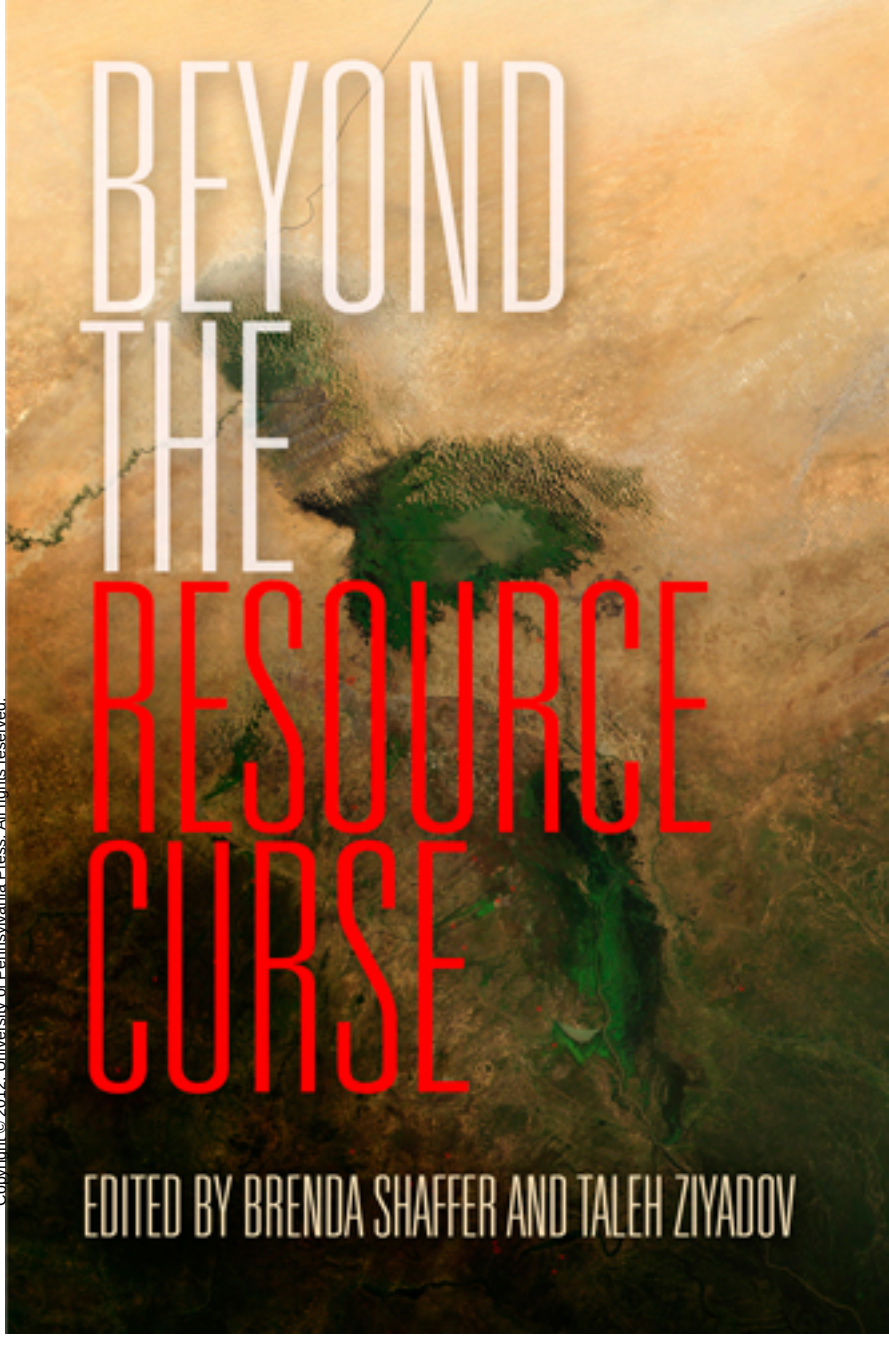

BEYOND THE RESOURCE CURSE

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Brenda Shaffer and Taleh Ziyadov

Introduction

Brenda Shaffer

Energy security is a fundamental challenge for major energy-exporting states. Most policymakers and many academics think of energy security solely in terms of the interests of energy importers. However, the constant volatility in energy prices and the permanent uncertainty of supply and consumption trends create energy security challenges for both importers *and* exporters. *Beyond the Resource Curse* examines a number of the challenges to energy-exporting states that emanate from this volatility and studies the various influences of oil and gas revenue on exporting states.

Energy production and transport is a highly capital-intensive industry. Creating new energy production also requires a long lead time, which means that energy supply and demand are frequently unsynchronized. This creates inherent energy price volatility and the subsequent boom and bust cycles characteristic of energy-exporting economies. Energy trade is the largest input in the world economy, and energy consumption and production trends directly influence and are influenced by the state of the world economy. Although the ebbs and flows of energy prices have a significant impact on the state of the world economy, those same ebbs and flows can translate into tsunamis and tidal waves for energy-exporting economies. This can be seen in the collapse of prices that took place with the onset of the current global financial crisis that began in 2008, when the price of oil fell to under $40 a barrel in January 2009. Just half a year earlier, oil prices had been at an all-time high of $147 a barrel.

Over the years, analysts have not been very good at predicting changes in oil prices, further complicating energy exporters' long-term planning. Oil prices fluctuate twice as frequently as other commodities.[1] In the last decade, oil prices have been especially volatile. In 2008, for example, daily oil prices increased or declined by at least 5 percent a total of thirty-nine times. This extreme unpredictability can wreak havoc with energy-exporting states' economic and budget projections. Oil producers may have enjoyed rising state revenues from 2004 to 2007, but the sudden collapse in oil prices in 2008 and 2009 left the state budgets and national economies of many oil exporters in turmoil.

States that rely predominately on revenues from energy export operate in an environment of constant uncertainty that creates a built-in challenge in state budgets on every level of government. This uncertainty leads to unstable state investments and thus often produces inadequately maintained infrastructures, such as roads and electricity grids. It also creates difficulty in building human capital over the long term. This often leads energy-exporting states to invest in policies that produce short-term, often ineffective, results, such as constructing new buildings and funding student scholarships instead of establishing comprehensive educational institutions and programs. This price uncertainty also affects exporters' ability to invest in and attract investments in oil and natural gas production, which affects the long-term productivity of the very source of their economic livelihoods.

The Resource Curse

In recent decades, scholars have found that exporting natural resources, such as oil and natural gas, tends to produce a distinctive set of political and economic qualities in major exporting states. This phenomenon is known as the resource curse. It refers to the tendency of natural-resource-exporting countries to underperform economically, have nondemocratic governments as well as poor governance, and a higher propensity for involvement in conflicts. *Beyond the Resource Curse* builds on the resource curse literature (which is surveyed in Chapter 2). It examines characteristics of energy exporters beyond these three main subjects that fall under the category of the resource curse and looks at a wider list of perils, including education, electricity infrastructure, and foreign policy.

Energy-exporting states are often categorized along the scale of "Norway or Nigeria," with these countries representing archetypical outcomes of

the benefits and the detriments of hydrocarbon export. *Beyond the Resource Curse* shows that the fate of states may be much more nuanced: even Norway is plagued with some of the perils of energy exports (see Chapter 10). In addition, a number of the energy exporters, such as the United Arab Emirates, have benefited immensely from their oil wealth and have advanced their levels of human development despite the associated perils of the resource curse (see Chapter 3). The analysis of Norway in this volume claims that energy-exporting countries tend to develop powerful oligarchies, regardless of their regime type, that influence policy decisions beyond the narrow economic sector in which they operate.

Beyond the Resource Curse also looks at the strategies various states have adopted to circumvent the resource curse. This volume uses *peril* and not *curse* to refer to the consequences of energy export because the dangers from oil and gas export might not materialize. Appropriate policies may enable the state to avert or minimize these dangers. In addition, a number of variables can produce different influences on the resource revenue. These variables include the size of a state's population, how diverse it was economically as well as how entrenched the rule of law and good governance were before major energy exports came online, the ownership structure of the state's energy resources, and the degree of modernization the state and society had undergone prior to the onset of the energy export. The volume shows, for example, that the fiscal volatility associated with energy exports is affected by the size of the population of a state. Energy exporters with relatively large populations (such as Iran, Russia, and Venezuela) are less likely to maintain fiscal balance when energy export revenues are relatively low. Energy-exporting countries with small populations (such as the United Arab Emirates, Qatar, and Azerbaijan) are much less likely to encounter this problem.

Beyond the Resource Curse also examines a variety of cases where newer energy exporters initiated their major export activity while already aware of the potential perils of the resource. Most of these states have undertaken measures intended to avert these perils. Study of these states that benefited from the knowledge of the potential export perils of hydrocarbons may shed new light on the impact oil and natural gas exports can have on a country's economy and society.

This volume will, however, focus only on major energy exporters. The International Monetary Fund (IMF) defines major energy exporters as countries in which the average share of fuel exports exceeds 40 percent of total exports over a five-year period and the average value of fuel exports exceeds

$500 million. The remainder of this introductory chapter examines energy security from the perspective of major energy exporters and the perils energy exporters face in the international political system.

Energy Security

In recent decades, the term *energy security* has appeared frequently in policy debates and has become a major policy goal of many states. Yet discussions of energy security are often unclear about what the term means. Energy security is composed of three elements:[2]

- Reliability
- Affordability
- Environmental Sustainability

In discussions of energy policies, many people confuse the concepts of energy security and energy independence. The goal of achieving "energy independence" is a frequent rallying call of U.S. politicians from across the political spectrum. For instance, President Barack Obama articulates this goal in his speeches and programs related to U.S. energy policies (note that the comprehensive U.S. legislation on energy policy from 2007 is called the Energy Independence Security Act). However, achieving adequate energy security does not require a state to provide all of its long-term energy needs domestically. Aspiring to energy independence is about as reasonable as striving for "technology independence." Most states do not attempt to cut themselves off from technology exchange and trade. Likewise, seeking isolation in the energy sphere limits opportunities to enhance energy security. In integrated global markets for oil and coal, domestically produced supplies do not provide economic advantage over imported ones. Thus, focusing on energy independence can mar the ability to achieve one of the components of energy security: affordability.

Energy Security Challenges Faced by Energy Exporters

Energy importers and exporters both face energy security challenges. Almost counterintuitively, energy security challenges may be more acute for export-

ing states than importing states. Here is an overview of the energy security challenges major energy exporters face.

Reliability

For energy exporters, *reliability* means dependability of markets. An energy supplier is concerned about reliability of demand, just as an energy importer is concerned about reliability of supply. As Hasan Qabazard, director of the Research Division of the Organization of Petroleum Exporting Countries (OPEC), noted in the newspaper *Emirates Business 24/7*, "The security and predictability of demand are as important as the security of supply."[3]

Demand for fossil fuels is vulnerable to change, especially in response to policy measures that promote conservation, economic downturns, and technological advances. State policies, such as carbon or other taxes that aim to reduce fossil fuel consumption or vehicle and machine efficiency standards, affect demand for fossil fuels. Moreover, there is a direct correlation between economic growth rates and energy consumption rates. In addition, new technological developments can create alternative sources of energy or develop additional locations of production and thus deprive energy suppliers of markets for their oil and gas. For example, recent technological developments in the production of natural gas found in shale rock will most likely lead to natural gas replacing oil and coal in many functions. This development may also turn many current natural gas importers into exporters. The map of natural gas exporters will most likely change fundamentally in the coming decade. In response to the current prospects for production of natural gas from shale rock and other unconventional sources, the future of a number of liquefied natural gas (LNG) markets has also become radically uncertain.

Just as the reliability of supply can change, the reliability of markets can be challenged by potential obstructions and disruptions from energy transit states. Supply arrangements involving transit states are much more prone to disruption than arrangements in which exporters and importers have a direct relationship. Among the three types of states along the energy supply line—exporting states, transit states, and importing states—transit states have the most significant incentive and least risk from disrupting supply as a means to

promote other goals. In recent decades, energy supply arrangements involving transit states have become more prevalent for three reasons: (1) rising consumption of natural gas, a commodity that is predominately supplied by pipelines; (2) initiation of oil and natural gas exports from a number of landlocked states (Chad, Kazakhstan, Azerbaijan, and Turkmenistan); and (3) expanded oil and natural gas exports from Russia to markets in Europe through supply networks involving transit states.

In addition, whereas the oil or "energy weapon" is seen as a tool in the hands of suppliers, it is more often utilized by consumers. In the case of oil, unless every supplier participates, a consumer cannot be denied supplies. However, export markets can effectively be denied to a state. In the last two decades, the United States and the UN have often used denial of oil markets and sanctions on investments in the oil and gas sector as a tool to moderate the behavior of oil- and gas-exporting states that include Iraq, Iran, Libya, and Sudan.

Furthermore, reliability of supply and markets is threatened by potential attacks on sea lanes and supply infrastructures. Both criminal and terrorist elements target energy export and transport infrastructure. Points of vulnerability include a number of narrow sea-lane passages that are potential choke points for major oil shipments, such as the Straits of Malacca, Hormuz, and Bosporus. Criminal elements are active in a number of major sea-lane passages. Terrorist elements can utilize this criminal infrastructure to obstruct oil transport as well.

A more fundamental challenge to energy exporters emanates from the fact that their main source of economic revenue is a commodity that in each location will at some point be depleted. In addition, on a global scale, technological advancement is likely to find a substitute for oil and other hydrocarbons even before they are exhausted. This bleak long-term outlook for energy exporters is compounded by the fact that major oil and natural gas exports tend to lead to the contracting of other sectors of the economy (a phenomenon commonly called "Dutch disease") that leaves exporters with little economic backup once those reserves are depleted or no longer in demand.

In recent decades, a number of energy exporters have undertaken policy measures to plan for their post-export period. One key policy instrument is the establishment of state oil funds. The guidelines governing a number of these funds deny the use of a large portion of the revenues for regular gov-

ernment budgetary expenditures and require saving them for investments in infrastructure and human capital.

Affordability

Affordability is an energy security concern for energy exporters and importers alike. Energy exporters face a complicated balancing act. On one hand, they must maintain a price that is high enough to attract continued investment in energy production and to maintain their national budgets. At the same time, energy exporters need energy prices to be moderate enough so that alternatives to fossil fuels do not become economically attractive and so that high energy prices do not lead to global economic recession and consequently a decline in demand for energy.

Maintaining oil and other energy prices that will attract investment in new production in the sector is a consistent energy security challenge. Investment trends are affected by prices and the general state of the economy, and so there is a trend toward underinvestment in future production when prices are low, which sets the stage for the next price spike and thus future volatility. Economic downturns generally lead to significant reduction in the demand for energy and thus lack of resources for investment in maintaining and expanding production of oil and natural gas. Although oil shocks have a negative impact on energy importers, they have an even greater negative impact on the economies of energy exporters over the long term. Each major oil shock during the last half century has led to long-term reduction in the growth of the global demand for oil.

In addition to maintaining a price that attracts investment in future production, major energy exporters require a price level that allows them to sustain their national budgets. Energy exporters are generally highly dependent on revenues from energy. Since the collapse of global oil prices in August 2008, most energy exporters with large populations have maintained a large gap between their budgets and their revenues from energy export. Iran, for instance, only maintains a balanced budget when oil prices are between $90 and $95 a barrel. Venezuela needs at least a similar oil price—if not a higher one—to maintain its budget.

State budgets of energy-exporting countries are particularly challenging to balance because most energy exporters maintain extensive subsidies for

domestic consumption (see Chapter 5), especially subsidies for energy and energy products (vehicle fuels, electricity, and heating). Traditionally, energy exporters have conducted policies of maintaining low energy prices or even supplying free energy for their publics as a symbolic gesture of sharing the energy wealth. Domestic energy consumption in energy exporters is generally extremely high and energy efficiency is low.

However, when energy export revenues fall, domestic energy consumption patterns do not change because domestic prices are not linked to market trends. Thus, the state must continue to pay out large amounts of money on energy subsidies, even when its own revenues have fallen. States encounter great public resistance to the reduction or elimination of the domestic subsidies despite the great economic burden they impose. Moreover, publics are attached to these energy subsidies even though in most states they actually benefit the rich more than the poor. (Even at subsidized rates, the poor have limited means to consume the energy and often the subsidized products do not even reach those in need.) Due to its subsidies policies, Malaysia, for example, expends more on domestic energy subsidies than on health and education. Indonesia, even after becoming a net importer of oil in 2004, continues to subsidize domestic consumption of fuel, importing fuel at a higher price than the price at which it sells the fuel to the public. Iran spends over a quarter of its economic output on energy subsidies. Energy consumption subsidies also create additional costs to the state by stimulating consumption and thus pollution, which causes environmental and public health damage. The Obama Administration and the Group of 20 (G-20) have emphasized reducing energy subsides as a major plank in their policies to reduce fossil fuel consumption in the developing world, and these subsidies will be an issue of international political interest and on the domestic political agendas of energy exporters in coming years.

While striving to keep oil prices at a level that attracts investment and sustains states' budgets, energy exporters aspire to maintain an oil price that is low enough to discourage the development of alternative energy sources. In recent decades, OPEC, under Saudi Arabia's leadership, adopted a policy that favored maintenance of moderate oil prices in order to discourage transference to other energy sources. The most powerful disincentive for the development of alternative energy sources is lower oil prices. There is a correlation between investments in alternative and renewable energy technologies and the oil price: when the price is down, investments in alternative and renewable energy go down as well. Oil's main appeal is its low price relative to other energy sources. However, since the early part of the twenty-first century, OPEC has abandoned

this policy of moderate world oil prices. Although keeping oil prices high brings revenue and investments to oil producers in the short run, it can lead to enduring reduction in demand in the long run. In order to maintain a price level that will ensure exporters' ability to meet their domestic commitments, OPEC producers often use their united production power to influence oil price trends. In 2009, OPEC cut production levels a number of times in order to prop up prices. This policy of maintaining higher prices, however, contains the peril of contributing to the demise of the long-term global demand for oil.

Environmental Sustainability

Environmental sustainability is a challenge for producers as well as consumers. Energy production poses dangers to public health and environmental sustainability. Most energy exporters rank high in pollution production and carbon emission. In addition, energy exporters tend to develop petrochemical industries that pose significant health and environmental risks.

Like all states, energy exporters are confronting the results of climate change. However, climate change creates an additional problem for energy exporters. If genuine steps are taken to address climate change and reduce global emission of carbon, demand will be greatly reduced or even eliminated for the very commodity that is the basis of these countries' economies. Many oil exporters view serious policies aimed at combating climate change as an existential threat. The December 2009 Copenhagen Conference failed to produce a binding agreement or defined targets for combating climate change. For those most concerned with the issue of climate change, this summit and the ensuing policy activity are considered a colossal failure. Still, major energy exporters expressed satisfaction regarding international inaction on climate change. On the closing day of the Copenhagen Conference, the chief negotiator from Saudi Arabia proclaimed that he was "satisfied" with the results of the Copenhagen Conference and that the adopted resolutions reflect "the interests of OPEC countries."[4]

Energy Exporters in the International Arena

Oil and natural gas exporters face a number of major perils in the international arena. Energy exporters are often presumed to possess significant

geopolitical clout due to their energy riches. Despite the immense wealth transfer from energy importers to energy exporters, however, exporters have not been able to convert their revenues into significant geopolitical power. Furthermore, importing states view political action by energy exporters with caution and take collective action to undermine it. Since the energy crisis of the 1970s, importing states have taken a number of significant steps to offset the geopolitical power of the energy exporters, such as coordinating their policies vis-à-vis exporters, sharing information, and establishing extensive energy storage reserves. In addition, when energy-exporting countries change their policies to respond to changes in energy prices, it can lead to a lack of synchronization among energy-exporting states' foreign policies.

Leveraging Energy Revenues?

Each extended oil price boom brings immense revenue to major energy exporters. Despite this tremendous wealth, the geopolitical advantage acquired from this revenue is not clear. Major oil exports contribute to the longevity of ruling regimes in the exporting states, including their ability to receive security backing from major powers, chiefly the United States.[5] However, beyond this advantage, it appears that energy exporters have not been able to leverage their energy revenues significantly in the foreign policy arena. For example, energy exporters—with the exception of Russia, which benefits from significant sources of geopolitical power that do not derive from its energy wealth—have in many instances not succeeded in accomplishing their goals in the territorial conflicts that they champion. Azerbaijan believed that its role as an energy exporter and its acquired energy wealth would interest a number of global powers in the stability of the South Caucasus and thus a resolution of the Nagorno-Karabach conflict. Yet, in the years following Azerbaijan's initiation of major energy exports, the country had not come closer to resolution of the conflict in a manner favorable to Azerbaijan's position. At the same time, major Middle East producers have not succeeded in leveraging their energy wealth into resolution of the Palestinian-Israeli conflict according to their proclaimed goals.

