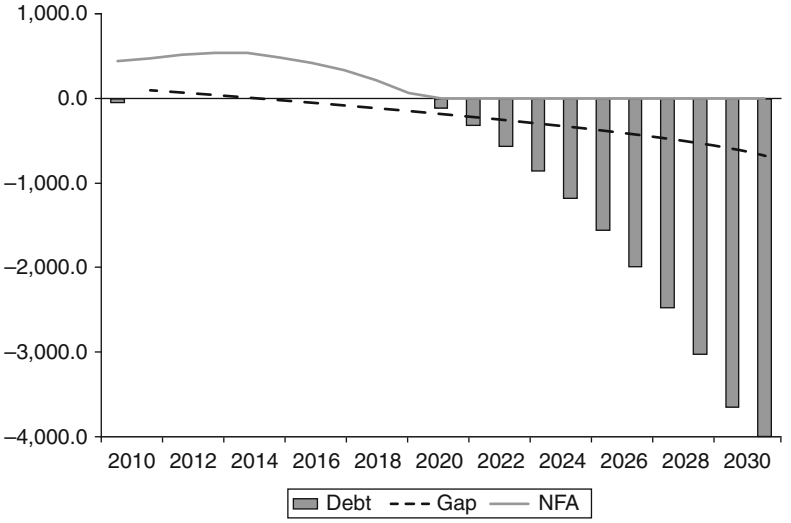


Figure 5.4 Financing the revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: our growth based, non-oil revenue: our GDP equation based, oil prices: OPEC.

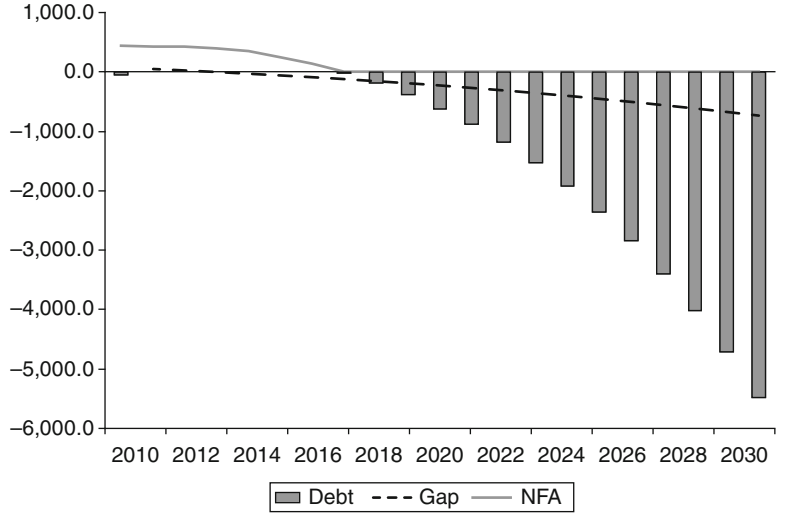


Figure 5.5 Financing the revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: our growth based, non-oil revenue: our GDP equation based, oil prices: OPEC.

Financing Scenario Six

When using B&G based data for oil revenues, our model results are even more alarming than before. Here a gap of $13.5 billion emerges in 2012, increasing gradually and eating away at the NFA, reaching $806.3 billion in 2016, and finally resulting in a cumulative debt of $5.74 trillion at the end of the year 2030 (figure 5.6).

Finally, we turn to our third set of financing scenarios, using MOEP based expenditures to work out the gaps, with all other variables remaining constant. The data is set out in table 5.3. The three scenarios are also depicted in figures 5.7 through 5.9.

Financing Scenario Seven

Figure 5.7 presents a financing scenario where a gap of $13.1 billion emerges in 2017 and grows to exhaust NFA by 2023, leading to government borrowing of $69.1 billion in the same year. By the year 2030 the gap increases to $741.5 billion. The financing of all of these gaps leaves a cumulative debt of $3.43 trillion by the end of year 2030.

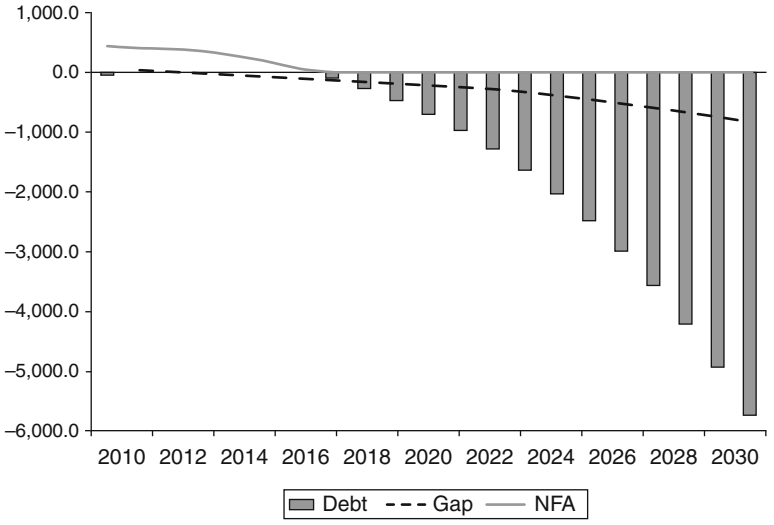


Figure 5.6 Financing the revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: our growth based, non-oil revenue: our GDP equation based, oil prices: OPEC.

Table 5.3 Financing the revenue-expenditure gap using MOEP expenditure oil revenue using IEA price-based oil revenue, and our GDP- equation-based non-oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2010		**440.4**	**−44.5**		**440.4**	**−44.5**		**440.4**	**−44.5**
2011	74.1	470.0	0.0	28.3	424.2	0.0	8.1	404.0	0.0
2012	63.6	533.6	0.0	13.4	437.6	0.0	−5.2	398.7	0.0
2013	45.9	579.5	0.0	−8.6	428.9	0.0	−25.0	373.7	0.0
2014	22.7	602.2	0.0	−35.9	393.0	0.0	−49.6	324.1	0.0
2015	**19.5**	**621.7**	**0.0**	**−43.0**	**350.0**	**0.0**	**−53.5**	**270.7**	**0.0**
2016	4.7	626.5	0.0	−60.8	289.2	0.0	−70.0	200.6	0.0
2017	−13.1	613.3	0.0	−81.3	207.9	0.0	−89.3	111.3	0.0
2018	−34.3	579.1	0.0	−104.7	103.2	0.0	−111.4	0.0	0.0
2019	−54.3	524.8	0.0	−126.7	0.0	−23.5	−131.9	0.0	−131.9
2020	**−87.9**	**436.9**	**0.0**	**−161.9**	**0.0**	**−185.4**	**−165.5**	**0.0**	**−297.5**
2021	−124.1	312.7	0.0	−201.8	0.0	−387.2	−208.2	0.0	−505.7
2022	−166.4	146.3	0.0	−247.4	0.0	−634.6	−256.9	0.0	−762.6
2023	−215.4	0.0	−69.1	−299.2	0.0	−933.8	−311.9	0.0	−1074.5
2024	−263.2	0.0	−332.3	−349.4	0.0	−1283.2	−365.6	0.0	−1440.1
2025	**−324.4**	**0.0**	**−656.7**	**−412.3**	**0.0**	**−1695.5**	**−432.1**	**0.0**	**−1872.2**
2026	−388.7	0.0	−1045.3	−481.8	0.0	−2177.3	−507.7	0.0	−2379.9
2027	−461.5	0.0	−1506.9	−559.4	0.0	−2736.7	−591.8	0.0	−2971.7
2028	−544.0	0.0	−2050.8	−645.9	0.0	−3382.7	−685.2	0.0	−3656.9
2029	−636.9	0.0	−2687.8	−742.3	0.0	−4125.0	−788.7	0.0	−4445.7
2030	**−741.5**	**0.0**	**−3429.3**	**−849.5**	**0.0**	**−4974.5**	**−903.5**	**0.0**	**−5349.2**

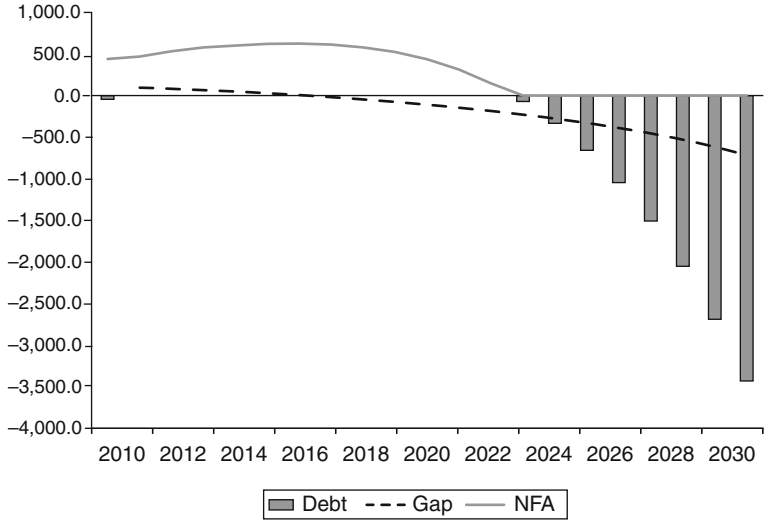


Figure 5.7 Financing the revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: MOPE data based, non-oil revenue: our GDP equation based, oil prices: IEA.

Financing Scenario Eight

The financing scenario presented in figure 5.8 uses the same variables as Financing Scenario Seven, except that Majed based oil export data is used. In this scenario, a gap of $8.6 billion shows up in 2013 that increases and chips away at the NFA by 2019, resulting in a debt of $23.5 billion. The gap gradually becomes $849.5 billion in the year 2030, and the gaps leave a cumulative debt of over $4.97 trillion by the end of that same year.

Financing Scenario Nine

In the B&G data driven scenario given in figure 5.9, a gap of $5.2 billion emerges in 2012 that increases to $903.5 billion by 2030. The gaps deplete the NFA in 2018, leaving a regime of government borrowing that cumulates to $5.35 trillion by the end of year 2030.

Table 5.4 presents financing scenarios based on expenditure forecasts from MOEP, as well as OPEC oil prices. The subsequent figures reflect, like in previous financing scenarios, our diverse data variables.

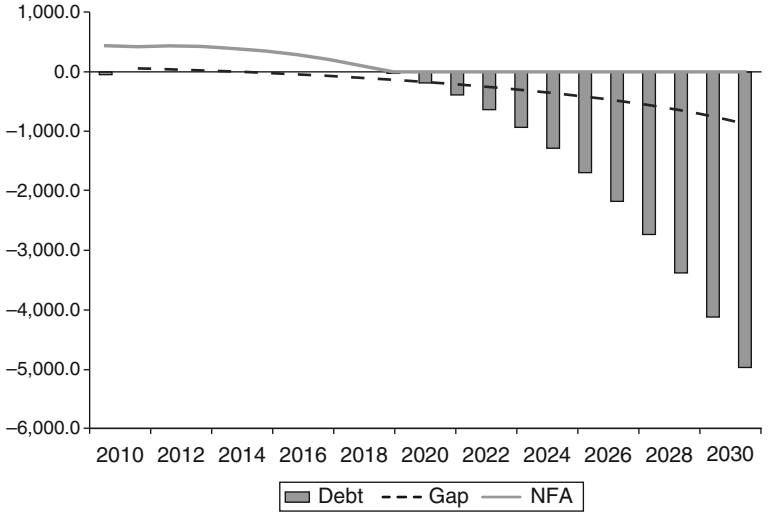


Figure 5.8 Financing the revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: MOPE data based, non-oil revenue: our GDP equation based, oil prices: IEA.

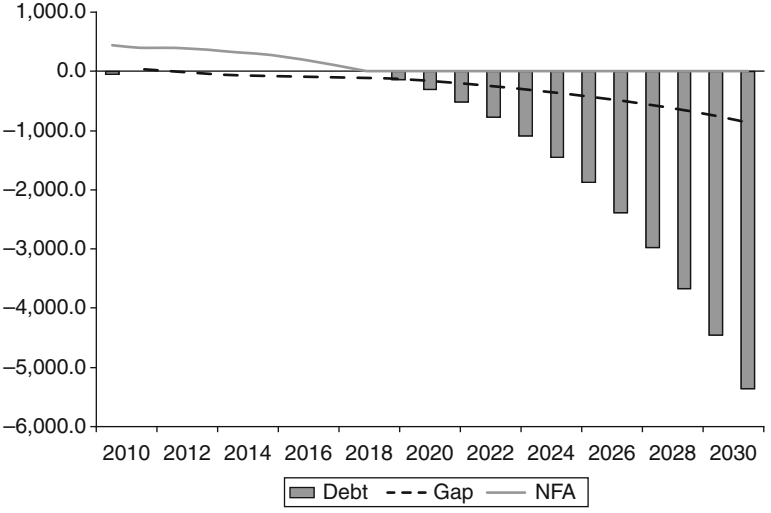


Figure 5.9 Financing the revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: MOPE data based, non-oil revenue: our GDP equation based, oil prices: IEA.

Table 5.4 Financing the revenue-expenditure gap using MOEP-based expenditure, oil revenue using OPEC price-based oil revenue, and our GDP-equation-based non-oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2010		**440.4**	**−44.5**		**440.4**	**−44.5**		**440.4**	**−44.5**
2011	68.0	463.9	0.0	23.3	419.2	0.0	3.6	339.5	0.0
2012	41.1	505.0	0.0	−4.9	414.3	0.0	−22.0	377.5	0.0
2013	7.2	512.2	0.0	−40.1	374.2	0.0	−54.3	323.2	0.0
2014	−32.0	480.2	0.0	−80.3	293.9	0.0	−91.6	231.6	0.0
2015	**−51.0**	**429.2**	**0.0**	**−100.2**	**193.6**	**0.0**	**−108.5**	**123.2**	**0.0**
2016	−73.1	356.2	0.0	−123.7	69.9	0.0	−130.8	0.0	−7.7
2017	−97.9	258.3	0.0	−149.7	0.0	−79.8	−155.8	0.0	−163.5
2018	−125.8	132.5	0.0	−178.5	0.0	−258.3	−183.5	0.0	−347.0
2019	−152.3	0.0	−19.8	−205.7	0.0	−464.0	−209.5	0.0	−556.5
2020	**−192.1**	**0.0**	**−211.9**	**−245.9**	**0.0**	**−709.0**	**−248.5**	**0.0**	**−805.0**
2021	−235.5	0.0	−447.4	−291.2	0.0	−1001.1	−295.8	0.0	−1100.8
2022	−284.7	0.0	−732.1	−342.0	0.0	−1343.1	−348.7	0.0	−1449.6
2023	−340.3	0.0	−1072.3	−398.9	0.0	−1741.9	−407.8	0.0	−1857.3
2024	−394.4	0.0	−1466.7	−453.9	0.0	−2195.9	−465.1	0.0	−2322.5
2025	**−461.4**	**0.0**	**−1928.0**	**−521.5**	**0.0**	**−2717.4**	**−535.1**	**0.0**	**−2857.6**
2026	−533.3	0.0	−2461.3	−596.3	0.0	−3313.7	−613.9	0.0	−3471.4
2027	−613.4	0.0	−3074.7	−679.0	0.0	−3992.7	−700.7	0.0	−4172.1
2028	−702.8	0.0	−3777.5	−770.4	0.0	−4763.2	−796.4	0.0	−4968.6
2029	−802.2	0.0	−4579.7	−871.5	0.0	−5634.7	−902.0	0.0	−5870.6
2030	**−912.8**	**0.0**	**−5492.5**	**−983.2**	**0.0**	**−6617.9**	**−1018.5**	**0.0**	**−6889.1**

Financing Scenario Ten

The scenario in figure 5.10 uses MOEP based expenditures, our GDP equation for non-oil revenues, IEA oil export data, and OPEC oil prices. In this scenario, a gap of $32 billion emerges in 2014 that expands to $913 billion in 2030. The successive gaps eliminate the NFA in 2019 and bring in a borrowing of $19.8 billion in the same year. By the end of 2030, cumulative debt reaches $5.49 trillion.

Financing Scenario Eleven

This financing scenario is similar to that found in Financing Scenario Ten, except that Majed export data is used. In this scenario, a gap of $4.9 billion emerges in 2012 that grows to deplete NFA by 2017, leading to government borrowing of $79.8 billion in the same year. By the year 2030, the gap increases to $9.83 trillion. The financing of successive gaps leaves a cumulative debt of $6.62 trillion by the end of year 2030 (figure 5.11).

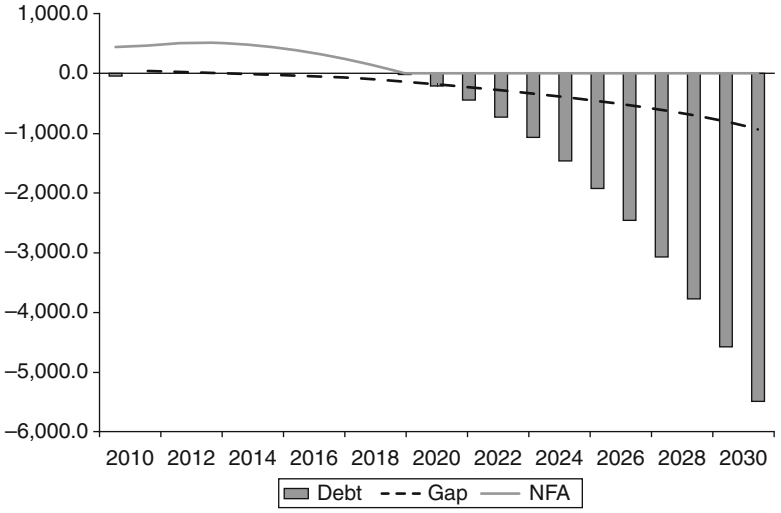


Figure 5.10 Financing the revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: MOPE data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

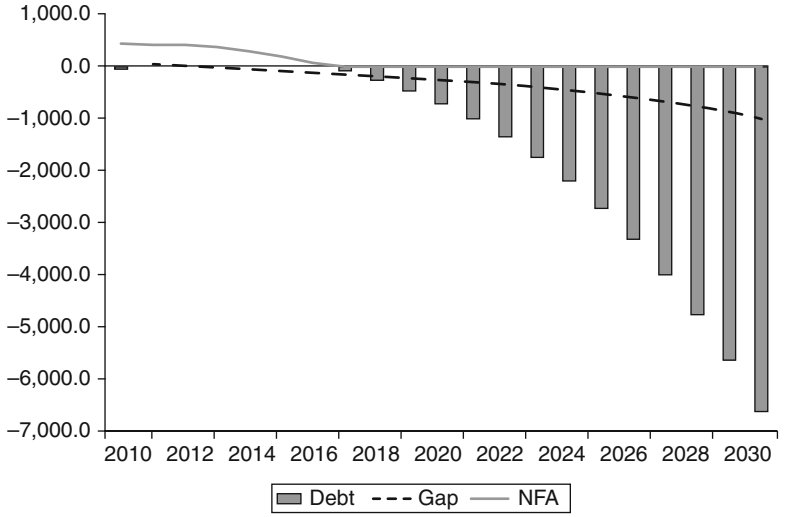


Figure 5.11 Financing the revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: MOPE data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

Financing Scenario Twelve

The use of B&G oil revenue, as seen in figure 5.12, produces even more alarming results. The fissure we witness here is more profound than that what was observed in figures 5.10 and 5.11. Here a gap of $22 billion is observed in 2012, and it gradually increases to completely erode the NFA by 2016, finally reaching $1.02 trillion and resulting in a cumulative debt of $6.89 trillion by the end of year 2030.

In table 5.5, we present scenarios that emerge using B&G data for expenditures, our GDP equation for non-oil revenues, IEA data for oil revenue, Majed and B&G based oil export data, and IEA oil prices. It is important to reiterate here that B&G based expenditure is substantially lower than our growth-rate based expenditure figures and MOEP based expenditure figures; as a result, we expect that revenue-expenditure gaps may not appear during the period from 2010 through 2030, or will only appear toward the end of this period. Accordingly, the NFA may or may not be exhausted by 2030.

Financing Scenario Thirteen

In this financing scenario presented in figure 5.13, a gap of $25.3 billion emerges in 2029 and becomes $61.1 billion in year 2030. The NFA

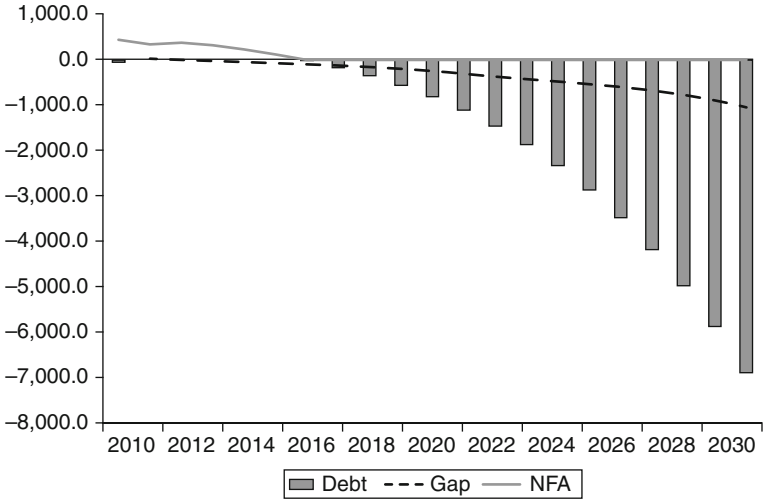


Figure 5.12 Financing the revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: MOPE data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

grows through 2028 due to successive surpluses and dips slightly toward the end of the period, standing at $2.09 trillion in 2030.

Financing Scenario Fourteen

Financing Scenario Fourteen uses B&G based expenditures, our GDP equation for non-oil revenue, oil revenues generated using B&G data, and IEA oil prices. In this scenario, a gap of $12.8 billion appears in 2025 that becomes $169.1 billion in year 2030. The successive surpluses enhance NFA until 2024, with its size in 2030 (notwithstanding a late dip) estimated at $542 billion, about $98 billion more than that in 2010 (figure 5.14).

Financing Scenario Fifteen

The scenario presented in figure 5.15 uses the same variables as Finance Scenario Fourteen, except that it uses B&G oil export data for oil revenue. In this financing scenario, a gap of $12.1 billion shows up in 2024 that gradually becomes $223.1 billion in the year 2030. The successive gaps do not exhaust the NFA and leave $167.3 billion by the end of that year.

Table 5.5 Financing the revenue-expenditure gap using B&G- based expenditure, oil revenue using IEA price-based oil revenue, and our GDP- equation-based non-oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2010		**440.4**	**−44.5**		**440.4**	**−44.5**		**440.4**	**−44.5**
2011	90.5	486.4	0.0	44.7	440.6	0.0	24.5	420.4	0.0
2012	101.1	587.5	0.0	50.9	491.5	0.0	32.3	452.6	0.0
2013	110.3	697.8	0.0	55.8	547.3	0.0	39.4	492.1	0.0
2014	121.2	819.1	0.0	62.6	609.9	0.0	48.9	541.0	0.0
2015	**129.2**	**948.3**	**0.0**	**66.6**	**676.5**	**0.0**	**56.2**	**597.2**	**0.0**
2016	129.9	1078.1	0.0	64.4	740.9	0.0	55.1	652.3	0.0
2017	129.2	1207.3	0.0	61.0	801.9	0.0	53.0	705.3	0.0
2018	127.1	1334.4	0.0	56.6	858.5	0.0	50.0	755.3	0.0
2019	128.1	1462.5	0.0	55.7	914.1	0.0	50.5	805.8	0.0
2020	**126.0**	**1588.4**	**0.0**	**52.0**	**966.1**	**0.0**	**48.4**	**854.1**	**0.0**
2021	119.0	1707.4	0.0	41.3	1007.4	0.0	34.8	889.0	0.0
2022	109.4	1816.8	0.0	28.4	1035.9	0.0	18.9	907.9	0.0
2023	97.1	1913.9	0.0	13.3	1049.1	0.0	0.5	908.4	0.0
2024	90.3	2004.1	0.0	4.1	1053.2	0.0	−12.1	896.4	0.0
2025	**75.1**	**2079.2**	**0.0**	**−12.8**	**1040.4**	**0.0**	**−32.7**	**863.7**	**0.0**
2026	55.7	2134.9	0.0	−37.5	1003.0	0.0	−63.4	800.3	0.0
2027	32.8	2167.7	0.0	−65.1	937.8	0.0	−97.5	702.8	0.0
2028	5.9	2173.6	0.0	−96.1	841.7	0.0	−135.3	567.5	0.0
2029	−25.3	2148.3	0.0	−130.7	711.1	0.0	−177.1	390.4	0.0
2030	**−61.1**	**2087.2**	**0.0**	**−169.1**	**542.0**	**0.0**	**−223.1**	**167.3**	**0.0**

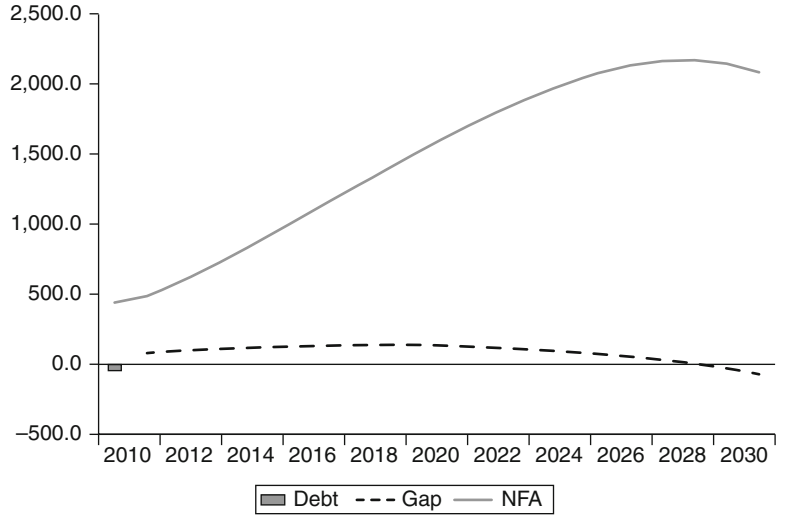


Figure 5.13 Financing the revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: IEA.

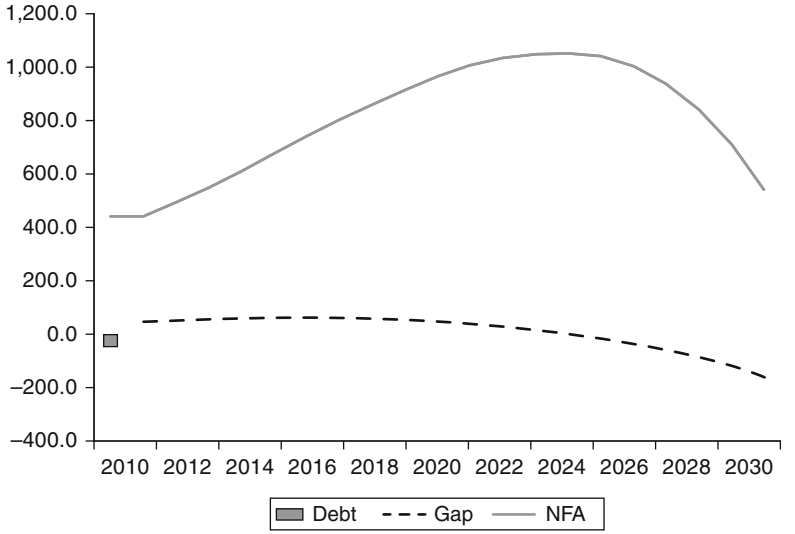


Figure 5.14 Financing the revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: IEA.

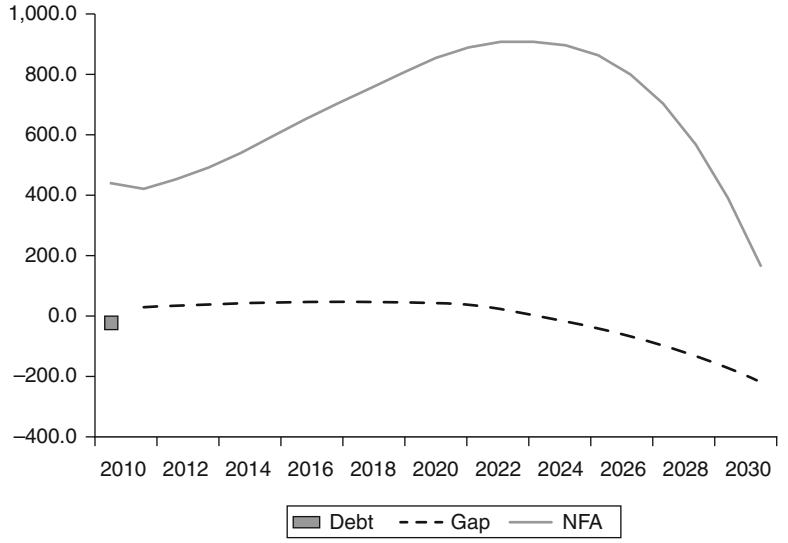


Figure 5.15 Financing the revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: IEA.

The financing scenarios presented in table 5.6 are similar to those summarized in table 5.5; they are are simulated using B&G data for expenditures, however, and our GDP equation for non-oil revenues, oil revenue numbers obtained from IEA, Majed, and B&G data for oil exports, and OPEC oil prices.

Financing Scenario Sixteen

Figure 5.16 presents a financing scenario that uses B&G data for expenditures, our GDP equation for non-oil revenues, oil revenues computed from IEA data, B&G data for oil exports, and OPEC oil prices. In this scenario, a gap of $8.9 billion emerges in 2022 that grows to $232.4 billion in 2030. The financing of successive gaps leaves a small sum of $24 billion in the NFA by the end of year 2030.

Financing Scenario Seventeen

The scenario portrayed in figure 5.17 is similar to that in figure 5.16, except that this scenario uses Majed based oil exports to generate oil revenues. In

Table 5.6 Financing the revenue-expenditure gap using B&G- based expenditure, oil revenue using OPEC price-based oil revenue, and our GDP-equation-based non-oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2010		**440.4**	**−44.5**		**440.4**	**−44.5**		**440.4**	**−44.5**
2011	84.4	480.3	0.0	39.7	435.6	0.0	20.0	415.8	0.0
2012	78.6	558.9	0.0	32.6	468.2	0.0	15.5	431.4	0.0
2013	71.7	630.5	0.0	24.4	492.6	0.0	10.2	441.6	0.0
2014	66.5	697.1	0.0	18.2	510.8	0.0	6.9	448.5	0.0
2015	**58.7**	**755.8**	**0.0**	**9.4**	**520.2**	**0.0**	**1.2**	**449.7**	**0.0**
2016	52.1	807.9	0.0	1.4	521.6	0.0	−5.7	444.0	0.0
2017	44.4	852.2	0.0	−7.4	514.2	0.0	−13.5	430.5	0.0
2018	35.5	887.7	0.0	−17.2	497.0	0.0	−22.2	408.3	0.0
2019	30.1	917.8	0.0	−23.3	473.7	0.0	−27.1	381.2	0.0
2020	**21.8**	**939.7**	**0.0**	**−32.0**	**441.7**	**0.0**	**−34.6**	**346.6**	**0.0**
2021	7.6	947.3	0.0	−48.1	393.6	0.0	−52.7	293.8	0.0
2022	−8.9	938.4	0.0	−66.2	327.4	0.0	−72.9	220.9	0.0
2023	−27.8	910.6	0.0	−86.4	241.0	0.0	−95.3	125.6	0.0
2024	−40.8	869.8	0.0	−100.4	140.6	0.0	−111.6	14.0	0.0
2025	**−61.9**	**807.9**	**0.0**	**−122.1**	**18.5**	**0.0**	**−135.7**	**0.0**	**−121.7**
2026	−88.9	719.0	0.0	−152.0	0.0	−133.5	−169.5	0.0	−291.2
2027	−119.1	599.8	0.0	−184.7	0.0	−318.2	−206.4	0.0	−497.6
2028	−152.9	446.9	0.0	−220.6	0.0	−538.8	−246.6	0.0	−744.2
2029	−190.5	256.4	0.0	−259.8	0.0	−798.6	−290.4	0.0	−1034.5
2030	**−232.4**	**24.0**	**0.0**	**−302.8**	**0.0**	**−1101.4**	**−338.0**	**0.0**	**−1372.6**

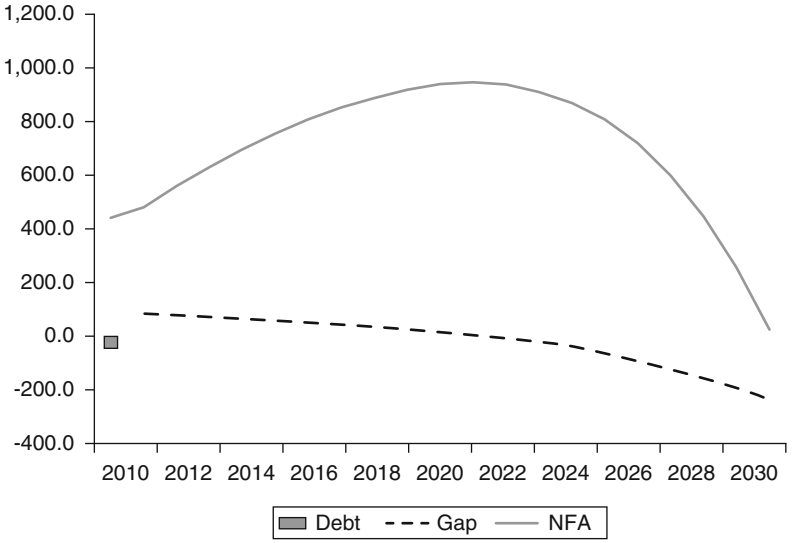


Figure 5.16 Financing the revenue-expenditure gap (USD Billion), oil revenue: IEA data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

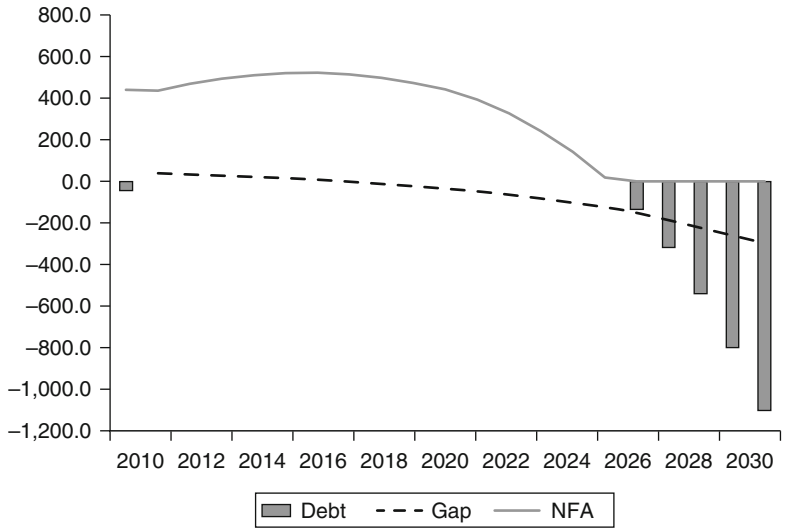


Figure 5.17 Financing the revenue-expenditure gap (USD Billion), oil revenue: Majed data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

this scenario, a gap of $7.4 billion appears in 2017 that gradually increases to deplete the NFA in 2025. This also leads to the borrowing of $133.5 billion in the same year. After exhausting NFA, the successive gaps create a cumulative debt of $1.01 trillion by the end of year 2030.

Financing Scenario Eighteen

This scenario presented in figure 5.18 uses the same variables as the previous scenario, except that it uses oil revenues generated from B&G data. In this scenario, a gap of $5.7 billion shows up in 2016 that increases and eats away at the NFA by 2025. A debt of $121.7 billion is also introduced that same year. The gap gradually becomes $338 billion in the year 2030, and the successive gaps leave a cumulative debt of over $1.37 trillion by the end of 2030.

A total of 14 out of 18 of our financing scenarios depict alarming financial situations with varying degrees of severity. The four scenarios that do not exhibit alarming financial failures during the future period result from B&G's low expenditures estimates. Even using B&G data, debt levels reach dangerous levels just after the future period; however we do the math, financial calamity eventually finds its place in the Saudi economy.

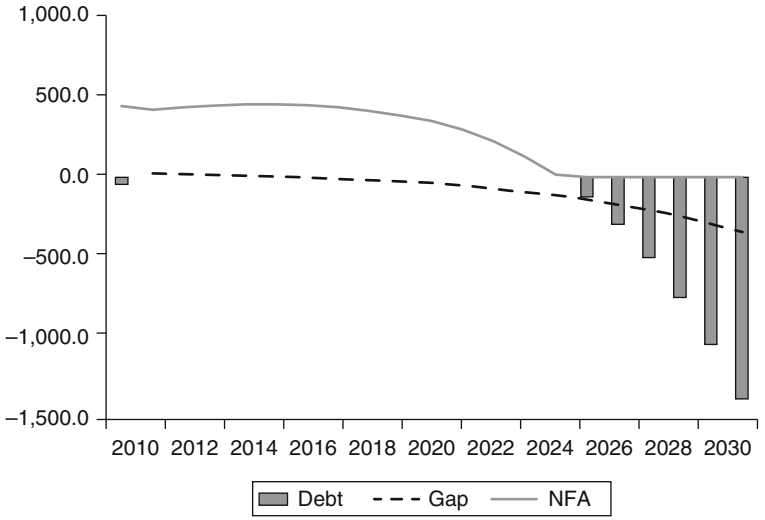


Figure 5.18 Financing the revenue-expenditure gap (USD Billion), oil revenue: B&G data based, expenditure: B&G data based, non-oil revenue: our GDP equation based, oil prices: OPEC.

Financing the Gaps in the Long-Term Period

For the future period, we used IEA and OPEC oil price estimates to construct gap analysis financing scenarios. Since we do not have IEA oil price data for the long-term period, we will be using OPEC prices only. This renders us half as many financing scenarios in the long-term period as compared to the future period. The nine financing scenarios will be presented in three groups.

Financing Scenarios One, Two, and Three

Financing scenarios are estimated using our growth rate forecasts for current expenditures and capital expenditures, IEA, Majed, and B&G data for oil revenue forecasts, and OPEC data for prices. As usual, we will use our GDP equation for non-oil revenue estimates.

Table 5.7 reveals that using IEA oil revenue data, debt that accumulated to $4.345 trillion at the beginning of the period grows further to $25.471 trillion in 2050. Similarly, using Majed data, debt of $5.470 trillion swells to $27.744 trillion in 2050. In the third case, using B&G, debt surges from $5.741 trillion in 2030 to $28.588 trillion in 2050.

Scenarios Four, Five, and Six

Using MOEP data instead for current expenditures and capital expenditure, with all other variables being equal, we ran three more financing scenarios. Table 5.7 shows that the accumulation of debt is even more aggravated in these three financing scenarios as opposed to the previous three. The amount of debt in the IEA revenues case becomes $34.718 trillion in 2050 from $5.493 trillion in 2030. Using Majed data, debt grows to $36.991 trillion from $6.618 trillion, and with B&G model, debt soars to $37.836 trillion from $6.889 trillion.

Scenarios Seven, Eight, and Nine

Finally, using B&G data for current expenditures and capital expenditures, with all other variables being equal, we develop another set of financing scenarios.

Table 5.9 demonstrates that using B&G data, Saudi financial woes are slightly less pronounced. Again, this is due to the fact that B&G expenditures forecasts are lower than our growth rate-based and MOEP based forecasts of expenditures. Despite relatively lower values of cumulative debt in 2050, the absolute magnitude of each stock of debt is still very large. Cumulative debt in 2050 stands at $12.479 trillion, $14.751

Table 5.7 Financing the revenue-expenditure gap using our expenditure, total revenue using OPEC price-based oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2030	**−700.7**	**0.0**	**−4344.5**	**−771.1**	**0.0**	**−5469.9**	**−806.3**	**0.0**	**−5741.1**
2031	−710.3	0.0	−5054.8	−779.3	0.0	−6249.2	−813.8	0.0	−6554.9
2032	−724.4	0.0	−5779.1	−792.0	0.0	−7041.3	−825.9	0.0	−7380.8
2033	−742.7	0.0	−6521.9	−809.0	0.0	−7850.3	−842.2	0.0	−8223.0
2034	−765.1	0.0	−7287.0	−830.1	0.0	−8680.4	−862.6	0.0	−9085.5
2035	−791.4	0.0	−8078.3	−855.0	0.0	−9535.4	−886.9	0.0	−9972.4
2036	−821.3	0.0	−8899.6	−883.7	0.0	−10419.1	−914.9	0.0	−10887.3
2037	−854.9	0.0	−9754.6	−916.1	0.0	−11335.2	−946.7	0.0	−11834.0
2038	−892.0	0.0	−10646.6	−952.0	0.0	−12287.2	−981.9	0.0	−12815.9
2039	−932.5	0.0	−11579.1	−991.3	0.0	−13278.4	−1020.7	0.0	−13836.6
2040	−976.5	0.0	−12555.6	−1034.0	0.0	−14312.5	−1062.8	0.0	−14899.4
2041	−1023.7	0.0	−13579.3	−1080.1	0.0	−15392.6	−1108.3	0.0	−16007.7
2042	−1074.3	0.0	−14653.6	−1129.6	0.0	−16522.1	−1157.2	0.0	−17164.9
2043	−1128.2	0.0	−15781.7	−1182.3	0.0	−17704.5	−1209.4	0.0	−18374.3
2044	−1185.4	0.0	−16967.1	−1238.5	0.0	−18942.9	−1265.0	0.0	−19639.3
2045	−1245.9	0.0	−18213.0	−1297.9	0.0	−20240.9	−1324.0	0.0	−20963.3
2046	−1309.8	0.0	−19522.8	−1360.8	0.0	−21601.7	−1386.3	0.0	−22349.6
2047	−1377.2	0.0	−20900.0	−1427.1	0.0	−23028.8	−1452.1	0.0	−23801.7
2048	−1448.0	0.0	−22348.0	−1497.0	0.0	−24525.8	−1521.5	0.0	−25323.2
2049	−1522.4	0.0	−23870.4	−1570.4	0.0	−26096.2	−1594.3	0.0	−26917.5
2050	−1600.3	0.0	−25470.7	−16747.4	0.0	−27743.5	−1670.9	0.0	−28588.4

Table 5.8 Financing the revenue-expenditure gap using MOEP-based expenditure, total revenue using OPEC price-based oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2030	**−912.8**	**0.0**	**−5492.5**	**−983.2**	**0.0**	**−6617.9**	**−1018.5**	**0.0**	**−6889.1**
2031	−93701.0	0.0	−6429.6	−1006.2	0.0	−7624.1	−10740.7	0.0	−7929.8
2032	−966.3	0.0	−7395.9	−1033.9	0.0	−8658.0	−1067.8	0.0	−8997.5
2033	−1000.0	0.0	−8395.9	−1066.3	0.0	−9724.3	−1099.5	0.0	−10097.0
2034	−1038.3	0.0	−9434.2	−1103.3	0.0	−10827.6	−1135.7	0.0	−11232.8
2035	−1080.9	0.0	−10515.1	−1144.6	0.0	−11972.1	−1176.4	0.0	−12409.2
2036	−1127.8	0.0	−11642.8	−1190.2	0.0	−13162.3	−1221.4	0.0	−13630.5
2037	−1178.9	0.0	−12821.7	−1240.0	0.0	−14402.3	−1270.6	0.0	−14901.1
2038	−1234.1	0.0	−14055.8	−1294.1	0.0	−15696.4	−1324.0	0.0	−16225.1
2039	−1293.5	0.0	−15349.3	−1352.3	0.0	−17048.6	−1381.6	0.0	−17606.8
2040	−1357.1	0.0	−16706.4	−1414.6	0.0	−18463.3	−1443.4	0.0	−19050.2
2041	−1424.8	0.0	−18131.2	−1481.2	0.0	−19944.5	−1509.4	0.0	−20559.6
2042	−1496.7	0.0	−19627.9	−1552.0	0.0	−21496.4	−1579.6	0.0	−22139.2
2043	−1572.9	0.0	−21200.7	−1627.0	0.0	−23123.5	−1654.1	0.0	−23793.3
2044	−1653.3	0.0	−22854.1	−1706.4	0.0	−24829.9	−1766.0	0.0	−25526.3
2045	−1738.2	0.0	−24592.3	−1790.3	0.0	−26620.2	−1816.3	0.0	−27342.6
2046	−1827.6	0.0	−26419.9	−1878.6	0.0	−28498.8	−1904.1	0.0	−29246.7
2047	−1921.6	0.0	−28341.5	−1971.6	0.0	−30470.4	−1996.6	0.0	−31243.2
2048	−2020.3	0.0	−30361.9	−2069.3	0.0	−32539.7	−2093.8	0.0	−33337.0
2049	−2123.9	0.0	−32485.8	−2171.9	0.0	−34711.6	−2195.9	0.0	−35533.0
2050	−2232.6	0.0	−34718.4	−2279.6	0.0	−36991.2	−2303.1	0.0	−37836.1

Table 5.9 Financing the revenue-expenditure gap using B&G-based expenditure, total revenue using OPEC price-based oil revenue (USD Billion)

	IEA			*Majed*			*B&G*		
Year	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*	*Gap*	*NFA*	*Debt*
2030	**−232.4**	**24.0**	**0**	**−302.8**	**0.0**	**−1101.4**	**−338**	**0.0**	**−1372.6**
2031	−261.3	0.0	−237.3	−330.3	0.0	−1431.7	−364.8	0.0	−1737.4
2032	−291.4	0.0	−528.6	−359.0	0.0	−1790.8	−392.9	0.0	−2130.3
2033	−322.7	0.0	−851.3	−389.0	0.0	−2179.7	−422.1	0.0	−2552.4
2034	−355.2	0.0	−1206.5	−420.2	0.0	−2599.9	−452.6	0.0	−3005.1
2035	−389.0	0.0	−1595.4	−452.6	0.0	−3052.5	−484.5	0.0	−3489.5
2036	−424.0	0.0	−2019.5	−486.4	0.0	−3539.0	−517.6	0.0	−4007.2
2037	−460.5	0.0	−2479.9	−521.6	0.0	−4060.6	−552.2	0.0	−4559.4
2038	−498.3	0.0	−2978.2	−558.2	0.0	−4618.8	−588.2	0.0	−5147.5
2039	−537.5	0.0	−3515.7	−596.2	0.0	−5215.0	−625.6	0.0	−5773.1
2040	−578.2	0.0	−4093.9	−635.8	0.0	−5850.8	−664.5	0.0	−6437.7
2041	−620.4	0.0	−4714.3	−676.8	0.0	−3527.6	−705.0	0.0	−7142.7
2042	−664.2	0.0	−5378.5	−719.5	0.0	−7247.1	−747.2	0.0	−7889.9
2043	−709.7	0.0	−6088.2	−763.9	0.0	−8011.0	−790.9	0.0	−8680.8
2044	−756.8	0.0	−6845.0	−809.9	0.0	−8820.9	−836.4	0.0	−9517.2
2045	−805.7	0.0	−7650.7	−857.7	0.0	−9678.6	−883.7	0.0	−10401.0
2046	−856.4	0.0	−8507.1	−907.4	0.0	−10586.0	−932.9	0.0	−11333.9
2047	−909.0	0.0	−9416.1	−959.0	0.0	−11545.0	983.9	0.0	−12317.8
2048	−963.5	0.0	−10379.7	−1012.5	0.0	−12557.5	−1037.0	0.0	−13354.8
2049	−1020.1	0.0	−11399.8	−1068.1	0.0	−13625.5	−1092.1	0.0	−14446.9
2050	−1078.7	0.0	−12478.5	−1125.8	0.0	−14751.3	−1149.3	0.0	−15596.2

trillion, and $15.596 trillion respectively for our three revenue different revenue options.

The latter debt financing scenarios for the long-term period have, without exception, produced amounts of debt by the end of the period. Even the four financing scenarios that started the long-term periods with surpluses ended up with what amounts to potentially crippling debt after 20 years. Saudi debt, using our models, could range from $ 12.4 trillion to $ 37.8 trillion in 2050.

Concluding Remarks

Saudi Government Debt in 2030 and 2050

In this chapter we looked into the ways that the Saudi government could fund deficit gaps between expenditures and revenues. We applied reasonable assumptions and applied them consistently, 18 scenarios for the period of 2011 through 2030 and 9 further scenarios for the period of 2031 through 2050. We assumed that NFA would be used first; Once NFA was exhausted, the government would likely borrow to finance its expenditures. Though the government uses both options interchangeably, for simplicity we started with one and moved to the other. [2]

Government Debt in 2030

According to 14 out of 18 financing scenarios evaluated, government debt would reach gigantic proportions by 2030. A low of $1.1 trillion and a high $6.9 trillion was the range. Only four of our financing scenarios—13, 14, 15, and 16—showed zero debt level.

Those four financing scenarios that showed no debt are the result of B&G data's low level of assumed government expenditures. I believe that MOEP estimates of government expenditures as well as our own house estimates are more reliable than B&G estimates. MOEP has access to unpublished government data, an "inside source" of course, and our estimates are based on a detailed analysis of government expenditure trends over the past 50 years. Both of the latter models build, in my view, more reasonable growth assumptions for government expenditures during the future period.

For the 14 scenarios that depicted potential financial upheaval, the Saudi government's accumulated debt in 2030 is even more alarming if you consider the following:

1. We excluded estimates of off-budget expenditures initiated by royal order, which are actually common, especially when surplus is available.

2. We have excluded the possibility of war, border disputes, or political unrest in any of the GCC countries, which could entail huge government spending.
3. We did not add debt service charges to government expenditures. These charges could be high when the interest rate is high, as the Saudi government experienced firsthand in the 1980s.

Any of these very possible but unpredictable eventualities would make government expenditure even higher than those assumed expenditures that already produced rather dismal outlooks in the vast majority of our analyses.

Government Debt in 2050

Determining government debt by 2050 entailed extrapolating the main variables, taking 2030 as a base, and applying various growth assumptions. Potential debt levels by 2050 produced by our models are so massive that the kingdom will likely never be able to sustain them. Mortgaging its oil and gas reserves, given the potentially lower market value in the future, may itself not be an option.