Presumably, many of the same perils and curses that afflict major energy-exporting economies and the governance patterns of major energy exporters also affect their security and foreign policy capacity. As seen in *Beyond the Resource Curse*, major energy exports have an impact on diverse spheres, such

as education reform and electricity provision. Accordingly, these same patterns can imperil additional spheres in the security and foreign policy realm, such as military acquisition patterns and security capacity building. Military capacity, like electricity infrastructures, requires long-term and consistent acquisitions and maintenance and is plagued by the inconsistencies of economic boom and bust cycles. In addition, energy exporters tend to acquire "white elephants" during boom cycles, which in the short term can create an impression of success but may not contribute to a sustainable policy in the long term. Military acquisition patterns in energy exporters will likely be a topic of further research.

An additional factor affecting the modest geopolitical clout of energy exporters is their lack of ability to operate as a coordinated force. Due to the commercial manner of the oil trade, OPEC did not succeed in conducting boycotts of states—even at the height of its power in the 1970s. The call of the Arab states in OPEC to embargo sales to the United States, the Netherlands, and Israel following the 1973 Yom Kippur War did not lead to the actual suspension of supplies to any states. The call to boycott did trigger an extreme price increase of more than 400 percent, but this was in light of the prevailing tight conditions in the world oil market.[6] Since the 1970s, however, OPEC member states have played a much smaller role in world oil production. In the 1970s, OPEC states produced 60 percent of the world oil output. In 2010, they are responsible for approximately 40 percent of global oil production.

In the field of natural gas, it seems that coordination between producers is even less attainable. In contrast to the dramatic statements of representatives from the Gas Exporting Countries Forum (GECF), this organization has not made any inroads in coordinating the policies of gas-exporting countries.[7] The core members of the group have conflicting interests, which dramatically decrease the prospects for coordinated action. Iran and Venezuela, for example, want to promote the forum to act as a "gas OPEC" regulating production and export among the member states, but Iran and Venezuela are not actually gas-exporting states.[8] The interests of these two countries diverge from those of Russia and Qatar, two other core states in the GECF. Russia is the largest exporter of the natural gas in the world, and Qatar is the largest exporter of LNG. In addition, as noted earlier, energy exporters are often more vulnerable to the perils of the "energy weapon" than consumers. Denial of markets to a specific producer is much more attainable and effective than attempts to boycott energy supplies to specific consumers.

The ability of energy exporters to leverage their energy revenue into geopolitical power has also been moderated by the united policy front by the major energy importers. As Richard Jones discusses in Chapter 10, the major energy importers have taken a number of steps since the oil crisis of the 1970s, including maintaining and coordinating energy supply storage, in order to minimize their vulnerability to the policies of the energy exporters. In fact, possessing substantial reserves—such as the U.S. Strategic Petroleum Reserve—give importers significant influence over market trends, including prices.

High-Risk Foreign Policy Perils?

The boom and bust revenue cycles resonate in the foreign policy patterns of many energy exporters. Among the manifestations in the sphere of foreign policy is the tendency of many energy exporters to adopt "resource nationalism" during periods of high oil and natural gas prices. As is discussed in Chapter 12, resource nationalism refers to the behavior of energy and other natural resource exporters to reopen contracts and nationalize production projects in an attempt to take advantage of their heightened power during periods of high prices. However, these policies often backfire in the long run, leading to a long-term decline in production and investments.

Another foreign policy manifestation of the boom and bust revenue cycles is the propensity for exporters to conduct foreign policies during periods of high prices that are unsustainable during periods of revenue decline. Revenue booms give these states a short-term increase in their power and thus encourage them to adopt hard-line foreign policy positions. These positions are not sustainable, however, due to the inevitable downward shift in oil prices and thus revenues and these states' power. Thus, oil and gas windfalls can lead to adoption of policies that are not effective in the long run and may be even very perilous for the exporters.

Organization of This Study

This volume presents the work of researchers from a variety of disciplines that range from economics and political science to international relations and sociology. The case studies examined in *Beyond the Resource Curse* cover a large

number of geographic locations, including Iran, Azerbaijan, Venezuela, East Timor, Trinidad and Tobago, the United Arab Emirates, Norway, and Cambodia. A number of the case studies are devoted to post-Soviet energy producers. In contrast to the bulk of the leading oil and natural gas producers, the post-Soviet producers had diversified economies and had undergone extensive modernization prior to becoming major oil exporters. At the same time, these states did not have democratic governments or strong rule of law. With this unique combination of traits, these post-Soviet cases enhance our ability to study the variance of different factors on the influence energy exports can have on countries' economies and societies.

Beyond the Resource Curse opens with a survey of energy security from the perspective of major energy exporters. In Chapter 1, Jeffrey Frankel reviews the resource curse literature. Next, Patrick Clawson examines successful cases of utilization of energy export revenue in Chapter 2. In Chapter 3, Richard Auty looks at the case of Trinidad and Tobago's export revenue to discern if the state has succeeded in avoiding the resource curse. In Chapter 4, Ahmad Mojtahed focuses on the impact of domestic energy consumption subsidies on Iran. In Chapter 5, Elkin Nurmammadov looks at central bank institutions in energy-exporting states, highlighting the case of Azerbaijan. Next, Theresa Sabonis-Helf examines the challenge of electricity provision in energy-exporting states in Chapter 6. In the volume's section on energy and society, Murad Ismayilov opens Chapter 7 with a discussion on energy exports and collective identity. In Chapter 8, Regine Spector analyzes education reform in energy-exporting states. Next, in Chapter 9, Ole Andreas Engen, Oluf Langhelle, and Reidar Bratvold ask if Norway has indeed averted the problems found in so many other energy-exporting states. In the volume's third section, which focuses on energy exporters in the international system, Richard Jones discusses the relationship between energy exporters and the International Energy Agency in Chapter 10. In Chapter 11, Amy Jaffe reviews energy exporters' adoption of resource nationalism policies. Next, in Chapter 12, Elnur Soltanov looks at the interaction between energy export, domestic instability, and international conflicts. In Chapter 13, Naazneen Barma examines energy exporters' postconflict governance and politics. The volume concludes with an analysis by Taleh Ziyadov.

1

The Natural Resource Curse: A Survey

Jeffrey Frankel

It is striking how often countries with oil or other natural resource wealth have failed to show better economic performance than those without. This is the phenomenon known as the "natural resource curse." The pattern has been borne out in econometric tests across a comprehensive sample of countries. This paper considers seven aspects of commodity wealth, each of which is of interest in its own right but also a channel that some have suggested could lead to substandard economic performance. They are: long-term trends in world commodity prices, volatility, permanent crowding out of manufacturing, weak institutions, unsustainability, war, and cyclical Dutch disease.

Skeptics have questioned the natural resource curse. They point to examples of commodity-exporting countries that have done well and argue that resource exports and booms are not exogenous. Clearly, the relevant policy question for a country with natural resources is how to make the best of them. The paper concludes with a consideration of ideas for institutions that could help a country that is endowed with commodities overcome the pitfalls of the curse and achieve good economic performance. The most promising ideas include indexation of contracts, hedging of export proceeds, denomination of debt in terms of the export commodity, Chile-style fiscal rules, a monetary target that emphasizes product prices, transparent commodity funds, and lump-sum distribution.

The Resource Curse: An Introduction

It has been observed for decades that the possession of oil or other valuable mineral deposits or natural resources does not necessarily confer economic success. Many African countries—such as Angola, Nigeria, Sudan, and the Congo—are rich in oil, diamonds, or minerals, yet their peoples continue to experience low per capita income and a low quality of life. Meanwhile, the East Asian economies of Japan, Korea, Taiwan, Singapore, and Hong Kong have achieved Western-level standards of living despite being rocky islands (or peninsulas) with virtually no exportable natural resources. Richard Auty is apparently the one who coined the phrase "natural resource curse" to describe this puzzling phenomenon.[1] Its use spread rapidly.[2]

Figure 1.1 shows a sample of countries during the last four decades. Exports of fuels, ores, and metals as a fraction of total merchandise exports appear on the horizontal axis, and economic growth is on the vertical axis. Conspicuously high in growth and low in natural resources are China (CHN), Korea (KOR), and some other Asian countries. Conspicuously high in natural resources and low in growth are Gabon (GAB), Venezuela (VEN), and Zambia (ZMB). The overall relationship on average is slightly negative. The negative correlation is not very strong, masking almost as many resource successes as failures. But it certainly does not suggest a positive correlation between natural resource wealth and economic growth.

How could abundance of hydrocarbon deposits—or other mineral or agricultural products—be a curse? What would be the mechanism for this counterintuitive relationship? Broadly speaking, there are at least seven lines of argument. First, prices of such commodities could be subject to secular decline on world markets. Second, the high volatility of world prices for energy and other mineral and agricultural commodities could be problematic. Third, natural resources could be dead-end sectors in the sense that they may crowd out manufacturing, which might be the sector to offer dynamic benefits and spillovers that are good for growth. (It does not sound implausible that "industrialization" could be the essence of economic development.) Fourth, countries in which physical command of mineral deposits by the government or by a hereditary elite automatically confers wealth on the holders may be less likely to develop the institutions, such as rule of law and decentralization of decision making, that are conducive to economic development. These resource-rich countries suffer in contrast to countries in which moderate taxation of a thriving market economy is the only way the government can finance itself.

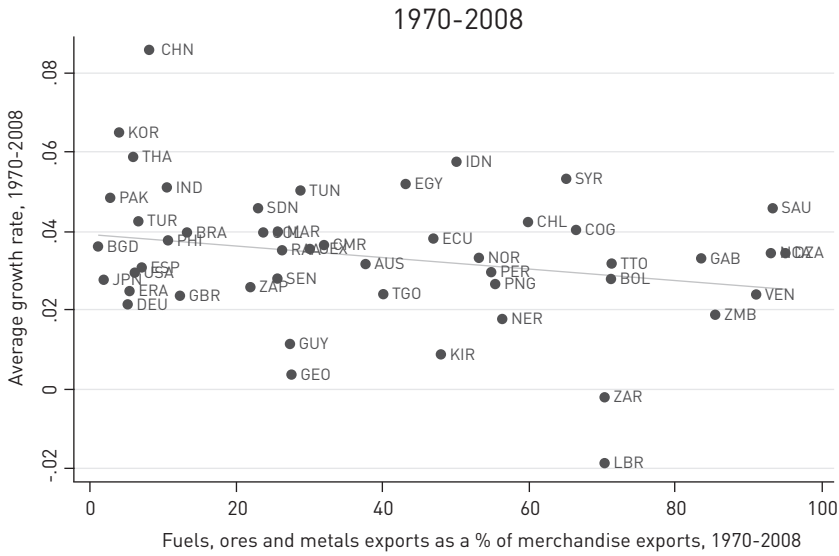


Figure 1.1 Statistical relationship between mineral exports and growth. World Development Indicators, World Bank.

Fifth, natural resources may be depleted too rapidly and leave the country with little to show for them, especially when it is difficult to impose private property rights on the resources, as under frontier conditions. Sixth, countries that are endowed with natural resources could have a proclivity for armed conflict, which is inimical to economic growth. Seventh, swings in commodity prices could engender excessive macroeconomic instability via the real exchange rate and government spending. This chapter considers each of these topics.

The conclusion will be that natural resource wealth does not necessarily lead to inferior economic or political development. Rather, it is best to view commodity abundance as a double-edged sword, with both benefits and dangers. It can be used for ill as easily as for good.[3] The fact that resource wealth does not in itself confer good economic performance is a striking enough phenomenon without exaggerating the negative effects. The priority for any country should be on identifying ways to sidestep the pitfalls that have afflicted other commodity producers in the past and to find the path of success. The last section of this chapter explores some of the institutional innovations that can help countries avoid the natural resource curse and achieve natural resource blessings instead.

Long-Term Trends in World Commodity Prices

Determination of the Export Price on World Markets

Developing countries tend to be smaller economically than major industrialized countries and more likely to specialize in the export of basic commodities. As a result, they are more likely to fit the small open economy model: they can be regarded as price takers, not just for their import goods, but for their export goods as well. That is, the prices of their tradable goods are generally taken as given on world markets. The price-taking assumption requires three conditions: low monopoly power, low trade barriers, and intrinsic perfect substitutability in the commodity between domestic and foreign producers—a condition usually met by primary products such as oil, and usually not met by manufactured goods and services. Literally speaking, not every barrel of oil is the same as every other and not all are traded in competitive markets. Furthermore, Saudi Arabia does not satisfy the first condition due to its large size in world oil markets.[4] But the assumption that most oil producers are price takers holds relatively well.

To a first approximation, then, the local price of oil is equal to the dollar price of oil on world markets times the country's exchange rate. It follows, for example, that a currency devaluation should push up the price of oil quickly and in proportion (leaving aside preexisting contracts or export restrictions). An upward revaluation of the currency should push down the price of oil in proportion.

Throughout this chapter, we will assume that the domestic country must take the price of the export commodity as given, in terms of foreign currency. We begin by considering the hypothesis that the given world price entails a long-term secular decline. The subsequent section of the paper considers the volatility in the given world price.

The Hypothesis of a Downward Trend in Commodity Prices (Prebisch-Singer)

The hypothesis that the prices of mineral and agricultural products follow a downward trajectory in the long run, relative to the prices of manufactures and other products, is associated with Raul Prebisch and Hans Singer and

what used to be called the "structuralist school."[5] The theoretical reasoning was that world demand for primary products is inelastic with respect to world income. That is, for every 1 percent increase in income, the demand for raw materials increases by less than 1 percent. Engel's Law is the (older) proposition that households spend a lower fraction of their income on food and other basic necessities as they get richer.

The Prebisch-Singer hypothesis, if true, would readily support the conclusion that specializing in natural resources is a bad deal. Mere "hewers of wood and drawers of water" (Deuteronomy 29:11) would remain forever poor if they did not industrialize. The policy implication that was drawn by Prebisch and the structuralists was that developing countries should discourage international trade with tariff and nontariff barriers to allow their domestic manufacturing sector to develop behind protective walls, rather than exploit their traditional comparative advantage in natural resources, as the classic theories of free trade would have it. This "import substitution industrialization" policy was adopted in most of Latin America and much of the rest of the developing world in the 1950s, 1960s, and 1970s. The trend reversed in subsequent decades, however.

Hypotheses of Upward Trends in Nonrenewable Resource Prices (Malthus and Hotelling)

There also exist persuasive theoretical arguments that we should expect prices of oil and other minerals to experience *upward* trends in the long run. The arguments begin with the assumption that we are talking about nonperishable, nonrenewable resources, that is, deposits in the earth's crust that are fixed in total supply and are gradually being depleted. (The argument does not apply as well to agricultural products.)

Let us add another assumption: whoever currently has claim to the resource, an oil company, for instance, can be confident that it will retain possession unless it sells to someone else, who then has equally safe property rights. This assumption excludes cases in which private oil companies fear that their contracts might be abrogated or their possessions nationalized.[6] It also excludes cases in which warlords compete over physical possession of the resource. Under such exceptions, the current owner has a strong incentive to pump the oil or extract the minerals quickly, because it might never

benefit from whatever is left in the ground. One explanation for the sharp rise in oil prices between 1973 and 1979, for example, is that private Western oil companies had anticipated the possibility that newly assertive developing countries would eventually nationalize the oil reserves within their borders and thus had kept prices lower by pumping oil more quickly during the preceding two decades than they would have done had they been confident that their claims would remain valid indefinitely.

HOTELLING AND THE INTEREST RATE

At the risk of some oversimplification, let us assume for now also that the fixed deposits of oil in the earth's crust are all sufficiently accessible and that the costs of exploration, development, and pumping are small compared to the value of the oil. Harold Hotelling deduced from these assumptions the important theoretical principle that the price of oil in the long run should rise at a rate equal to the interest rate.[7]

The logic is as follows: At every point in time, an owner of the oil—whether a private oil company or a state—chooses how much to pump and how much to leave in the ground. Whatever is pumped can be sold at today's price (this is the price-taker assumption) and the proceeds invested in bank deposits or U.S. Treasury bills, which earn the current interest rate. If the value of the oil in the ground is not expected to increase in the future or not expected to increase at a sufficiently rapid rate, then the owner has an incentive to extract more of it today so that it can earn interest on the proceeds. As oil companies worldwide react in this way, they drive down the price of oil today, below its perceived long-run level. When the current price is below its perceived long-run level, companies will expect that the price must *rise* in the future. Only when the expectation of future appreciation is sufficient to offset the interest rate will the oil market be in equilibrium. That is, only then will oil companies be close to indifferent between pumping at a faster rate and a slower rate.

To say that oil prices are *expected* to increase at the interest rate means that they should do so on average; it does not mean that there will not be price fluctuations above and below the trend. But the theory does imply that, averaging out short-term unexpected fluctuations, oil prices in the long term should rise at the interest rate.

If there are constant costs of extraction and storage, then the trend in oil prices will be lower than the interest rate, by the amount of those costs; if

there is a constant convenience yield from holding inventories, then the trend in prices will be higher than the interest rate, by the amount of the yield.[8]

MALTHUSIANISM AND THE "PEAK OIL" HYPOTHESIS

The idea that natural resources are in fixed supply and that as a result their prices must rise in the long run as reserves begin to run low is much older than Hotelling. It goes back to Thomas Malthus and the genesis of fears of environmental scarcity (albeit without interest rates necessarily playing a role).[9] Demand grows with population, and supply is fixed; what could be clearer in economics than the prediction that price will rise?[10]

The complication is that supply is not fixed. True, at any point in time there is a certain stock of oil reserves that have been discovered. But the historical pattern has long been that as the stock is depleted, new reserves are found. When the price goes up, it makes exploration and development profitable for deposits that are farther underground, underwater, or in other hard-to-reach locations. This is especially true as new technologies are developed for exploration and extraction.

During the two centuries since Malthus, or the seventy years since Hotelling, exploration and new technologies have increased the supply of oil and other natural resources at a pace that has roughly counteracted the increase in demand from growth in population and incomes.[11]

Just because supply has always increased in the past does not necessarily mean that it will always do so in the future. In 1956, oil engineer Marion King Hubbert predicted that the flow supply of oil within the United States would peak in the late 1960s and then start to decline permanently. The prediction was based on a model in which the fraction of the country's reserves that has been discovered rises through time, and data on the rates of discovery versus consumption are used to estimate the parameters in the model. Unlike myriad other pessimistic forecasts, this one came true on schedule and earned subsequent fame for its author.

The planet Earth is a much larger place than the United States, but it too is finite. A number of analysts have extrapolated Hubbert's words and modeling approach to claim that the same pattern will follow for extraction of the *world*'s oil reserves. Specifically, some of them claim the 2000 to 2011 run-up in oil prices confirmed a predicted global "Hubbert's Peak."[12] It remains to be seen whether we are currently witnessing a peak in world oil

production, notwithstanding that forecasts of such peaks have proven erroneous in the past.

Evidence

STATISTICAL TIME SERIES STUDIES

With strong theoretical arguments on both sides, one must say that the question whether the long-term trend in commodity prices is upward or downard is an empirical one. Although specifics will vary depending on individual measures, it is possible to generalize somewhat across commodity prices.[13] Terms of trade for commodity producers had a slight upward trend from 1870 to World War I, a downward trend in the interwar period, an upward trend in the 1970s, a downward trend in the 1980s and 1990s, and an upward trend in the first decade of the twenty-first century.

What is the overall statistical trend in the long run? Some authors find a slight upward trend, some a slight downward trend.[14] The answer seems to depend, more than anything else, on the end date of the sample. Studies written after the commodity price increases of the 1970s found an upward trend, but those written after the 1980s found a downward trend, even when both kinds of studies went back to the early twentieth century. No doubt, when studies using data through 2011 are completed, some will again find a positive long-run trend. This phenomenon is less surprising than it sounds. When a real price undergoes large twenty-year cycles around a trend,[15] estimates of the long-term trend are very sensitive to the precise time period studied.[16]

THE WAGER OF PAUL EHRLICH AND JULIAN SIMON

Paul Ehrlich is a biologist who is highly respected among scientists but has a history of sensationalist doomsday predictions regarding population, the environment, and resource scarcity. Julian Simon was a libertarian economist frustrated by the failure of the public to hold Malthusians such as Ehrlich accountable for the poor track record of their predictions. In 1980, Simon publicly bet Ehrlich $1,000 that the prices of five minerals would decline between then and 1990. (Simon let Ehrlich choose the ten-year span and the list of minerals: copper, tin, nickel, chromium, and tungsten.)

Ehrlich's logic was Malthusian: because supplies were fixed while growth of populations and economies would raise demand, the resulting scarcity would continue to drive up prices. He, like most observers, was undoubt-

edly mentally extrapolating into the indefinite future what had been a strong upward movement in commodity prices during the preceding decade.