Table 5.10 includes total debt accumulated by the Saudi government over the course of its debt financing after exhausting NFA for all scenarios for the future period. Table 5.11 does the same for the long-term period.

Figure 5.19 depicts total government debt in 2030 for each of our financing scenarios.

Table 5.10 2011–2030 debt scenarios (USD Billion)

Scenario	**1**	**2**	**3**
Debt	2281.3	3826.5	4201.2
Scenario	**4**	**5**	**6**
Debt	434405	5469.9	5741.1
Scenario	**7**	**8**	**9**
Debt	3429.3	4974.5	5349.2
Scenario	**10**	**11**	**12**
Debt	5492.5	6617.9	6889.1
Scenario	**13**	**14**	**15**
Debt	0	0	0
Scenario	**16**	**17**	**18**
Debt	0	1101.4	1372.6

Table 5.11 2031–2050 debt scenarios (USD Billion)

Scenario	**1**	**2**	**3**
Debt	25470.7	27743.5	28588.4
Scenario	**4**	**5**	**6**
Debt	34718.4	36991.2	37836.1
Scenario	**7**	**8**	**9**
Debt	12478.5	14751.3	15596.2

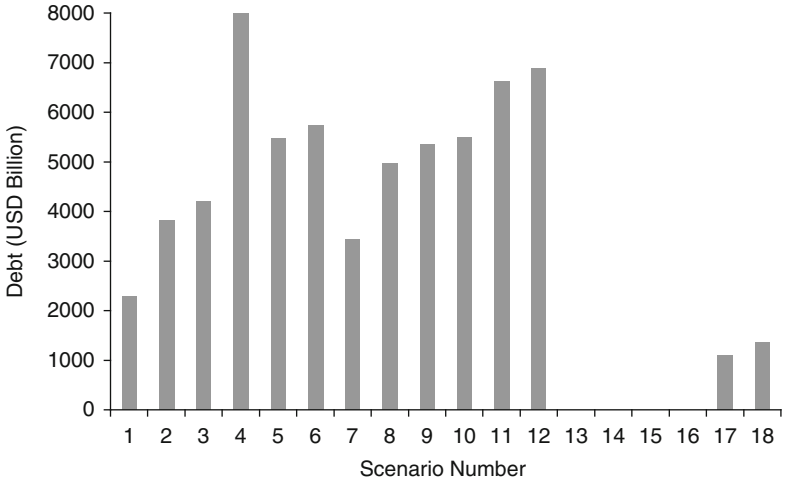


Figure 5.19 2030 Debt scenario comparison.

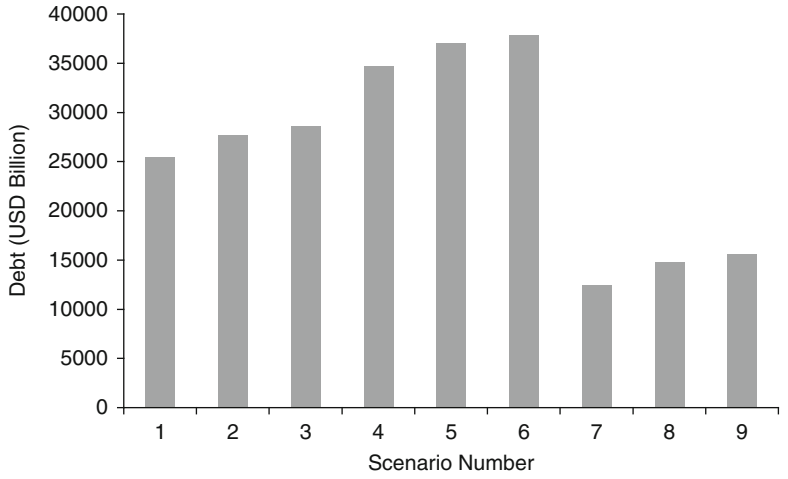


Figure 5.20 2050 Debt scenario comparison.

Figure 5.20 depicts the government debt level in 2050 for each of our alternative nine financing scenarios.

Debt Ratios

In order to illustrate the magnitude of the accumulated debt during the terminal years of the periods we are assessing, 2030 and 2050, we have computed the debt/budget expenditures and debt/budget revenue equations.

This analysis of government debt in 2030 for the 18 scenarios shows that the debt/budget expenditure ratio reaches a high level of 500 percent in Finance Scenario Twelve and 160 percent in Finance Scenario Seventeen. As for debt/revenue ratios, we see a high of 1,300 percent in Finance Scenario Twelve and 314 percent in Finance Scenario Seventeen. These are potentially catastrophic levels (see table 5.12).

The ratio analysis of government debt in 2050 for the nine scenarios shows a high debt/budget expenditures ratio of 2,800 percent in Finance Scenario Six, and 1900 percent in Finance Scenario Seven. As for debt/revenue ratios, we see a high of 120,000 percent and 3000 percent, respectively(see table 5.13).

Table 5.12 Debt ratios for (2011–2030) scenarios

Scenario	1	2	3
Debt/Exp	2281.3/1122.4=2.03	3826.5/1122.4=3.41	4201.2/1122.4=3.74
Debt/Rev	2281.3/593=3.85	3826.5/485=7.89	4201.2/431=9.75
Scenario	4	5	6
Debt/Exp	4344.5/1122.4=3.87	5469.9/1122.4=4.87	5741.1/1122.4=5.12
Debt/Rev	4344.5/421.8=10.30	5469.9/351.3=15.57	5741.1/316.1=18.16
Scenario	7	8	9
Debt/Exp	3429.3/1334.6=2.57	4974.5/1334.6=3.73	5349.2/1334.6=4.01
Debt/Rev	3429.3/593=5.78	4974.5/485=10.26	5349.2/431=12.41
Scenario	10	11	12
Debt/Exp	5492.5/1334.6=4.12	6617.9/1334.6=4.96	6889.1/1334.6=5.16
Debt/Rev	5492/4218=13.02	6617.9/351.3=18.84	6889.1/3161.1=21.80
Scenario	13	14	15
Debt Scenario Debt/Exp	0/654.1=0	0/654.1=0	0/654.1=0
Debt/Rev	0/593=0	0/485=0	0/431=0
Scenario	16	17	18
Debt/Exp	0/654.1=0	1101.4/654.1=1.68	1372.6/6541.1=2.01
Debt/Rev	0/421.8=0	1101.4/351.3=3.14	1327.6/316.1=4.34

Table 5.13 Debt ratios for (2031–2050) scenarios

Scenario	1	2	3
Debt/Exp	25470.7/1122.4=22.70	27743.5/1122.4=24.72	28588.4/1122.4=25.47
Debt/Rev	25470.7/421.8=60.39	27743.5/351.3=78.97	28588.4/3161.1=90.44
Scenario	4	5	6
Debt/Exp	34718.4/1334.6=26.01	36991.2/1334.6=27.72	37836.1/1334.6=28.35
Debt/Rev	34718.4/4218=82.31	36991.2/351.3=105.30	37836.1/3161.1=119.70
Scenario	7	8	9
Debt/Exp	12478.5/654.1=19.01	14751.3/654.1=22.55	15596.2/654.1=23.84
Debt/Rev	12478.5/421.8=29.58	14751.3/351.3=42.00	15596.2/316.1=49.34

Conclusion

So now we have forecasted government expenditures, revenues, and gaps, for two periods that together look 40 years into the future. I particularly looked into financing government debt by using its reserves (NFA) and subsequent borrowing locally and internationally. The accumulated debt in period-terminal years of 2030 and 2050 for almost all of the models are exceptionally large, especially during the period spanning 2031 through 2050. However, all these dire predictions are made without considering other likely government expenditures, such as off-budget spending, debt servicing, wars, and border disputes.

Ratio calculation of debt versus revenue and expenditures reveals the same dramatic picture of soaring government debt, gradually getting worse through year 2050.

As a result of this, we can reasonably conclude that the Saudi government will face a serious financial crisis by around 2030, if current trends and logic hold. Such a financial crisis may bankrupt the country and jeopardize its political stability.

If Saudi oil supply to the international market remains as significant as it is today, then the bankruptcy and/or political instability of the Saudi government will also destabilize oil markets and world economy.

Is the Financial Crisis Real?

A Gas Revolution

The majority of gas production in the United States in 2000 came from conventional sources, with less than 5 percent of such production from shale. In 2010 around 23 percent of production came from

shale; IEA, in its latest forecasts, projects that nearly 50 percent of US gas production in 2035 will come from shale.[3] The shale revolution, and the technological advancement in the energy sector, generally, increase the potential decrease in Saudi oil exports and the decline in oil prices (or at least a decline in the upward trend of oil prices). These problems will increase the probability of the drop in Saudi government oil revenues and the increase in government deficits and debt.

Government Expenditure: Government current and capital expenditures rose over the reference period (1960–2010) and continued to rise in 2011 and 2012. In the long run and in the future, they will inevitably be going up, because of the growing size of the population and the government's need to increase spending and subsidies to maintain political support. Nothing is likely to change this dynamic.

The government-accumulated negative budget gaps, which have been forecasted in this book, like any forecast, are not exact. Deficits may not appear in the same years as we predict or for the same reasons; in fact, our 2012 data (extrapolated from forecast data of over a year ago) demonstrate this. In the long run, however, the structural factors we consider for analysis here will not change, and the general direction of our model is probably inevitable without such structural change. It goes without saying that a strong exogenous policy is needed to interrupt the trend revenue and expenditure trends we have predicted. If things remain as they are, then, it is not unreasonable to assume with reasonable certainty that a financial crisis is looming in Saudi Arabia.

CHAPTER 6

Are Saudi Government Expenditures Sustainable? (The Genuine Savings Criterion)

In chapters 4 and 5, we explored Saudi Arabia's fiscal predicament, past, present, and future. This analysis has revealed that the government will likely face huge amounts of debt in 2030 and 2050, based on expected revenue and expenditure.

In this penultimate chapter, I will explore the role of capital in the Saudi government economy by extending the application of the *genuine savings model (or genuine savings theory)*[1] to the Saudi economy.

I will start by defining the particular anatomy of the Saudi economy in a way that helps us apply the model adequately; although similar to other developing countries, the Saudi system has some special features. As we have discussed, revenue is mainly earned from extracting oil and gas resources.

Then I will develop what I call a "Saudi Genuine Savings" criterion to predict the future sustainability of government expenditure. I will empirically apply Saudi genuine savings to Saudi government data for the period starting 1990 through 2010 to test the government's ability to sustain its supply of public goods and services in the future.

Anatomy of an Oil-Dependent Economy

Two all-important facets of government economy are government spending (expenditures) to supply public goods and services and government revenues to finance such government spending.

The following equations explain algebraically the main variables in these two functions:

Government Total Expenditures

$$GTE_t = GGP_t = GC_t + GI_t \quad (1)$$

GTE_t = Government Total Expenditures, at t
GGP_t = Government Gross Product, at t
GC_t = Government Current Expenditures, at t
GI_t = Government Capital Expenditures, at t

Government Gross Saving

$$GS_t = GGP_t - GC_t \quad (2)$$

Note that $GTE_t = GGP_t$

Saudi Genuine Savings

$$GNS_t = GS_t - \beta K_t \quad (3)$$

K_t, Government-Fixed (man-made) Capital, at t
β; Depreciation Ratio,
βK_t, Depreciation of Government Fixed Capital

Gross Annual Revenue from Oil and Gas Extraction

$$GRZ_t = XZ_t \times P_t \quad (4)$$

GRZ_t = Gross Annual Revenue from Oil and Gas Extraction, at t
XZ_t, Annual extraction of Oil and Gas, at t
P_t = Oil and Gas Equivalent, Price per Barrel, at t[2]

Net Annual Revenue from Oil and Gas, at t

$$NZR_t = GZR_t - EZ_t \quad (5)$$

NZR_t= Net Annual, Oil and Gas Revenue, at t
EZ_t= Total Annual Cost of Extraction of Oil and Gas, at t

Government Annual Revenue of Oil and Gas

$$GRZ_t = NRZ_t - IZ_t \quad (6)$$

GRZ_t, Government Annual Revenue of Oil and Gas, at t
IZ_t, Government Annual Investments for Exploration, Discovery of New Oil and gas fields, and greater recovery from Existing Wells

Government Total Annual Revenues, at t

$$GTR_t = GRZ_t + NOR_t \quad (7)$$

NOR_t; Non-oil Government Revenue, at t [3]

Government Budget Surplus

$$BS_t = GTR_t - GTE_t > 0 \quad (8)$$

BS_t; Government Budget Surplus, at t

Government Budget Deficit

$$BD_t = GTR_t - GTE_t < 0 \quad (9)$$

BDt; Government Budget Deficit, at t

Government Debt

$$GTD_t = \sum BD_t\, t,1,2,3,,,,,,,,,,,,T \quad (10)$$

Government Surplus

$$GTS_t = \sum BS_t\, t,1,2,3 \ldots T \quad (11)$$

Budget annual surplus is added to government total surplus, and budget annual deficit is added to government total debt. Net government financial position at any time is the difference between the two:

$$GFP_t = GTS_t - GTD_t \quad (12)$$

GFP_t: Government Financial Position, at t

It is important to note that, though our description of the government's fiscal model is very close to the actual government Saudi National Accounting System, there are some minor variations. These variations do not affect the legitimacy of the model.

The Saudi Genuine Savings Criterion

Generally speaking, the government's role in the economies of oil-exporting countries is more essential to the fate of that economy than in non-"rentier" states; the magnitude of expenditure, availability of goods for consumption, etc. all hinge on government intervention (or nonintervention). These expenditures are financed mainly by the extraction

and sale of oil and gas resources in Saudi Arabia.[4] The Saudi genuine savings (SGS) model I am proposing here follows the same theoretical structure of the genuine savings model developed on the basis of Hicksian income theory,[5] which states that revenue from the sale of an asset is not income. Income, rather, is the yield on annuity of an alternative asset purchased from the revenue sale.

Government Assets

$$GA_t = K_t + Z_t + F_t \quad (13)$$

Government assets comprise three categories:

1. Man-made capital (K), which includes roads, buildings, machinery, etc.
2. Oil and gas, (Z)[6]
3. Foreign and domestic investments (F).

Government Gross Saving

$$GS_t = GC_t - GI_t \quad (14)$$

GS_t = Government gross savings
GC_t = Government consumption expenditures, at *t*
GI_t = Government capital expenditures, at *t*

Saudi Genuine Savings

$$GNS_t = GS_t - \beta K_t \quad (15)$$

K_t, Government total fixed capital, at *t*
β, Capital depreciation rate.

Saudi Government data do not show total government fixed capital, therefore in order to overcome this shortage in the data, I assumed that government fixed capital stock, at *t*, equals the summation of government annual capital expenditures, ($\sum I_t$), for the last 20 years depreciated annually at 5 percent.[7]

$$K_t = \sum I_t + I_{t-1} + I_{t-2} \ldots . I_{t-20} \text{ depreciated annually at 5 percent} \quad (16)$$

Oil and Gas Annual Depreciation

$$\lambda Z_t = GRZ_t \quad (17)$$

GRZ_t= Government annual revenue from oil and gas (rent)

λZ_t= Net depreciation of oil and gas reserves at *t* after deducting extraction cost and investment for exploration and fields developments.

Government Financial Assets

Government financial assets (GFA)[8] refer to the government's total investment in domestic and foreign capital markets, mainly in equities and bonds.

$$GFA_t = GFDA_t + GFFA_t \quad (18)$$

GFDA = Government financial domestic assets
GFFA = Government financial foreign assets

Government domestic financial assets have become part of private sector or public sector corporations and institutions. For this reason, they will not be accessible for financing government debt, or to finance a budget deficit. As a result, only government foreign financial assets will represent government financial assets (GFA) in our savings model.

Government Financial Assets Depreciation

Government foreign financial assets are increased or decreased annually by budget surplus or deficit. Annual budget surplus is added to government net foreign financial assets, and annual budget deficit is deducted from government accumulated surplus.

$$GFA_t = GFA_{t-1} + (BS_t - BD_t) \quad (19)$$
$$\mu GFA_t = GFA_t - GFA_{t-1} = (BS_t - BD_t) \quad (20)$$

μF_t; net annual changes in foreign financial assets.

Saudi Genuine Savings

$$SGS_t = (GS_t - \beta K_t) - \mu GFA_t - \lambda Z_t \quad (21)$$
$$SGS_t = GNS_t - \mu GFA_t - \lambda Z_t \quad (22)$$

When annual SGS covers and/or exceeds annual depreciations in fixed capital, oil and gas reserves, and government financial assets for a prolonged period of time (positive SGS), this indicates that the government will be able to sustain its current supply of public goods and services in the future. Positive SGS does not guarantee sustainability; nonetheless, positive SGS (piggybacking on the genuine savings model),

for a long period of time, is a very strong indicator of sustainability. Likewise negative genuine savings are "unequivocal indicators of non-sustainability."[9]

The Empirical Application of Saudi Genuine Savings: 1990–2010

The Saudi government's National Account System and fiscal structure is very similar to the general structure I presented as the anatomy of Middle Eastern oil-exporting countries. The data used in our empirical application of the SGS model is based on the government's actual accounts published in SAMA (from the Central Bank) and the Central Department of Statistics and Information (CDS), which is part of Ministry of Economy and Planning.[10] I chose a reference period of 20 years (1970–1990). The choice of this rather long period for testing the genuine savings model and its application to Saudi government expenditures is to ensure that results are not an anomaly, and are generally applicable.

Annual Government Gross Product (GGP) is the government's total annual budget expenditures (current [C] and capital [I]). I have limited government-owned natural resources to oil and gas (Z)—the backbone of the Saudi economy in general and the government economy in particular. In the 2012 budget of Saudi Arabia, 93 percent of government annual revenues came from the sale of oil and gas. The government does not issue data related to government fixed capital (K). To overcome this problem, I have assumed that capital stock today is the summation of government capital expenditures over the past 20 years discounted at 5 percent annually. Government capital expenditures over the preceding 20 years form the base for government capital stock in 1990. I have assumed the annual depreciation[11] rate of 5 percent to calculate government-fixed capital depreciation.

Aramco is owned 100 percent by the government and is charged with all aspects of oil and gas in Saudi Arabia (including exploration, extraction, sales, and transportation).[12] The company provides little precise data on the status of any oil and gas fields, new or old.[13] It deducts from the annual sale of extracted oil and gas that which it considers necessary for its investments in future exploration and discovery. Aramco also deducts its annual cost of operations, including extraction and sale, from its annually issued sales figures of oil and gas. It also deducts the foregoing before presenting its calculations and transferring its annual revenue (rent) from the sale of oil and gas to the Saudi government.

To borrow from the genuine savings model vernacular, the Saudi government's oil and gas revenue represents natural resource depreciation (rent) adjusted for annual appreciation and depreciation of oil and gas supplies. In the case of Saudi Arabia, both changes are accounted for in what I call "adjusted net oil and gas revenue," which is the annual revenue paid to the government by Aramco (for oil and gas extracted and sold after Aramco has finished deducting both extraction costs and investments required for new exploration or development.

The following tables present the results of our empirical application of SGS to the Saudi economy over the period of 1970 through 1920.

Table 6.1 includes base data for our models; it includes both government actual expenditures and actual revenues and the difference between the two in the form of budget surplus or budget deficit.

Table 6.2 shows actual government expenditures (GGP), comprising government current expenditures (C) and government capital expenditures (K). The word "current" in Saudi budget terminology means wages, salaries, maintenance, subsidies, etc. (see chapters 1 and 2 relating to the Saudi budget); some of these expenditures are related to capital projects, and as such I deduct some of these expenditures from consumption and add them to investment. Capital expenditures on the other hand (see chapter 3) mean expenditures on projects such as roads, buildings, and hospitals.

Government Gross Product
$GGP_t = C_t + I_t$
Saudi Genuine Savings
$SGS_t = GGP_t - GC_t = I_t$

SGS is the difference between GGP and government consumption (the same as government capital expenditures, our variable "I"). Because government current expenditures may include items that relate to projects, that is fixed capital, we establish three scenarios for calculating annual government gross savings (see figure 6.1):

1. $SGS_t = I_t$
2. $SGS_t = I_t + 30\%$ of C_t
3. $SGS_t = I_t + 50\%$ of C_t

Tables 6.3 to 6.8 and figures 6.2 to 6.6 show the three scenarios for SGS for the period 1990 through 2010.

Table 6.1 Actual government revenue and expenditure (USD Million)

	Revenue			*Expenditure*			
Year	*Oil Revenue*	*Non- Oil Revenue*	*Total Revenue*	*Current Expenditure*	*Capital Expenditure*	*Total Expenditure*	*Budget Surplus /deficit*
1990	27,026	9,186	36,212	44,645	11,270	55,915	−19,703
1991	38,653	9,572	48,225	55,943	18,122	74,065	−25,840
1992	34,344	10,895	45,239	43,293	20,437	63,730	−18,491
1993	28,260	9,458	37,719	49,301	803	50,104	−12,385
1994	25,468	8,930	34,398	43,035	639	43,674	−9,276
1995	28,194	10,873	39,067	39,674	6,711	46,385	−7,318
1996	36,262	11,494	47,756	45,669	7,162	52,831	−5,075
1997	42,663	12,137	54,800	58,368	638	59,006	−4,206
1998	21,333	16,429	37,762	45,643	5,039	50,683	−12,921
1999	27,853	11,469	39,321	44,585	4,439	49,024	−9,703
2000	57,180	11,638	68,817	57,855	4,897	62,753	6,065
2001	49,044	11,798	60,842	59,602	8,435	68,037	−7,195
2002	44,293	12,507	56,800	54,267	8,000	62,267	−5,467
2003	61,600	16,533	78,133	59,608	8,925	68,533	9,600
2004	88,000	16,611	104,611	66,040	10,014	76,053	28,558
2005	134,544	15,945	150,489	75,779	16,614	92,393	58,096
2006	161,192	18,457	179,649	85,976	18,910	104,886	74,763
2007	149,916	21,497	171,413	92,586	31,746	124,333	47,081
2008	262,232	31,366	293,598	103,690	34,995	138,685	154,913
2009	115,845	20,103	135,948	111,092	47,957	159,049	−23,101
2010	178,737	19,027	197,764	121,345	53,025	174,369	23,395

Source: SAMA, 47th Annual Report 2011

Table 6.2 Gross government product in (USD Million)

Year	*GGP*	*C*	*I*
1990	55,915	44,645	11,270
1991	74,065	55,943	18,122
1992	63,730	43,293	20,437
1993	50,104	49,301	803
1994	43,674	43,035	639
1995	46,385	39,674	6,711
1996	52,831	45,669	7,162
1997	59,006	58,368	638
1998	50,683	45,643	5,039
1999	49,024	44,585	4,439
2000	62,753	57,855	4,897
2001	68,037	59,602	8,435
2002	62,267	54,267	8,000
2003	68,533	59,608	8,925
2004	76,053	66,040	10,014
2005	92,393	75,779	16,614
2006	104,886	85,976	18,910
2007	124,333	92,586	31,746
2008	138,685	103,690	34,995
2009	159,049	111,092	47,957
2010	174,369	121,345	53,025

Source: SAMA, 47th Annual Report 2011
GGP = C+ I: Government Annual Expenditure
C: Government Current Expenditure
I: Government Capital Expenditure

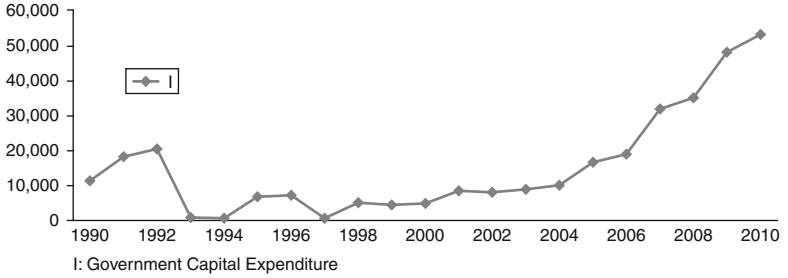


Figure 6.1 Government gross savings (GGS) in USD Million.
Source: SAMA, 47th Annual Report 2011.
*Data are actual and in nominal terms.

Table 6.3 Gross savings in USD Million

Year	*I*
1990	11,270
1991	18,122
1992	20,437
1993	803
1994	639

continued

Table 6.3 Continued

Year	*I*
1995	6,711
1996	7,162
1997	638
1998	5,039
1999	4,439
2000	4,897
2001	8,435
2002	8,000
2003	8,925
2004	10,014
2005	16,614
2006	18,910
2007	31,746
2008	34,995
2009	47,957
2010	53,025

Source: SAMA, 47th Annual Report 2011

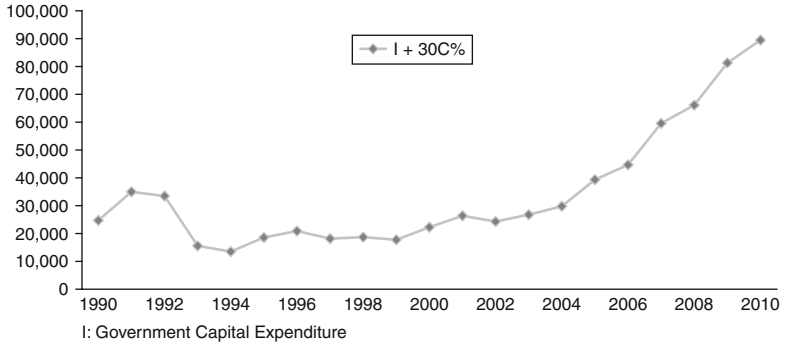


Figure 6.2 Government gross savings (GGS) @ (I + 30%C) in USD Million.
Source: SAMA, 47th Annual Report 2011.
*Data are actual and in nominal terms

Table 6.4 Gross savings @ I+30%C in USD Million

Year	*I + 30%C*
1990	24,664
1991	34,905
1992	33,425
1993	15,593
1994	13,549
1995	18,613
1996	20,863
1997	18,148

Year	*I + 30%C*
1998	18,732
1999	17,815
2000	22,254
2001	26,316
2002	24,280
2003	26,808
2004	29,826
2005	39,347
2006	44,702
2007	59,522
2008	66,102
2009	81,285
2010	89,428

Source: SAMA, 47th Annual Report 2011

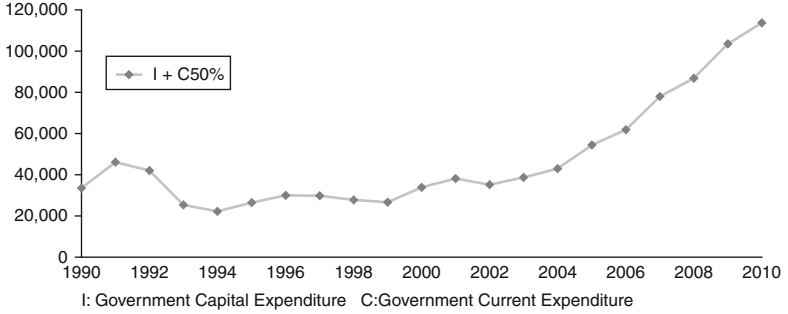


Figure 6.3 Government gross savings (GGS) @ (I+ 50%C) in USD Million.
Source: SAMA, 47th Annual Report 2011.
*Data are actual and in nominal terms.

Table 6.5 Gross savings @ I+50%C in USD Million

Year	*I + 50%C*	*Year*	*I + 50%C*
1990	33,593	**2000**	33,825
1991	46,093	**2001**	38,236
1992	42,083	**2002**	35,133
1993	25,454	**2003**	38,729
1994	22,156	**2004**	43,033
1995	26,548	**2005**	54,503
1996	29,997	**2006**	61,898
1997	29,822	**2007**	78,040
1998	27,861	**2008**	86,840
1999	26,732	**2009**	103,503
		2010	113,697

Source: SAMA, 47th Annual Report 2011

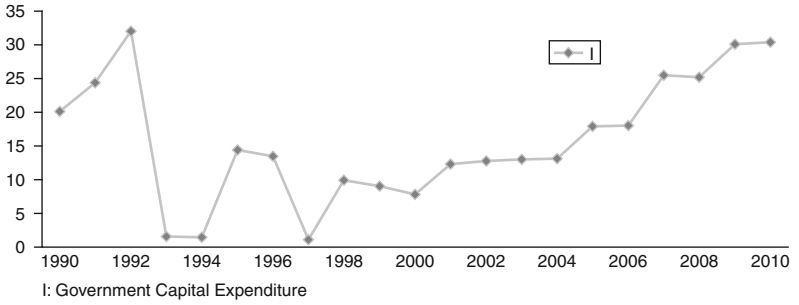


Figure 6.4 Government gross savings (GGS) as % of GGP.

Source: SAMA, 47th Annual Report 2011.

*Data are actual and in nominal terms.

Table 6.6 Government gross savings as % of GGP

Year	*I % GGP*	*Year*	*I % GGP*
1990	20.1	**2000**	7.8
1991	24.4	**2001**	12.3
1992	32.0	**2002**	12.8
1993	1.6	**2003**	13.0
1994	1.5	**2004**	13.1
1995	14.4	**2005**	17.9
1996	13.5	**2006**	18.0
1997	1.1	**2007**	25.5
1998	9.9	**2008**	25.2
1999	9.1	**2009**	30.1
		2010	30.4

Source: SAMA, 47th Annual Report 2011

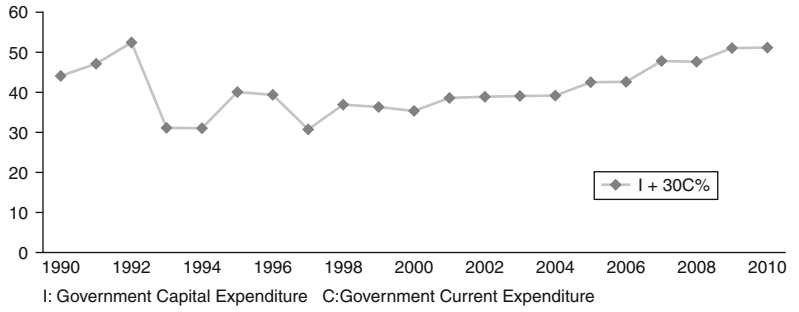


Figure 6.5 Government gross savings (GGS) @ (I + 30%C) as % of GGP.

Source: SAMA, 47th Annual Report 2011.

*Data are actual and in nominal terms.

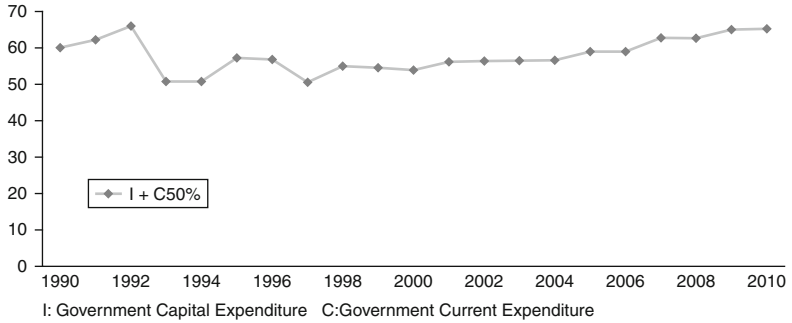


Figure 6.6 Government gross savings (GGS) @ (I + 50% C) as % of GGP.
Source: SAMA, 47th Annual Report 2011.
*Data are actual and in nominal terms

Table 6.7 Government gross savings @ (I+30%C) as % of GGP

Year	*I + 30%C*
1990	44.1
1991	47.1
1992	52.4
1993	31.1
1994	31.0
1995	40.1
1996	39.4
1997	30.7
1998	36.9
1999	36.3
2000	35.4
2001	38.6
2002	38.9
2003	39.1
2004	39.2
2005	42.5
2006	42.6
2007	47.8
2008	47.6
2009	51.1
2010	51.2

Source: SAMA, 47th Annual Report 2011

Table 6.8 Government gross savings @ (I+50%C) as % GGP

Year	*I + 50%C*
1990	60.1
1991	62.2
1992	66.0
1993	50.8
1994	50.7
1995	57.2
1996	56.8
1997	50.5
1998	55.0
1999	54.5
2000	53.9
2001	56.2
2002	56.4
2003	56.5
2004	56.6
2005	59.0
2006	59.0
2007	62.8
2008	62.6
2009	65.1
2010	65.2

Source: SAMA, 47th Annual Report 2011

Saudi Genuine Savings

Government gross savings at (t) is the summation of capital expenditures over the preceding 20 years depreciated by 5 percent, as per our assumption, capital stock (K) at (t)

$K_t = \sum I_t + I_{t-1} + I_{t-2} \ldots I_{t-20}$ depreciated annually at 5 percent

SGS at t is SGS_t minus capital depreciation at t, $\beta K t$.

$GNS_t = SGS_t - \beta K_t$

K_t, government total fixed capital at t is the last 20 years of investment expenditures depreciated at 5 percent annually.

β; capital depreciation rate.

Table 6.9 shows our calculation of government capital stock at 1990, the base year of our reference period (1990–2010) for the application of the genuine savings criterion to the Saudi government economy.

Table 6.10 shows our calculation of government capital stock at the terminal year of our period (2010) for SGS calculations equaling $262.43 million.

Table 6.11 and Figure 6.7 show the annual government capital depreciation, βK, for the years 1990 through 2010.

Table 6.12 and figure 6.8 show βk as percentage of GGP.

Table 6.9 Government capital accumulation (1970–1990), in USD Million

Year	*Capital Accumulation*	*Accumulated Capital*	*Depreciated @ rate*	*Capital Depreciation*
1970	614		5%	31
1971	900	930	10%	93
1972	1,201	1,294	15%	194
1973	2,700	2,894	20%	579
1974	5,289	5,867	25%	1,467
1975	11,548	13,015	30%	3,904
1976	14,574	18,478	35%	6,467
1977	17,768	24,236	40%	9,694
1978	17,196	26,890	45%	12,100
1979	22,207	34,308	50%	17,154
1980	27,758	44,912	55%	24,702
1981	45,604	70,305	60%	42,183
1982	38,044	80,227	65%	52,148
1983	28,302	80,450	70%	56,315
1984	25,245	81,560	75%	61,170
1985	17,104	78,273	80%	62,619
1986	10,274	72,893	85%	61,959
1987	13,467	75,426	90%	67,883
1988	6,553	74,436	95%	70,714
1989	9,751	80,465	100%	80,465
Total	**316,098**	**866,859**		**631,841**

Table 6.10 Government capital accumulation (1990–2010) in USD Million

Year	*Net Accumulated Capital*	*Capital Exp.*	*Total Capital*	*Capital Depreciation @ 5%*
1990	866,859	11,270	878,129	−43,906
1991	834,223	18,122	808,438	−40,422
1992	768,016	20,437	748,031	−37,402
1993	710,630	803	674,031	−33,702
1994	640,330	639	607,267	−30,363
1995	576,904	6,711	553,251	−27,663
1996	525,589	7,162	505,088	−25,254
1997	479,834	638	455,217	−22,761
1998	432,457	5,039	414,735	−20,737
1999	393,998	4,439	377,700	−18,885
2000	358,815	4,897	344,827	−17,241
2001	327,586	8,435	318,780	−15,939
2002	302,841	8,000	294,902	−14,745
2003	280,156	8,925	274,336	−13,717
2004	260,620	1,014	247,917	−12,396
2005	235,521	16,614	239,739	−11,987
2006	227,752	18,910	234,675	−11,734
2007	222,941	31,746	242,954	−12,148
2008	230,806	34,995	253,653	−12,683
2009	240,971	47,957	276,245	−13,812
2010	262,433	53,025	301,645	−15,082

Table 6.11 Capital depreciation at 5% in USD Million

Year	*βK @ 5%*
1990	−43,906
1991	−42,617
1992	−41,508
1993	−39,473
1994	−37,531
1995	−35,990
1996	−34,549
1997	−32,853
1998	−31,463
1999	−30,111
2000	−28,851
2001	−27,830
2002	−26,838
2003	−25,943
2004	−24,696
2005	−24,292
2006	−24,023
2007	−24,409
2008	−24,939
2009	−26,089
2010	−27,436

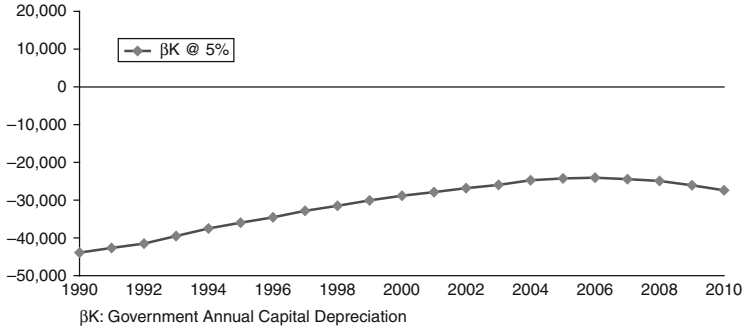


Figure 6.7 Capital depreciation @5%, in USD Million.
Source: SAMA, 47th Annual Report 2011.

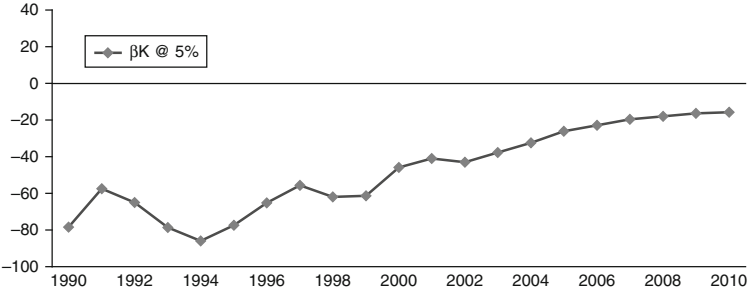


Figure 6.8 Capital depreciation @5%, as % of GGP.
Source: SAMA, 47th Annual Report 2011.

Table 6.12 Capital depreciation at 5% as % of GGP

Year	*βK @ 5%*	*Year*	*βK @ 5%*
1990	−78.5	**2000**	−45.9
1991	−57.5	**2001**	−40.9
1992	−65.1	**2002**	−43.1
1993	−78.7	**2003**	−37.8
1994	−85.9	**2004**	−32.4
1995	−77.5	**2005**	−26.2
1996	−65.3	**2006**	−22.9
1997	−55.6	**2007**	−19.6
1998	−62	**2008**	−17.9
1999	−61.4	**2009**	−16.4
		2010	−15.7

Source: SAMA, 47th Annual Report 2011

Table 6.13 and figure 6.9 show government oil and gas, natural assets, depreciation, λZ, from 1990 through 2010. λZ is equal to government oil and gas revenues (rent).

Table 6.14 and figure 6.10 show λZ as a percentage of GGP, and figure 6.11 shows the budget surplus a percentage of GGP.

The illustrations here likewise show net changes in government foreign financial assets (μf) as a percentage of GGP.

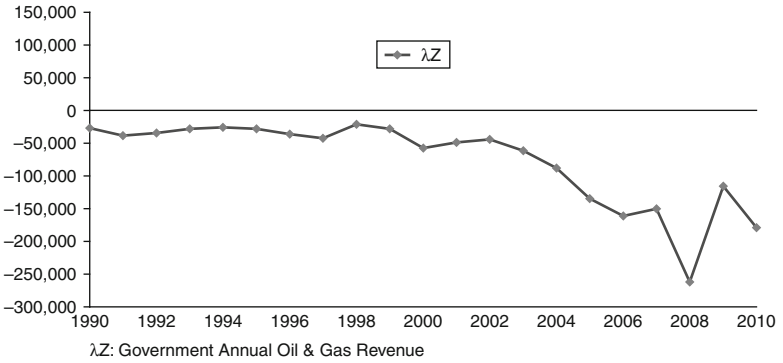


Figure 6.9 Government annual oil and gas revenue in USD Million.
Source: SAMA, 47th Annual Report 2011.

Table 6.13 Government annual oil and gas depreciation in USD Million

Year	*λZ*	*Year*	*λZ*
1990	−27,026	**2000**	−57,180
1991	−38,653	**2001**	−49,044
1992	−34,344	**2002**	−44,293
1993	−28,260	**2003**	−61,600
1994	−25,468	**2004**	−88,000
1995	−28,194	**2005**	−134,544
1996	−36,262	**2006**	−161,192
1997	−42,663	**2007**	−149,916
1998	−21,333	**2008**	−262,232
1999	−27,853	**2009**	−115,845
		2010	−178,737

Source: SAMA, 47th Annual Report 2011

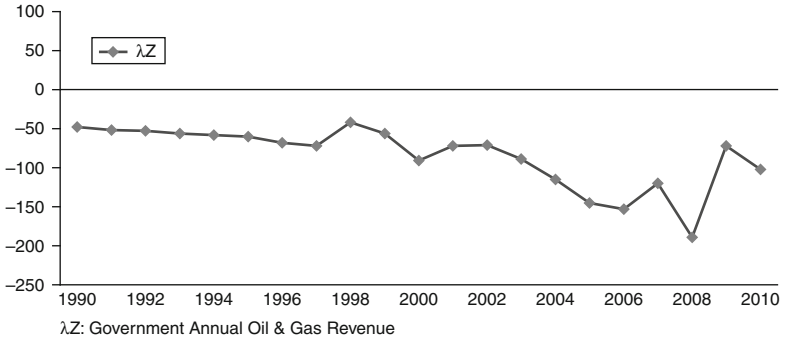


Figure 6.10 Government annual oil and gas revenue, as a % of GGP.
Source: SAMA, 47th Annual Report 2011.

Table 6.14 Government annual oil and gas depreciation as a percentage of GGP

Year	*λZ*	*Year*	*λZ*
1990	−48.0	**2000**	−91.0
1991	−52.0	**2001**	−72.0
1992	−53.0	**2002**	−71.0
1993	−56.0	**2003**	−89.0
1994	−58.0	**2004**	−115.0
1995	−60.0	**2005**	−145.0
1996	−68.0	**2006**	−153.0
1997	−72.0	**2007**	−120.0
1998	−42.0	**2008**	−189.0
1999	−56.0	**2009**	−72.0
		2010	−102.0

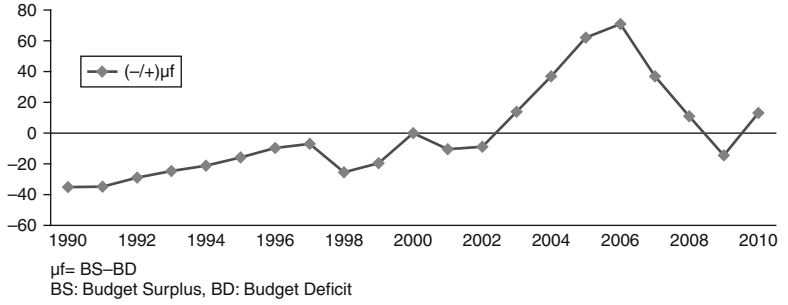


Figure 6.11 Budget surplus/deficit, as a % of GGP.
Source: SAMA, 47th Annual Report 2011.

Table 6.15 Changes in government sovereign financial assets (+BS/-BD) as a percentage of GGP

Year	*(2/1) μf*
1990	−35.2
1991	−34.8
1992	−29.0
1993	−24.7
1994	−21.2
1995	−15.7
1996	−9.6
1997	−7.1
1998	−25.4
1999	−19.7
2000	0.0
2001	−10.5
2002	−8.8
2003	14.0
2004	37.0
2005	62.0
2006	71.0
2007	37.0
2008	11.0
2009	−14.5
2010	13.0

The SGS model we have tested is set out completely below:

$$GSg_t = SGS_t - \beta K_t + BS_t - BD_t - \lambda Z_t$$
$$GSg = SGS_t - \beta K_t - \mu F_t - \gamma Z_t$$
$$GSg_t = GNS_t - \mu F_t - \lambda Z_t$$

The genuine savings model as applied to Saudi Arabia, as I have defined it here, is limited to government capital goods, government financial assets at home and abroad, and oil and gas reserves. I have excluded human resources, water resources, and other variables in order to focus attention on petroleum reserves depletion, which is by far the most important natural resource that the Saudi government depends on. If these oil and gas resources are exhausted before Saudi Arabia can build productive capital to replace practically replace them, the economy at large is likely to face financial crises, which, as we discussed, will yield political and social unrest that may jeopardize the unity and stability of the country. The next few tables and graphs (see figures 6.12 to 6.17 and tables 6.16 to 6.21) exhibit the result of my empirical application of the genuine savings model to test the Saudi government's ability to sustain its expenditures in the future.

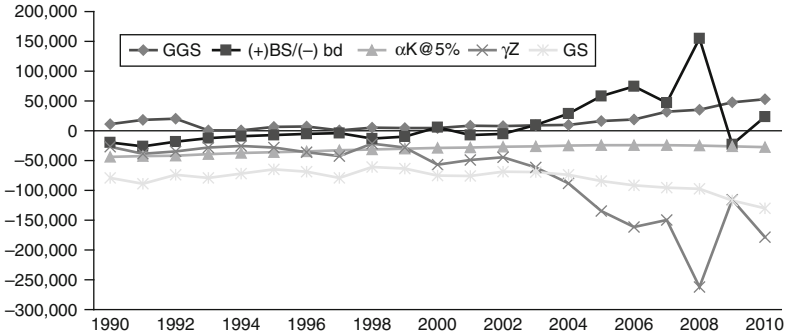


Figure 6.12 Government genuine savings (GSg), in USD Million.
Source: SAMA, 47th Annual Report 2011.

Table 6.16 Saudi genuine savings, SGS = I (USD Million)*

Year	*SGS*	*(1/2)μf*	*βK @ 5%*	*λZ*	*GS*
1990	11,270	−19,703	−43,906	−27,026	−79,365
1991	18,122	−25,840	−42,617	−38,653	−88,988
1992	20,437	−18,491	−41,508	−34,344	−73,906
1993	803	−12,385	−39,473	−28,260	−79,315
1994	639	−9,276	−37,531	−25,468	−71,636
1995	6,711	−7,318	−35,990	−28,194	−64,791
1996	7,162	−5,075	−34,549	−36,262	−68,724
1997	638	−4,206	−32,853	−42,663	−79,084
1998	5,039	−12,921	−31,463	−21,333	−60,677
1999	4,439	−9,703	−30,111	−27,853	−63,228
2000	4,897	6,065	−28,851	−57,180	−75,069
2001	8,435	−7,195	−27,830	−49,044	−75,634
2002	8,000	−5,467	−26,838	−44,293	−68,598
2003	8,925	9,600	−25,943	−61,600	−69,017
2004	10,014	28,558	−24,696	−88,000	−74,125
2005	16,614	58,096	−24,292	−134,544	−84,126
2006	18,910	74,763	−24,023	−161,192	−91,543
2007	31,746	47,081	−24,409	−149,916	−95,499
2008	34,995	154,913	−24,939	−262,232	−97,263
2009	47,957	−23,101	−26,089	−115,845	−117,078
2010	53,025	23,395	−27,436	−178,737	−129,754

Source: SAMA, 47th Annual Report 2011
*Data are actual and in nominal terms

Table 6.17 Saudi genuine savings @ SGS (I+30% C) in USD Million

Year	*SGS @30% (I130%C)*	*(1/2)μf*	*βK @ 5%*	*λZ*	*GS*
1990	24,664	−19,703	−43,906	−27,026	−65,972
1991	34,905	−25,840	−42,617	−38,653	−72,205
1992	33,425	−18,491	−41,508	−34,344	−60,918
1993	15,593	−12,385	−39,473	−28,260	−64,525
1994	13,549	−9,276	−37,531	−25,468	−58,726
1995	18,613	−7,318	−35,990	−28,194	−52,889
1996	20,863	−5,075	−34,549	−36,262	−55,023
1997	18,148	−4,206	−32,853	−42,663	−61,574
1998	18,732	−12,921	−31,463	−21,333	−46,984
1999	17,815	−9,703	−30,111	−27,853	−49,853
2000	22,254	6,065	−28,851	−57,180	−57,712
2001	26,316	−7,195	−27,830	−49,044	−57,753
2002	24,280	−5,467	−26,838	−44,293	−52,318
2003	26,808	9,600	−25,943	−61,600	−51,135
2004	29,826	28,558	−24,696	−88,000	−54,313
2005	39,347	58,096	−24,292	−134,544	−61,392
2006	44,702	74,763	−24,023	−161,192	−65,750
2007	59,522	47,081	−24,409	−149,916	−67,723
2008	66,102	154,913	−24,939	−262,232	−66,155
2009	81,285	−23,101	−26,089	−115,845	−83,751
2010	89,428	23,395	−27,436	−178,737	−93,351

Source: SAMA, 47th Annual Report 2011

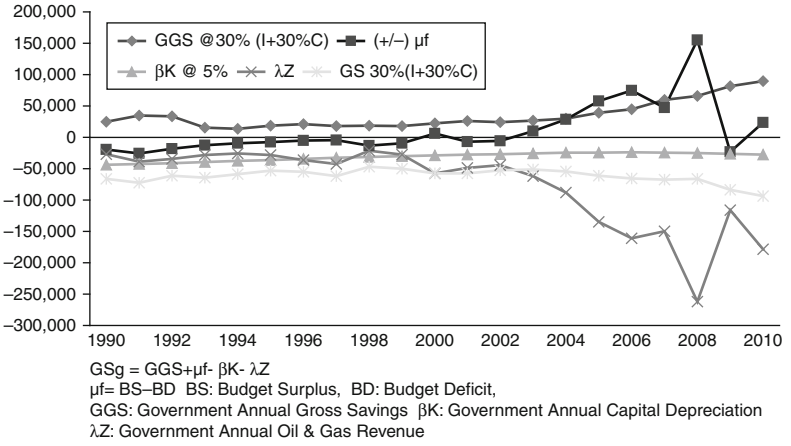


Figure 6.13 Government genuine savings GSg30% (I + 30%C) in USD Million.
Source: SAMA, 47th Annual Report 2011.