Simon's logic, on the other hand, is called cornucopian. Yes, the future would repeat the past. The relevant pattern from the past was not the ten-year trend, however, but rather a century of cycles: resource scarcity does indeed drive up prices, whereupon supply, demand, and (especially) technology respond with a lag, which drives the prices back down. Simon was precisely right. He won the bet handily. Not only did the real price of the basket of five minerals decline over the subsequent ten years, but also every one of the five real prices declined. Simon was also, almost certainly, right about the reasons: in response to the high prices of 1980, new technologies came into use, buyers economized, and new producers entered the market.

The Ehrlich-versus-Simon bet carries fascinating implications, for Malthusians versus cornucopians, environmentalists versus economists, extrapolationists versus contrarians, and futurologists versus historians. For present purposes, the main important point is slightly more limited. Simple extrapolation of medium-term trends is foolish. One must take a longer-term perspective. The review of the statistical literature in the preceding subsection illustrated the importance of examining as long a statistical time series as possible.

However, one should seek to avoid falling prey to *either* of two reductionist arguments at the philosophical poles of Malthusianism and cornucopianism. On one hand, the fact that the supply of minerals in the earth's crust is finite does not in itself justify the apocalyptic conclusion that we must necessarily run out. As Sheik Ahmed Zaki Yamani, the former Saudi oil minister, famously said, "The Stone Age came to an end not for a lack of stones, and the oil age will end, but not for a lack of oil." Malthusians do not pay enough attention to the tendency for technological progress to ride to the rescue. On the other hand, the fact that the Malthusian forecast has repeatedly been proven false in the past does not in itself imply the Panglossian forecast that this will always happen in the future. Rather, one must seek a broad perspective in which all relevant reasoning and evidence are brought to bear in the balance.

Medium-Term Volatility of Commodity Prices

Of course, the price of oil does not follow a smooth path, whether upward or downward. Rather, it experiences large short- and medium-term swings

around a longer-term average. The world market prices for oil and natural gas are more volatile than those for almost any other mineral and agricultural commodities. (Copper and coffee are two major runners-up.) Most other mineral and agricultural commodity prices are also far more volatile than prices of most manufactured products or services.

Some have suggested that it is precisely the volatility of natural resource prices, rather than their long-term trends, that is bad for economic growth.[17]

Low Short-Run Elasticities

It is not hard to understand why the market price of oil is volatile in the short run or even the medium run. Because elasticities of supply and demand with respect to price are low, relatively small fluctuations in demand (due to weather, for example) or in supply (due to disruptions, for example) require a large change in price to re-equilibrate supply and demand. Demand elasticities are low in the short run largely because the capital stock at any point in time is designed physically to operate with a particular ratio of energy to output. Supply elasticities are also often low in the short run because it takes time to adjust output. Inventories can cushion the short-run impact of fluctuations, but they are limited in size. Some scope exists to substitute across different fuels, even in the short run. But this just means that the prices of oil, natural gas, and other fuels tend to experience their big medium-term swings together.

In the longer run, elasticities are far higher, both on the demand side and the supply side. This dynamic was clearly at work in the oil price shocks of the 1970s—the quadrupling of prices after the Arab oil embargo of 1973 and the doubling of prices after the Iranian revolution of 1979—which elicited relatively little consumer conservation or new supply sources in the short run but a lot of both after a few years had passed. People started insulating their houses and driving more fuel-efficient cars, and oil deposits were discovered and developed in new countries. This is a major reason why the real price of oil came back down in the 1980s and 1990s.

In the medium term, oil may be subject to a "cobweb cycle" due to the lags in response. Under this scenario, if the initial market equilibrium is a high price, the high price reduces demand after some years, which in turn leads to a new low price, which raises demand with a lag, which pushes the price back up again, and so on. In theory, if people have rational expectations, they should

look ahead to the next price cycle before making long-term investments in housing or drilling. But the complete sequence of boom-bust-boom during the past thirty-five years looks suspiciously like a cobweb cycle nonetheless.

Is Volatility per se Detrimental to Economic Performance?

Gamblers aside, most people would rather have less economic volatility than more. But is variability necessarily harmful for long-run growth? Some studies and historical examples suggest that high volatility can accompany the rapid growth phase of a country's development (the United States before World War I).

Cyclical shifts of factors of production (labor, capital, and land) back and forth across sectors—mineral, agricultural, manufacturing, and services—may incur needless transaction costs. Frictional unemployment of labor, incomplete utilization of the capital stock, and incomplete occupancy of housing are true deadweight costs, even if they are temporary. Government policy-makers may not be better than individual economic agents at discerning whether a boom in the price for an export commodity is temporary or permanent. But the government cannot completely ignore the issue of volatility with the logic that the private market can deal with it. When it comes to exchange rate policy or fiscal policy, governments must necessarily make judgments about the likely permanence of shocks. Moreover, because commodities are inherently risky, a diversified country may indeed be better off than one that specializes in oil or a few other commodities, all other things being equal. However, the private sector dislikes risk as much as the government does and will take steps to mitigate it; thus, one must think where the market failure lies before assuming that a policy of deliberate diversification is necessarily justified.

Later parts of this chapter will consider the implications of the medium-term boom-bust cycle further, under the heading "Dutch Disease and Procyclicality" and will consider how to deal with short-term volatility further, under the heading "Institutions and Policies to Address the Natural Resource Curse."

More Possible Channels for the Natural Resource Curse

The natural resource curse is not confined to individual anecdotes or case studies but has been borne out in some statistical tests of the determinants

of economic performance across a comprehensive sample of countries. Jeffrey Sachs and Andrew Warner (1995) kicked off the econometric literature and found that economic dependence on oil and minerals is correlated with slow economic growth, controlling for other structural attributes of the country. Sachs and Warner (2001) then summarized and extended previous research to show evidence that countries with great natural resource wealth tend to grow more slowly than resource-poor countries.[18] They say their result is not easily explained by other variables or by alternative ways to measure resource abundance. Their paper claims that there is little direct evidence that omitted geographical or climate variables explain the curse or that there is a bias in their estimates resulting from some other unobserved growth deterrent. Many other studies find a negative effect of oil in particular on economic performance.[19]

The result is by no means universal, especially when one generalizes beyond oil. Norway is conspicuous as an oil producer that is at the top of the international league tables for governance and economic performance.[20] As many have pointed out, Botswana and the Congo are both abundant in diamonds, yet Botswana is the best performer in continental Africa in terms of democracy, stability, and rapid growth of income[21] while the Congo is among the very worst.[22]

Among the statistical studies, Jacques Delacroix, Graham Davis, and Michael Herb all find no evidence of the natural resource curse.[23] Most recently, Michael Alexeev and Robert Conrad find that oil wealth and mineral wealth have *positive* effects on income per capita when controlling for a number of variables, particularly dummy variables for East Asia and Latin America.[24] In some cases, especially if the data do not go back to a time before oil was discovered, the reason different studies come to different results is that oil wealth may raise the *level* of per capita income while reducing or failing to raise the *growth rate* of income (or the end-of-sample level of income, if the equation conditions on initial income).[25]

In some cases, the crucial difference is whether "natural resource intensity" is measured by true endowments ("natural resource wealth") or by exports ("natural resource dependence"). The skeptics argue, in several different ways, that commodity exports are highly endogenous.[26]

On one hand, basic trade theory readily predicts that a country may show a high mineral share in exports, not necessarily because it has a higher endowment of minerals than other countries (*absolute* advantage) but because

it does not have the ability to export manufactures (*comparative* advantage). This is important because it offers an explanation for negative statistical correlations between mineral exports and economic development, an explanation that would invalidate the common inference that minerals cause low growth.

On the other hand, the skeptics also have plenty of examples in which successful institutions and industrialization went hand in hand with rapid development of mineral resources. Economic historians have long noted that coal deposits and access to iron ore deposits (two key inputs into steel production) were geographic blessings that helped start the industrial revolutions in England, the vicinity of the lower Rhine, and the American Great Lakes region. Subsequent cases of countries that were able to develop their resource endowments efficiently as part of strong economy-wide growth include: the United States during its prewar industrialization period,[27] Venezuela from the 1920s to the 1970s, Australia since the 1960s, Norway since its oil discoveries of 1969, Chile since its adoption of a new mining code in 1983, Peru since its privatization program in 1992, and Brazil since it lifted restrictions on foreign mining participation in 1995.[28] Examples of countries that were equally well endowed geologically but failed to develop their natural resources efficiently include Chile and Australia before World War I and Venezuela since the 1980s.[29]

It is not that countries with oil wealth will necessarily achieve worse performance than those without. Few would advise a country with oil or other natural resources that it would be better off destroying them or refraining from developing them. Oil-rich countries can succeed. The question is how to make best use of the resource. The goal is to achieve the prosperous record of a Norway rather than the disappointments of a Nigeria. The same point applies to other precious minerals: the goal is to be a Botswana rather than a Bolivia, a Chile rather than a Congo.

Let us return to a consideration of various channels whereby oil wealth could lead to poor performance. Based on the statistical evidence, we have already largely rejected the hypothesis of a long-term negative trend in world prices while accepting the hypothesis of high volatility. But we have yet to spell out exactly how high price volatility might lead to slower economic growth. In addition, we have yet to consider the hypotheses according to which oil wealth leads to weak institutions—including in countries experiencing

military conflict and authoritarianism—that might in turn lead to poor economic performance.

Is Commodity Specialization per se Detrimental to Growth?

What are the possible negative externalities to specialization in natural resources, beyond volatility? What are the positive externalities to diversification into manufacturing?

Outside of classical economics, diversification out of primary commodities into manufacturing in most circles is considered self-evidently desirable. Several false arguments have been made for it. One is the Prebisch-Singer hypothesis of secularly declining commodity prices, which we judged to lack merit in Part I of this chapter. Another is the mistaken "cargo cult" inference that is based on the observation that advanced countries have heavy industries such as steel mills and concludes that these visible monuments must therefore be the route to economic development. But one should not dismiss more valid considerations just because less valid arguments for diversification into manufacturing are sometimes made.

Is industrialization the sine qua non of economic development? Is encouragement of manufacturing necessary to achieve high income? Classical economic theory says no; it is best for countries to produce whatever is their comparative advantage, whether that is natural resources or manufacturing. In this nineteenth-century view, attempts by Brazil to industrialize were as foolish as it would have been for Great Britain to try to grow coffee and oranges in hothouses. But the "structuralists" mentioned early in this chapter were never alone in their feeling that countries only get sustainably rich if they industrialize (oil-rich sheikdoms notwithstanding). Nor were they ever alone in feeling that industrialization in turn requires an extra push from the government at least for latecomers, often known as industrial policy.

Kiminori Matsuyama provided an influential model formalizing this intuition: the manufacturing sector is assumed to be characterized by "learning by doing," yet the primary sector (agriculture, in his paper) is not.[30] This is the channel through which the resource curse works in Sachs and Warner (1995). The implication is that deliberate policy-induced diversification out of primary products into manufacturing is justified and that a permanent commodity boom that crowds out manufacturing can indeed be harmful.[31]

On the other side, it must be pointed out that there is no reason why "learning by doing" should be the exclusive preserve of manufacturing tradeables. Nontradeables can enjoy learning by doing.[32] Mineral and agricultural sectors can as well. Some countries have experienced tremendous productivity growth in the oil, mineral, and agricultural sectors. Since the late nineteenth century, American productivity gains have been aided by American public investment in such institutions of knowledge infrastructure as the U.S. Geological Survey, the Columbia School of Mines, the Agricultural Extension program, and land grant colleges. Although well-functioning governments can play a useful role in supplying these public goods for the natural resource sector, this is different than mandating government ownership of the resources themselves. In Latin America, for example, public monopoly ownership and prohibition on importing foreign expertise or capital has often stunted development of the mineral sector, whereas privatization has set it free.[33] Moreover, attempts by governments to force linkages between the mineral sector and processing industries have not always worked.[34]

Institutions

INSTITUTIONS AND DEVELOPMENT

A prominent trend in thinking regarding economic development is that the quality of institutions is the deep fundamental factor that determines which countries experience good performance and which do not[35] and that it is futile to recommend good macroeconomic or microeconomic policies if the institutional structure is not there to support them. Dani Rodrik, Arvind Subramanian, and Franceso Trebbi use as their measure of institutional quality an indicator of the rule of law and protection of property rights (taken from Daniel Kaufmann, Aart Kraay, and Pablo Zoido-Lobaton).[36] Daron Acemoglu, Simon Johnson, and James Robinson use a measure of expropriation risk to investors.[37] Acemoglu, Johnson, Robinson, and Yunyong Thaicharoen measure the quality of a country's "cluster of institutions" by the extent of constraints on the executive.[38] The theory is that weak institutions lead to inequality, intermittent dictatorship, and lack of constraints to prevent elites and politicians from plundering the country.

Institutions can be endogenous—the *result* of economic growth rather than the cause. (The same problem is encountered with other proposed

fundamental determinants of growth, such as openness to trade and freedom from tropical diseases.) Many institutions, such as the structure of financial markets, mechanisms of income redistribution, social safety nets, tax systems, and intellectual property rules, tend to evolve *endogenously* in response to the level of income.

Econometricians address the problem of endogeneity by means of the technique of instrumental variables. What is a good instrumental variable for institutions, an exogenous determinant? Acemoglu, Johnson, and Robinson introduced the mortality rates of colonial settlers.[39] The theory is that out of all the lands that Europeans colonized, only those where Europeans actually settled were given good European institutions. These scholars chose their instrument on the reasoning that initial settler mortality rates determined whether Europeans subsequently settled in large numbers.[40] One can help justify this otherwise idiosyncratic-sounding instrumental variable by pointing out that there need not be a strong correlation between the diseases that killed settlers and the diseases that afflict natives, and that both are independent of the countries' geographic suitability for trade. The conclusion of Rodrik's study is that institutions trump everything else; the effects of both tropical geography and trade dim in the blinding light of institutions.

This is essentially the same result found by Acemoglu, Johnson, and Robinson; William Easterly and Ross Levine; and Robert Hall and Chad Jones: institutions drive out the effect of policies, and geography matters primarily as a determinant of institutions.[41] Clearly, institutions are important, whether the effect is merely one of several important deep factors or whether, as these papers seem to claim, it is the only important deep factor.

OIL, INSTITUTIONS, AND GOVERNANCE

Of the various possible channels through which natural resources could be a curse to long-run development, the quality of institutions and governance is perhaps the most widely hypothesized. Roland Hodler and Francesco Caselli are among those finding a natural resource curse via internal struggle for ownership.[42] Carlos Leite and Jens Weidmann find that natural resource dependence has a substantial statistical effect on measures of corruption in particular.[43] Elissaios Papyrakis and Rever Gerlach estimate effects via corruption but also via investment and other channels.[44] Others find a negative effect via inequality.[45] Gylfason reviews a number of possible channels that could explain natural resource dependence, as measured by labor allocation, that leads to worse average performance.[46]

It is not necessarily obvious, a priori, that endowments of commodities should lead to inequality or authoritarianism or bad institutions generally. Macartan Humphreys, Jeffrey Sachs, and Joseph Stiglitz point out that a government wishing to reduce inequality should in theory have an easier time of it in a country where much wealth comes from a nonrenewable resource in fixed supply because taxing it runs less risk of eliciting a fall in output.[47] This is in comparison to the more elastic supplies of manufactures and other goods or services, including agricultural goods, produced with a higher labor component. But the usual interpretation is that most governments in resource-rich countries have historically not been interested in promoting equality.

The "rent cycling theory" as enunciated by Richard Auty holds that economic growth requires recycling rents via markets rather than via patronage.[48] In high-rent countries, the natural resource elicits a political contest to capture ownership, but in low-rent countries the government must motivate people to create wealth, for example, by pursuing comparative advantage, promoting equality, and fostering civil society.

This theory is related to the explanation that economic historians Stanley Engerman and Kenneth Sokoloff make as to why industrialization first took place in North America and not Latin America (and in the U.S. Northeast rather than the South).[49] Lands endowed with extractive industries and plantation crops (mining, sugar, and cotton) developed institutions of slavery, inequality, dictatorship, and state control, whereas those climates suited to fishing and small farms (fruits, vegetables, grain, and livestock) developed institutions based on individualism, democracy, egalitarianism, and capitalism. When the industrial revolution came along, the latter areas were well suited to make the most of it. Those that had specialized in extractive industries were not, because society had come to depend on class structure and authoritarianism rather than on individual incentive and decentralized decision making. The theory is thought to fit Middle Eastern oil exporters especially well.[50]

Jonathan Isham and his coauthors find that the commodities that are damaging to institutional development, which they call "point-source" resources, are: oil, minerals, plantation crops, coffee, and cocoa (versus the same small-scale farm products identified by Engerman and Sokoloff).[51] Other authors find that the point-source resources which undermine institutional quality and thereby growth include oil and some particular minerals, but not agricultural resources.[52] Halvor Mehlum, Karl Moene, and Ragnar Torvik observe the distinction by designating them "lootable" resources.[53] Rabah Arezki and Markus Brückner find that oil rents worsen corruption.[54]

Some have questioned the assumption that oil discoveries are exogenous and institutions endogenous. In other words, they posit that oil wealth is not necessarily the cause and institutions the effect; rather, it is the other way around. Catherine Norman points out that the discovery and development of oil is not purely exogenous but rather is endogenous with respect to, among other things, the efficiency of the economy.[55] But many authors have argued that the important question is whether the country already has good institutions at the time that oil is discovered, in which case it is more likely to be put to use for the national welfare instead of the welfare of an elite.[56] Alexeev and Conrad find no evidence that oil or mineral wealth interacts positively with institutional quality.[57] But Rabah Arezki and Frederick Van der Ploeg use instrumental variables to control for the endogeneity of institutional quality and trade; they confirm that the adverse effect of natural resources on growth is associated with exogenously weak institutions and, especially, that it is associated with exogenously low levels of trade.[58] Pauline Jones Luong and Erika Weinthal, in a study of five former Soviet republics that have oil and similar initial conditions, conclude that the choice of ownership structure makes the difference as to whether oil turns out to be a blessing rather than a curse.[59]

Unsustainability and Anarchy

Two hundred years ago, much of the island of Nauru in the South Pacific consisted of phosphate deposits derived from guano. The substance is valuable in the fertilizer industry. As a result of highly profitable phosphate exports, Nauru in the late 1960s and early 1970s showed up globally with the highest income per capita of any country. Eventually, however, the deposits gave out. Not enough of the proceeds had been saved, let alone well invested, during the period of abundance. Today, the money is gone, and so is the tropical paradise: the residents are left with little more than an environmentally precarious rim of land circling a wasteland where the phosphates used to be.

What happens when a depletable natural resources is indeed depleted? This question is not only of concern to environmentalists. It is also one motivation for the strategy of diversifying the economy beyond natural resources into other sectors. The question is also a motivation for the "Hartwick Rule," which says that all rents from exhaustible natural resources should be

invested in reproducible capital so that future generations do not suffer a diminution in total wealth (natural resource plus reproducible capital) and therefore in the flow of consumption.[60]

Sometimes, as in the Nauru example, it is the government that has control of the natural resource, and excessive depletion is another instance of a failure in governance. Robinson, Torvik, and Verdier (2006) show that politicians tend to extract at a rate in excess of the efficient path because they discount the future too much. They discount the future because they are more intent on surviving the next election or coup attempt.

Privatization would be a possible answer to the problem of excessive depletion, if a full assignment of property rights were possible, thereby giving the private sector owners adequate incentive to conserve the resource in question. But often this is not possible, either physically or politically. The difficulty in enforcing property rights over some nonrenewable resources creates a category of natural resource curse of its own.

UNENFORCEABLE PROPERTY RIGHTS OVER DEPLETABLE RESOURCES

Although one theory holds that the physical possession of point-source mineral wealth undermines the motivation for the government to establish a broad-based regime of property rights for the rest of the economy, another theory holds that some natural resources do not lend themselves to property rights whether the government wants to apply them or not. Overfishing, overgrazing, and overuse of water are classic examples of the so-called "tragedy of the commons" that applies to "open access" resources. Individual fishermen, ranchers, or farmers have no incentive to restrain themselves, even while the fisheries, pastureland, or water aquifers are being collectively depleted. The difficulty in imposing property rights is particularly severe when the resource is dispersed over a wide area, such as timberland. But even the classic point-source resource, oil, can suffer from this problem, especially when wells drilled from different plots of land hit the same underground deposit.

This unenforceability of property rights is the market failure that can invalidate some of the standard neoclassical economic theorems in the case of open access resources. One obvious implication of unenforceability is that the resource will be depleted more rapidly than the optimization of the Hotelling calculation calls for.[61] The benefits of free trade are another possible casualty: the country might be better off without the ability to export the resource, if doing so exacerbates the excess rate of exploitation.[62]

Common pool resources are (i) subtractable (as are private goods). At the same time, (ii) it is costly to exclude users from consuming them (as with public goods). Yet (iii) it is not impossible to exclude users from them.[63] Elinor Ostrom investigates ways that societies have dealt with water systems and other such common pool resources, institutions that lie between pure individual property rights and government management.[64]

Enforcement of property rights is all the more difficult in a frontier situation. The phrase "Wild West" captures the American experience, including legendary claim-jumping in the gold or silver rushes of the late nineteenth and early twentieth centuries. Typically, only when a large enough number of incumbents have enough value at stake are the transactions costs of establishing a system of property rights overcome.[65] Frontier rushes went on in many other parts of the world during this period as well.[66] Today, anarchic conditions can apply in the tropical forest frontiers of the Amazon Basin, Borneo, or the Congo.[67] Edward Barbier argues that frontier exploitation of natural resources can lead to unsustainable development characterized by a boom-bust cycle as well as permanently lower levels of income in the long term.[68]

DO MINERAL RICHES LEAD TO WARS?

Domestic conflict, especially when violent, is certainly bad for economic development. Factions are more likely to fight over a valuable resource such as oil or diamonds when it is there for the taking, rather than when production requires substantial inputs of labor and capital investment. James Fearon and David Laitin, Paul Collier, and Macartan Humphreys all find that economic dependence on oil and mineral wealth is correlated with civil war.[69] Chronic conflict in oil-rich countries such as Angola and Sudan comes to mind. Civil war is, in turn, very bad for economic development.

The conclusion is not unanimous: Christa Brunnschweiler and Erwin Bulte argue that the conventional measure of resource dependence is endogenous with respect to conflict and that instrumenting for dependence eliminates its significance in conflict regressions.[70] They find conflict increases dependence on resource extraction, rather than the other way around.

Oil and Democracy

Hussein Mahdavy was apparently the first to suggest—followed by Giacomo Luciani, Dirk Vandewalle, and many others—that Middle Eastern govern-

ments' access to rents, in the form of oil revenue, may have freed them from the need to tax their peoples and that this in turn freed them from the need for democracy. The need for tax revenue is believed to require democracy under the theory "no taxation without representation."[71]

Statistical studies across large cross-sections of countries followed. Michael Ross finds that economic dependence on oil and mineral wealth is correlated with authoritarian government.[72] So do others.[73] Some find that authoritarian regimes have lasted longer in countries with oil wealth.[74]

But Terry Karl points out that Venezuela had already been authoritarian when oil was developed and in fact transitioned to democracy at the height of its oil wealth.[75] None of the Central Asian states are democracies, even though Kazakhstan is the only one of them with major oil production. Inspired by such observations Stephen Haber and Victor Menaldo look at historical time series data for a link to democracy from the share of oil or minerals in the economy; they fail to find the statistically significant evidence that is typical of cross-section and panel studies.[76] Similarly, Marcus Noland finds that oil rents are not a robust factor behind lack of democracy in Middle Eastern countries.[77] When Thad Dunning introduces fixed effects to take into account country-specific differences within Latin America, he finds that the negative correlation between oil profits and democracy reverses.[78] Romain Wacziarg, too, finds no effect of oil prices on democracy.[79]

The question of whether oil dependence tends to retard democracy should probably not be regarded as a component of the causal relation between oil and economic performance. Some correlates of democracy—rule of law, political stability, openness to international trade, and initial equality of economic endowments and opportunities—do tend to be good for economic growth. But each of these other variables can also exist without democracy. Examples include predemocratic Asian economies such as Korea or Taiwan. Some believe that Lee Kwan Yew in Singapore and Augusto Pinochet in Chile could not have achieved their economic reforms without authoritarian powers (though the former was far more moderate and benevolent than the latter). On a bigger scale, it is said that China has grown so much faster than Russia since 1990 because Deng Xiaopeng chose to pursue economic reform before political reform while Mikhail Gorbachev did it the other way around.

The statistical evidence is at best mixed as to whether democracy per se is good for economic performance. Robert Barro finds that it is the rule of law,

free markets, education, and small government consumption that are good for growth, not democracy per se.[80] Jose Tavares and Romain Wacziarg find that it is education, not democracy per se.[81] Alberto Alesina and his coauthors find that it is political stability.[82] Some scholars even find that, after controlling for important factors such as the rule of law and political stability, democracy has if anything a weak negative effect on economic growth. One *can* claim good evidence for the *reverse* causation—that economic growth leads to democracy, often assisted by the creation of a middle class—much more reliably than the other way around.[83] Examples include Korea and Taiwan.

Of course democracy is normally regarded as an end in itself, aside from whether it promotes economic growth. Even here, one must note that the benefits of the formalities of elections can be overemphasized. For one thing, elections can be a sham. Western-style or one-man, one-vote elections should probably receive less priority in developing countries than the fundamental principles of rule of law, human rights, freedom of expression, economic freedom, minority rights, and some form of popular representation.[84]

Dutch Disease and Procyclicality

The Macroeconomics of Dutch Disease

Dutch disease refers to some possibly unpleasant side effects of a boom in oil or other mineral and agricultural commodities.[85] The phenomenon arises when a strong, but perhaps temporary, upward swing in the world price of an export commodity causes:

- large real appreciation in the local currency (taking the form of nominal currency appreciation if the country has a floating exchange rate or the form of money inflows and inflation if the country has a fixed exchange rate[86]);
- an increase in spending (especially by the government, which increases spending in response to the increased availability of tax receipts or royalties—discussed below);
- an increase in the price of nontraded goods (goods and services such as housing that are not internationally traded) relative to traded goods (manufactures and other internationally traded goods other than the export commodity);

- resultant shift of labor and land out of non-export-commodity traded goods (pulled by the more attractive returns in the export commodity and in nontraded goods and services); and
- a possible current account deficit (thereby incurring international debt that may be difficult to service when the commodity boom ends).[87]

When the crowded-out, noncommodity tradable goods are in the manufacturing sector, the feared effect is deindustrialization. In a real-trade model, the reallocation of resources across tradable sectors—for example, from manufactures to oil—may be inevitable regardless of macroeconomics. But the movement into nontraded goods is macroeconomic in origin.

What makes Dutch disease a "disease"? One interpretation, particularly relevant if the complete cycle is not adequately foreseen, is that the process is all painfully reversed when the world price of the export commodity goes back down. A second interpretation is that, even if the perceived longevity of the increase in world price turns out to be accurate, the crowding out of noncommodity exports is undesirable, perhaps because the manufacturing sector is the locus of learning by doing.[88] The latter view is just another instance of the natural resource curse; it has nothing to do with cyclical fluctuations per se.

Dutch disease can arise from sources other than a rise in the commodity price. Other examples arise from commodity booms due to the discovery of new deposits or some other expansion in supply leading to a trade surplus via exports or to a capital account surplus via inward investment to develop the new resource. In addition, the term is also used by analogy for other sorts of inflows such as the receipt of transfers (foreign aid or remittances) or a stabilization-induced capital inflow. In all cases, the result is real appreciation and a shift into nontradeables and away from (nonbooming) tradeables. Again, the real appreciation takes the form of a nominal appreciation if the exchange rate is flexible or inflation if the exchange rate is fixed.

Procyclicality

Volatility in developing countries arises both from foreign shocks, such as the fluctuations in the price of the export commodity discussed above, and

from domestic macroeconomic and political instability. Although most developing countries in the 1990s managed to control the chronic runaway budget deficits, money creation, and inflation that they had experienced in the preceding two decades, many are still subject to monetary and fiscal policy that is procyclical rather than countercyclical: they tend to be expansionary in booms and contractionary in recessions, thereby exacerbating the magnitudes of the swings. Ideally the aim should be to moderate them—to foster the countercyclical pattern, which the models and textbooks of the decades following the Great Depression originally hoped discretionary policy would accomplish. At a minimum, macroeconomic policy should not be procyclical. Often populist political economy underlies the observed procyclicality.

The fact that developing countries tend to experience larger cyclical fluctuations than industrialized countries do is only partly attributable to commodities. It is also in part due to the role of factors that "should" moderate the cycle but in practice seldom operate that way: procyclical capital flows, procyclical monetary and fiscal policy, and the related Dutch disease. If anything, they tend to exacerbate booms and busts instead of moderating them. The hope that improved policies or institutions might reduce this procyclicality makes this one of the most potentially fruitful avenues of research in emerging market macroeconomics.

The Procyclicality of Capital Flows to Developing Countries

According to the theory of intertemporal optimization, countries should borrow during temporary downturns to sustain consumption and investment and should repay or accumulate net foreign assets during temporary upturns. In practice, it does not always work this way. Capital flows are more often procyclical than countercyclical.[89] Most theories to explain this phenomenon involve imperfections in capital markets, such as asymmetric information or the need for collateral.

As developing countries evolve more market-oriented financial systems, the capital inflows during the boom phase show up increasingly in prices for land and buildings and in prices of financial assets. Prices of equities and bonds (or the reciprocal, the interest rate) reflect the extent of speculative enthusiasm, sometimes useful for predicting which countries are vulnerable to crises in the future.

In the commodity and emerging market boom of 2003–2011, net capital flows typically went to countries with current account surpluses, especially Asian countries and commodity producers in the Middle East and Latin America, where they showed up in record accumulation of foreign exchange reserves. This was in contrast to the two previous cycles, 1975–81 and 1990–97, when the capital flows into developing countries largely went to finance current account deficits.

One interpretation of procyclical capital flows is that they result from procyclical fiscal policy: when governments increase spending in booms, some of the deficit is financed by borrowing from abroad. When these governments are forced to cut spending in downturns, it is to repay some of the excessive debt that they incurred during the upturn. Another interpretation of procyclical capital flows to developing countries is that they pertain especially to exporters of agricultural and mineral commodities. We will consider procyclical fiscal policy in the next subsection and return to the commodity cycle (Dutch disease) in the one after.

The Procyclicality of Fiscal Policy

Many authors have documented that fiscal policy tends to be procyclical in developing countries, especially in comparison with industrialized countries.[90] Most studies look at the procyclicality of government spending, because tax receipts are particularly endogenous with respect to the business cycle. An important cause of procyclical spending is precisely that government receipts from taxes or royalties rise in booms and the government cannot resist the temptation or political pressure to increase spending proportionately, or more than proportionately.

Procyclicality is especially pronounced in countries that possess natural resources and in which income from those resources tends to dominate the business cycle. Commodity booms are found to be correlated with spending booms.[91]

Two large budget items that account for much of the increased spending from commodity booms are investment projects and government salaries. Regarding the first budget item, investment in infrastructure can have a large long-term payoff if it is well designed. In practice, however, it too often takes the form of white elephant projects, which are stranded without funds for completion or maintenance when the commodity price goes back down.[92]

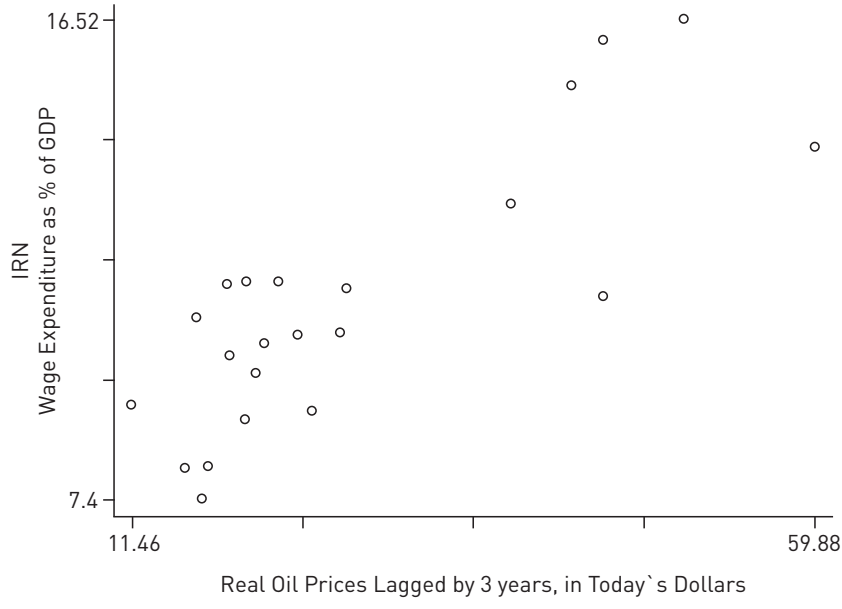


Figure 1.2 Iran's government wage bill is influenced by oil prices during the preceding three years (1974, 1977–1997).

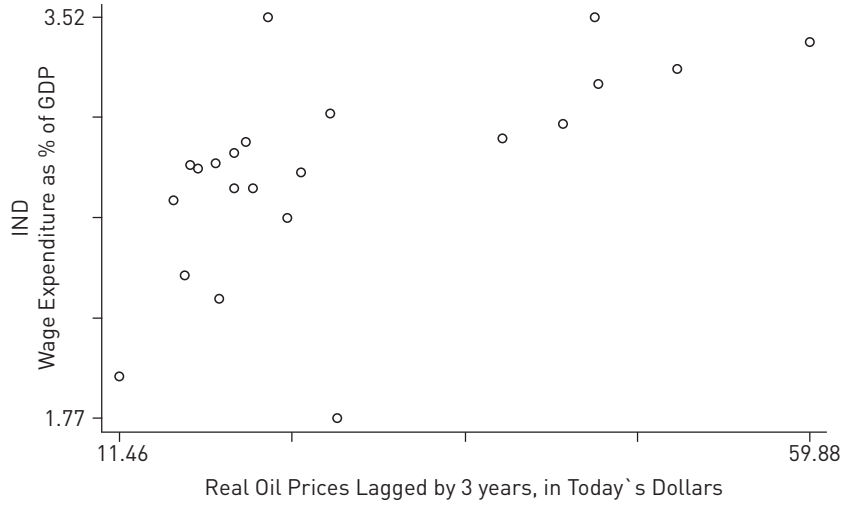


Figure 1.3 Indonesia's government wage bill is influenced by oil prices during the preceding three years (1974, 1977–1997).

Regarding the second budget item, Paolo Medas and Daria Zakharova point out that oil windfalls have often been spent on higher public sector wages.[93] They can also go to increasing the number of workers employed by the government. Either way, they raise the total public sector wage bill, which is hard to reverse when oil prices go back down. Figures 1.2 and 1.3 plot the public sector wage bill for two oil producers, Iran and Indonesia, against oil prices over the preceding three years. There is a clear positive relationship. That the relationship is strong with a three-year lag illustrates the problem: primary product prices may have fallen over three years, but it is not easy to cut public sector wages or lay off workers.[94]

Institutions and Policies to Address the Natural Resource Curse

A variety of measures have been tried to cope with the commodity cycle.[95] Some work better than others.

Institutions That Were Supposed to Stabilize but Have Not

A number of institutions have been implemented in the name of reducing the impact of volatility in world commodity markets on producer countries. Most have failed to do so, and many have had detrimental effects.

MARKETING BOARDS

Marketing boards were implemented around the time of independence in some East and West African countries. They required all sales of cocoa and coffee to pass through a government agency. The original justification was to stabilize the price to domestic producers and symmetrically set a price above world prices when the latter were low and a domestic price below world prices when the latter were high. That in turn would have required symmetrically adding to government stockpiles when world prices were low and running them down when world prices were high.

In practice, the price paid to cocoa and coffee farmers, who were politically weak, was always below the world price in the early decades of the marketing boards. The rationale eventually shifted from stabilization to taxation of the agricultural sector (which was thought to be inelastic in its supply

behavior) and subsidization of the industrial sector. But industrialization did not happen. Rather, the coffee and cocoa sectors shrank. Commodity marketing boards were a failure.

TAXATION OF COMMODITY PRODUCTION

Some developing countries subject their mineral sectors to high levels of taxation and regulation, particularly where foreign companies are involved, which can discourage output. Of course, some taxation and regulation may be appropriate on environmental or safety grounds. One can understand, moreover, the desire to avoid past experiences where multinational companies were able to walk away with the lion's share of the profits. But when Bolivia, Mexico, and Venezuela, motivated by populist nationalism, explicitly prohibit or discourage foreign involvement in the development of their mineral resources, the danger is that they end up "killing the goose that lays the golden egg."

PRODUCER SUBSIDIES

More often in rich countries, the primary producing sector has political power on its side. Then stockpiles are used as a subsidy rather than a tax. An example is the Common Agricultural Policy in Europe. Subsidies also go to coal miners in Germany, oil companies with cheap leases on federal lands in the United States, and agricultural and energy sectors in many other countries.

GOVERNMENT STOCKPILES

Some governments maintain stockpiles under national security rationales, such as the U.S. Strategic Petroleum Reserve. One drawback is that decisions regarding the management of government stockpiles are made subject to political pressure, often failing to maximize the objective of insulating against the biggest shocks. Another drawback is that government stockpiles undermine the incentive for private citizens to hold inventories.

In some countries where the prices of fuel or food to consumers are a politically sensitive issue, the incentive for the private sector to maintain inventories is undercut in any case by the knowledge that in the event of a big increase in the price of the commodity, the inventory holder will probably not be allowed to reap the benefits. If this political economy structure is a given, then there is a valid argument for the government to do the stockpiling.

PRICE CONTROLS FOR CONSUMERS

In many developing countries, political forces seek to shield consumers from increases in basic food and energy prices through price controls. If the

country is a producer of the crop or mineral in question, then the policy tool to insulate domestic consumers against increases in the world price may be export controls. (Examples include Argentina's wheat and India's rice in 2008, and Russia's wheat in 2010.) If the country is an importer of the crop or mineral in question, then either the commodity is rationed to domestic households or the excess demand at the below-market domestic price is made up by imports. Capped exports from the exporting countries and price controls in the importing countries both work to exacerbate the magnitude of the upswing of the price for the (artificially reduced) quantity that is still internationally traded. If the producing and consuming countries in the rice market could cooperatively agree to *refrain* from government intervention, volatility could be lower, rather than higher, even though intervention is rationalized in the name of reducing price volatility.

OPEC and Other International Cartels

In a world of multiple producers for a given commodity, efforts by producing countries to raise the price or reduce the volatility would logically require the cooperation of all or most of the producers. Each is strongly tempted to defect from the agreement and raise output to take advantage of the higher price. Most attempts at forming international cartels have failed within a few years.[96]

The institution that endures decade after decade is OPEC. It is not clear whether its attempts to raise the average price or reduce the variability of the international oil price have succeeded. Some of the most abrupt decreases and increases in the world oil price over the last half century have arguably been attributable to changes in OPEC's internal dynamics (increased collusion after the Arab Oil Embargo of 1973, followed by a breakdown in the 1980s when members stopped obeying their agreed-upon quotas). Meanwhile, many new oil producers have cropped up outside of OPEC, suggesting a diminution in its collective monopoly power even when the members act in unison.

Devices to Share Risks

It is probably best to accept that commodity prices will be volatile and to seek to establish institutions that will limit adverse effects that result from the volatility. In this section we will consider microeconomic policies to

minimize exposure to risk, the sort of short-term volatility discussed earlier in the chapter. (We will shortly consider *macro*economic policies to minimize the costs of big medium-term swings of the sort associated with Dutch disease.)

Three devices for avoiding exposure to short-term volatility are promising. One is relevant for commodity exporters who sign contracts with foreign companies, another is relevant for producers who do their own selling, and a third for governments dependent on commodity revenues.

PRICE SETTING IN CONTRACTS WITH FOREIGN COMPANIES

Price setting in contracts between energy producers and foreign companies is often plagued by a problem that is known to theorists as "dynamic inconsistency."[97] A price is set by contract. Later the world price goes up, and then the government wants to renege. It does not want to give the company all the profits, and, in a sense, why should it? Certainly the political pressures are typically strong.

But this is a "repeated game." The risk that the locals will renege makes foreign companies reluctant to do business in the first place. It limits the amount of capital available to the country and probably raises the price of that capital. The process of renegotiation can have large transactions costs, such as interruptions in the export flow.

It has become such a familiar pattern that it seems more contracts ought to have been designed to be robust with respect to this inconsistency by making the terms explicitly dependent on future market conditions.[98] The simplest device would be indexed contracts in which the two parties agree ahead of time that "if the world price goes up 10 percent, then the gains are split between the company and the government" in some particular proportion. Indexation shares the risks of gains and losses, without the costs of renegotiation or the damage to a country's reputation from reneging on a contract.

HEDGING IN COMMODITY DERIVATIVES MARKETS

Producers, whether private or public, often sell their commodities on international spot markets. They are thus exposed to the risk that the dollar price of a given export quantity will rise or fall. In many cases, the producer can hedge the risk by selling that quantity on the forward or futures market.[99] As with indexation of the contract price, hedging means that there is no need for costly renegotiation in the event of large changes in the world price.

The adjustment happens automatically. One possible drawback, especially if it is a government ministry doing the hedging, is that the minister typically receives little credit for having saved the country from disaster when the world price plummets but will be excoriated for having sold out the national patrimony when the world price rises. Mexico has the best solution to this problem, a marriage of finance theory and political economy: it hedges by means of the options markets. Options allow the buyer to hedge the downside but retain the upside. The country is protected if the world price of oil falls, yet the finance minister is not put in a difficult position if the price of oil rises.