Table 6.18 Saudi genuine savings @ SGS (I+50%C) in USD Million

Year	*SGS @50% (I150%C)*	*(1/2)μf*	*βK @ 5%*	*λZ*	*GS*
1990	33,593	−19,703	−43,906	−27,026	−147,679
1991	46,093	−25,840	−42,617	−38,653	−168,127
1992	42,083	−18,491	−41,508	−34,344	−146,603
1993	25,454	−12,385	−39,473	−28,260	−134,784
1994	22,156	−9,276	−37,531	−25,468	−122,394
1995	26,548	−7,318	−35,990	−28,194	−116,457
1996	29,997	−5,075	−34,549	−36,262	−121,775
1997	29,822	−4,206	−32,853	−42,663	−129,622
1998	27,861	−12,921	−31,463	−21,333	−103,571
1999	26,732	−9,703	−30,111	−27,853	−108,603
2000	33,825	6,065	−28,851	−57,180	−126,106
2001	38,236	−7,195	−27,830	−49,044	−129,901
2002	35,133	−5,467	−26,838	−44,293	−118,063
2003	38,729	9,600	−25,943	−61,600	−117,156
2004	43,033	28,558	−24,696	−88,000	−125,244
2005	54,503	58,096	−24,292	−134,544	−146,976
2006	61,898	74,763	−24,023	−161,192	−159,007
2007	78,040	47,081	−24,409	−149,916	−176,450
2008	86,840	154,913	−24,939	−262,232	−177,674
2009	103,503	−23,101	−26,089	−115,845	−226,568
2010	113,697	23,395	−27,436	−178,737	−251,860

Source: SAMA, 47th Annual Report 2011

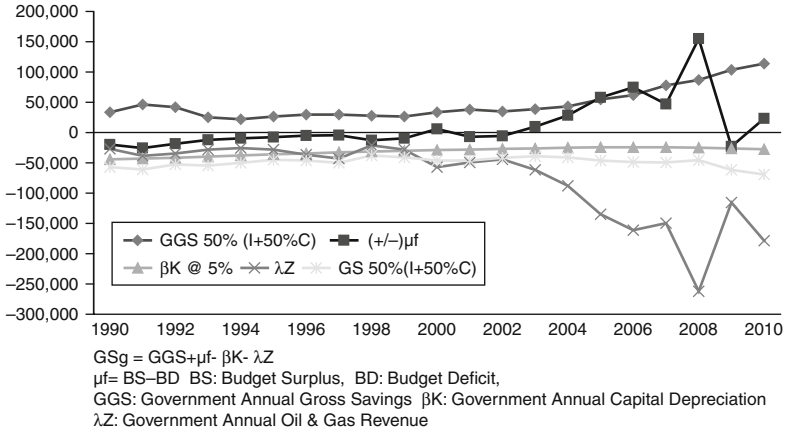


Figure 6.14 Government genuine savings GSg50% (I + 50%C) in USD Million.
Source: SAMA, 47th Annual Report 2011.

Table 6.19 Saudi genuine savings as % of GGP

Year	*SGS*	*(1/2)μf*	*βK @ 5%*	*λZ*	*GS*
1990	20.1	−35.2	−78.5	−48.0	−141.6
1991	24.4	−34.8	−57.5	−52.0	−119.9
1992	32	−29.0	−65.1	−53.0	−115.1
1993	1.6	−24.7	−78.7	−56.0	−157.8
1994	1.46	−21.2	−85.9	−58.0	−163.6
1995	14.4	−15.7	−77.5	−60.0	−138.8
1996	13.5	−9.6	−65.3	−68.0	−129.4
1997	1.08	−7.1	−55.6	−72.0	−133.6
1998	9.94	−25.4	−62	−42.0	−119.5
1999	9.05	−19.7	−61.4	−56.0	−128.1
2000	7.8	9.0	−45.9	−91.0	−120.1
2001	12.3	−10.5	−40.9	−72.0	−111.1
2002	12.8	−8.8	−43.1	−71.0	−110.1
2003	13	14.0	−37.8	−89.0	−99.8
2004	13.1	37.0	−32.4	−115.0	−97.3
2005	17.9	62.0	−26.2	−145.0	−91.3
2006	18	71.0	−22.9	−153.0	−86.9
2007	25.5	37.0	−19.6	−120.0	−77.1
2008	25.2	11.0	−17.9	−189.0	−170.7
2009	30.1	−14.5	−16.4	−72.0	−72.8
2010	30.4	13.0	−15.7	−102.0	−74.3

Source: SAMA, 47th Annual Report 2011

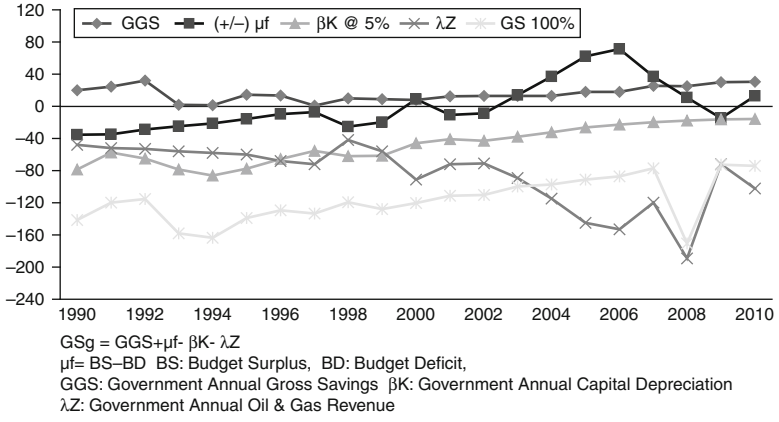


Figure 6.15 Government genuine savings GSg as a % of GGP.

Source: SAMA, 47th Annual Report 2011.

Table 6.20 Saudi genuine savings @ GGC (I + 30%C) as % of GGP

Year	*SGS @30% (I+30%C)*	*(+/2)μf*	*βK @ 5%*	*λZ*	*GS*
1990	44.1	−35.2	−78.5	−48.0	−117.6
1991	47.1	−34.8	−57.5	−52.0	−97.2
1992	52.4	−29.0	−65.1	−53.0	−94.7
1993	31.1	−24.7	−78.7	−56.0	−128.3
1994	31	−21.2	−85.9	−58.0	−134.1
1995	40.1	−15.7	−77.5	−60.0	−113.1
1996	39.4	−9.6	−65.3	−68.0	−103.5
1997	30.7	−7.1	−55.6	−72.0	−104.0
1998	36.9	−25.4	−62	−42.0	−92.5
1999	36.3	−19.7	−61.4	−56.0	−100.8
2000	35.4	9.0	−45.9	−91.0	−92.5
2001	38.6	−10.5	−40.9	−72.0	−84.8
2002	38.9	−8.8	−43.1	−71.0	−84.0
2003	39.1	14.0	−37.8	−89.0	−73.7
2004	39.2	37.0	−32.4	−115.0	−71.2
2005	42.5	62.0	−26.2	−145.0	−66.7
2006	42.6	71.0	−22.9	−153.0	−62.3
2007	47.8	37.0	−19.6	−120.0	−54.8
2008	47.6	11.0	−17.9	−189.0	−148.3
2009	51.1	−14.5	−16.4	−72.0	−51.8
2010	51.2	13.0	−15.7	−102.0	−53.5

Source: SAMA, 47th Annual Report 2011

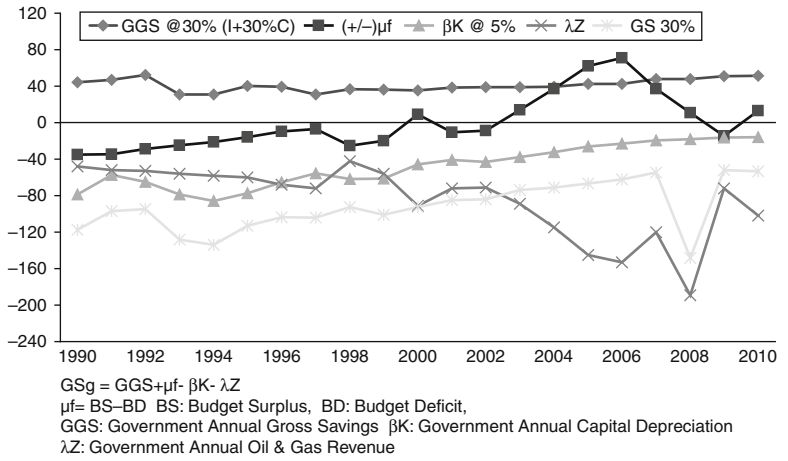


Figure 6.16 Government genuine savings GSg 30%, as a % of GGP.

Source: SAMA, 47th Annual Report 2011.

Table 6.21 Saudi genuine savings (I + 50%C) as % of GGP

Year	*SGS @50%*	*(+/2)μf*	*βK @ 5%*	*λZ*	*GS*
1990	60.0	−35.2	−78.5	−48.0	−101.7
1991	62.0	−34.8	−57.5	−52.0	−82.3
1992	66.0	−29.0	−65.1	−53.0	−81.1
1993	50.0	−24.7	−78.7	−56.0	−109.4
1994	50.0	−21.2	−85.9	−58.0	−115.1
1995	57.0	−15.7	−77.5	−60.0	−96.2
1996	56.0	−9.6	−65.3	−68.0	−86.9
1997	50.0	−7.1	−55.6	−72.0	−84.72
1998	54.0	−25.4	−62	−42.0	−75.4
1999	54.0	−19.7	−61.4	−56.0	−83.1
2000	53.0	9.0	−45.9	−91.0	−74.9
2001	56.0	−10.5	−40.9	−72.0	−67.4
2002	56.0	−8.8	−43.1	−71.0	−66.87
2003	56.0	14.0	−37.8	−89.0	−56.8
2004	56.0	37.0	−32.4	−115.0	−54.4
2005	58.0	62.0	−26.2	−145.0	−51.2
2006	59.0	71.0	−22.9	−153.0	−45.9
2007	62.0	37.0	−19.6	−120.0	−40.6
2008	62.0	11.0	−17.9	−189.0	−133.9
2009	65.0	−14.5	−16.4	−72.0	−37.92
2010	65.0	13.0	−15.7	−102.0	−39.7

Source: SAMA, 47th Annual Report 2011

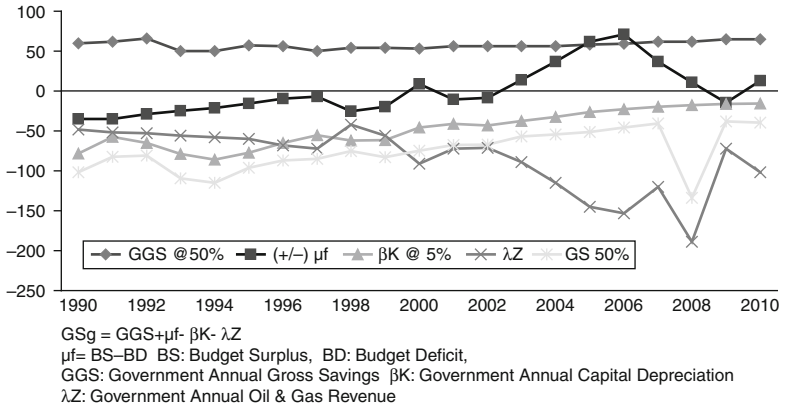


Figure 6.17 Government genuine savings GS 50%, as a % of GGP.

Source: SAMA, 47th Annual Report 2011.

Our Results

We have made use of three scenarios to estimate the Saudi government's gross savings, which is the most important variable in the genuine savings model (and the SGS model).

In the first scenario, I used government capital expenditures (I) to represent government gross savings (SGS= I).

In the second and third scenarios, I have added 30 percent and 50 percent of government current expenditures to government capital expenditures in order to boost government gross savings; to be on the safe and reasonable side, most of these moved expenditures are those current expenditures related to capital expenditures, particularly in the area of health and education. (SGS = I+30%C and SGS= I +50%C)

Despite these additions to government gross savings, our attempt to be optimistic with our expenditure variables, and even the elimination of depreciation of other natural resources such as water, government genuine savings showed consistent negative results over the entire period starting 1990 through 2010; these results are very alarming. However, perhaps the results are not terribly surprising. The Saudi economy is based after all on extracting oil and gas resources, selling them, and spending the proceeds on consumption and general investments.

Policy makers may not be fully aware of the implications of having persistent negative genuine savings. It means that the government will not be able to supply public goods and services to society with an increasing population and, consequently, a swelling set of needs.

We know that SGS has been negative for the entire 21 years in our model period of 1990 through 2010; I also suspect that it was negative for even the previous 50 years (since the inception of the five-year economic development plans in 1970), judging by the values of government expenditures and revenues as exhibited in table 1.6, chapter 1. Such a result strongly indicates that the Saudi government will not be able to sustain the supply of public goods and services to future generations of Saudi Arabians. It is natural to conclude that those citizens' welfare will deteriorate accordingly.

Saudi society has been dependent on government spending since 1950, when oil revenue became the major provider of government income.[14] The five-year development plans, which started in 1970, were unable to decrease the level of the government's dependence on oil revenue, despite each plan's declaration that diversification of government income was a major goal.

The Saudi government is perhaps disingenuously painting a different economic picture; by inflating private sector GDP contribution and

deflating its own contribution in order to claim a higher level of diversification, they are pushing the image that the Saudi government is becoming more diverse. But as we saw in the first chapter of this book, the government's size is much bigger and the private sector is much smaller than what government statistics indicate.

GDP indicators used by the Saudi government to measure the size and growth of its economy gives an incomplete picture not only to the academic, but also to the policy maker. Depreciation of natural assets such as oil and gas are not accounted for in GDP calculation. While the emphasis in economic development should be on making up for the depreciation of natural assets by savings and investing in substitutable productive assets, the government is engaged in excessive extraction and depreciation of oil and gas resources for excessive consumption and waste.

As the author of this manuscript, I am not hiding the fact that this book is intended as a wake-up call to the Saudi policy maker. Future economic crises are on the horizon if things remain as they are. The continuation of the government's current economic strategy and policies will mean mounting government debt. The size of this debt will be coupled with the inevitable decrease in oil extraction and a decrease in oil exports and revenue. These events will be met with rising consumption and investments needs—a recipe for disaster. Lack of financial credibility disallows the government from borrowing large sums of money internationally or locally to finance its debt. Government debt crises will be of a size and magnitude that will pose serious economic, social, and political problems.

I have also sought to show in this chapter, based on the logic of the genuine savings model, that the Saudi government's supply of goods and services for future generations is not sustainable.

Saudi government dependence on oil and gas for the purpose of providing society with the goods and services it needs puts the fate of future generations of Saudis in jeopardy. The nonrenewable and highly depreciative nature of oil and gas, and its unstable market, is hardly something for the government to continue to hang its hat on. The government's high oil and gas reserve depreciation and low level of savings and investment to compensate for such deterioration in petroleum assets means that this valuable resource will, sooner or later, cease to exist to the detriment of your average Saudi.

This book seeks to encourage policy makers to take Saudi Arabia's future fiscal predicament seriously, and heed the urgent need to structurally change current economic strategy and policies. These policies must go from being consumption and waste based, to savings and

production based. In chapter 7, the last chapter of this book, I suggest a future agenda that takes into consideration two essential reforms: economic, of course, but also political. Only a remedy that includes both of these ingredients has a chance to succeed and, ultimately, avoid a financial crisis.

CHAPTER 7

Is a Saudi Financial Crisis Inevitable?

Our prediction of a potential government financial crisis caused by budget deficits that snowball over time was based on rather conservative assumptions of the two essential variables of such a deficit equation: government expenditure and government revenue.

Government expenditure estimates found in chapter 3 are based on a growth rate consistent with government fiscal policy over our reference period of 1960 through 2010. As discussed in depth in various parts of this book, its two major components are current expenditures and capital expenditures. Our analysis of historical government expenditure data over the reference period reveals a consistent government expenditure policy, which is highly correlated with government oil revenue. The forecast of expenditure over the period of 2010 through 2030, or our future period, is based on historical government expenditures; combining this with reasonable forecasts for changes in oil revenue (chapter 3) provides a more or less complete picture, with reasonable confidence, of a relatively simple Saudi rentier economy. The 2030–2050 long-term period forecasts (chapter 4) is a continuation of those expenditure forecasts.

For the reference period of 1960–2010, government revenue has been almost entirely oil revenue. Non-oil revenue has been insignificant and will continue to be insignificant as long as the current fiscal policy is not changed structurally. Forecasted government oil revenue for the period of 2010 through 2030 and 2031 through 2050 is based on data borrowed from internationally recognized institutions: IEA, OPEC, and BP. The non-oil portion of government revenue is forecasted on the basis of growth assumptions consistent with past trends.

Eighteen scenarios were developed that took into account various growth (or inverse growth) rates for all of our subject variables in the forecast equations. Fourteen of the eighteen scenarios suggest

unambiguously a future financial crisis when extrapolating the Saudi government's current expenditure and revenue policies.

Based on our assumption of necessary growth in government expenditures (without including certain moderately likely events like natural disasters, regional wars, or political crises) on one side of the equation, and our use of international petroleum institutions' assumptions for forecasting oil revenue on the other, one must conclude that our predictions are at least very credible, that is, if the Saudi government continues the same spending policies and revenue-generation strategy.

Saudi Arabia is at the crossroads. It must choose between a sustainable long-term political, social, and economic route or remain on its current course, which is not sustainable. The latter threatens to catapult it into a future that is almost certain to contain a major upheaval.

If the Saudi government continues employing the same economic strategy of spending its revenue on consumption and unproductive mega projects while exhausting oil and gas resources, it will be unprepared to provide for its citizens in the next half century. This will inflict damage on the country that will extend beyond the economy, to the political and social spheres. As we have seen in chapter 1, government expenditure is the cornerstone of the Saudi economy and its dynamics. As such, government bankruptcy would have catastrophic consequences.

In this chapter we will consider whether or not the financial crisis that we have predicted is inevitable. That answer is that it is not inevitable; however, three conditions must be met:

1. The Saudi king and the core of the royal family (who are the decision makers on all strategic matters) must see and believe that the country is heading toward a major financial crisis, and they must recognize that this will undoubtedly lead to a serious political and social crisis as well.
2. This core group of decision makers must choose individuals with knowledge, integrity, and experience to deal with the potential crisis, and equip them with all they need to fundamentally restructure the existing political and economic system.
3. This structural change must happen in the short term.

The backbone of Saudi policy and impetus for these three conditions must be the institution of the Saudi royal family. Primarily, we are speaking of a circle of senior decision makers, headed by the king and the crown prince. Their full commitment to finding the necessary remedies and implementing the required changes is essential. Unfortunately

for Saudi Arabia and perhaps for the royal family itself, no one else in the country is empowered to deal with strategic issues or make major decisions. As such, these decisions are within the sole jurisdiction of the royal family and must be made by them.

Since its establishment, Saudi Arabia has witnessed sensitive political and economic conditions. It is in these moments that we have witnessed the king and senior circle of the royal family take drastic measures to avert crises, exhibiting that they are a competent force for strategic change. One such instance happened in the late 1920s, when King Abdulaziz, the founder of Saudi Arabia as we know it, fell into conflict with the *al-ikhwan* (the brotherhood).[1] They were previously the king's main tribal forces with which he conquered many areas of the country. When, for political reasons, King Abdulaziz disagreed with their desire to attack Iraq (which was then under British occupation), they revolted against him. King Abdulaziz fought and defeated the *al-ikhwan* in the Battle of Sabilla in March of 1929.

Another precarious moment in Saudi Arabia's history was when it found itself in a financial crisis in 1952 and 1953. The royal family had indulged in excessive luxuries and lavish spending that drained the government's income and pushed it close to financial bankruptcy.[2] The Saudi government requested financial intervention from the IMF, a program that was also recommended by the US government. The Saudi government ultimately emerged from the crisis. Other critical moments in Saudi Arabia's history include King Faisal's 1967 oil embargo against the United States and Great Britain for their role in the war against Egypt that same year[3], the occupation of the Holy Mosque in Mecca by Islamic extremists in 1979, and the occupation of Kuwait by Saddam Hussein.[4]

Unfortunately, the Saudi political system was not constructed upon national institutions that are capable of foreseeing and dealing with major national crises. Rather, the system was built around the king, with the only power to deal with critical national issues centered and controlled by him and the senior circle close to the royal family. This may have served a purpose in 1930, during the early stages of founding the nation and during the bringing together of its various parts by King Abdulaziz. Today, however, the issues Saudi Arabia faces are global and diverse and significantly more complicated; the Saudi population is also much larger and more demanding, both politically and economically.

The people of Saudi Arabia today differ fundamentally from their fathers and grandfathers; they are inspired and motivated by their rights as citizens, and they believe that they are the true owners of the country

and its resources and are the guardians of its future. In the past, the king ordered and people followed. Those who disagreed were few, if any, and it was easy for the government to deal with those dissenters the way it saw fit. Today, however, the scene is starkly different, both nationally and internationally. Though the king and the senior royal circle are still the dominant players in the Saudi decision-making equation, people's opinions and demands have now become a part of that equation as well, and that equation is more complex than before.

Successful structural economic reforms I propose are dependent on major political reform as well.

The policy recommendations I propose in this chapter are divided into two parts, political and economic.

Political and Administrative Reform

In the context of developing counties in general, and Middle Eastern oil-exporting countries in particular, political power usually resides with one person, or a small circle of aides around him. The king or the president or the supreme leader is the center of power, and all other powers revolve around him. The separation of powers principle is fundamentally nonexistent in these countries, and it can be said that democracy itself is a foreign concept to the political culture in these countries (with some exceptions). This is not because liberty and democracy are foreign to the souls and inspirations of the inhabitants; it is because these people were forbidden from such notions and have had to live under the unchallenged absolute power of the ruler. Generation after generation lived and died, blind to the idea of liberty, because it was eliminated from their realities and perception.[5] Nevertheless, it is my view that the desire for liberty is inherent in every human soul and will eventually emerge even in the darkest of democratic holes, as the Arab Spring of 2011 has demonstrated.[6]

A government political system without a modicum of separation of powers is not an ideal petri dish for the initiation and implementation of rational economic policies. The lines separating the three main powers in the Saudi political system—the executive, the legislative, and the judiciary—are blurred and leaky. It is safe to say that there is no real separation at all between the executive and legislative branches; it is all in the hands of the Council of Ministers, which is headed by the King. The *Alshora* council, established in 2000, is merely a body of citizens from various walks of life appointed by the king for consultation, not legislation.[7]

The effective formulation and implementation of economic policies that will safeguard against an eventuality like a financial crisis requires the establishment of an independent legislative body, empowered with the authority to legislate and supervise government efficiency in implementing economic policies. Members of the legislative assembly must be elected on the basis of knowledge, integrity, and independence, and not be chosen on the basis of loyalty to the government.

Another uncomfortable but necessary change for the Saudi system is the separation between the position of the king, who should remain the head of the state, and the prime minister, who should be the head of government. The king, as the head of the state, should be the symbol of unity in Saudi Arabia, but not be a day-to-day manager of issues. The Crown Prince also must play a more ceremonial role. The prime minister, on the other hand, is the CEO, and he is the one in charge of managing the government's business, with all other ministers reporting to him. The prime minister and all other ministers must of course be subject to scrutiny and, ultimately, dismissal if they do not perform their duties according to the accepted standard. In this way the executive branch of the government will be held accountable on the basis of recommendations of a majority of a consultative body to the King, now, and hopefully an elected parliament, later. This separation will not be easy in the immediate term, as the king and the senior royal circle must be convinced that having an efficient and effective government is more important to the royal institution than controlling all the power in the country.

Democratization or quasi-democratization of the political system is not easy to achieve, or even to propose, in Saudi Arabia, but times have changed, and rulers in the Arab world have seen that people can't be ruled by force any longer. The Arab Spring maybe facing difficulties during the current transitional period, but democratic change in the Arab world is here to stay. A new page of Arab history has been opened where liberty, dignity, justice, human rights, and freedom of speech all are sought and admired by Arab people, poor and wealthy, educated and illiterate alike. And Saudis are no exception.

To achieve democracy by evolution is much safer for the country than revolution, as it prevents bloodshed and maintains national unity and coexistence among the various ethnic and religious groups within the country. Future political instability, due to the lack of democracy and its requisite institutions, will hinder the development of an efficient economic system, thereby minimizing productivity, growth, and human development.

As stated, political reform is a prerequisite for the success of any economic reform. The political reforms I suggest may, to some readers, seem unrealistic and difficult to implement in Saudi Arabia. While I do agree that the proposed political reforms will be difficult to implement, my motivation in encouraging the pursuit of this strategy is to protect the country as it heads into a period of uncertainty. The suggested reforms require strong political will that must impose recommended structural changes, not suggest them, as there will be many who oppose any diversion from the status quo. If nothing is done, Saudi Arabia's future is in jeopardy.

If the government simply pays lip service to political reforms, it will not create the right political infrastructure to implement structural economic reforms, which are critically needed to halt the unseen deterioration of the economy's already shaky fundamentals.

The following subsections outline the specific political changes that are likely to be necessary.

The Constitution

Saudi Arabia does not have a written constitution; it is governed by various legal and administrative laws enacted by royal decrees, the most important being *Nezam Alhokum*. The king and senior government officials are the standard bearers and interpreters of the text of the Holy Quran and the sayings of the Prophet Mohammed, which are in turn the closest equivalents to a guiding text for Saudi Arabian jurisprudence. Though this may sound acceptable to the general public, it does not provide an effective platform to construct a legal system that encompasses and is equipped to deal with the complexities of today's relationships among individuals. The various *Suras* (chapters) of the Holy Quran and the sayings and traditions of the Prophet (the *hadith* and *sunnah*) deal with relationships between Muslims and emphasize the values and principles of Islam, such as justice, human rights, honesty, and charity. While these values are important and are embodied in other modern constitutions worldwide, they do not amount to specific, discernible policies and procedures fit for a modern government. Constitutions are subject to improvement and change. The Holy Quran is composed of the words of God, and cannot be changed or modified; trying to adapt it to every situation begets arbitrariness.