DENOMINATION OF DEBT IN TERMS OF COMMODITY PRICES

An excellent idea that has never managed to catch on is for a commodity-producing company or government to index its debt to the price of the commodity. Debt service obligations automatically rise and fall with the commodity price. This would save developing countries from the kinds of crises that Latin American countries faced in 1982 and Asian countries in 1997, when the dollar prices of their exports fell at the same time that the dollar interest rate on their debts went up. The result for many countries was an abrupt deterioration of their debt service ratios and a balance of payments crisis. This would not have happened if their debts had been indexed to their commodity prices—the oil price in the case of such borrowers as Ecuador, Indonesia, Iran, Mexico, Nigeria, and Russia. As with contract indexation and hedging, the adjustment in the event of fluctuations in the world price is automatic.

When officials in commodity-producing countries are asked why they have not tried indexing their bonds (or loans) to the price of their export commodity, the usual answer is that they believe there would not be enough demand from the market (or enough interest from banks). It is true that a market needs a certain level of liquidity in order to thrive and that it can be hard for a new financial innovation to get over the volume threshold. But it used to be said that foreigners would not buy bonds denominated in the currencies of emerging market countries.[100] Yet in recent years, more and more developing countries have found that they could borrow in their own currency if they tried. Investor receptivity to oil-denominated bonds is potentially larger. There are obvious natural ultimate customers for oil-linked bonds: electric utilities, airlines, and the other companies in industrialized countries who are as adversely affected by an increase in the world price of

oil as the oil exporters are by a decrease. This is a market waiting to be born.

Monetary Policy

We will now move from ideas for institutions to address the risk created by short-term price volatility to ideas for macroeconomic management of medium-term swings. We will begin with monetary and exchange rate policy to manage Dutch disease.

FIXED VERSUS FLOATING EXCHANGE RATES

Fixed and floating exchange rates each have their advantages. The main advantages of a fixed exchange rate are, first, that it reduces the costs of international trade and finance and, second, that it is a nominal anchor for monetary policy that helps the central bank achieve low-inflation credibility. The main advantage of floating, for a commodity producer, is that it often provides automatic accommodation of terms of trade shocks. During a commodity boom, the currency tends to appreciate, thereby moderating what would otherwise be a danger of excessive inflows and overheating of the economy, and the reverse occurs during a commodity bust.

A reasonable balancing of these pros and cons, appropriate for many middle-size middle-income countries, is an intermediate exchange rate regime such as managed floating or a target zone (a band). In the booming decade that began in 2001, many countries followed the intermediate regime, in between a few commodity producers in the floating corner (Chile and Mexico) and a few in the firmly fixed corner (Gulf oil producers and Ecuador). Although these intermediate countries officially declared themselves as floating currency states (often as part of inflation targeting), in practice they intervened heavily, taking perhaps half the increase in demand for their currency in the form of appreciation but half in the form of increased foreign exchange reserves. Examples among commodity-producers include Kazakhstan, Peru, South Africa, and Russia.[101]

Particularly at the early stages of a commodity boom, when there is little idea whether it is permanent, there is a good case for intervention in the foreign exchange market—adding to reserves (especially if the alternative is abandoning an established successful exchange rate target) and perhaps for awhile attempting to sterilize the inflow of foreign currency to prevent rapid

expansion in the money supply. In subsequent years, if the increase in world commodity prices looks to be long-lived, there is a stronger case for accommodating it through nominal and real appreciation of the local currency.

It is especially important in developing countries, where institutions tend to have lower credibility than in advanced countries, that the public's expectations of inflation be anchored by some nominal target by which the central bank asks to be judged. If the exchange rate is not to be that nominal target, then some other anchor variable should be chosen.

ALTERNATIVE NOMINAL ANCHORS

Three candidates for nominal anchor have had ardent supporters in the past but are no longer prominently in the running. They are: the price of gold, as under the nineteenth-century gold standard; the money supply (the choice of monetarists); and national income (the choice of many mainstream macroeconomists in the 1980s).

In recent years, central bankers and monetary economists alike have considered inflation targeting to be the preferred approach—or at least the preferred alternative to fixed exchange rates, which may be appropriate for very small, open countries. Although there are different interpretations of inflation targeting, some more flexible than others, they all tend to take the consumer price index (CPI) as the index to be targeted, and they tend to explicitly disavow the exchange rate, or domestic commodity prices or asset prices, as a target.[102]

Inflation targeting (IT) has a particular disadvantage for commodity producing countries: it is not robust with respect to changes in the terms of trade. Consider a fall in world market conditions for the export commodity, that is, a decrease in the dollar price. It has a negative impact on both the balance of payments and the level of economic activity. It would be desirable under these circumstances for monetary policy to loosen and the currency to depreciate to boost net foreign demand and thereby restore external and internal balance. But CPI targeting tells the central bank to keep monetary policy sufficiently tight so that the currency does not depreciate, because otherwise import prices will rise and push the CPI above its target. Conversely, if the world price for the export commodity goes *up*, a CPI target prevents a needed appreciation of the currency because it would lower import prices and push the CPI below its target.

I have in the past proposed for commodity producers a regime that I call "Peg the Export Price" (PEP). The proposal was that monetary policy be guided

by the rule to keep the local currency price of the export commodity stable from day to day. For an oil exporter, every day that the dollar price of oil goes up 1 percent, monetary policy would allow the dollar price of the local currency to go up 1 percent, thereby keeping the local price of oil unchanged. The argument was that PEP combines the best of both worlds: it automatically accommodates terms of trade changes, as floating is supposed to do, while abiding by a preannounced nominal anchor, as IT is supposed to do.

Simulations show, for example, that if Indonesia and Russia had been on a PEP regime, they would have automatically experienced necessary depreciation in the late 1990s, when oil prices fell, without having to go through the painful currency crises that these two countries in fact experienced in 1998.[103] An additional selling point is that because PEP moderates swings in the real value of export revenue, expressed in terms of purchasing power over domestic goods and services, it would reduce the tendency for governments to increase spending excessively in boom times and symmetrically cut it in busts.

PEP in its pure form was a rather extreme proposal, which may account for the lack of guinea pigs willing to try it. If the noncommodity export sector is not small or if policy-makers want it to become larger, then PEP has the disadvantage of fully transferring the burden of exogenous fluctuations in world commodity prices to variability in domestic prices of noncommodity exports. It is not clear that this is an improvement over continuing to let the fluctuations show up as variability in domestic prices of the commodity export. A more practical version of the proposal would be to target a more comprehensive index of export prices rather than a single export price (Peg the Export Price Index).[104] Better still is the most recent version called PPT, for Product Price Targeting. It would target a comprehensive index of domestic production prices, including nontraded goods. Possibilities are the Producer Price Index, the GDP deflator, or a specially constructed index.[105] The important point is to include export commodities in the index and exclude import commodities, whereas the CPI does it the other way around.

Institutions to Make National Saving Procyclical

We have noted the Hartwick Rule, which says that rents from a depletable resource should be saved against the day when deposits run out. At the same

time, traditional macroeconomics says that government budgets should be countercyclical: running surpluses in booms and spending in recessions. Commodity producers tend to fail in both these principles; they save too little on average and all the more so in booms. Thus some of the most important ways to cope with the commodity cycle are institutions to ensure that export earnings are put aside during the boom time into a commodity saving fund, perhaps with the aid of rules governing the cyclically adjusted budget surplus.[106] Jeffrey Davis and coauthors include under the rubric Special Financial Institutions three sorts of mechanisms: oil funds, fiscal rules and fiscal responsibility legislation, and budgetary oil prices.[107]

RULES FOR THE BUDGET DEFICIT: THE EXAMPLE OF CHILE

As of June 2008, the government of Chilean President Michele Bachelet had unusually low approval ratings. That it had resisted intense pressure to spend the soaring receipts from copper exports was widely resented. One year later, in the summer of 2009, Bachelet and her finance minister, Andres Velasco, had the *highest* approval ratings of any Chilean officials since the restoration of democracy. Why the change? In the meantime, the global recession had hit, and copper prices had fallen abruptly. But the government had increased spending sharply, using the assets that it had acquired during the copper boom, and thereby moderated the downturn. Saving for a rainy day made these officials heroes, now that the rainy day had come. Chile has achieved what few commodity-producing developing countries have achieved: a truly countercyclical fiscal policy. Some credit should go to previous governments, who initiated an innovative fiscal institution.[108] But much credit should go to the Bachelet government, which enshrined the general framework in law and abided by it when it was most difficult to do so politically.[109]

Chile's fiscal policy is governed by a set of rules. The first one is a target for the overall budget surplus—originally set at 1 percent of GDP, then lowered to 0.5 percent of GDP, and again to 0 percent in 2009. This may sound like the budget deficit ceilings that supposedly constrain members of Euroland (deficits of 3 percent of GDP under the Stability and Growth Pact) or like the occasional U.S. proposals for a Balanced Budget Amendment (zero deficit). But those attempts have failed because they are too rigid to allow the need for deficits in recessions, counterbalanced by surpluses in good times. The alternative of letting politicians explain away any deficits by declaring

them the result of slower growth than expected also does not work because it imposes no discipline.

Under the Chilean rules, the government can run a deficit larger than the target when: (1) output falls short of trend, in a recession or (2) the price of copper is below its medium-term (ten-year) equilibrium. The key institutional innovation is two panels of experts that each mid-year make the judgments, respectively: what is the output gap and what is the medium-term equilibrium price of copper.

Thus in the copper boom of 2003–8 when, as usual, the political pressure was to declare the increase in the price of copper permanent and justify spending on par with export earnings, the expert panel ruled that most of the price increase was temporary so that most of the earnings had to be saved. As a result, Chile's fiscal surplus reached almost 9 percent when copper prices were high. The country paid down its debt to a mere 4 percent of GDP and saved about 12 percent of GDP in its the sovereign wealth fund. This allowed a substantial fiscal easing in the recession of 2009, when the stimulus was most sorely needed.

Any country, but especially commodity producers, could usefully apply variants of this Chilean fiscal device. Given that many developing countries are prone to weak institutions, a useful reinforcement of the Chilean idea would be to formalize the details of the procedure into law and give the expert panels legal independence. There could be a law protecting the members from being fired, as there is for governors of independent central banks. The principle of a separation of decision-making powers should be retained: the rules as interpreted by the panels determine the total amount of spending or budget deficits, but the elected political leaders determine how that total is allocated.

COMMODITY FUNDS OR SOVEREIGN WEALTH FUNDS

Many natural resource producers have commodity funds, often in global portfolios, to invest savings for future welfare. The oldest and biggest commodity funds are in the Persian Gulf and belong to Kuwait and the United Arab Emirates. Some highly successful noncommodity exporters in Asia have established such funds, too. When China joined the club in 2007, these funds received a new name—sovereign wealth funds—and a lot of new scrutiny.[110]

It has been pointed out that the mere creation of a commodity fund, in itself, does not necessarily do anything to ensure that politicians will not

raid the fund when it is flush.[111] Two standard recommendations are that the funds be transparently and professionally run and that they be given clear instructions that politics should not interfere with their objective of maximizing the financial well-being of the country. The Norwegian State Petroleum Fund (now called the Norwegian Pension Fund) is often held up as a model.[112] But in fact Norway's legal system puts few restrictions on what policy makers can do, and the fund is managed with political objectives that sometimes go unnoticed when held up as an example for developing countries to emulate.[113] Botswana's Pula Fund is a more appropriate model.

For most countries, it would be best to have rules dictating the cap on spending from out of the fund. The commodity fund of São Tomé and Principe, established in 2004, includes extensive restrictions guiding how the oil revenues are to be saved, invested, or spent. Outflows legally cannot exceed the highest amount that could be sustained in perpetuity.

Macartan Humphreys and Martin Sandhu and Rolando Ossowski and coauthors sensibly recommend that commodity fund spending go through the regular budget so that these resources do not become any politicians' private "slush funds."[114] There can be advantages in earmarking the commodity funds for specific good causes such as education, health, or retirement support for a future generation (while seeking to avoid ad hoc extrabudgetary spending). If the political constituents know how the money is to be spent, they may be both more tolerant of the initiative to save it in the first place and more vigilant with respect to transgressions by politicians wishing to raid the kitty to spend on armies or palaces.

RESERVE ACCUMULATION BY CENTRAL BANKS

One way that countries save in the aggregate during booms, in order to be able to spend in busts, is for central banks to accumulate international reserves via foreign exchange intervention. Economists have regarded this as a suboptimal mechanism: if the goal is smoothing spending over time, as opposed to stabilization of the exchange rate, holding the assets in the form of foreign exchange reserves has disadvantages. First, the reserves (typically U.S. Treasury bills) do not earn a high return. Second, increases in reserves can lead to rapid monetary expansion (if not sterilized) and thereby to inflation. Thus a central bank that already has enough reserves, judged by precautionary and monetary criteria, should consider selling some of its foreign exchange reserves to the country's natural resource fund (NRF). But if the

central bank has political independence and the NRF does not, that may be a reason to leave the reserves where they cannot be raided.

REDUCING NET PRIVATE CAPITAL INFLOWS DURING BOOMS

If foreign exchange reserves are piling up to excessive levels, there are other ways to reduce the balance of payments surplus and facilitate national saving. One is for the government to pay down debt deliberately, especially short-term debt. Another is to remove any remaining controls on the ability of domestic citizens to invest abroad. A third is to place controls on capital inflows, especially short-term inflows.

LUMP SUM DISTRIBUTION

The Alaska Permanent Fund saves earnings from the state's oil sector. Alaska state law says that the fund must distribute half of the investment earnings on an equal per capita basis. The theory is that the citizens know how to spend their money better than their government does. Certainly the system gives Alaskans a good reason to feel that they are full stakeholders in the fund. Xavier Sala-i-Martin and Arvind Subramanian suggest that Nigeria should similarly distribute its oil earnings on an equal per capita basis;[115] Nancy Birdsall and Subramanian make the same proposal for Iraq.[116]

Efforts to Impose External Checks

All these institutions can fail if, as in some countries, the executive simply ignores the law and spends what he wants. In 2000, the World Bank agreed to help Chad, a new oil producer, finance a new pipeline. The agreement stipulated that Chad would spend 72 percent of its oil export earnings on poverty reduction (particularly health, education, and road building) and put aside 10 percent in a "future generations fund." ExxonMobil was to deposit its oil revenues from Chad in an escrow account at Citibank, and the government was to spend them subject to oversight by an independent committee. But once the money started rolling in, the government (ranked by Transparency International as one of the two most corrupt in the world) reneged on the agreement.[117]

Evidently international financial institutions would have to go beyond the Chad model if local rulers are to be prevented from abusing natural resource funds. The Extractive Industries Transparency Initiative, launched in 2002, includes the principle "publish what you pay," under which interna-

tional oil companies commit to make known how much they pay governments for oil so that the public at least has a way of knowing when large sums disappear. Legal mechanisms adopted by São Tomé and Principe void contracts if information relating to oil revenues is not made public. Further proposals would give extra powers, such as freezing accounts in the event of a coup, to a global clearing house or foreign bank where the natural resource fund is located.[118] Perhaps that principle could be generalized: it may be that well-intentioned politicians spend resource wealth quickly out of fear that their successors will misspend whatever is left, in which case the adoption of an external mechanism that constrains spending both in the present and in the future might not be an unacceptable violation of sovereignty.

Summary

Much theoretical reasoning and statistical evidence suggest that possession of natural resources, such as hydrocarbons, minerals, and perhaps agricultural endowments, can confer negative effects on a country along with the benefits. This chapter has considered seven channels whereby natural resources might possibly have negative effects on economic performance. The first—the Prebisch-Singer hypothesis of a negative long-term trend in commodity prices—is counteracted by theoretical arguments for a positive trend and empirical findings that there is no consistent trend either way.

But the other six channels each have at least some truth to them.

(1) Commodity price volatility is high, which imposes risk and transactions costs. (2) Specialization in natural resources can be detrimental to growth if it crowds out the manufacturing sector and the latter is the locus of positive externalities. (3) Mineral riches can lead to civil war, an obstacle to development. (4) Endowments of "point-source" commodities (oil, minerals, and some crops) can lead to weak institutions, including corruption, inequality, class structure, chronic power struggles, and absence of the rule of law and property rights. Natural resource wealth can also inhibit the development of democracy though there is not good evidence that democracy per se (as opposed to openness, economic freedom, decentralization of decision making, and political stability) leads to economic growth. (5) Dutch disease, resulting from a commodity boom, entails real appreciation of the currency and increased government spending, both of which expand nontraded goods and service sectors such as housing and render noncommod-

ity export sectors such as manufactures uncompetitive. If and when world commodity prices go back down, adjustment is difficult due to the legacy of bloated government spending, debt, and a shrunken manufacturing sector.

In recent years, revisionists have questioned each of these channels and the bottom line that natural resource wealth is detrimental for economic growth. Some differences in econometric findings are attributable to whether economic performance is measured as the level of income or the rate of growth of income during the sample period. Others are due to whether the equation conditions on related variables when it tests the influence of the channel in question. The revisionists often emphasize that resource extraction is endogenous and that it is wrong to treat data on mineral exports—the usual measure of "resource dependence"—as if they represent geographic endowments.

From a policy viewpoint, we do not necessarily need to settle these questions. It is clear that some resource-rich countries do surprisingly poorly economically while others do well. We have noted examples of both sorts: Norway, Botswana, and Chile, which have done very well with their endowments (oil, diamonds, and copper, respectively), versus Sudan, Bolivia, and the Congo, which have done much less well. The natural resource curse should not be interpreted as a rule that all resource-rich countries are doomed to failure. The question is which policies to adopt to increase the chances of prospering. It is safe to say that destruction or renunciation of resource endowments, to avoid dangers such as the corruption of leaders, will not be one of these policies. Even if such a drastic action would on average leave the country better off, which seems unlikely, who would be the policy maker to whom one would deliver such advice?

This chapter concludes with a list of ideas for institutions designed to address aspects of the resource curse and thereby increase countries' chances of economic success. Some of the ideas that most merit consideration by countries rich in oil or other natural resources are as follows.

1. In contracts with foreign purchasers, include clauses for automatic adjustment in the commodity price if world market conditions change.
2. Hedge export proceeds in commodity futures markets or, more pragmatically, options markets.
3. Denominate debt in terms of commodity prices.

4. Allow some nominal currency appreciation in response to an increase in world prices of the commodity, but also add to foreign exchange reserves under these circumstances, especially at the early stages of the boom when it may prove temporary.
5. If a country chooses inflation targeting as the monetary regime, consider using a price measure that puts greater weight on the important export commodities, such as an index of export prices or producer prices, as the target in place of the standard CPI,
6. Emulate Chile: avoid excessive spending in boom times and allow deviations from a target surplus only in response to output gaps and long-lasting commodity price increases, as judged by independent panels of experts rather than politicians.
7. Run commodity funds transparently and professionally, with rules to govern the payout rate and with insulation for the managers from political pressure in their pursuit of the financial well-being of the country.
8. When spending oil wealth, consider lump-sum distribution on an equal per capita basis, as occurs in Alaska.
9. Mandate an external agent, for example a financial institution that houses a commodity fund, to provide transparency and to freeze accounts in the event of a coup.

Needless to say, policies and institutions have to be tailored to local circumstances, country by country. But with good intentions and innovative thinking, there is no reason why resource-rich countries need fall prey to the curse.

2

Sometimes the Grass Is Indeed Greener: The Successful Use of Energy Revenues

Patrick Clawson

Juan Pablo Pérez Alfonzo, Venezuela's oil minister in the early 1960s and a father of OPEC, referred to oil not as "black gold" but as the "devil's excrement." In recent decades, the natural resource curse argument has often been presented as either a universal or near-universal rule.[1]

The rule nature of the argument is not plausible, however, because the exceptions are so glaring. The most important countercase is historical. Edward Barbier convincingly demonstrated that "throughout history abundant natural resources and favorable conditions in the world economy have combined often to generate successful resource-based development in many economies," particularly during the "Golden Era of resource-based development" from 1870 to 1913.[2] Indeed, over the millennia of recorded history, ample natural resource endowments have more often than not been associated with sustained development.

Another important countercase to the natural resource curse argument is provided by the six oil-rich monarchies of the Persian Gulf: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE).[3] As these six states constitute the members of the Gulf Cooperation Council (GCC), they are sometimes referred to collectively as the GCC. This chapter shows that without oil, the Gulf monarchies would be desperately poor, but with oil they have become spectacularly well-off. The chapter then asks what accounts for the success of oil-driven growth in the Gulf monarchies and

looks at three classes of possible explanations: favorable circumstances, good policies, and vast resources.