Saudi Arabia needs a constitution that is prepared, scrutinized, and approved by the people of Saudi Arabia. The constitution will be based on the principles of Islam, because it is the only prevalent religion in the

country, and the one that all Saudis consider their own. Assuming Saudi society embraces the idea of monarchy, as it seems to, then a constitutional monarchy can be a fine balance for a future Saudi government.

Political Parties

Political parties are effectively not allowed in Saudi Arabia, whereas democracy cannot be fully established without multiple political parties that reflect the various political leanings and ideas of the people. If political parties are not allowed, the masses will find different ways to collectively organize themselves. Some of these organizations may be of a tribal or religious nature; others may be bent on the destruction of the government. Either way, these extralegal forms of organization serve to divide society, instead of moving society toward unity, modernity. and political and intellectual diversity.

A constitution to be approved by the people will dictate that political parties are to be allowed and set out a structure for their establishment and organization. Organized political parties are the platform that will allow people to express their political and social views freely and openly, instead of going underground to do so.

The King and the Crown Prince

The King is the Saudi head of state, and the symbol and preserver of unity. The king should not be part of day-to-day management of government affairs. The Crown Prince should assist the King in his royal duties as specified by the constitution, and likewise not be part of day-to-day management.

The Political System

Modern and democratic political systems must have three main and independent branches: legislative, judicial, and executive. The creation of these branches represents the fundamental change required to build an effective and efficient government that can steer the country in the direction of stable and sustainable political, social, and economic growth.

The Executive Branch
The Prime Minister: The prime minister is the CEO of the executive branch of government. He should be selected by a parliament and

appointed ceremonially by the King. The prime minister will select his cabinet members, and submit their names for approval by the parliament. The prime minister will also submit to parliament his declaration of the goals he wants to achieve. In this sense, the prime minister is accountable to the people's representatives in parliament to ensure the achievement of his goals in declaration. When relevant, the prime minister, and any minister for that matter, will be open to questioning and asked to provide explanations to the parliament or any of its specialized committees. The parliament can ask the King to dissolve the government; if the majority of the population votes for it in referendum, the King should do so.

The Council of Ministers: The prime minister will select all cabinet ministers, but the entire cabinet must be ratified by parliament and appointed by the King. The Council of Ministers is the engine of the executive branch; it should be responsible for the management of all government tasks and responsibilities. The Council of Ministers will propose to parliament the laws it requires to manage and operate the various branches of the government. The parliament will ensure that the proposed laws are constitutional before they are approved.

Government Administration

What the Saudi government's system requires is perhaps most simply and eloquently described in the phrase *Good Governance*. Governance in this context is defined as the ability of government to create and implement effective and efficient public policy. Good governance hinges on the rule of law, transparency, and accountability. The Organisation for Economic Cooperation and Development (OECD) defines good governance as the role of public authorities in establishing the environment in which economic operators function, and in determining the distribution of benefits as well as the relationship between the ruler and the ruled.[8] These are some policy recommendations that need to be implemented to improve the performance of the Saudi government's administrative system:

Corruption

Corruption undermines and weakens all efforts for reform and development. It may be the case that the lack of rule of law, transparency, and accountability is more or less part of the general environment of developing countries. Saudi Arabia is not particularly better in any of these regards than other developing countries. But these features encourage

corruption, which is one of the most serious obstacles to economic development and structural reform. The World Bank has been instrumental in the fight against corruption by establishing unambiguously that it is one of the most serious impediments to economic development. Saudi Arabia acknowledges the need to fight corruption, and the government has established an independent agency for that purpose,[9] but this may not be enough. Any agency must be equipped with the power to investigate all aspects of corruption and any suspected persons, regardless of political status or power. Due to Saudi Arabia's current power structure, this is probably difficult to implement; however, if corruption is not reduced, it will be difficult to implement a reform program that is supported by the Saudi people. For society to support economic reforms, and accept certain economic pains for the sake of a better future, that pain has to be shared equally by everyone including members of the Saudi royal family and elite. Corruption allows some people to escape paying their share of societal costs, and hence the whole reform program loses its integrity and credibility.

Efficiency and Productivity

Good governance begins with the elimination of certain detrimental characteristics that abound among government employees who are part of an inefficient bureaucracy: a lack of professionalism and competence at the human level, as well as a lack of accountability, nepotism, and appointments based on reasons other than merit at a systemic level. Good governance in the Saudi public sector must deal with these issues and find solutions to improve government and employee productivity and efficiency. As the largest employer of Saudis,[10] the government offices are overcrowded with employees not required for the tasks at hand. The overcrowding of Saudis in the government system is at the expense of both efficiency and productivity. When the government administrative system is riddled with all of these issues, negative outcomes are not restricted to improper execution of policies. They also result in certain increased costs borne by all citizens, as government employee salaries eat up more than 50 percent of the budget.

Government Size

The number of government ministries and agencies that exists far exceeds what is needed to deliver public goods and services efficiently in Saudi Arabia. The bloated size of government is reflected in the large

share of the budget that employees' salaries accounts for, which is about 65 percent of budget expenditure. For many years a government committee headed by the late Crown Prince Sultan Bin Abdulaziz worked on reforming government organization, but very little has actually been accomplished. Bureaucracy and the lack of strong political will were the main reasons for its minimal efficacy. A number of ministries, agencies, and departments can be downsized, eliminated, or combined in today's system to increase efficiency and, ultimately, save money. There may be many government employees who will be without government jobs after such a process, but the negatives of such a process can be offset, both financially and administratively, with the help of a social program designed to assist those who want to work in the private sector. Such a program can direct Saudis to build new careers through education and training, and place them in private sector companies that can receive tax or other benefits for participation. Just like every major structural change, restructuring the government's administrative system requires strong political will.

Central versus Regional Governments

The Saudi government conducts all of it operations from Riyadh, the capital, where all ministries and government agencies are located. The local governments of the four main regions in the kingdom, East, Middle, West, and North, have very limited power. They must come to the central government in Riyadh, to their respective ministries, for approval of most decisions. Each region is bigger than any of the other Gulf States, with populations ranging from five to ten million.[11]

An *emarah* is a regional government that is headed by a young but senior-ranking member of the Royal family. The various departments working in the region are branches of ministries and have limited authority. Such a centralized model has worked in the past when the budget was limited, the population much smaller, and all decisions resided in the hands of the King and his assistants. Today however, things have changed dramatically, as oil revenue has pushed government expenditures far beyond the management and control of the central government. Many projects have been delayed, and corruption has been fueled by the centralization of financial power in the hands of few. Moreover, the inhabitants of each region do not engage in participation in governing their region, its affairs, or its development.

A regional government with effective power to run and manage its affairs, within the framework of national goals and a developmental

strategy, will increase government efficiency, minimize corruption, and allow the citizens of each region to participate in the development and progress of their region.

The Legislative Branch

Legislation in Saudi Arabia today is not independent from the executive branch; it is actually one of the main functions of the Council of Ministers. This violates an important principle of effective governance: the system of checks and balances. The government is free from any supervision in imposing its will and can never be subject to investigation or evaluation of its operation or performance. The legislative branch should be composed of two houses:

The Parliament: this should be composed of the people's representatives, chosen by the people through fair and equitable election processes. The parliament will have full power to legislate, guided by the letter and spirit of the constitution.

The Consultative Assembly: this body will be appointed by the King. It has no legislative power; its role is to consult and advise.

The Judiciary

The judiciary must have full independence from the influence of the King, Crown Prince, and the Royal family. It should be independent from the legislative and executive branches completely. It is claimed that the current judiciary is independent, but this is questionable.

An independent and fair legal system is essential for the development and progress of any society. The courts of law and judges have been the last defense in all functioning societies for protecting justice. It must function in the realm of a well-established legal system. Economic development and the policies that spawn development are directly affected by the quality of the legal system in place. The Saudi legal system has lagged behind development in both social and economic systems.

Saudi law is derived from religious law, specifically, the Islamic *sharia*. But sharia is not codified, and is sometimes subject to different interpretations by different judges. As Christoph Wilck states, "Without codification or system of precedence, individual judges are free to interpret the Quran and prophetic traditions—the two agreed sources of Sharia—as they see fit, within general Islamic legal doctrines."[12]

While technically a part of Islamic law, court procedures to protect the rights of individuals and ensure justice, as well as define the duties and rights of lawyers, are sometimes ignored by judges.

The independence of the judiciary and judges, particularly due to the influence of people of high political or financial power, is imperative. That independence is at the core of the judiciary's integrity, and without it justice cannot truly be served. The Saudi judicial system has to strengthen its independence to gain and maintain the respect of society and the international community. Legal systems that do not ensure justice to all, and do not punish those who break the law and inflict harm on private or public rights and property, will seriously hinder the effective implementation of economic reform.

On October 1, 2007, King Abdullah issued a Royal Decree for an overhaul of the Saudi judicial system.[13] That overhaul should not focus on furnishing new offices and hardware to judges and prosecutors; instead, it should focus on human resource development, judges and staff, developing effective policy and procedures to ensure justice for all, as well as creating an efficient and speedy application of the law. An ambiguous and inefficient legal system will raise the risk of long-term investment for both local and international investors, which in turn will hinder capital investment. A well-developed, just, and efficient legal system is a prerequisite for economic progress.

The following changes and improvements need to be implemented in the Saudi judicial system to render it more effective:

Supreme Judicial Council

The supreme judicial council should be composed of experienced judges and scholars of law. The members of the supreme council should include not only religious *olama* (scholars) specialized in sharia, but also senior scholars in law, whose integrity and reputation are indisputable. They could be selected by the parliament and confirmed by the King.

The Court System

Saudi courts have to be fundamentally overhauled to ensure that court structure, policy, and procedures adhere to Islamic and international legal standards. Only in this way can justice be ensured to all parties, and speedy and efficient legal judgments made.

Judges

Judges constitute the core of any legal system. While they must be knowledgeable in sharia law, they do not have to be graduates of sharia

colleges per se. Alternative law colleges, with multipronged legal education, should be supported in the Saudi education system to produce lawyers who will one day be eligible to become judges and members of the supreme judicial council.

Lawyers

Lawyers in Saudi Arabia today are not actively involved in legal proceedings. To the contrary, they must be given an important role to play in the Saudi legal system, particularly in defending the accused vigorously, and be allowed to function as an integral part of the court system.

The Law

Sharia is the principal source of law applied in the Saudi legal system. This will continue to be the case, but it must be codified and made explicit in the form of clear legal language, so that judges will not have different interpretations of the same law. Moreover, the codified law has to include elements of modern human life that sharia scholars did not face centuries ago.

Conclusion

The aforementioned political and administrative reforms highlight the main changes required to the Saudi political and administrative system, to ensure its democratic tendencies and adherence to the principle of liberty and efficiency. These features, the baseon which a modern, efficient, and effective political system is constructed, are essential to Saudi Arabia's future. Naturally, these proposals are guidelines that require the addition of more features as well as nuances.

Economic Reform

The economic reform I am proposing is not a detailed reform plan that is ready for immediate implementation, but rather a broad strategic and structural overview with certain milestones. The implementation of the economic reform proposed requires the political infrastructure and will that I have referenced many times in this book. Such economic reform is composed of new economic strategies and institutions, and building a new set of national assets.

New Economic Strategy and Institutions

A Ten-Year Economic Development Strategy

In 1970, Saudi Arabia generated its first five-year plan for the period 1970 through 1975. The plan was technically prepared by the Stanford Institution, the Ministry of Planning's consultant at the time. With the rise of oil prices in 1973, the plan was drastically changed. This was necessary because the five-year plan was not equipped for long-term economic strategy beyond the five-year time span, or equipped to deal with various scenarios that allow for major changes in the main drivers of the Saudi economy. A new ten-year strategy and plan must be developed, implemented, supervised, and modified by a National Economic Planning Agency (NEPA). The agency must have financial independence and the power to hire national and international experts without the bureaucracy and limitations of the current system. The agency also must have the power to request information from any government ministry or agency, including the ministry of finance. The agency will replace the current Ministry of Economy and Planning.

A new ten-year economic strategy should be designed and built to attain strategic economic goals to be achieved over the course of ten years, with a rough sketch for a period beyond ten years. The plan should be equipped with all of the required bells and whistles to provide guidance as to its implementation.

The most important goals of the plan would be to maximize current and future generations' benefits from the extraction of oil and gas reserves, diversify government income and minimize government revenue dependence on oil, reform structurally the education system such that it promotes skilled, scientific, and technologically minded human resources, and builds productive national assets to replace nonrenewable natural assets, mainly oil and gas.

The plan has to be approved first by the parliament with the confidence of the consultative assembly, and then authorized by the King. After that the strategy plan should become law. Major amendments to the plan will follow the same process.

A Three-Year Budget

The Ministry of Finance prepares the budget on an annual basis. A one-year time horizon is mostly impractical, with projects being extended over more than one year. The Ministry of Finance has strong financial and economic power over other ministries. Its power emanates from its control over budget revenues and budget expenditures. The following

changes need to be introduced to the method by which the Ministry of Finance prepares the budget and controls its expenditures.

Budget Preparation

The rather antiquated budget-preparation process is controlled and managed by the Ministry of Finance. It reflects the unilateral authority of the minister of finance, which was bestowed by the founder of the Saudi state, the late King Abdulziz, during the country's earliest years (1920–1950). Budget preparation starts when the ministry distributes the new budget guidelines, duly approved by the Council of Ministers without much critique or challenging of assumptions. Then begins the long process of meetings and countermeetings under the budget directorate of the ministry's administration, which takes place over a long period of time. During this process, the Ministry of Finance applies pressure to align the other ministries with the directives and guidelines it has produced. When the deputy minister or his team reaches a wall with a counterpart from another ministry, he raises the matter to the minister of finance to resolve it. Dialogue between the Ministry of Finance and other ministries institutions of government over budget preparation is hardly a discussion at all; it is more an exercise in the Ministry of Finance dictating its opinion, unless of course the other ministries are headed by senior members of the Royal family. It is all a picture of lack of transparency and shows inefficiency.

While the Ministry of Finance must have a leading role in arranging and preparing the budget, its role should not be to dominate or or dictate. The process has to be changed as follows:

First, there must exist well-defined financial guidelines for the budget to be drafted by the Ministry of Finance and the Ministry of Planning (or a new NEPA), based on the ten-year strategy, and other metrics. Second, the guidelines must be discussed with the prime minister for his approval, and then raised to the Council of Ministers for discussion and approval. Finally, once the guidelines are approved by the Council of Ministers, they should be raised to the King for the issuance of a Royal decree. At the end of this process, such guidelines should become the rules that the various ministries and institutions must adhere to.

Periodic Preparation of the Budget

The current Saudi budgets are prepared with a one-year horizon in mind from December through January. But budgeting for one year is

impractical, with projects almost always extending beyond a year. A three-year budget is more practical and covers a time horizon for the majority of the projects. Additionally, it saves the Ministry of Finance and other government agencies the annual effort to close the yearly accounts in December and reopen them in January.

Rules and Regulations for Budgeted Procurements and Payments

The unfettered power of the Ministry of Finance representatives has led to corruption and caused delays in project execution. A solution to this would be the government imposing strict rules and regulations applicable to all ministries and government institutions, regarding the use of funds allocated to them in their respective budgets.

Full authority given to ministers in executing their duties and achieving the goals set forth in their budgets according to a set of rules ensures transparency and accountability. With full authority comes full responsibility. Audits should be the sole responsibility of the independent government auditing directorate (the General Audit Directorate).

Oil and Gas: An Optimization Strategy

The depreciation of oil and gas reserves, the most important natural asset in the government's portfolio, is basically a function of extraction. The higher the extraction level the higher depreciation is. Oil and gas is extracted for export or for domestic consumption.

The policies I propose will lead to optimization in the exploitation of these assets, in order to produce greater benefits for Saudi society, both in current and future generations. The aim is to optimize the use of oil and gas, and minimize the level of unwarranted depreciation.

To ensure that Saudi society (including future generations of Saudis) reaps maximum benefit from the extraction of oil and gas on a practical level, policy makers have to optimize both oil exports and domestic oil and gas consumption, as well as prices. In order to achieve this goal, structural changes to the Saudi petroleum sector must be implemented. The following are policy recommendations for the oil and gas sector.

Institutional Changes

The Saudi oil and gas sector, from exploration and discovery to extraction and sale, is managed by Saudi Aramco, the hydrocarbon arm of

the Saudi government. The company's board of directors is headed by the minister for Petroleum and Mineral Resources. The Ministry of Petroleum and Mineral Resources is in charge of all oil, gas, and mineral resources. But the reality on the ground is that all issues relating to oil and gas affairs are relegated to Aramco. Restructuring the petroleum and mineral sector is essential to restructure the government economy. Currently, the entire economy depends on oil revenues. The oil and gas sector in Saudi Arabia requires major institutional changes, including the following:

1. Management of petroleum national resources and mineral natural resources must be separate. Each one of these must be managed by an independent entity.
2. The national ownership of oil and gas reserves and the rights of exploration around the country should be separate from the process of extraction, transportation, and sale. Aramco's responsibility should be limited to the latter, while the ownership and management of the oil and gas pre-extraction (including exploration rights) should be assigned to an independent National Petroleum Agency.
3. National Petroleum Agency should have the ability to lease the rights to extract oil and gas to Aramco and other Saudi petroleum joint stock companies that should be established for competition. The lease agreements should be based on well-defined international standards for oil and gas proven deposit leasing and in accordance with the principle of maximizing long-term value.
4. The new Saudi Aramco should be converted into a joint stock company with public share ownership (limited to Saudi citizens and institutions, if need be). Non-Saudis could be allowed to own shares in oil and gas companies, but with certain limitations.
5. The National Petroleum Agency would be fully independent from the Ministry of Petroleum or any other ministry. The head of the agency and the board of directors would be nominated by the prime minister and confirmed by the parliament. The National Petroleum Agency would be entrusted with managing oil and gas wealth for current and future generations. The board, which would be made up of professionals in the field of oil and gas, can be assisted by local and international experts and advisors.
6. The National Petroleum Agency should develop long-term strategies for utilizing oil and gas resources that lead to the achievement of the highest possible return to current and future generations.

Strategy would be subject to regular review and amendment and special sessions when technology or the current state of the economy requires them. This strategy and its various components will be the basis upon which oil and gas contracts are drawn and updated. This in turn will be the basis for determining Saudi oil prices and exports.

7. The government should aim to free itself, through the foregoing processes, from foreign political pressure to increase oil exports.
8. The future structure of the Saudi petroleum sector should not include a role for OPEC. OPEC's time has passed, and it should be retired or rebuilt on different premises. Saudi Arabia should serve its interest through a different form of cooperation with both oil exporters and oil consumers.

Optimizing Oil Exports and Prices

A future Saudi oil export and pricing policy should fulfill the most essential objectives before the Saudi government[14]: to provide the government with the foreign exchange it requires to finance its expenditures, to maintain stable and moderate oil prices, and to assure its strategic customers.

The following policies are aimed at achieving a more rational oil export and pricing policy consistent with the goal of maximizing long-term return from oil reserves:

1. Limit and control the government's excessive demand on foreign exchange by maintaining efficient current and capital expenditures. This will require policy makers to filter government programs and projects to eliminate waste and unproductive expenditures.
2. Limit oil-extraction goals to financing government expenditures, maintaining stable and long-term oil prices, and ensuring the existence of long-term foreign investment in the country.
3. Eliminate political considerations in the increasing or decreasing of oil exports, unless Saudi national security is at stake.
4. Optimize oil-export pricing, since it has a direct and significant influence on government revenues and savings. Saudi Arabia has always played a key role and is one of moderators in OPEC with regard to pricing, ensuring that major increases are avoided and that oil supply is constant. This is due to its client relationship with the United States. Maintaining a stable long-term

international oil market is in the best interests of Saudi Arabia; consequently, depressing oil prices or increasing oil exports when not in line with the country's long-term interests is detrimental to current and future generations of Saudis. Oil must be priced so as to maximize revenue in the long term and maintain demand and stability in the long term.

Reducing Domestic Oil & Gas Consumption

Domestic oil and gas consumption in Saudi Arabia has increased drastically as a result of its subsidized nature.[15] Unduly low prices that are not in line with supply and demand ultimately increase consumption and waste. Policy makers must adjust fuel prices upward toward a "real" median price, gradually but surely. Failing to do so will leave Saudi Arabia without oil to export and without foreign exchange to pay for its imports. The society has been accustomed to cheap energy, and will resist government efforts to raise prices, but this has to be met by a strong political will, coupled with a subsidy program to help the poor who cannot afford new prices. The government has to be open and honest with the public, explaining the reasons and the long-term benefits of the rise in prices. The public will not likely accept increased fuel prices if it is clear that the income generated will be allocated to other forms of consumptions that only benefit the rich and powerful; benefits of long-term Saudi policy, including those relating to oil and gas, must benefit the general public above all.

Reducing Government Expenditures

The rise in oil prices and oil exports since 1973 has driven the Saudi government from a state of moderate spending to one of very high expenditures. Government expenditures have naturally been pushed up by rising oil revenue; the more oil revenue came in, the more government expenditures soared. After the 1973 oil-price increase, these proponents of high government expenditures had a strong desire to build modern infrastructure, including a "gas gathering" system, the East to West oil pipeline, as well as mega projects such as the industrial cities of Jubail and Yanbu. Human development was not at the top of the list of the Ministry of Planning's priorities at this time. On the other hand, the Ministry of Finance at the time preferred to focus on human resource development and social programs as opposed to mega projects. I was a part of the Ministry of Finance team and have witnessed firsthand the

battle that was won by the "high expenditures" mega-projects group. I believe their success is why Saudi Arabia ended up with modern buildings and physical industries, accompanied by many foreign workers and engineers (and few Saudis) to operate and maintain them. Subsidies and lower fuel and utility prices were extended to all people, rich and poor alike. Imports of luxury products have flooded the markets and continue to do so, while the middle class and rich have become accustomed to lavish consumption and waste.

The government and Saudi people have to realize that their consumption is at the cost of depreciating their most valuable national asset, oil, and not at the cost of income generated by their productivity. The mind-set of lavish consumption and the environment that propagates it has dominated the spending behavior of the government for a long time, and it must be stopped. These are some policy recommendations in this regard.

Reduce Government Size

With the rise of oil revenue and government expenditures, government size has increased dramatically. The increase in the number of ministries, departments, and other government bodies has contributed to a budget predicament where public salaries account for about 65 percent of total budget expenditure. Two major policies have to be applied to reduce the size of government and the cost of employment:

1. The government's organizational structure must be evaluated to eliminate redundancy and overlap. This should be done in accordance with a focused and specified scope of work. This organizational restructuring will lead to the elimination of some ministries, and many government agencies.
2. Efficiency tests should be run on all current government employees to go hand in hand with the new government organization structure. Certain individuals will ultimately need to be sent to retirement. Others who are willing and able to work may need to be relocated through a government program designed to assist them in training and finding new work in the private sector.

Reduce the Number of Public Sector Employees

According to budget classifications, government expenditures are either current expenditures or project expenditures. The largest item in current expenditures is public sector employees' salaries and wages, as it absorbs

around 65 percent of budget revenues. Reducing this item is the major step in normalizing government expenditures and raising public sector employee productivity and efficiency. The overhiring of government employees has led to reduced employee productivity. The government is politically unwilling to touch this major expenditure item because of political sensitivities, but the problem is only being exacerbated as time progresses. Strong political will is needed to solve this problem, and the time to do so is now while the government has cash to finance remedial programs that will be necessary.

Eliminate White Elephant Projects

The huge amount of money that pours into government bank accounts from extracting and exporting oil, coupled with a general environment that lacks transparency, accountability, and economic scrutiny, has led to wasteful mega projects. Linking budget projects to a ten-year plan that has been prepared diligently by the government, and reviewed and approved by the proper legislative bodies, will minimize and prevent projects that are not economically viable and do not add to the productivity of the economy and the prosperity of the Saudi people.

Reduce Off-Budget Expenditures

Some projects and programs are added to the budget during the year by Royal order. This practice must be stopped, and nothing should be added to the approved budget except for critical and unexpected national necessities, which should themselves be dealt with through a legal process for changes and modifications to the approved budget.

Reduce Subsidies and Price Supports

There are two main categories of government subsidies, commercial subsidies and consumption subsidies.

As far as commercial subsidies are concerned, the Saudi government has established three funds to supplement them: an industrial fund, an agriculture bank, and a real-estate fund. These institutions are owned by the government and offer free loans with very small administrative charges. These facilities must be reviewed and restructured, according to economic and financial criteria geared toward productivity, to add value to the economy. They should not simply reduce project costs, which then serve to merely increase owners' profits.