Gulf Monarchies Without Oil

Before the discovery of oil, the Gulf monarchies were weak and desperately poor. It is hard for Westerners to appreciate how underdeveloped Gulf societies were only a few short decades ago. Consider the following description of Saudi Arabia:

> In 1940 the wheel was not in general use in most areas of the nation. Saudi Arabia had a pastoral economy based on the raising of goats, sheep, and camels. The majority of the urban population lived in small villages built of mudbrick and earned a living from subsistence agriculture. The nomads drove their herds of animals across the desert in search of forage, carrying their meager belongings on camel back.[4]

Karl Twitchell used data from the UN Food and Agriculture Organization (FAO) to estimate that in 1956, 66 percent of Saudis were nomads and seminomads, 12 percent were settled peasants, and 22 percent were urban dwellers.[5] The oil firm Aramco was already operating in Saudi Arabia by that time, and Twitchell notes, "Initially Aramco even employed slaves, whose masters took part of their salary. Some tribal shaikhs, merchants, and moneylenders acted as intermediaries in supplying the workers and received part of their salaries."[6]

Thanks to oil income, the kingdom was able to buy slaves from their owners in 1963 and abolish slavery.[7] After a series of strikes and unrest by workers in the 1950s, Aramco improved laborers' conditions. Still, a 1962 survey found that among Aramco workers—the elite of ordinary Saudis—16 percent of homes had neither running water nor electricity, 48 percent had running water but no electricity, and 36 percent had both running water and electricity.[8] Having both running water and electricity is what constituted well-to-do in Saudi Arabia fifty years ago—that is, when the current Saudi elite was young.

Education and health conditions in Saudi Arabia were dreadful during this period. In 1954, when the kingdom's Ministry of Education was

established, only 8 percent of school-age children attended school. The curriculum centered on religious education, which was 57 percent of the second-grade school day, 53 percent of the third grade, and 35 percent of the fourth grade.[9] In short, "education consisted primarily of the teaching of Moslem doctrine and memorization of the Koran to boys; education of girls was practically nonexistent."[10] In 1956, the literacy rate in the kingdom was slightly above 5 percent. As late as the 1971–72 school year, in a country with at least three million citizens, only 27,109 Saudis graduated from elementary school and 3,279 from secondary school. In 2009, these secondary-school graduates were fifty-six years old and at the height of their careers in business or politics, so the impact of this legacy of educational underdevelopment remains relevant.

Saudi Arabia's economic situation before the development of the oil industry was no worse than that of other Gulf monarchies. Indeed, thanks to the pilgrimage trade and some agricultural and livestock prospects, Saudi Arabia was better placed economically than Kuwait, Qatar, and the UAE. (Bahrain and Oman also had some agricultural potential.) Pre-oil, those three regions depended on the sea to a considerable extent, especially on pearl diving. In his definitive 1915 *Gazetteer of the Persian Gulf*, J. G. Lorimer wrote, "Were the supply of pearls to fail . . . the ports of Trucial Oman [the future UAE], which have no other resources, would practically cease to exist; in other words, the purchasing power of the eastern coast of Arabia depends very largely upon the pearl fisheries."[11] Unfortunately for the locals, the 1930s combination of the global depression and Japanese development of cultured pearls was catastrophic for the Gulf pearl diving industry. The Gulf economic situation was becoming desperate just as oil income started flowing into the Arabian Peninsula.

After her detailed and well-researched description of life in the pre-oil Trucial States—including the region's efforts toward developing via pearling and entrepôt trade—Frauke Heard-Bey sums up the area's limited potential for change:

> Before the export of oil from Abu Dhabi began, even the most industrious of the people in the Trucial States could not dramatically increase their wealth or improve upon the overall economic situation in these shaikhdoms. . . . Whether pearls were in fashion in Europe, whether entrepôt trade with neighbouring countries shifted to the Trucial States, whether there were a few years of good rains or whether

> the locust swarms destroyed the date crop, the economic base remained the same: pearls, dates, boats, camels, domestic animals, fish, agriculture, and trade.[12]

Bahrain, Kuwait, and Qatar began their economic development much earlier than the UAE, given that these three regions' oil output began in1934, 1946, and 1947, respectively. But their pre-oil standard of living was also extremely low. During the 1936–37 academic year, Kuwaiti schools had 600 students, all boys.[13] The British political resident described Qatar's capital, Doha, at the end of the 1940s as "little more than a miserable fishing village straggling along the coast for several miles and half in ruins. The *suq* [market] consisted of mean fly-infested hovels, the roads were dusty tracks, there was no electricity, and the people had to fetch their water in skins and cans from wells two or three miles outside the town."[14] With the collapse of the pearling industry, Qatar's population in 1949 was estimated at less than 60 percent of its level at the beginning of the century.

The last Gulf monarchies to begin to develop were the UAE and Oman, where oil production only began in the late 1950s and 1960s, respectively. "In May 1962, two British engineering firms submitted [to Abu Dhabi's ruler Sheikh Shakhbut] a joint Development Plan [for Abu Dhabi]. . . . It provided for a hospital, water distillation, and electric power plants, four residential areas [for the anticipated growth to 25,000 residents], drainage and sanitation plants, public parks, and a public transportation system. . . . Sheikh Shakhbut refused to approve this plan . . . stating that it was too grandiose for Abu Dhabi's needs."[15] To be sure, Sheikh Shakhbut was cautious and suspicious about modernization, but it was also the case that in 1962 Abu Dhabi's government revenue was only $150,000 (by 1966, it was $42 million). Yet Abu Dhabi was arguably more advanced than Oman. When Qaboos became Oman's sultan by overthrowing his father Said in 1970, the capital, Muscat, had no central electricity, and the city gates were still locked at night.[16]

In 1966, as the oil era started, Abu Dhabi had exactly six primary schools with 587 students—students who in 2009 would be aged 49 to 55.[17] To be sure, there were additional schools in some of the other emirates of what would in 1971 become the UAE though it is worth noting that most were financed by other Gulf monarchies (mostly Kuwait), where oil exports had started earlier. It was only with the inflow of oil income and with the ascendancy of the more development-minded Sheikh Zayed (who replaced

Sheikh Shakhbut in 1966) that schooling developed in Abu Dhabi. In 1968, Abu Dhabi had seven new primary schools and enrollment was up to 4,937 students. That put it far ahead of Oman, which, despite a population at least ten times larger than Abu Dhabi in 1970, had only 900 students in the state-run schools. (There were also some students enrolled in schools run by the Petroleum Development [Oman] oil company.)[18] After coming to power that year, Sultan Qaboos sent 700 Omanis to elementary school in what was soon to become the UAE. This is well within the memory of many in the contemporary Omani elite.

In their survey of Middle East economies, Roger Owen and Şevket Pamuk summarize the many ways the pre-oil Gulf monarchies were the least developed parts of the Middle East.[19] Indeed, as the evidence above suggests, these monarchies were arguably the least developed places on earth, with social indicators and infrastructure that were on the whole no better than, and often behind that of, the poorest parts of sub-Saharan Africa or South Asia.

Not only were the economy and social infrastructure underdeveloped, but also so was the state. In the pre- and early oil days, the Gulf monarchies were fragile states often on the brink of becoming failed states. The governments were extremely weak. Monarchs were dependent on the powerful merchants who paid the taxes that sustained them. The region was often on the brink of war over boundary disputes, most notably between Saudi Arabia and Abu Dhabi and between the historical enemies Bahrain and Qatar. Oman had a series of civil wars, including one fought off and on for decades until the 1960s between the sultan and the imamate—the religious leadership of the main Ibadi sect. Another war was fought from 1963 to 1975 against communist rebels in Oman's southern region of Dhofar, a war put down by British special forces and, later, thousands of Iranian troops. Bahrain's majority Shi'a population regarded the ruling al-Khalifa family as foreigners, even though they had been in power for more than two centuries. Saudi Arabia has deep regional and tribal divisions, and these are not only among the Shi'a, who are a large portion of the population along the oil-rich Gulf coast. There are also divisions among the more cosmopolitan residents of the Red Sea coast (known as the Hejaz), which was ruled for most of a millennium by the Hashemite family that is now on the Jordanian throne. Lastly, there are divisions among the more traditionalist tribal elements in the kingdom (including the royal family) from the Nejd region around Riyadh. Without oil, the Gulf monarchies could easily have experi-

enced devastating unrest from a combination of interstate wars, ethnoreligious unrest, and civil strife.

Sharing the Arabian Peninsula with the oil-rich monarchies is the populous and desperately poor country of Yemen. Yemen shows what could have happened to the Gulf monarchies had they not found oil—they could have remained weak and underdeveloped. Until reunification in 1990, Yemen was split into two countries: the more populous and always independent North Yemen and the ex-British colony South Yemen. South Yemen was more formally known as the People's Democratic Republic of Yemen, for it was indeed a communist-run country. Both North and South Yemen depended upon foreign aid—Saudi and Soviet aid, respectively—and most especially on remittances from Yemeni workers in Saudi Arabia. In the 1970s, one-fifth of North Yemen's labor force and one-third of South Yemen's were employed abroad, and for both countries, remittances made up the vast majority of foreign exchange earnings; they were 40 percent of the South Yemen GDP.

After reunification, Yemen began producing modest amounts of oil. Even with that income, which provides about three-fourths of the country's GDP, the country remains desperately poor, with a per capita income of below $1,000 at purchasing power parity. The 2009 UN Development Programme (UNDP) Human Development Report ranks Yemen 138th of 179 countries, by far the lowest UNDP Human Development Index ranking of any Arab country.[20] And this is in a country with much more favorable natural conditions for non-oil development than that of the Gulf monarchies, because large areas of Yemen have sufficient rainfall to support agriculture. If the Gulf monarchies did not have oil, they would be hard-pressed to do better than Yemen—which is on the edge of being a failed state.[21]

Development Thanks to Oil

With oil, the Gulf monarchies have developed a standard of living comparable with Central Europe or the most advanced parts of Latin America. All six Gulf monarchies are in the top third of the 179 countries ranked in the UNDP's Human Development Index, with Saudi Arabia the lowest of the group at 55th and Kuwait at the top at 29th. That puts Kuwait ahead of eleven members of the EU and Saudi Arabia ahead of two EU members. In the lowest-ranked state, Saudi Arabia, life expectancy at birth is 72.7 years,

higher than in some EU countries, such as Latvia and Lithuania. To be sure, Saudi adult literacy rate at 84.3 percent is lower than anywhere in Europe, but the figure is still quite respectable. And if one looks solely at GDP per capita, then the Gulf monarchies rise sharply in their relative rankings. With high oil income in 2008, the Gulf monarchies as a group had a GDP per capita higher than EU countries as a group. In short, the Gulf monarchies have a standard of development that is much closer to that of the world's most advanced nations than that of most developing nations.

The Gulf monarchies have undertaken tremendous physical infrastructure investments to support social development and higher consumption.[22] In such hot and dry countries, increased income has translated into vastly higher consumption of electricity and desalinated water, which political realities required delivering at subsidized prices. The hot temperatures have also contributed to the automobile culture; neither walking nor public transportation is particularly comfortable when the temperature is 50 degrees Centigrade (122 degrees Fahrenheit), especially since along the Gulf relative humidity can be above 80 percent. That has required constant expansion of roads, often in dense urban surroundings. The reliance on imports, rather than local production, has meant frequent expansion of port and airport infrastructure. The Gulf monarchies started the oil era with an almost complete lack of public services—hospitals, schools, universities, and so on. And these states have experienced rapid population growth, which has slowed only in the last decade. (Birth rates began dropping after female literacy rose, as has happened in so many places around the globe.) In short, demands for public investment have been enormous, yet the Gulf monarchies have been able to keep up.

It was not inevitable that the Gulf monarchies would economically develop to this extent. They have faced many challenges on the path to their current prosperity. In particular, over the last forty years, oil income has been extremely volatile, with peak years seeing the Gulf monarchies' oil export earnings grow to more than four times the trough years' earnings.[23] The cycles have been unpredictable. Who could have predicted that oil prices in 2008 would not only burst through the $100 per barrel level but also reach $147 and then crash to $28—all in the same year? Perhaps one could say that on the whole, the oil revenue peaks and troughs have each lasted for three to five years, but that may overstate the regularity of the fluctuations. Furthermore, neither analysts nor investors have accurately pre-

dicted the timing of inflections (turns up or down), the magnitude of price changes, or the duration of peaks and troughs.

As a side note, it is not plausible to blame this volatility on price manipulation by the Gulf monarchies. For partisans of market mechanisms, it is sobering that oil prices have if anything become more volatile in the years since most oil sold in the world has had a price based on trading at commodity exchanges. Indeed, the actions of the Gulf monarchies—such as their willingness to hold millions of barrels a day of excess capacity off the markets when oil prices weaken and then restore them when markets tighten—seem to have been major factors in tamping down price swings.

Oil price volatility was particularly marked in the period between 1972 and 1987. Gulf monarchies' nominal oil export earnings rose about fivefold between 1972 and 1974. That increase is all the more impressive since oil revenue in 1972 was already 60 to 80 percent of GDP in these countries (except for Kuwait, where in 1972 oil revenue was "only" half of GDP). Earnings then fell by half by 1977–78, rose to record levels in 1981–82, and then collapsed to about 1972 levels in 1985–86.

Extreme volatility in export earnings can pose many different challenges to economic development. For instance, some commodity exporters have ramped up their public spending during peak years but then have attempted to sustain the peak public spending levels during trough years by incurring external debts. This borrowing strategy can lead to a debt crisis, which forces disruptive adjustments such as suspending partially completed projects. This pattern has been an important part of the resource curse. By contrast, Gulf monarchies have had remarkably little disruptive yo-yoing on account of export price fluctuations. There have been very few cases in any of the oil-exporting Gulf monarchies in the last thirty-five years of development projects cancelled in mid-construction, even during periods of low oil export earnings. Although government capital expenditures were trimmed during the lean years, there are few if any cases in which maintenance and repair of existing infrastructure were deferred. To be sure, there have been times when infrastructure had difficulty keeping up with growing demands. For instance, Riyadh and other Saudi cities have not always been able to provide continuous piped water to every neighborhood. But those have been exceptional circumstances. In fact, infrastructure shortfalls—especially with regard to electricity and roads—have been more significant during periods of rapid growth than during periods of low income.

The Gulf has experienced unsustainable bubbles, but most of those bubbles have been driven as much by private sector behavior as by government action. Some of the worst cases have been stock market bubbles, such as those of the early- and mid-2000s. The sums involved were huge, as the capitalization of the GCC stock markets went from $129 billion in early 2002 to $499 billion at the end of 2004. Then in 2006 came the crash, which badly hit many small investors who entered the market late. The Saudi market started 2006 at a $645 billion valuation before losing 52 percent of its value during the year. The drop in 2006 affected markets across the region: a 43 percent loss in Abu Dhabi, 44 percent in Dubai, and 47 percent in Qatar. (The Kuwaiti stock market index is calculated in a unique way, which makes it a poor indicator of what is happening to the value of stocks.)

There is no definitive account of the government role (if any) in these stock market bubbles though available information does not suggest a large government role in any of these cases. It does not seem, for instance, that governments' monetary and credit policies were particular drivers of the stock market bubbles. Perhaps investors were influenced by expectations that governments would bail them out if markets crashed. If so, they must have been disappointed. When investors loudly demanded public bailouts in the face of the 2006 market crashes, governments generally resisted and provided only limited relief. After all, even after the 2006 crash, markets in Gulf states were still up between 55 and 91 percent over the three-year period from 2004 to 2006.

Perhaps the worst case of an unsustainable bubble in the Gulf since the 1973 oil price boom has been in Dubai during the last decade.[24] Right after the turn of the millennium, the Dubai economy became red-hot. Local boosters claimed that a substantial chunk—some said one-fourth—of the world's construction cranes were at work in Dubai.[25] Private investors, usually with quiet quasi-government participation, launched a wide array of ambitious projects, such as construction of the world's tallest building, an indoor ski slope, and an artificial island in the shape of a palm tree with more than 4,000 luxury villas. Other than tourism and leisure, Dubai positioned itself as a commercial entrepôt, an air transport and shipping hub and a home to a variety of free zones for light industry and services. Many of these projects have excellent prospects for being profitable over the long run, and Dubai has a long track record of opening up the country to attract foreign merchants, investors, and tourists.

However, the timing for the Dubai property boom was terrible, with large numbers of apartments, villas, and office buildings coming on the market in 2008 after the global financial crisis hit. With potential buyers unable to secure financing, property prices began to fall and cause a drop-off in construction, which led to a further contraction in the market. By late 2009, property prices had fallen by about half from their 2008 peak—which still left them at least twice what they had been at the beginning of the decade. The Dubai bubble was arguably as much the fault of the Dubai government as of the private sector, in that Dubai's ruling family was heavily involved in many nominally private real estate developments. With prices dropping and demand falling, several major government-linked developers were unable to repay their debts as originally scheduled. In November 2009, Dubai World, a major government-linked firm, announced it was seeking a six-month "standstill" on $26 billion of its debt. World financial markets reacted with great concern, not only regarding Dubai government-linked firms' approximately $100 billion in debt, but also regarding the possibility that other semi-official borrowers in emerging markets around the world would not pay their debts on time. In December 2009, the government of Abu Dhabi stepped forward to make a $4 billion debt payment on behalf of Nakheel, a Dubai World subsidiary. At the same time, Abu Dhabi extended an additional $6 billion to be used for an orderly workout for the debt of firms linked to the Dubai government with the implication that debt holders would have to agree to some concessions.[26] In March 2010, the Dubai government proposed a restructuring of Dubai World and Nakheel debts.

But the episode differs from the stereotype of resource export volatility in at least three ways. First, Dubai was not a major oil exporter, and its borrowing binge was arguably based more on loose international lending standards than on expectations of future oil income. Indeed, the "Dubai Model" was one of an entrepôt leveraging foreign funding to create commercial and leisure opportunities, rather than depending on oil for development.

Second, Dubai's problems were on a par with those simultaneously occurring in major non-resource-based economies, such as the United States. In many cases, investors in Dubai may not make the extraordinary returns on which they were counting but will still do better from their Dubai holdings than from investments on the New York Stock Exchange or other major international markets. Dubai real estate prices hit bottom in 2010 and drop to about one-third of their summer 2008 peak—but still at about double the 2000 price level.[27] So while investors who came into the market late lost a

great deal, those who bought early and held on for the long-term have earned a strong return. And the prospects going forward are quite good. Helped by a recovering world economy and business diverted from other Arab countries experiencing turmoil, Dubai bounced back from the 2009 crisis with GDP growing 4 percent in 2010 and a projected 6 percent in 2011.[28]

Third, the Dubai crisis is primarily about the profitability of private investments, without many repercussions on government spending. Concerned that major defaults would hurt the reputation of both the emirate and the ruling family (which was, one way or another, a partner in most developments), the Dubai authorities took responsibility for working out debt refinancing for both the government and also major real estate and commercial development projects. After initial hesitation the Abu Dhabi authorities provided the financing Dubai needed to weather its financial problems, though at a political price for Dubai, symbolized by the renaming of the world's tallest building—of which Dubai is immensely proud—as the Burj Khalifa (Khalifa being the name of the Abu Dhabi ruling family) instead of Burj Dubai. Dubai appears on track to finance the $20 billion in debt repayments due in 2011. On this assumption, it appears that the main impact of the crisis in Dubai will be delayed development plans and trimmed government spending. That is nothing like the destructive impact of crises in other oil-exporting states, where governments have had to make dramatic cuts in such basic services as elementary education and infrastructure maintenance—cuts with long-lasting costs to national development.

Why Oil Helped the Gulf Monarchies

Explanations for why oil has helped the Gulf monarchies develop economically fall into three major classes: favorable circumstances, good policies, and vast resources. Let us examine each in turn.

Favorable Circumstances

No one seems to have argued that, aside from their oil and natural gas endowments, Gulf monarchies enjoy circumstances favorable to economic development. So we have to start from scratch in constructing a list of potentially favorable characteristics. The only ones that come to this author's

limited imagination are: institutional continuity, monarchy, unified societies, and Islam. None of them is in the least bit credible as an explanation for the successful use of oil income by the Gulf monarchies.

INSTITUTIONAL CONTINUITY

Some economists have argued that the economic development of Africa—or even of Latin America—has been held back by the colonial experience, which destroyed preexisting social structures to such an extent that the postcolonial societies have had difficulty sustaining stable and effective governing institutions. Perhaps. But the Gulf monarchies have hardly been free of imperial interference. Kuwait, Bahrain, Oman, Qatar, and the Trucial Coast (which became the UAE after independence) were all British colonies, achieving independence only in 1961 (Kuwait) or 1971 (the other four). And Saudi Arabia existed as a country for only twenty years before the discovery of oil; the kingdom was the forcible merger of several quite distinct regions, at least one of which (the Hejaz along the Red Sea coast) has a long history of hostility toward societies from the Arabian Peninsula's interior, such as the Saudi royal family.