Consumption subsidies subsidize food items, utilities, and fuel. The social rationale behind these subsidies is to help the poor, while the political rationale is to please the public and gain political support. Subsidy structure in Saudi Arabia has increased consumption and led to excessive waste. Though subsidies are theoretically supposed to benefit the poor, they actually benefit the middle class and the rich much more, whose consumption of these subsidized items is much larger than that of the poor. These items include rice, flour, milk, water, electricity, and fuel. The most obvious waste is the rising domestic consumption of oil and gas due to the very low prices of gasoline, diesel, and gas, even when compared to other GCC oil-producing countries. Such a high and continually rising level of domestic crude oil consumption will threaten Saudi Arabia's ability to export oil. The subsidy structure and its channels must be changed.

On this front as well, the government lacks the political courage to change the system, or optimize the allocation of public funds to produce better results for the needy, as it fears this will enrage the general public. The public is fully aware of various forms of waste and corruption in the use of public funds and will question why only their subsidies are revoked. Subsidy reform must be part of comprehensive economic reform that targets corruption, waste, and the misuse of public funds. In order to arrive at rational economic policies that maximize public utility for all, not just the politically, socially, and financially empowered, reform is essential. Subsidies for food, utilities, and fuel must be replaced by direct income subsidies for the poor, and prices should subsequently be freed to reach real market levels.

Establish a Budget for Royal Expenditures

Currently, public financing of royal expenditures is not specified in the budget; no one but the minister of finance knows how much that amounts to. Royal expenditures using public funds should not be open-ended; they must be fixed in a royal budget. The annual royal budget must be established by a law, drafted by the government and approved by the parliament. The law has to determine the size of the royal budget and the process and procedures for its management and or amendment.

Apply an Effective Tax System

Since the government began economic planning and wrote up its first five-year plan for the period of 1970 through 1975, oil revenue has

constituted more than 90 percent of government revenues. Forty years and nine economic plans later, the government has not been able to diversify its revenue and achieve some sort of independence from oil. Current public expenditures are financed by the exploitation of the Saudi assets of oil and gas; a healthy economy would include a larger percent of revenue from taxed income that those assets generate. For the government to attain its goal of diversifying revenue and achieving a certain level of independence from oil, it must reform its current tax system and introduce an effective income and corporate tax system, as well as an indirect tax.

Saudi citizens do not pay income tax or any indirect taxes, and corporate tax is limited to *zakat*, an Islamic tax of 2.5 percent on income and property.[16] For a tax system in Saudi Arabia to be effective and acceptable by the Saudi people, it must be based on the following principles:

1. All people must adhere to tax laws; no one, including royalty, should be above the law.
2. The tax law has to be effectively applied without exceptions, and those who violate or do not pay their taxes must be punished regardless of their political, social, or financial status.
3. The tax system must be equitable, and tax burden should be correlated to gains and income levels.
4. The tax system should not be prohibitive to private business and entrepreneurial initiatives.

As mentioned many times, current Saudi political culture and infrastructure is based on using oil revenues to finance public expenditures, subsidies, and grants. As a result, taxing comes with risks. A (non)fiscal policy is keeping the rich and middle class happy, financially comfortable, and loyal to the government. Taxing these people will shake their acquiescence, and they will ask for political representation to be linked to their taxation. Financing the budget with taxes will ultimately create a more engaged Saudi society that asks how and where money is spent. For this reason, political reform is essential to fiscal reform.

Natural Resources and Future Generations

While other minerals such as gold and phosphate do exist in Saudi Arabia, oil and gas are the most abundant natural resources that exist in the country. Each generation of Saudis must act as trustees for these

resources, and be obliged by law to utilize and manage this wealth according to a principle of long-term maximization.

Each generation in Saudi Arabia must extract from the oil and gas stock what is needed to maximize utility, with a view on the long term. Once the optimum extraction quantity for domestic development is determined, extra extraction of oil and gas should be set by the comparative value of annual real increase in oil price in the ground (dp/dt) and the annual real return on foreign investment of the funds generated from the extra sale of oil and gas (dr/dt).[17]

The higher future oil and gas prices are likely to be, the less it should be extracted, and vice versa. The managers of the nation's natural resource wealth should be guided by the principle of maximizing the terminal value of this irreplaceable wealth. Economic planners should be guided by an economic and investment strategy that achieves sustainable growth of consumption and investment, with maximal social utility, for the benefit of current and future generations.

Future Generations Fund

If the government extracts the appropriate amount of oil and gas, that is, what the current generation requires to build productive investments and infrastructure to maintain a sustainable per capita consumption level, and leaves the rest in the ground, there will be no need to establish a future generation fund. However, if the government has to extract more oil and gas than it requires to sustain an optimum level of per capita consumption, because the real return of foreign investments (dr/dt) is higher than the real increase in oil price (dp/dt), then establishing a future generation fund is necessary.

As of 2012, the Saudi government has amassed around $556 billion in foreign investment assets (FIA). This FIA is managed by the central bank of Saudi Arabia, SAMA, and is mostly invested in US Treasury Bills. These funds are not earmarked for future generations, but are kept in liquid form, to be consumed by the government when needed.

Much of these resources should be placed in a trust-like structure—a "Future Generations Fund"—to manage and invest all funds that have been generated by the extraction and sale of natural resources over and above the current generation's needs and entitlements.

The fund must be fully independent from the government and managed by a board of directors according to a law created for that purpose. The board of directors will select a board of highly professional, national, and international investment advisors. The board of directors

reports directly to the parliament. No funds will be drawn from the fund, for any reason except in a national crisis, and by request of the King to be approved by the parliament.

Reduce Population Growth

According to the Central Department of Statistics (CDS), in 2011, the total population of Saudi Arabia was 28.3 million, of which 19.4 million were Saudi nationals. Population growth is 2.28 percent a year in Saudi Arabia, of which 29.4 percent is in the age range of 0–14 years old, and 67.6 percent is in the age range 15–64 years old.[18]

The Saudi population's growth rate is alarmingly high, even by developing countries' standards. Controlling population growth through family planning is difficult in Muslim countries in general, and especially in Saudi Arabia, because of its adherence to a rigid Islamic interpretation of birth control. Reducing population growth has a direct positive effect on reducing current and future government expenditures on health care, education, housing, etc. Real economic growth has to surpass population growth in order to yield positive per capita income growth. This is another reform that requires strong and determined political will to enforce a long-term plan for birth control. The plan will be met with fierce opposition from religious institutions and traditional Saudis, but political determination has to be stronger.

Building Productive and Long-Term National Assets

Current government investments outside the hydrocarbon sector are split between financial investments (equity and bonds) in local and international markets, or domestic capital investments, most of which are related to infrastructure, health, education, and utilities. The petrochemical industry is part of the downstream petroleum industry and is heavily dependent on cheap gas, thus investment in this industry cannot be considered a long-term substitute for depleting natural oil and gas assets.

Saudi Arabia's strategic dilemma is its complete economic dependence on its oil and gas reserves, which will be depleted in few decades. No other assets in Saudi Arabia today, natural or manmade, can substitute for the value of oil and gas in reducing the country's dependence on petroleum. Creativity is required.

The Saudi private sector, though vibrant and more efficient than the government, suffers from the same disease as the government; while the

government is directly dependent on oil revenue to finance more than 90 percent of its expenditures, the private sector is heavily dependent on government expenditures. It is a vicious circle of oil dependence that engulfs the government, the economy, and the people. Due to the private sector's risk appetite, it is not equipped to build long-term productive national assets that will generate future income to replace oil revenue and maintain sustainable and optimum levels of per capita consumption. The private sector can help and join the government in the building of national assets, but it cannot alone assume the full risk or provide the capital for long-term productive investment projects.

Building mega projects is easy for any government when it has cheap and easy income. It is a completely different story to build long-term productive national assets. This requires an efficient government system, as I have outlined in my proposed political reforms. The Saudi government has a unique opportunity to start building assets to replace oil and gas now; it still has a medium-sized population, political stability, rising oil revenue, and large oil reserves that will last for some decades. Political and economic reforms are prerequisites for setting the country on the right path. If Saudi Arabia misses this chance it may miss the opportunity to take the country to long-lasting economic, social, and political stability. Time is of the essence.

For the government to build strategic and productive nonpetroleum national assets, it has to entrust this task to a National Agency (NA), fully independent from government bureaucracy and its financial system. The NA will mobilize all national and international expertise to assist in developing a master plan and guidelines for building alternative national assets to replace oil and gas. The new Saudi economy with renewable productive national assets will be based on real production where Saudi labor and capital are the sources of GDP, not the extraction of oil and gas.

I suggest a few areas that could have promising potential for building long-term productive national assets. Below is merely a preliminary list of ideas, which along with others, should be considered.

Human Resources

Educated, efficient, and productive human resources are the best of all assets. Human capital is the main national asset that can substitute oil when it is gone. To develop educated, skilled, progressive, and productive Saudi human resources, the following structural changes must take place in the social sphere and in the education system.

Women

A conservative interpretation of Islam and conservative traditions in Saudi Arabia are major barriers to women's active participation in all aspects of Saudi social, political, and economic life. Women account for 55 percent of the population. In order to rebuild Saudi, for human resources to be the base of a productive economy, the barriers to women's participation in economic, social, and political life must gradually be dismantled. This will free half of the population to participate in building the country's national assets. This is not an easy task, as the barriers are mainly religious and cultural, which are difficult to transform. However, the will should exist to tackle the main obstacle that is blocking development in the country, on all fronts. The true pillars of Islam allow for this—not the Islam of conservative religious scholars who believe that the only role for the woman is to stay home for the pleasure of the husband and to raise the children. The true teachings of Islam, which came more than 14 centuries ago, were to liberate women from slavery. What holds women down in society today is anything but true Islam. It is an outdated tribal value system, coupled with a reactionary culture, veiled with religious interpretations from very conservative religious scholars that is holding women and the population in general from social modernity.

Education

The Saudi education system must be structurally adjusted, from kindergarten through college, especially with respect to the content of curricula and the quality of teachers. A new education philosophy based on science, logic, art, creativity, and free expression has to replace the existing system. Education is essential for building human resources capable of advancing the quality of Saudi Arabia on the political, economic, and social fronts. Human resource development is the base for building a productive society, upon which productive national assets can be planted and cultivated.

The Desalination Industry

Water in Saudi Arabia is limited; there are no rivers or adequate rainfall to enhance the scarce water resources in the country. Saudi Arabia has resorted to desalination to provide people with fresh water supply. In Saudi Arabia, 50 percent of municipal water is provided by the Saline Water Corporation.[19] Saudi Arabia has the largest desalination plants in the world, and it has been the ground for testing new international

technologies. The desalination industry is strategic for Saudi Arabia, as it will provide the country a secure water source in the long run and will make the country the beacon of desalination technology.

Solar Energy

Another area where Saudi Arabia can have comparative advantage is with solar energy, as sunshine exists in Saudi Arabia all year round. Saudi Arabia can attract international technology and build an international solar industry development center. The solar industry should be treated as a strategic national industry, as it can provide the country with a major portion of its energy needs if developed economically and with sound technology. Another upside is that technology and hardware could be exported, providing a new source of revenue.

Mineral Resources

Just as with the case of data on petroleum resources, reliable data on mineral resources are also unavailable.[20] The establishment of an independent department for mineral resources, separate from the Ministry of Petroleum that is currently in charge of minerals, will be the first step toward building this sector. Further exploration and geological investigation is also needed to determine the geological and economic viability of mineral deposits.

Religious Tourism

Saudi Arabia has spent billions of dollars on the development and expansion of the holy mosques in Mecca and Medina. Millions of pilgrims from all over the world come to perform Hajj or Omra annually. A moderate operation and maintenance fee to be paid by all pilgrims, Saudis and non-Saudis alike, will partially compensate for the huge capital and operational expenditures coming out of the Saudi treasury. The religious tourism industry could be expanded to include other religious sites in both Mecca and Medina, in addition to the two holy mosques. The government should start looking to religious tourism as a potential source of income to both the private and public sectors.

Specialized Health Care

Since the 1960s, Saudi Arabia has sent many students to medical schools around the world. In addition, it has invested in building modern and specialized medical centers and has subsidized the private sector to

invest in building hospitals and clinics. Today, Saudi Arabia has the base for developing an advanced specialized health care industry. The industry can cater to the middle and high-income classes in the Middle East and Africa with the right planning.

The Fishing Industry

Saudi Arabia is flanked by the Red Sea on the west and Arabian Gulf on the east. The fishing industry could be one of the natural national assets that can satisfy part of the country's food requirements and increase its non-oil exports. Today one Saudi company controls most of the rich fishing fields. The fishing industry should be freed from this royal monopoly and be opened to competition. The fishing industry must be taken out of the Ministry of Agriculture's domain, and a special department should be established for this industry.

Industrial Development

The government has participated generously in the development of the industrial sector through subsidies, loans, equities, the low price of energy, etc. Some government aid, which is misused, does not go to building viable industries at all, however; it inflates industrialists' profits and increases waste. The government and private sector can work together to build long-term viable and productive national assets, but in a different form than those joint efforts of the past. The government has the money and the credit to borrow money, and the private sector has the right management and ability to acquire the right knowhow and foreign participation. The private sector cannot finance very long-term productive projects, as the cost of borrowing will be high due to time and risk. But the government can finance these projects with less cost, and co-opt the private sector. The private sector has better management skills than the government, and so combining government financing with private financing and management skills will be an effective investment model in Saudi Arabia. Both parties complement each other and can cooperate to build productive projects on a national scale, oriented to both domestic and international markets.

Revisiting the Petrochemical Industry

Saudi Arabia has invested heavily in building its petrochemical industry. The industry's success is based on cheap gas provided by the government. The government started a policy of replacing gas for oil as

fuel for electricity generators and desalination plants, and this will take away some of the gas reserves available for petrochemical industry operation and expansion. Ultimately domestic gas prices will increase along with other domestic energy fuel prices. Domestic oil consumption is rising drastically due to low prices, and this is threatening oil exports. For all of these reasons, gas prices must increase in the future and the petrochemical industry has to be ready to deal with higher raw material costs to maintain its international competitiveness. The petrochemical industry depends heavily on oil and gas, which are limited in the long term, and thus a subsidized price cannot be taken for granted. For all of these reasons and more, the petrochemical industry should be revisited, as it is a strategic national industry. The industry could be expanded in various fields and for various products, benefiting from knowledge developed over decades of government investments and technology. The new petrochemical industry should be based on long-term economic viability and not on heavy government subsidies on gas and capital.

The Fallacy of Agriculture and Food Security

Saudi Arabia is a desert country with no rivers or sizable water deposits. Water is scarce, and that scarcity is only increasing with time and population growth. The government was ill advised to invest in building a huge agriculture sector to begin with. Even worse, in the late 1970s, the government introduced a massive wheat subsidies program to ensure food security. The erroneous policy cost the nation billions of dollars, and more importantly, it cost millions of cubic meters of scarce and irreplaceable deposits of water in deep aquifers. Wheat production for food security is a fallacy that has been used by corrupt officials, people with political power, and some businessmen to benefit from government price subsidies, which was three times less than that of wheat prices on the international market. Some people became very rich at the expense of wasted public funds and scarce water. This is what investments in white elephant projects, induced by corruption, can do to the country.

The notion of food security or food independence is not an economic notion; it is a political one used mainly to exploit public funds for the benefit of a few corrupt politicians in cooperation with corrupt businessmen. A security net is to have a productive economy capable of generating foreign exchange surpluses through its exports. Today, with open international markets and advanced transportation, the country can obtain its food requirements with ease. Of course, a limited amount of reserves of basic food staples or strategic foodstuffs must be kept to

allow enough time for importation. The Ministry of Agriculture must be reduced to a small department, and all subsidies for agricultural products must be eliminated, while efforts should be directed toward agriculture and plantation based on water-saving irrigation methods.

Technology and Innovation

Investing in the technology industry, in developing its institutions, human resources, research labs, et cetera, is essential to bolstering the development of productive long-term investment projects. Technology has been, and is, the key to industrial advancement. Restructuring the education system to strengthen mathematical and science skills, beginning in the early stages, is an important base for developing the human resources from whom scientists and innovators will emerge.

Proposed Reforms and Reality

The nature of the political and economic reforms proposed in this chapter will be criticized for not being workable in the current Saudi political and decision-making environment. While this is true, it is not the basis upon which these reforms are suggested. These reforms are structural in nature, because the crisis the country will face if it continues along the same lines will be catastrophic. Government financial bankruptcy will undermine the political and social stability of the country. Government expenditure is the glue that holds the country together for now. Once that glue loses its stick, the pieces will fall apart. The strength and power of the coming storm requires drastic strategic reforms to build new, genuine, and strong political, social, and economic foundations for Saudi Arabia, which is what I propose here. For these reforms to be applied they must be regarded by the King and the senior Royal circle around him as a necessary medicine for a life-threatening disease. Al-Saud is known for taking daring decisions when it comes to life or death. The only problem is that we don't traditionally anticipate crisis before it arrives; we wait, and when it happens we do what it takes to deal with it. Saudi Arabia has been lucky with the scale and circumstances of past crises in the kingdom; however, we may not be lucky all the time. If the coming financial crisis anticipated in this book is to be averted, political and economic reforms proposed must start now.

Summary and Conclusion

Saudi society has been dependent on government revenues since 1950, when oil revenue became the major source of government income. The five-year development plans, which began in 1970, were unable to decrease the level of government dependence on oil revenue. In 2012, 93 percent of government revenues came from that oil revenue.

The government is trying to portray a different predicament altogether. By inflating figures for private sector GDP contribution, and deflating statistics relating to government GDP contribution, the Saudi government is claiming a higher level of economic diversification. However, as I have illustrated in chapter 1 of this book, the size of the government's contribution to GDP is much larger, and that of the private sector is much smaller, than that which government statistics indicate. Indeed, Saudi Arabia's economy is dominated by the government's role. The country has a free market veneer, but with government's fiscal domination. The Saudi private sector is active, but its activities are heavily dependent on government expenditures. When oil revenue rises, government expenditures increase, and private sector activities increase as well. A correlation between the three is expected, but the correlation found in Saudi Arabia is in fact unhealthy.

The Saudi government uses the classical method for calculating its gross domestic product (GDP). In employing this method, natural resource depreciation is not deducted from gross product. Oil and gas extraction, which is a depreciation of the main natural resources in the country, is not deducted from but added to non-oil production. The GDP and GNP indicators used by the Saudi government to measure the size and growth of the economy provide inaccurate and misleading information about the state of the economy, to the public and decision makers alike.

Saudi economic development plans should make up for the depreciation of crude oil and other natural resources, by saving and investing in productive national assets. Instead, the government is engaged in

excessive consumption and increased extraction and depreciation of oil and gas resources, the backbone of the economy. The government calls the depreciation (extraction) of oil and gas "real production," and the rise in its value and/or quantity as "real growth." But this is contrary to common sense and economic theory.

In chapter 2, regression analyses on actual government expenditures and revenues for 50 years (1960–2010) were carried out in order to study various economic cycles in Saudi Arabia and government fiscal policy. In chapters 3 and 4, I forecasted government expenditures and revenues over two periods (2010–2030 and 2030–2050) using 18 different scenarios. Over time, expenditures surpassed revenues, producing budget deficits and accumulated debt. Chapter 5 dealt with financing government debt from foreign financial assets after it has exhausted its financial surplus. Once those assets had also been exhausted, the government will start accruing debt to finance the budget and provide the people with public goods and services. Debt will accumulate further, reaching various levels according to various scenarios, but all suggesting that proportions would be catastrophic. Out of the 18 scenarios I have constructed, 14 of them illustrate a level of government debt that is far beyond acceptable debt ratios, and within the bounds of financial crisis.

In chapter 6 I extend the application of the genuine savings theory to a government economy, and then apply it specifically to the Saudi government case, both theoretically and empirically. The result was consistent with simulation approaches for future expenditures and revenues generated in earlier chapters: the government will not be able to sustain its future expenditures. In the final chapter, I have proposed major reforms in two important areas: politics and economics. Political reform is a prerequisite for the effective implementation of economic reform.

The reforms I propose are structural and require strong and determined political will for implementation. I believe that the coming financial crisis may be so severe that it requires immediate structural reform for the country to avert long-term catastrophe on the political, social, and economic fronts. Moreover, the real decision makers in the country, the Saudi king and the senior royal circle around him, must realize and believe in the severity of the coming danger in order to act and implement reforms. There is no time to wait or to waste.

The government's dependence on the extraction of oil to provide society with the goods and services it needs puts the fate of generations of Saudis in jeopardy. Saudi government oil reserve depreciation on one

hand and its rising level of expenditures on the other indicate that future generations have not been accounted for on the government's drawing board. Oil and other natural resources are not owned by the current generation of Saudis, but belong principally also to future generations.

According to my assumptions and analyses, it is highly probable that the Saudi government will face major financial crises in the next few decades if nothing is done to alter current economic strategy and policies. The driving force behind this book is to ring the alarm, and raise a red flag, to alert Saudi Arabia of an upcoming financial crisis. The continuation of the government's current economic strategies and policies will mean mounting government debt; the size of the debt will be coupled with a geologically inevitable decrease in oil extraction and in oil exports and revenue. Oil prices, even if we assume their relative increase, will not be able to compensate for the decrease in such oil exports. If oil prices were to actually decrease, the government's financial problems would be compounded. On the other side of the equation, the government will face rising future consumption and investment needs due to a growing population. Government debt will reach a crisis level that will pose serious economic, social, and political threats to the country. Huge debt with depleted oil resources and reduced oil exports will undermine the government's financial credibility, and will not allow the government to borrow large sums of money internationally or locally to finance its debt. It is important to draw the attention of policy makers to the seriousness of the government's future fiscal situation and the urgent need to structurally change current economic strategy from a platform of consumption and waste, to one of savings and productive investments. If the Saudi government acts now, decisively and with political courage, it will have a chance to reverse the dynamics of rising expenditures and decreasing future revenues. For this to happen effectively and efficiently, strong and committed political will from those who hold the center of power in the country is urgently required. In order to see to the urgent need to change the course of economic development to one of building productive investments and growth, policy makers must realize the economic and political danger of continuing along the current trajectory.

Listing what needs to be done is not difficult, what is difficult is to convince policy makers that the current government economic strategy and policies will bankrupt the government financially, and then politically. The aim of this book is to bring to light that the country is on the road to future financial crisis. My experience as a former deputy

minister of finance in the 1970s demonstrated to me that when the top decision makers in Saudi Arabia do see that a coming crisis is inevitable, they will take immediate and decisive action to deal with it. This book is dedicated to convincing the decision makers in Saudi Arabia of the coming financial crisis if the country continues on the same path.

Notes

Introduction

1. Arthur N. Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 3 (1953): 21; Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 4 (1953): 26.
2. Alexei Vassiliev, *The History of Saudi Arabia* (London: Saqi Books, 1998), 278.
3. Kingdom of Saudi Arabia, Ministry of Finance, *Budget Announcement*, 1434/1433 (Riyadh: 2012), 1.
4. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *The Tenth Development Plan*, 2015–2019, 1436–1441AH (Riyadh: 2010), 190.
5. During his visit to the United States in 2008, King Abdulah said to his audience, "Saudi students in the U.S., I ask God to prolong his life." The students asked, "Who is he your majesty?" The King replied, "Oil."
6. Matthew R. Simmons, *Twilight in The Desert* (Hoboken: John Wiley & Sons, 2005), 2881; Glada Lahn and Paul Stevens, *Burning Oil to Keep Cool: The Hidden Energy Crisis in Saudi Arabia* (London: Chatham House, 2011), 4.
7. Nadav Safran, *Saudi Arabia: The Ceaseless Quest for Security* (Cambridge: Harvard University Press, 1985), 60.
8. Arthur N. Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 3 (1953): 21; Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 4 (1953): 26.
9. Mordechai Abir, *Saudi Arabia, Government, Society and the Gulf Crisis* (London: Routledge, 1993), 30.
10. Saudi Arabian Monetary Agency, Research and Statistics Department, *Forty-Seventh Annual Report*, 1432H (Riyadh: 2011), 289.
11. Abdulaziz M. Aldukheil, "An Optimum Base for Pricing Middle Eastern Crude Oil" (PhD diss., Indiana University, 1974).
12. Oil revenue in the 2012 budget constituted of 93 percent of the total government revenues, confirming that the government is still highly dependent on oil revenue and has failed to diversify its income resources.