MONARCHY

Monarchy as a system of governance is not likely to promote inclusiveness, transparency, and accountability, which are often said to be important parts of the good governance that promotes economic development. It would be hard to suggest that the Gulf monarchies rank well on these indicators. Indeed, World Bank rankings of public accountability show the Gulf monarchies doing poorer than the rest of the Middle East, which is not a high standard to meet.[29]

Vigorous disputes rage about the connection between democracy and economic development. Although participants in this debate agree on few points, I suspect there would be broad agreement that monarchy is not a positive factor for economic development. The argument has been made, however, that monarchy in the Middle East has been good for political openness and stability because monarchies are more secure and stable than revolutionary republics, having preserved links to valued traditions.[30]

CHARACTER OF SOCIETY

It could be argued that more unified societies, without deep ethno-religious or regional splits, enjoy better development prospects. Perhaps. The Gulf

monarchies are characterized by deep divisions along those lines. The most obvious case is Bahrain, where many in the majority Shi'a population consider the Sunni ruling family to be foreigners (even though they have been in Bahrain for two centuries) and certainly illegitimate. Both Saudi Arabia and Kuwait have large Shi'a populations that are not fully integrated into national life. In addition, three of the six Gulf monarchies have deep regional divisions: (1) the UAE, in which seven emirates jealously guard their prerogatives and are often unwilling to work together; (2) Oman, which experienced more than a century of intermittent civil wars until the mid-1970s; and (3) Saudi Arabia, which the ruling family cobbled together in the 1920s and 1930s from three regions with very separate histories and peoples who did not particularly like each other.

ISLAM

Some have argued that particular religions are better than others for economic development, most famously Max Weber in his *The Protestant Ethic and the Spirit of Capitalism*. Perhaps this is so, though it is humbling to realize how wrong Weber was in his argument in *The Religion of China: Confucianism and Taoism* in which he argued that China was poorly placed to develop a capitalist economy. It is not clear that Islam is particularly conducive to capitalist growth, although as Maxime Rodinson has shown, Islam is highly compatible with capitalism.[31] Indeed, the way in which Islam has been implemented in the Gulf monarchies has at times posed problems for economic development. For instance, it has had an impact on the administration of justice, the enforceability of contracts, and the leveling of interest charges. In addition, violent radicals inspired by their interpretation of Islam have in Saudi Arabia—by far the largest of the Gulf monarchies—been a major source of internal instability, imposing heavy security costs on economies, discouraging foreign investors, and leading to complications in foreign trade and travel.

Even if someone were to come up with some circumstances that made the Gulf particularly suitable for economic development, they would still have to be balanced against other circumstances that have made the Gulf a poor location for economic growth. Two such obvious examples are water and wars. The Gulf is arguably the least water-endowed populated region in the world. In addition, the Gulf monarchies have some neighbors who pose severe security challenges. Six prominent examples include (1) Gulf states had reason to worry about being drawn into the eight-year Iran-Iraq war

during the 1980s; (2) Iran has targeted Kuwait on several occasions, including the attacks on oil tankers that led to the U.S. Navy tanker convoys in the Gulf during 1988 and 1989; (3) the 1990 Iraqi conquest of Kuwait was followed by a twelve-year standoff with a U.S.-led coalition and a complex war and insurgency thereafter; (4) Iran continues to occupy islands that had been part of the UAE; (5) Bahrain, Kuwait, and Saudi Arabia have accused Iran of organizing terrorist attacks in their countries; and (6) the impasse over Iran's nuclear programs has been a major factor behind more than $50 billion in Gulf monarchy arms orders in the last five years.

Good Policies

Those who emphasize resource endowments' negative impact acknowledge considerable variation in that impact, depending on the state's policies. Extending that thesis, could one argue that the reason Gulf monarchies have done well is that they have followed especially good policies? The evidence for such an argument is slim. The Gulf monarchies have adopted some policies supportive of growth, especially an embrace of globalization, macroeconomic stability, and a reliance on the private sector to the extent practicable. But the Gulf monarchies have also implemented policies that have contributed to corruption, waste, policy paralysis, and excessive reliance on foreign labor—all of which have hindered sustainable development.

GLOBALIZATION

The Gulf monarchies have been extraordinarily open to interaction with the world. Obviously, they were major exporters. But they have not gone down the route of being mercantilists or import-substituting industrialists that have tried to meet domestic needs through local production. One could be cynical about these countries' openness to foreign labor, which could be read as reflecting a weak local work ethic, but Gulf societies' willingness to tolerate large numbers of foreigners living in their midst has benefited both the Gulf economies and the labor-exporting countries, such as Jordan and Lebanon, enriched by remittances. And societies as capital-rich as the Gulf monarchies did not have to be as open to foreign investment as they have been. Furthermore, the Gulf monarchies have been open to foreign brands and foreign service industries in ways that have transformed conservative local cultures. Obviously, Gulf monarchies, most especially Saudi Arabia,

have limits that Westerners find grating, but any Westerner will find much to recognize in Saudi Arabia's numerous shopping malls.

To be sure, there have been limits to the openness of Gulf monarchies, even beyond those related to religion. The long-imposed requirements that foreign firms operate through local agents were little more than a tax on the foreign firms, in that local agents rarely did much to merit their substantial share of profits. Most Gulf monarchies have subsidized local agriculture and imposed various barriers to imports in order to protect local producers—some traditional (dates) but many newly established (poultry, eggs, and vegetables). To a much larger extent than other Gulf monarchies, Saudi Arabia had relatively high tariffs on industrial products that were competing with local industry. However, the Saudi case is a good example of how the trend over time has been toward greater openness. In the course of its 2005 accession to the World Trade Organization, Saudi Arabia eliminated the requirement that foreign firms operate through local agents and reduced tariffs from 12 percent to 5 percent on three-fourths of Saudi imports. It also simplified a wide range of trade procedures.[32]

As an example of the much more closed-to-the-world policies that the Gulf monarchies could have pursued, consider the policy mix adopted by Libya or Algeria. Their focus on self-sufficiency and their hostility to foreign influences—for instance, to Western brand-name services—was driven largely by leftist ideology, which has served as a greater barrier to globalization than the Gulf's conservative Islam. Libya and Algeria have societies with a very different feel than those of the Gulf monarchies—without the same ubiquitous presence of Western brands and Western lifestyle. Furthermore, the most charitable interpretation would be that Libya and Algeria have had considerably worse growth outcomes than the Gulf monarchies, despite ample resource endowments.[33]

MACROECONOMIC STABILITY

An important aspect of the resource curse has typically been an asymmetrical response to income shocks. Namely, government spending has risen quickly when income soars but also stays high when income plummets, with foreign borrowing being used to postpone the inevitable adjustment. The adjustment becomes all the more harsh due to the country's taking on substantial foreign debt. This pattern has not been seen in the Gulf monarchies. As a rule, though arguably with a few exceptions, Gulf states' adjustment to lower income has been timely, and windfalls have not led to unsustainable

increases in government spending. The most significant exception—the Dubai bubble of recent years—was discussed above.

The acid test of commitment to macroeconomic stability has come when revenue fell sharply and reserves ran out. There have been few such cases in the Gulf in the last quarter century; reserves have generally been sufficient to cover deficits. A unique case of the importance of building reserves for unexpected contingencies is Kuwait prior to the 1990 Iraqi invasion. Kuwait faced massive spending, equal to several times GDP, for both the war costs (including grants to states providing troops to repel the Iraqi invaders) and the postwar reconstruction bill. Retreating Iraqi troops destroyed many buildings and set fire to all Kuwaiti oil wells, causing spectacular environmental damage that required tens of billions of dollars to reverse. Although the Kuwaiti government has not provided a clear accounting of the crisis's costs or the country's financial situation prior to the war, it appears that Kuwait exhausted nearly all its reserve fund of about $100 billion.

In the last quarter century, Saudi Arabia has twice faced serious budgetary problems.[34] The first was in the aftermath of the spectacular 1986 oil price crash. Government revenue, which had already plummeted from $100 billion in 1981 to $36 billion in 1985, dropped to $21 billion in 1986 and then averaged $27 billion from 1987 to 1989. An embarrassing run-up in unpaid bills to contractors squeezed local businesses hard, because local banks were reducing lending to Saudi firms. Banks did this partly because of increasing defaults and partly because they were increasingly financing the government's deficit. The Saudi government did not, however, try to sustain its previous spending plans through foreign borrowing. Instead, it responded by drastically curtailing investment expenditure while using scarce resources to complete all projects underway and to sustain repairs and maintenance on existing infrastructure.

By contrast, the Saudi government did turn to foreign borrowing, as well as to pressure on local financial institutions, on the second occasion when it faced serious budget problems, during the aftermath of the 1990–91 Kuwait crisis. That was hardly surprising: few countries go through a major war without incurring a national debt. The spending went both for war costs and for the substantial postwar arms purchases meant to guard against the perceived continuing Iraqi threat. But Saudi Arabia kept a tight lid on spending during the 1990s, even though that meant that civil servants' standard of living fell noticeably, unemployment became a serious social problem, and water, electricity, and roads did not keep up with demand.[35]

The last decade in Saudi Arabia has seen dramatic increases in oil revenues accompanied by largely modest increases in government spending. Beginning in 1999, the combination of rapid Asian economic growth and OPEC solidarity at restraining oil production resulted in steadily increasing oil export revenues for Gulf monarchies. This income increase, coming after fifteen years of more modest export earnings, could have fueled another unsustainable spending boom. It did nothing of the sort. Instead of immediatedly funding massive new projects, the Gulf states, if anything, accelerated their economic reform efforts and used the additional income sparingly, only launching new projects when the funds to pay for them were already in the bank. For instance, Saudi Arabia paid down much of its debt to the local banking system, which allowed banks to vigorously lend to private businesses. Particularly striking was that military budgets and arms purchases throughout the Gulf monarchies significantly fell despite the higher oil income.[36] It would appear that Gulf states' high levels of military spending in the 1980s and 1990s were based on the perception of real threat from first Iran and then Iraq. As those threats faded, so did the Gulf states' spending. And now as the Iranian nuclear impasse worsens, military spending in the Gulf has trended sharply upward in the last few years. Furthermore, Gulf monarchies have spent more wisely on their militaries in recent years, acquiring real capabilities well in line with the conventional threats they face.

A substantial but measured increase in oil export earnings turned into another oil boom in 2005. The income windfall was stunning, but still the Gulf governments did not rush to spend it all. For instance, Saudi oil exports tripled from 2002 to 2006, and most of that windfall went into turning a 2002 budget deficit into a $60 billion surplus four years later. Spending initiatives were modest: a 15 percent government salary increase (the first in almost twenty years), an $8 billion program for basic infrastructure, and a $19 billion purchase of seventy-two Eurofighter Typhoon jets to replace an aging force and counter a growing perceived Iranian threat. By the end of 2008, the Saudi government had wiped out the national debt, which in 2002 had been $250 billion, slightly more than the annual GDP at the time.

However, the path of economic reform and cautious spending changed sharply in early 2011 when the royal family became concerned that the protests in many other Arab countries might spread to Saudi Arabia (indeed, there were some modest protests in the kingdom). In forty-one royal decrees in February and March 2011, King Abdullah announced $129 billion in spending designed to address social discontent.[37] Government workers got an

extra two months' salary; unemployment benefits of $533 a month were instituted; the Ministry of Interior created 60,000 new law enforcement jobs; $67 billion was allocated to build 500,000 housing units; and a minimum wage for citizens was introduced. These benefits do little if anything to add to economic growth; indeed, they could further erode the Saudi work ethic, as the benefits suggest that government largesse, rather than work effort, is what will raise personal income. Furthermore, the spending on these benefits may exhaust the government budget surplus if oil prices stabilize at $100 a barrel, leaving the government with little room for the increased spending on education and infrastructure which would contribute to economic growth.

For Kuwait and the UAE, combined oil exports rose more than threefold from 2002 to 2006, from $35 billion to $120 billion, and then rose another 50 percent by 2008 to $180 billion.[38] Although government spending certainly rose in the two countries, much of the extra revenue was saved and yielded budget surpluses of more than 25 percent of GDP. So much has been added to Kuwait's Reserve Fund for Future Generations that the International Monetary Fund estimates that by 2010, interest from government funds invested abroad will be $14 billion, which is more than $10,000 per Kuwaiti. But it is unclear if these economically sound policies will be sustained in face of the worries about protests similar to those in many other Arab countries. In early 2011, Kuwait and the UAE both announced generous benefits for citizens, though not as over-the-top as those in Saudi Arabia.

RELIANCE ON THE PRIVATE SECTOR

The vast sums of oil revenues flowing into Gulf monarchies' government coffers, combined with the meager resources (managerial, technical, and financial) of these countries' private firms, would seem to push them toward state-run development. And of course the state has been the principal funder of industry, commercial real estate, housing, and all manner of infrastructure in the Gulf. That said, the Gulf monarchies have done a remarkable job at encouraging the private sector. Consider Saudi Arabia. A census of establishments in 1962 showed how small and undercapitalized Saudi firms were. Over the next four decades, the Saudi state used its resources to encourage private wealth. Giacomo Luciani describes a typical case, namely, electricity:

> The state did not nationalize the originally private electricity companies, but underwrote increases in their equity capital so that they could expand their generation capacity in line with demand; in this

> way it acquired the vast majority of the equity. Furthermore, because electricity was for several years sold below cost to check increases in the cost of living, the private equity holders were guaranteed a minimum return on their equity notwithstanding the fact that the companies may have been operating at a loss. Overall, it was a sweet deal for the original owners.[39]

Luciani goes on to document the development of substantial Saudi private entrepreneurs, some of whom have made billion-dollar investments in industrial projects. He also shows how these entrepreneurs have become quite independent of the Saudi state. One indication is that they increasingly turn to the Saudi stock market and to privately owned Saudi banks to raise funding for projects, which has led to increasing transparency in business practices. Another sign is that they are investing billions of dollars in major international banks, hotels, retail store chains, and real estate projects. Perhaps most surprisingly, given the closed character of the political system, the Saudi state has been quite comfortable with Saudi entrepreneurs who act quite independently of the government, including a few who are open critics of the political system.

Saudi policy has been good not only to the ultrarich but also to businessmen in general. Perhaps one of the best ways to illustrate this is to turn to the World Bank's *Doing Business* series, which ranks 183 economies on a wide range of policies, including enforcing contracts, protecting investors, registering property, getting credit, and procedures for starting or closing a business. In the 2010 edition, Saudi Arabia ranks 13 out of 183.[40] In short, Saudi Arabia is hardly a model of crony capitalism, much less of state capitalism. Nor has reliance on the private sector in the Gulf been confined to Saudi Arabia. Writing in the mid-1990s, one eminent economist of the Middle East ranked the UAE as by far the most market-oriented and friendly to the private sector of the four OPEC-member Gulf monarchies.[41] All the Gulf monarchies rank in the top half of countries in the World Bank's 2010 *Doing Business* index: Saudi Arabia at thirteen, Bahrain at twenty, UAE at thirty-three, Qatar at thirty-nine, Kuwait at sixty-one, and Oman at sixty-five. By contrast, three EU members, including Italy, rank below all of the Gulf monarchies in this index.

Intriguingly, although the Gulf states all adopted similar policies of relying on the private sector to the extent practicable, their development strategies differed considerably. The 1970s oil boom accentuated the preexisting

differences in the development strategies that various Gulf monarchies had already chosen by the late 1960s (if not earlier). To develop in the face of ample cash but limited human capital and small local markets, the different monarchies followed four general development strategies: industrial, natural gas, financial, and trading. Bahrain and Saudi Arabia have been the states most focused on industrial development. Industrialization in these two countries was at first thought of as primarily producing for the local market, in line with the economic development theory popular in the 1960s known as import-substituting industrialization. But it later shifted to energy-intense products for world markets in line with the economic development theory of the 1980s known as export-led industrialization. Natural gas was the route chosen by Qatar, with its limited oil but massive natural gas reserves, which it has developed for use both in industry and as liquefied natural gas for export. Investing wealth abroad has been a major activity for Kuwait, which early on established a formal reserve fund, but the domestic economy was dominated by commerce and services for the local population. Being a trading center has been Dubai's ambition for decades, at least since Sheikh Rashid came to power in 1958. Dubai developed as a regional trade entrepôt, with extensive port and airport facilities and a welcoming attitude toward foreign investors.

CORRUPTION, WASTE, AND PARALYSIS

The Gulf monarchies have certainly suffered from corruption, particularly Bahrain and Saudi Arabia. Saudi ambassador to the United States Prince Bandar bin Sultan responded to criticisms of corruption by saying "So what?" if the royal family had siphoned off $50 billion over the years, arguing that they had spent $350 to $400 billion modernizing Saudi Arabia.[42] In a lengthy interview with a prominent American journalist, the prince argued that much of the criticism of corruption was either a misunderstanding of the Saudi system of personal patronage or an example of hypocrisy, because the West also tolerates the dispensing of favors to prominent politicians and excessive charges by suppliers to the government. Prince Bandar may have overstated the case, but he is quite correct that Saudi practice is not as different from Western experience as is often suggested. In this context, it is worth noting that in the 1990s the direct financial payments from the state to Saudi royals were relatively modest, with most of the 6,000 to 10,000 princes receiving less than $1,000 a month. That is a remarkably different situation from 1959, when the king's "private treasury" took up 20

percent of the budget and all economic projects were only 9 percent. Even that was probably an improvement on previous years, given that 1959 was the year financial reforms along the IMF lines were introduced in Saudi Arabia.[43] In contrast to the 9 percent for economic projects in 1959, a much larger percentage of the budget was devoted to capital investment projects in the 2010 budget.[44]

Waste has been a much greater drain than corruption on the Gulf monarchies' resources. Through the 1980s, governments often felt compelled to cushion locals from losses. Kuwait, for instance, spent $90 billion to offset losses from the bursting of a 1981 stock market bubble; those payments were equal to $180,000 per citizen. More common were generous subsidies that had perverse effects. Scared by rising world wheat prices, Saudi Arabia so generously promoted wheat raising, which entailed production of highly subsidized water, that the land under cultivation rose twentyfold, and the kingdom became the world's sixth-largest wheat exporter. The subsidized purchase price was finally cut in 1988; output then stabilized. A similar case of waste occurred in the UAE, where the competition among the different emirates led to spectacular duplication. There were, for instance, six international airports in a small area at a time when demand could have been met by any one of them.

In four of the six Gulf monarchies—Bahrain, Kuwait, Oman, and Saudi Arabia—arguably the most serious policy shortcoming has been policy paralysis. Kuwait has had great difficulty resolving standoffs between the popularly elected parliament and the executive branch—that is, the royal family. The result was years of delay in implementing investments of potentially great benefit, especially in the oil industry, though that the logjam was broken in 2010 when consensus was reached on a number of contentious issues.[45] In Saudi Arabia, decision making has been similarly slow. Part of the problem has been a succession of elderly unhealthy kings. Another issue has been what Steffen Hertog refers to as segmented clientalism, in which "juxtaposed groups of stakeholders tend to have different patrons within the state and the political elite . . . The system has created a number of institutional, regulative, and distributive 'fiefdoms,' sometimes with strongly overlapping areas of jurisdiction."[46]

THE EMPLOYMENT MESS

The Gulf monarchies' most troubling economic policy may be their heavy reliance on foreign laborers. Although data about employment in the Gulf

monarchies are notoriously unreliable, it appears that approximately three-fourths of those employed in the Gulf monarchies are foreigners and that the great majority of employed locals work for the government.[47] According to the 1995 UAE census, 12,000 nationals worked outside the public sector compared to 102,000 working in the public sector; that made UAE nationals 27 percent of the public sector workforce but only 1.3 percent of the non-public workforce.

The heavy reliance on foreign labor creates two profound socioeconomic problems. The first is unemployment, a subject so sensitive that there are no reliable figures in these countries. For instance, serious estimates for unemployment among Saudi males in 2002 range from 10 percent to 30 percent. And unemployment is getting worse because the rapid population growth rate in past decades is translating into a rapidly growing pool of young people, many of them university graduates, joining the labor market. From 1999 to 2004, the UAE's national labor force grew at 10 percent a year. To be sure, in all the Gulf monarchies, extended family networks cushion the social impact of unemployment, which generally takes the form of young men having to stay in their parents' home for years until they finally land a government job. But those idle young men are both an economic waste and a potential political problem. A problem set to mushroom in the next decade is unemployment among women, who now make up a majority of university students in every Gulf country but whose participation in the labor force has been only about 10 percent of the working-age population. That participation rate has risen in Kuwait in recent years, and so has female unemployment.