1 Anatomy of the Saudi Economy

1. Saudi Arabian Monetary Agency, Research and Statistics Department, *Forty-Seventh Annual Report*, 1432H (Riyadh: 2011), 334.
2. Saudi Stock Exchange (Tadawul), *Annual Statistical Report 2011* (Riyadh, 2011), 18.
3. International Monetary Fund, *Saudi Arabia: Recent Economic Developments and Selected Issues*, Article IV, SM/98/152 ([City Published]: 1998), 29.
4. Jeroen C. J. M. Van den Bergh, "The GDP Paradox," *Journal of Economic Psychology* 30 (2009): 117–135.
5. Kingdom of Saudi Arabia, Ministry of Economy and Planning, Central Department of Statistics and Information, *Statistical Yearbook 2010*, no. 46, 1431–1432 (Riyadh: 2010), 121.
6. Kingdom of Saudi Arabia, Ministry of Finance, *Budget Announcement*, 1434/1433 (Riyadh: 2012), 2.
7. Saudi Arabian Monetary Agency, Research and Statistics Department, *Forty-Seventh Annual Report*, 1432H (Riyadh: 2011), 296.
8. Saudi Arabian Monetary Agency, Research and Statistics Department, *Forty-Seventh Annual Report*, 1432H (Riyadh: 2011), 295.
9. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *The Ninth Development Plan*, 2010 – 2014, 1431–1435H (Riyadh: 2009), 2.
10. Since the first five-year plan in 1970, diversification was a major goal to be achieved. In 2012, oil revenue accounted for 93 percent of government revenue, indicating government failure in reducing the economy's dependence on oil.
11. International Monetary Fund, *Saudi Arabia: Staff Report for the 2011Article IV Consultation,* IMF Country Report No. 11/292 (Washington, DC: 2011), 14.
12. P. S. Dasgupta and G. M. Heal, *Economic Theory and Exhaustible Resources* (New York: Cambridge University Press, 1979), 25.
13. Lewis C. Gray, "Rent under the Assumption of Exhaustibility," *Quarterly Journal of Economics* 28 (1914): 466–80; Harold Hoteling, "The Economics of Exhaustible Resources," *Journal of Political Economy* 39, no. 2 (1931): 46; Abdulaziz M. Aldukheil, "An Optimum Base for Pricing Middle Eastern Crude Oil" (PhD diss., Indiana University, 1974).
14. International Monetary Fund, *Saudi Arabia: Recent Economic Developments and Selected Issues*, Article IV, SM/98/152 (Washington, DC: 1998), 30.
15. This may be termed as "Government expenditure elasticity of private sector GDP" with a value of 0.5.
16. International Monetary Fund, *Saudi Arabia: Recent Economic Developments and Selected Issues*, Article IV, SM/98/152 (Washington, DC: 1998), 30.
17. Tim Niblock and Monica Malik, *The Political Economy of Saudi Arabia* (London: Routledge, 2007), 90.
18. Saudi Stock Exchange (Tadawul), *Annual Statistical Report 2011* (Riyadh, 2011), 18.

19. Saudi Stock Exchange (Tadawul), *Annual Statistical Report 2011* (Riyadh, 2011), 18.
20. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *Achievements of the Development Plan: Facts and Figures*, 1970–2010, no. 27 (Riyadh: 2010), 23.
21. International Monetary Fund, *Saudi Arabia: 2005 Article IV Consultation*, SM/05/354 (Washington, DC: 2005), 67.
22. International Monetary Fund, *Saudi Arabia: Recent Economic Developments and Selected Issues*, Article IV, SM/98/152 ([City Published]: 1998), 21.
23. International Monetary Fund, *Saudi Arabia:2005 Article IV Consultation*, SM/05/354 (Washington, DC: 2005), 25.
24. International Monetary Fund, *Saudi Arabia: Recent Economic Developments and Selected Issues*, Article IV, SM/98/152 (Washington, DC: 1998), 20.
25. Ministry of Industry and Commerce, Saudi Arabia. Council of Ministers Ruling, 1988.
26. International Monetary Fund, *Saudi Arabia: Recent Economic Developments and Selected Issues*, Article IV, SM/98/152 (Washington, DC: 1998), 5.
27. International Monetary Fund, *Saudi Arabia: 2005 Article IV Consultation*, SM/05/354 (Washington, DC: 2005), 77.
28. Abdulaziz M. Aldukheil, "An Optimum Base for Pricing Middle Eastern Crude Oil" (PhD diss., Indiana University, 1974).
29. Green GDP should also encompass depreciation in other natural resources, such as water quivers, fertile land, environment, as well as human resources.

2 Government Expenditures and Revenues, 1960–2010

1. Alexei Vassilieve, *The History of Saudi Arabia* (London: Saqi Books, 1998), 402.
2. Arthur N. Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 3 (1953): 20; Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 4 (1953): 20
3. Alexei Vassiliev, *The History of Saudi Arabia* (London: Saqi Books, 1998): 278.
4. Arthur N. Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 3 (1953): 21. Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 4 (1953): 26.
5. Saudi Arabian Monetary Agency, Research and Statistics Department, *Forty-Sixth Annual Report*, 1431H (Riyadh: 2010), 14; Kingdom of Saudi Arabia, Ministry of Economy and Planning, *Achievements of the Development Plan: Facts and Figures*, 1970–2010, no. 27 (Riyadh: 2010), 14.
6. Mordechai Abir, *Saudi Arabia In the Oil Era: Regime and Elites; Conflicts and Collaboration* (London: Croom Helm, 1988), 119.
7. International Monetary Fund, *Saudi Arabia–2005 Article IV Consultation*, SM/05/354 (Washington, DC: 2005), 23.

8. "Recent Economic Developments and Highlights of Fiscal Years 1432/1433 (2011) & 1433/1434 (2012)," Kingdom of Saudi Arabia, Ministry of Finance. press release, December 26, 2011.
9. We have used the exchange rate fixed by SAMA, the central Bank, 1$= 3.75SR.
10. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *Achievements of the Development Plan: Facts and Figures*, 1970–2010, no. 27 (Riyadh: 2010), 7.
11. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *Achievements of the Development Plan: Facts and Figures*, 1970–2010, no. 27 (Riyadh: 2010), 20; Kingdom of Saudi Arabia, Ministry of Economy and Planning, *Achievements of the Development Plan: Facts and Figures*, 1970–2011, no. 28 (Riyadh: 2011), 20. For all changes in expenditures and revenues during 1970–2010, see Ministry of Economy and Planning Reports referred to in the text.
12. The data are for a period of 51 years, however, due to introduction of lag we are left with 50 observations.

3 Forecasting Government Expenditures, Revenues, and Gaps, 2011–2030

1. An exchange rate of 1 US = 3.75 SR has been used wherever conversion is required.
2. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *The Ninth Development Plan*, 2010 – 2014, 1431–1435H (Riyadh: 2009), 61.
3. Brad Bourland and Paul Gamble, "Saudi Arabia's Coming Oil and Fiscal Challenge," Jadwa Investment, July 2011, 3–24.
4. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *The Ninth Development Plan*, 2010 – 2014, 1431–1435H (Riyadh: 2009), 54.
5. Saudi Arabian Monetary Agency, Research and Statistics Department, *Forty-Seventh Annual Report*, 1432H (Riyadh: 2011), 231.
6. Ibid., 219.
7. The minimum rate arbitrarily assumed at 2 percent. The actual policy rate could be much higher.
8. Saudi Arabia's Coming Oil and Fiscal Challenge, Jadwa Investments, July 2011, 3–24. The B&G paper spells out the assumption for forecasting capital expenditure as, "We expect capital expenditure to peak in 2012 as the house building program gains momentum and infrastructure enhancement is at its high point. It will then fall gradually with completion of major infrastructure projects. We assume that further cutbacks in capital spending are made in line with a deteriorating budgetary position from towards the end of this decade until 2024, when the level stabilizes."
9. International Energy Agency, *World Energy Outlook 2011* (Paris: OECD/IEA, 2011), 47.

10. Majid Al-Moneef, "Global Energy Outlook: Challenges and Opportunities for the GCC," in *The Oil Era: Emerging Challenges*, ed. Emirates Center for Strategic Studies and Research (ECSSR), (Abu Dhabi: ECSSR, 2011), 25.
11. Dermot Gately, Nourah Al-Yousef, and Hamad M. H. Al-Sheikh, "The Rapid Growth of Domestic Oil Consumption in Saudi Arabia and the Opportunity Cost of Oil Exports Foregone," *Energy Policy* 47 (2011): 57. Department of Energy (DOE), USA, data as quoted in text.
12. Dermot Gately, Nourah Al-Yousef, and Hamad M.H. Al-Sheikh, "The Rapid Growth of Domestic Oil Consumption in Saudi Arabia and the Opportunity Cost of Oil Exports Foregone," *Energy Policy* 47 (2011): 57. British Petroleum data as quoted in text.
13. International Energy Agency, *World Energy Outlook 2011* (Paris: OECD/IEA, 2011), 74.
14. ORB refers to OPEC Reference Basket, introduced in 2005, and currently made up of Saharan Blend (Algeria), Girassol (Angola), Oriente (Ecuador), Iran Heavy (Islamic Republic of Iran), Basra Light (Iraq), Kuwait Export (Kuwait), Es Sider (Libya), Bonny Light (Nigeria), Qatar Marine (Qatar), Arab Light (Saudi Arabia), Murban (UAE), and Merey (Venezuela).
15. Organization of the Petroleum Exporting Countries, *World Oil Outlook 2011* (Vienna: OPEC, 2011), 33.
16. Organization of the Petroleum Exporting Countries, *World Oil Outlook 2011* (Vienna: OPEC, 2011), 33.

5 Financing the Gaps

1. In all of the figures 5.1 through 5.17 in this chapter, the dotted curve shows the annual gap; the solid curve presents the cumulative (increasing or decreasing) NFA level; and the bars show the cumulative borrowing or the cumulative debt. All financing scenarios begin with the $44.5 billion of outstanding debt being paid off in 2010 using NFA, resulting in zero debt and leaving $395 billion in NFA at the beginning of 2011.
2. In the 1980s and 90s when government expenditures far exceeded revenues, it used both surplus funds and borrowed funds. To avoid the complexity of choosing between the two, we assumed that the government will start by using its surplus funds and then resort to borrowed funds.
3. Credit Suisse Securities Research and Analytics, *The Shale Revolution*, December 2012: 11.

6 Are Saudi Government Expenditures Sustainable? (The Genuine Savings Criterion)

1. K. Hamilton, G. Atkinson, and D. Pearce, Genuine Savings as an Indicator of Sustainability, CSERGE WORKING PAPER, GEC 97–103.
2. It is assumed that P the market price for oil and gas, is a proxy for its shadow price.

3. Non-oil and gas government revenue is small relative to oil and gas revenue (Budget revenue from oil and gas in 2012, budget is 93percent).
4. Repetto R, W. Magrath, M Wells, C. Beer, and F. Rossini, 1989. *Wasting Assets: Natural Resources in the National Income Accounts* (Washington DC: World Resource Institute, 1989).
5. J. R. Hicks, *Value and Capital* (Oxford: Oxford Press, 1946).
6. There are some mineral resources, but they are of minimal significance.
7. Government applies similar rate to corporate capital depreciation used for calculating corporate tax.
8. Government foreign financial assets are assumed to appreciate by annual increase from budget surplus, and decrease by withdrawal to cover budget deficit; other factors affecting its appreciation or depreciations are assumed to be constant.
9. Hamilton, Atkinson, and Pearce, Genuine Savings, 97–103.
10. SAMA Annual Report 2011, and CDS, Annual report 2010. Riyadh, Saudi Arabia.
11. Department of Zakat, depreciation, schedule, Ministry of Finance.
12. Saudi Aramco, 2010. www.saudiaramco.com.
13. Matthew R. Simmons, *Twilight in the Desert*, (New York: John Wiley & Sons,2010).
14. See SAMA annual reports, 2011, Riyadh Saudi Arabia, Government Income. p. 114.

7 Is a Saudi Financial Crisis Inevitable?

1. Alexei Vassiliev, *The History of Saudi Arabia* (London: Saqi Books, 1998), 278.
2. Arthur N. Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 3 (1953): 15; Young, "Saudi Arabian Currency and Finance," *The Middle East Journal* 7, no. 4 (1953): 21.
3. Nadav Safran, *Saudi Arabia: The Ceaseless Quest for Security* (Cambridge: Harvard University Press, 1985), 215.
4. Peter W. Wilson and Douglas F. Graham, *Saudi Arabia: The Coming Storm* (New York: M. E. Sharpe, 1994), 160.
5. Ibid.
6. Arab Spring is the term used for the uprising of the people in Libya, Tunisia, Egypt, Yemen, and Syria against their dictators. It started in January 2011.
7. Majles al Shora, The Consultative Assembly, was established by late King Fahad in November 24, 2000. It had 60 members when it was established and has increased gradually. It reached 150 members in the 2005–2009 term.
8. OECD- www.oecd.org/dac/.
9. In Arabic, NAZAH means being honest and clean from corruption. It is an independent commission established by King Abdullah in April 2011 to fight corruption.

10. Ministry of Civil Services, Saudi Arabia, *Annual Report 2010*.
11. Central Department of Statistics, *CDS Report 2011*.Riyadh, Saudi Arabia.
12. Christophe Wilck, "Saudi Arabia Needs a More Transparent Justice System," *The Guardian*, October 26, 2011, 12.
13. Abdullah F. Ansary, "A Brief Overview of the Saudi Arabian Legal System," Hauser Global Law School Program, New York University School of Law, 2008, http//www.nylawglobal.org/globalex/Saudi_arabia.htm.
14. Gas export is limited in Saudi Arabia. Oil is the main hydrocarbon export. The policy recommendation for oil is applied to gas.
15. Dermot Gately, Nourah Al-Yousef, and Hamad M. H. Al-Sheikh, "The Rapid Growth of Domestic Oil Consumption in Saudi Arabia and the Opportunity Cost of Oil Exports Foregone," *Energy Policy* 47 (2011):58; Glada Lahn and Paul Stevens, *Burning Oil to Keep Cool: The Hidden Energy Crisis in Saudi Arabia* (London: Chatham House, 2011), 11.
16. http://www.taxrates.cc/htm1/Saudi-arabia-tax-rates.
17. Abdulaziz M. Aldukheil and Darwin Wassink, "Oil and the International Finance System," *Business Horizon* 20, no. 4 (1977): 69.
18. Kingdom of Saudi Arabia, Ministry of Economy and Planning, Central Department of Statistics and Information, *Statistical Yearbook 2010* (Riyadh: 2010), 41.
19. Saline Water Conversion Corporation, *Annual Report 2011*, 24.
20. Kingdom of Saudi Arabia, Ministry of Economy and Planning, *The Ninth Development Plan*, 2010–2014, 1431–1435H (Riyadh: 2009), 529.

Bibliography

Abdeen, Adnan M., and Shook N. Dale. *The Saudi Financial System: In the Context of Western and Islamic Finance*. New York: John Wiley & Sons, 1984.

Adelaman, Morris A. *The World Petroleum Market*. Baltimore, MD: John Hopkins University Press, 1974.

Aissaoui, Ali. "Saudi Arabia's Economic Diversification—Progress in the Context of GCC and Challenges." In *Resources Blessed: Diversification and the Gulf Development Model,* edited by Giacomo Luciani. Berlin: Gerlach Press, 2012.

Aldukheil, Abdulaziz M. "An Optimum Base for Pricing Middle Eastern Crude Oil." PhD diss., Indiana University, 1974.

———. "Financial System Development in Saudi Arabia" MEED Conference, 1991.

———. *The Banking System and Its Performance in Saudi Arabia*. London: Saqi Books, 1995.

———. *Saudi Stock Market: Future Vision for the Saudi Economy—The Financial Sector: Challenges and Opportunities*. Ministry of Economy and Planning, Saudi Arabia, 2002.

Aldukheil, Abdulaziz M., and Wassnik, Darwin. "Oil and International Systems," Indiana University. *Business Horizons*. April 1977, 69.

Alisjahbana, Armida, and Arief Anshory Yusuf. "Assessing Indonesia's Sustainable Development: Long-Run Trend, Impact of Crisis, and Adjustment during the Recovery Period." *Asian Economic Bulletin* 3, no. 21 (2004): 290–307.

Al-Moneef, Majid. "Global Energy Outlook: Challenges and Opportunities for GCC." In *The Oil Era: Emerging Challenges,* edited by Emirates Center for Strategic Studies and Research (ECSSR). Abu Dhabi: ECSSR, 2011.

Alquist, Ron, Lutz Kilian, and Robert J. Vigfusson. "Forecasting the Price of Oil." Working Papers. Bank of Canada (2011): 11–15.

Arrow, Kenneth J., Partha Dasgupta, and Karl-Goran Maler. "The Genuine Savings Criterion and the Value of Population." *Economic Theory* 21 (2003): 217–225.

Askari, Hossein. *Saudi Arabia: Oil and the Search for Economic Development*. Stanford: JAI Press, 1990.

———. *The Middle East Oil Exporters: What Happened to Economic Development?* Cheltenham: Edward Elgar Publishing, 2006.

Askari, Hossein, John Thomas Cummings, and J. McMurray. "How Rich is Oil Rich?" *Middle East International* 87 (1978).

Askari, Hossein, and John Thomas Cummings. *Middle East Economies in the 1970s: A Comparative Approach*. New York: Praeger, 1976.

Askari, Hossein, and M. Jaber. "Oil Exporting Countries of the Persian Gulf: What Happened to All That Money?" *Journal of Energy Finance and Development* 4, no. 2 (2000).

Askari, Hossein, Stephen Pease, C. Stone, and J. Wolgin. "The Value of a Barrel of Oil." *The Middle East Journal* 120, no. 2 (1975).

Atkinson, Giles. "Re-thinking Economic Progress." *World Economics* 1, no. 1 (2000).

Atkinson, Giles, Simon Dietz, and Eric Neumayer, eds. *Handbook of Sustainable Development*. Cheltenham: Edward Elgar Publishing Company, 2007.

Atkinson, Giles, and K. Hamilton. "Saving, Growth and Resource Curse Hypothesis." *World Development* 31, no.11 (2003): 793–1807.

Credit Suisse Securities Research and Analytics. "The Shale Revolution." December, 2011.

Darely, J. "The Future of Global Oil Supply: Saudi Arabia" Julian@postcarbon.org.

Dasgupta P. S., and G. M. Heal, *Economic Theory and Exhaustible Resources* (New York: Cambridge University Press, 1979).

Deffeyes, Kenneth S. *Beyond Oil*. New York: Hill and Wang, 2006.

Economist Intelligent Unit. "The GCC in 2020: Outlook for the Gulf and Global Economy." White Paper, The Economist Intelligent Unit Limited and Qatar Financial Centre Authority, 2009.

El-Serafy, Salah. "Absorptive Capacity, the Demand for Revenue, and the Supply of Petroleum." *Journal of Energy and Development* 7 (1981): 73–88.

———. "The Proper Calculation of Income from Delectable Natural Resources. In *Environmental Accounting for Sustainable Development: A UNDP-World Bank Symposium*, edited by Y. J. Ahmed, S. El-Serafy, and E. Lutz, 10–18. Washington DC: World Bank, 1989.

Ferreira, Susan, Kirk Hamilton, and Jeffrey R. Vincent. "Comprehensive Wealth and Future Consumption: Accounting for Population Growth." *The World Bank Economic Review* 22, no. 2 (2008): 233–248.

Galal, Ahmed and Nadeem Ul Haque, eds. *Fiscal Sustainability in Emerging Markets: International Experience and Implications for Egypt*. Cairo: The American University in Cairo Press, 2006.

Gately, D., N. Al-Yousef, and H. Al-Sheik. " The Rapid Growth of OPEC Domestic Oil Consumption." August 13, 2011, "http://ssrn.com/" \t "_blank" http://ssrn.com/abstract = 2006767.

Gulf Investment Corporation. *GCC Economic Statistics*. 10th ed. Safat: GIC Economics and Strategy Division, 2011.

Hamilton, Kirk. "Accounting for Sustainability." The World Bank Environment Department, April 2003.

Hamilton, Kirk, and Ernst Lutz. "Green National Accounts: Policy Uses and Empirical Experience." Environmental Economic Series, The World Bank, Paper No. 039. July 1996.

Hamilton, Kirk, Giles Atkinson, and David Pearce. "Genuine Savings as an Indicator of Sustainability." Working Paper. The World Bank, Environment Department and The Centre for Economic and Social Council.

Hartwick, John, M. "Natural Resources, National Accounting and Depreciation." *Journal of Public Economics* 43 (1990): 291–304.

———. "Green National Income and Green National Product." *The Annual Review of Resource Economics* (2011).

International Energy Agency. *World Energy Outlook 2011.* Paris: OECD/IEA, 2011.

International Monetary Fund. *Saudi Arabia—An Economic and Financial Survey*. SM/78/220. Washington DC: International Monetary Fund, 1978.

———. *Saudi Arabia—Recent Economic Developments*. SM/79/94. Washington DC: International Monetary Fund, 1979.

———. *Saudi Arabia—Staff Report for the 1979 Article IV*. SM/79/79. Washington DC: International Monetary Fund, 1979.

———. *Saudi Arabia—Recent Economic Developments and Selected Issues*. Article IV, SM/ 89/142. Washington DC: International Monetary Fund, 1989.

———. *Saudi Arabia—Recent Economic Developments*. Washington DC: International Monetary Fund 1990.

———. *Saudi Arabia—Recent Economic Developments and Selected Issues.* SM/98/152. Washington DC: International Monetary Fund, 1998.

———. *Saudi Arabia———Selected Issues and Statistical Appendix*. SM/05/354. Washington DC: International Monetary Fund, 2005.

———. *Saudi Arabia—Staff Report for the 2003 Article IV Consultation*. Washington DC: International Monetary Fund, 2003.

———, *Saudi Arabia- Staff Report for the 2005 Article IV Consultation*. SM/05/328. Washington DC: International Monetary Fund, 2005.

———. *Saudi Arabia: Financial System Stability Assessment, including Reports on the Observance of Standards and Codes on the Following Topics: Monetary and Financial Policy Transparency, Banking Supervision and Payment System*. IMF Country Report no. 06/199. Washington DC: International Monetary Fund, 2006.

———. *Saudi Arabia: Staff Report for the 2011 Article IV Consultation*. IMF Country Report No. 11/292. Washington DC: International Monetary Fund, 2011.

Karl, Terry L. *The Paradox of Plenty: Oil Booms and Petro-States*. Berkeley: University of California Press, 1997.

Kingdom of Saudi Arabia. Ministry of Economic and Planning. Central Department of Statistics and Information. *Achievements of Development Plans—Facts and Figures 1970–2011*, no. 28. Riyadh, 2010.

———. Ministry of Economic and Planning. Central Department of Statistics and Information. *Export Statistics 2010*. Riyadh, 2010.

Kingdom of Saudi Arabia. Ministry of Economic and Planning. Central Department of Statistics and Information. *Import Statistics 2010*. Riyadh, 2010.

———. Ministry of Economic and Planning. Central Department of Statistics and Information. *National Accounts 2010*. Riyadh, 2010.

———. Ministry of Economic and Planning. Central Department of Statistics and Information. *The Ninth Development Plan 2010–2014*. Riyadh, 2010.

———. Ministry of Economic and Planning. Central Department of Statistics and Information. *The Statistical Indicators 2010*. Riyadh, 2010.

———. Ministry of Economic and Planning. Central Department of Statistics and Information. *Statistical Yearbook 2010*. Riyadh, 2010.

———. Ministry of Economic and Planning. Central Department of Statistics and Information. *Statistical Yearbook 2011.* Riyadh, 2010.

Krimly, Rayed. "The Political Economy of Adjusted Priorities: Declining Oil Revenues and Saudi Fiscal Policies." *The Middle East Journal* (1999): 254–267.

Lahn, Glada, and Paul Steven. *Burning Oil to Keep Cool: The Hidden Energy Crisis in Saudi Arabia*. London: Chatham House, 2011.

Macartan Humphreys, Jeffery D. Sach, and Joseph E. Stiglitz, (eds.), *Escaping The Resource Curse*. New York: Columbia University Press, 2007.

Massayuki, Sato, Sovannroeun Samreth, and Katsunori Yamada. " A Numerical Study on Assessing Sustainable Development with Future Genuine Savings Simulation." *Human Behavior and Socioeconomic Dynamics.* Global COE Program, Discussion Paper no. 22, 2011.

Mitchell, J. V., and P. Steven. *Ending Dependence—Hard Choices for Oil-Exporting States*. Chatham House Report, July 2008.

Mitchell, J. V., and Daniel Schmidt. " Petroleum Depletion, Dependence and Development in Saudi Arabia." Working Paper. Chatham House Report, Jan. 2008.

Mordechai, Abir. *Saudi Arabia: Government, Society and Gulf Crisis*. London: Routledge, 1993.

Nabli, Mostapha Kamel. *Breaking the Barriers to High Economic Growth*. Washington DC: The World Bank, 2007.

Niblock Tim, and Monica Malik, *The Political Economy of Saudi Arabia* (London: Routledge, 2007).

Parra, Francisco. *Oil Politics: A Modern History of Petroleum*. London: I. B. Tauris, 2010.

Robins, Philips. "Can Gulf Monarchies Survive the Oil Bust." *The Mideast Quarterly* (1994): 45.

Safran, Nadav. *Saudi Arabia: The Ceaseless Quest for Security* (Cambridge: Harvard University Press, 1985).

Simmons, Matthew R. *Twilight in The Desert* (Hoboken: John Wiley & Sons, 2005).

Tanzer, Michael. *The Political Economy of International Oil and the Underdeveloped Countries.* London: Beacon Press, 1970.

Van den Bergh, Jeroen, C. J. M. "The GDP Paradox." *Journal of Economic Psychology* 30 (2009): 117–135.

Vassiliev, Alexei. *The History of Saudi Arabia*. London: Saqi Book, 1998.

Wilson, Peter W. and Douglas F. Graham, *Saudi Arabia: The Coming Storm* (New York: M. E. Sharpe, 1994).

Young, Arthur N. "Saudi Arabia Currency and Finance." *The Middle East Journal* 7, no. 3 (1953): 25.

———. "Saudi Arabia Currency and Finance." *The Middle East Journal* 7, no. 4 (1953): 25.

———. *Saudi Arabia: The Making of a Financial Giant*. New York: New York University Press, 1983.

Index