The second problem related to the heavy reliance on foreign labor is the social tension from foreigners predominating the local population. The situation is most extreme in the UAE, where many businesses cater to the foreign residents and foreign tourists rather than to UAE citizens. Furthermore, the overwhelmingly male foreign labor force means that 67 percent of the UAE population is male, with the proportion being even higher among young adults—a socially explosive situation, particularly in a society so conservative about sexual mores. The heavy dependence on foreigners also creates security concerns of many sorts, from conflicts among foreigners of different nationalities (for example, Pakistani and Indian) to infiltration by foreign subversives (for example, radical Islamists). And in Bahrain, the local population's Shi'a majority is deeply embittered by what it perceives as a concerted government campaign to give citizenship to Sunni foreigners and change the country's religious mix.

Gulf governments have had at best limited success at addressing the problem of heavy reliance on foreign labor. Programs requiring private firms to hire locals have been marked by failure; the typical response of private firms is to treat the program as, in effect, a tax, with the hired locals not expected to be seriously competitive with their foreign coworkers. Some small reforms have been made in schooling to make education more responsive to labor market needs, but the emphasis should be placed on the word *small*. Locals' expectations about how much effort they must make at work and how much income they should expect to make have only changed incrementally. On the whole, the response of Gulf societies to the employment problem has been to continue with the old model—foreign labor for private-sector work, nationals working for the government—and hope for the best. After all, it would only take modest adjustment in the proportion of new jobs going to nationals rather than foreigners to absorb the growth in the national labor force. Consider that between 1999 and 2004, employment in the UAE rose by 929,000 yet the national labor force rose by only 96,000. Had the share of nationals among those being hired been only 11 percent, national unemployment would have been eliminated; instead, it more than doubled to a total of 29,000.

THE BALANCE SHEET ON THE POLICY MIX

In sum, can it be argued that good policies explain the Gulf monarchies' escape from the resource curse? To be sure, many of their policy choices have been admirable, especially the embrace of globalization, macroeconomic stability, and the private sector to the extent practicable. But the Gulf monarchies have also implemented many policies that held back sustainable development. Waste, corruption, and policy paralysis, with the partial exceptions of Qatar and the UAE, have too often been the norm. The heavy reliance on foreign labor also undercuts the local work ethic and creates serious social problems. On balance, government policies in the Gulf states have been modestly supportive of sustainable growth.

It is not clear that the policies modestly supportive of growth have been enough to account for the spectacular growth of the Gulf monarchies. That said, perhaps other oil exporters have had such bad policies that the Gulf's modestly growth-supportive policies account for the better outcome in the Gulf compared to many other oil exporters. Further research would be necessary to address the question of whether the combination of modestly pro-growth policies plus oil exports is sufficient to avoid the resource curse.

Vast Resources

It would be comforting to think that good policies account for the Gulf monarchies' successes at using resource wealth for development. That explanation would suggest that if other resource exporters adopted similar policies, they, too, would avoid the natural resource curse. However, at least as plausible an explanation for the Gulf monarchies' growth is the simple fact that they have had so much oil income that even if they wasted much of it, they would still be immensely rich. Consider the extreme case of Qatar. Qatar's 2008 oil and gas exports were $66 billion.[48] There are perhaps 200,000 Qatari nationals, meaning that these exports came to $330,000 per national. Even if we take as the denominator the entire population of 900,000—including foreigners, most of whom are simple laborers—Qatar's per capita oil and natural gas exports were $73,000. It is hard to argue that $73,000 per person per year is a curse. And there is little reason to think that this income is a flash in the pan: Qatar's presently proven oil reserves are sufficient to sustain current production levels for 54 years, and its proven gas reserves (and gas products account for more exports from Qatar than oil) are sufficient for 335 years.[49]

With such an extraordinary income stream from an industry that requires so few inputs other than the natural resource endowment, Qataris are well positioned to enjoy a high standard of living even if much of the income is wasted or appropriated by a small part of the population. Indeed, much money has gone into luxury and prestige projects. In 2008 and 2009, Qatar built too many buildings of all types, feeding a real estate asset bubble similar to that which affected much of the world, but building prices recovered thereafter. In 2011, Qatar announced plans for $140 billion in infrastructure construction over four years, even before it committed to $64 billion in additional spending for the 2022 World Cup.[50] On top of that are multibillion plans for art museums, educational facilities, housing, and showcase commercial developments. The program is extraordinarily ambitious, but it is arguably appropriate for a country with Qatar's income level and accumulated financial reserves.

Perhaps the natural resource curse theory needs to be rephrased as "Lots of natural resources are a curse, but incredibly huge amounts of natural resources are a blessing." We are used to thinking of correlations that are either positive or negative, but perhaps in the case of the correlation between natural resource endowments and economic development, there is a tipping

point at which the correlation shifts from negative to positive. If so, that would be an interesting converse to Thad Dunning's argument that modest oil wealth can be good for democracy but that vast wealth is bad.[51]

However, more research into the situation of other countries with very large resource endowments is needed before we conclude that the natural resource curse theory needs any such coda. In particular, the experience of Libya and Brunei would seem to suggest that some extremely well-endowed countries have social indicators and economic development below what would seem achievable with their readily exploitable resource wealth. It could be argued that Equatorial Guinea is on the same path: its 2008 oil exports were $30,000 per capita but its life expectancy, at fifty-one years, was 159th in the world.[52]

Words of Caution

The evidence is clear that the Gulf monarchies are economically better off due to their oil and gas resource endowments. The standard of living in the Gulf monarchies is certainly higher than it would have been in the absence of oil and gas. However, it would be premature to conclude that we know why these countries have avoided the natural resource curse. There are no obvious factors in the Gulf monarchies' historical and cultural circumstances that would account for this success. It seems that decent government policies were a considerable factor. However, it is also plausible that the vast size of the Gulf monarchies' natural resource endowment was at least as important. Certainly that latter explanation fits the popular image—that is, that the Gulf monarchies are so rich because they are swimming in oil.

The counterintuitive argument that oil is a curse was never going to be easy to make. Selling that theory becomes all the more difficult when there are counterexamples. The Gulf monarchies' spectacular success at raising their standard of living through oil income has arguably shaped popular and policy maker views about the impact of oil on economies. Who would not want one's country to be as wealthy as Qatar? And if vast amounts of oil and gas have been good for Qatar, then it would seem to make sense to hope that one's country has substantial oil and gas reserves. Plus, it is a natural human failing to be optimistic. So it would not be surprising if policy makers and publics feel that their countries could imitate the Gulf monarchies' success. They may think they can implement policies that are at least as

good for development as those in the Gulf monarchies, and they may hope their countries turn out to have vast natural resource endowments on the scale of Qatar's. I suspect that this optimism is generally misplaced. But I doubt that policy makers and publics will abandon their hopes for oil until we economists and political scientists can provide a fuller explanation of why oil and gas helped the Gulf monarchies.

3

Is There a Policy Learning Curve? Trinidad and Tobago and the 2004–8 Hydrocarbon Boom

Richard M. Auty

Since gaining independence in 1962, Trinidad and Tobago has experienced three hydrocarbon booms (1974–78, 1979–81, and 2004–8). The first two booms each conferred an additional 35 to 39 percent of non-energy GDP in revenue annually, and the most recent windfall conferred an average extra 59 percent of non-energy GDP annually. The over-rapid domestic absorption of the first two booms through increased consumer subsidies and state-led resource-based industrialization triggered a protracted growth collapse through 1982–93 that cut incomes by one-third and destabilized politics.

Some lessons have been learned from the 1974–81 booms, and the deployment of Trinidad and Tobago's 2004–8 hydrocarbon windfall revenue was more cautious. Two-thirds of the 2004–8 windfall was saved by both the private sector and the public sector. Even so, the third of the windfall that was absorbed domestically expanded the non-energy public sector deficit to three times the IMF estimate of a sustainable deficit level. The scale of absorption also intensified "Dutch disease" effects (that is, the relative contraction of nonhydrocarbon tradable activity, notably agriculture and manufacturing, relative to service activity) and sustained rent-seeking interests. Consequently, despite the welcome gain in policy-making caution, Trinidad and Tobago has yet to nurture an effective pro-reform political coalition that can neutralize rent-seeking interests and promote competitive diversification of the economy.

Fashionable statist policies encouraged government intervention in many developing countries through the 1960s and 1970s, and these policies cumulatively distorted these countries' economies and triggered growth collapses during the 1974–85 period of commodity price vulnerability. This was notable among the resource-rich countries.[1] The growth collapses proved protracted because the interventionist policies established powerful rent-seeking constituencies that resist International Financial Institutions (IFI) efforts at economic reform. Nevertheless, evidence of a policy learning curve emerged among the rent-distorted developing economies through the late 1990s and early 2000s. However, high-rent, hydrocarbon-driven economies have struggled through the 2004–8 commodity boom. Three hydrocarbon-dependent economies in South America (Bolivia, Ecuador, and Venezuela) appear to have learned little, but this chapter finds patchy evidence of policy learning in Trinidad and Tobago.

The chapter is structured as follows: The first section briefly summarizes the literature pertaining to the political economy of rent deployment in Trinidad and Tobago and identifies five features of the country's political economy that create the risk of maladroit rent deployment. It also compares the scale of the hydrocarbon windfall rents of 1974–78 and 1979–81 with those of the 2004–8 windfall and establishes the legacy of the 1974–81 deployment. The next section analyzes the political economy of the 2004–8 rent deployment in Trinidad and Tobago. Briefly, the chapter finds that although recent rent deployment has improved compared with 1974–81, the rent-seeking interests established during the earlier booms persist and channel revenue in ways that retard the long-term competitive diversification of the economy.

The Legacy of Past Hydrocarbon Rent Deployment

Implications of the Rent Cycling Literature for Trinidad and Tobago

The emerging theory of rent cycling suggests that the scale of rent relative to GDP impacts both elite incentives and the development trajectory.[2] Whereas low rent incentivizes elites to grow the economy (because that increases the level of taxation, which is the principal source of discretionary expenditure and one that the elite frequently benefit from disproportionately), high rent encourages rent distribution at the expense of investment efficiency and sustained long-term growth.

More specifically, low rent motivates governments to provide public goods and efficiency incentives that align the economy with its comparative advantage, which in low-rent economies for the most part initially lies in early competitive labor-intensive manufactured exports. The low-rent development trajectory rapidly absorbs surplus rural labor so that rising wages automatically drive diversification into productivity-boosting, skill-intensive, and capital-intensive sectors. In addition, early industrialization drives early urbanization that accelerates the demographic cycle to reduce the dependent/worker ratio, which raises the share of investment in GDP and accelerates per capita GDP growth.[3] Finally, the rapid structural change engendered by competitive industrialization drives a virtuous sociopolitical circle as it proliferates social groups that restrict policy capture by one group and also strengthen sanctions against antisocial governance as: (1) firms protect their investment by lobbying for property rights and the rule of law;[4] (2) unsubsidized urbanization strengthens civic voice;[5] and (3) early government reliance on taxing income, profits, and expenditure (forced by the absence of rent from trade) spurs demand for accountable public finances.[6]

In contrast, high rent creates contests for its capture that deflect elite incentives toward cycling rent to boost patronage and personal enrichment that offer more immediate (often personal) rewards than the long haul of wealth creation. Consequently, more rent flows through patronage networks at the expense of markets than in low-rent economies, and this shifts the high-rent economy away from its comparative advantage. In the absence of competitive industrialization, surplus labor persists and encourages governments to deploy some rent to expand employment that markets would not support in protected industry and an expanded bureaucracy. The demand for transfers from the subsidized sector eventually outstrips the rent due to structural change or falling commodity prices, so the high-rent economy becomes locked into a staple trap trajectory of increasing reliance on a weakening primary sector. But rent recipients resist market reform because it shrinks their rent. In the absence of reform, investment efficiency declines. GDP growth decelerates and causes the economic growth rate to collapse, and recovery from this is protracted. Rent cycling theory also recognizes that the adverse impacts of high rent are exacerbated (and therefore more intractable) in the presence of (1) statist policies,[7] (2) high ethnicity,[8] (3) concentrated commodity linkages,[9] and (4) parliamentary democracies[10] that are young.[11]

Rent cycling theory therefore suggests that hydrocarbon rents risk feeding rent-seeking activity at the expense of sustained economic growth in Trinidad and Tobago. First, the country's rent has been both high and concentrated on the government. In addition, the country gained independence from Great Britain in 1962 as a parliamentary democracy that was racially divided. Around 40 percent of the population is descended from Indian indentured plantation workers who succeeded the slave labor force and remained largely rural and strongly dependent on the sugar industry at independence.[12] Around 39.5 percent of the population is black, comprising mostly freed slave immigrants to Trinidad and Tobago who reside mainly in the northern urban region that extends east from Port of Spain. Finally, some 17 percent of the population is mixed and includes Syrians, Europeans (who dominate finance), and Chinese.[13] Each of the two largest ethnic groups (Indians and blacks) formed a political party, but neither commanded a majority and both relied on co-opting smaller groups in order to govern.

The Scale of the Three Hydrocarbon Booms

Trinidad and Tobago lies at the eastern edge of a set of hydrocarbon fields that extends from northern Venezuela. Most of the fields are offshore, and these require elaborate technology for the extraction of the resources and impose technical demands that require capital and expertise that have rendered the tiny country reliant on leading international oil companies (IOCs). After oil output peaked in Trinidad and Tobago during the 1970s, natural gas extraction rose to dominate hydrocarbon production. Reserves were constantly expanded and by 2004, the total reserves of oil and gas were estimated at 4.5 billion barrels of oil equivalent (just 17 percent of which comprised oil) and double that if probable and possible reserves are included.[14] The IMF projects that oil production will stabilize at around 125,000 barrels per day and then abruptly cease in 2042.[15] Natural gas production will flatten around 4.3 billion cubic meters per day (bm^3pd) and cease around 2022. These projections are likely to prove underestimates, however, given the scale of the existing probable and possible reserves together with remaining exploration prospects. However, the government of Trinidad and Tobago has targeted 2020 for the country to achieve "developed" status when it will no longer rely heavily on hydrocarbon extraction.

Trinidad and Tobago experienced three hydrocarbon booms that each conferred sizeable rents. More specifically, the 1973–74 price shock quadrupled oil prices and coincided with a two-thirds expansion in hydrocarbon production in Trinidad and Tobago to render the 1974–78 windfall there large relative to GDP compared to those of countries examined by Alan Gelb and his associates—namely, Algeria, Ecuador, Indonesia, Nigeria, and Venezuela.[16] In total, the hydrocarbon revenue of Trinidad and Tobago rose by an extra 39 percent of non-energy GDP annually through the 1974–78 boom. The shorter 1979–81 boom conferred another windfall equivalent to 35 percent of non-energy GDP annually on top of the earlier one after oil prices doubled to confer an overall eightfold gain from the early 1970s.

The 2004–8 boom exceeded the two earlier booms, and it owed more to price effects (three-fifths) than volume effects (two-fifths). Natural gas production quadrupled from 1998 to 2007 to reach 39 bm^3, yet oil production briefly reversed its long-term decline to average 166,000 barrels per day in 2005–07 compared with 134,000 in 1998.[17] Table 3.1 shows that from 2005 to 2007, the combined effect of the expansion in oil and gas production plus the sharp rise in energy prices almost doubled the share of energy rent in GDP compared with 2000–04 and tripled it compared with the cyclical low point of 1995–99. Taking 1999–2003 as the pre-boom benchmark, the 2004–8 windfall amounted to an additional $6.1 billion (TT$38.2 billion) annually, which is equivalent to an extra 32.1 percent of GDP annually and an extra 59.3 percent of non-energy GDP annually. The 2004–8 windfall was therefore significantly larger than the earlier booms, which each conferred windfalls of 35 to 39 percent of non-energy GDP during 1974–78 and 1979–81.[18]

The Legacy of Hydrocarbon Revenue Deployment from the 1974–81 Booms

In 1970, extraparliamentary protests in Trinidad and Tobago, mainly by black youth protesting unemployment, shook a seemingly strong government into pursuing populist policies. Through the 1970s, the government espoused a nationalistic strategy for deploying the hydrocarbon rent. After a promising start that saved around 70 percent of the 1974–78 windfall abroad and pushed international reserves to $1.8 billion by 1978, the rate of domestic absorption became overly rapid. The 1974–78 deployment increased both

Table 3.1 Rent, Domestic Absorption, Structural Change, and GNP Growth, Trinidad and Tobago, 1970–2007[1]

	1970–74	*1975–79*	*1980–84*	*1985–89*	*1990–94*	*1995–99*	*2000–2004*	*2005–7*
Rent proxies								
Energy depletion (percent GNI)	12.7	32.5	26.8	17.1	17.1	13.6	22.8	42.6
Terms of trade	n.a.	n.a.	155.6	97.4	n.a.	n.a.	101.8	129.9
Aid (percent GNI)	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1
Arable land/hd (ha)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Absorption (percent GNP)								
Fixed capital	24.3	24.1	26.1	17.9	15.4	25.9	22.3	13.9
Final govt. consumption	14.1	12.9	17.8	19.3	12.3	11.8	12.2	11.6
Private consumption	54.2	48.3	54.4	60.1	62.0	58.0	53.7	48.6
Exports (percent GDP)	45.2	49.5	38.8	36.3	43.6	51.5	54.3	64.3
Real exchange rate[2]	n.a.	95.7	126.8	118.9	107.8	95.1	105.0	129.9
Structural change								
Agriculture (percent GDP)	n.a.	n.a	n.a.	2.9	2.5	2.2	1.2	0.4
Industry	n.a.	n.a.	n.a.	41.7	46.0	44.4	50.0	60.2

(continued)

Table 3.1 (*continued*)

	1970–74	*1975–79*	*1980–84*	*1985–89*	*1990–94*	*1995–99*	*2000–2004*	*2005–7*
Manufacturing	n.a.	n.a	n.a.	10.8	10.1	8.4	7.5	5.9
Services	n.a.	n.a	n.a.	55.4	51.5	53.4	48.7	39.5
Growth								
Population (percent/yr)	0.9	1.2	1.8	0.9	0.7	0.5	0.4	0.3
GDP (percent/yr)	3.2	6.1	0.8	–3.3	1.0	4.6	8.1	7.9
PCGDP (percent/yr)	2.2	4.9	–1.0	–4.2	0.2	4.0	7.7	7.5
PCGDP (US$2,000)	4,800	5,755	6,755	5,196	4,866	5,440	7,265	9.954
Crop output index[3]	184.5	160.3	110.9	99.6	116.8	108.2	92.8	79.3

Source: World Bank, *Development Indicators 2008* (Washington, D.C.: World Bank, 2008).

1. 2008 data still not available

2. 2000 = 100

3. 1999–2001 = 100.

domestic investment (12 percent of the windfall) and consumption (18 percent) and boosted inflation so that investment efficiency fell. Half the domestic investment went into infrastructure and just under one-third went into state-led gas-based industry.[19] The expansion of state ownership included the nationalization of some hydrocarbon operations such as the Shell oil refinery and the labor-intensive sugar industry, which was dominated by Indian supporters of the leading opposition party and was subsidized to maintain employment rather than being competitively restructured.

The nationalistic strategy sought to maximize domestic rent retention by investing in state-led resource-based industrialization (RBI). Unfortunately, the government invested in those options offering the lowest potential rent per unit of heat value. Estimates made from feasibility studies in the early 1980s indicate that direct-reduced iron (steel made by this process uses scrap and is cheaper than blast furnace [DRI] steel, the principal choice of the government of Trinidad and Tobago) offered considerably lower potential rent per unit of gas applied than chemicals, which in turn generated less rent than liquefied natural gas.[20]

Moreover, the new state enterprises struggled to implement and operate the RBI projects. The wholly state-owned $500 million ISCOTT steel plant experienced a 30 percent cost overrun and then lost $108 million annually through 1982–85 before the management was contracted to private European firms. The plant was eventually sold in 1988 to Mittal as a viable concern but for a nominal sum. The methanol and fertilizer plants were implemented as joint ventures with multinational firms and proved more profitable. However, the proposed LNG project offered the highest potential netback per unit of gas, but the government rejected it because its domestic multiplier seemed limited.[21]

Control of public expenditure lapsed toward the end of the 1974–78 boom and then broke down through the 1979–81 boom. The domestic rent deployment became more expansionary so that barely half the 1979–81 windfall was saved overseas and the rest was split evenly between investment and consumption. Far from expanding the relative size of the non-energy tradable sector, the ambitious industrialization strategy was associated with a further contraction. On the eve of the oil boom, in 1972, the share of non-energy tradables in non-energy GDP had been only two-thirds the size expected for an economy of Trinidad and Tobago's size and per capita income and through 1981 the ratio shrank by another 10 percent of non-energy GDP.[22] The rent-seeking public sector propagated pay raises throughout the economy, but, as Dudley Seers had warned,[23] without offsetting gains in productivity.[24] Inflation

intensified and strengthened the real exchange rate by two-thirds during 1980–85, exacerbating Dutch disease effects.

Meanwhile, the efficiency of domestic public investment deteriorated as inflation quadrupled the cost of capital projects such as schools and hospitals, indicating leakage of rent into the overstretched domestic construction industry. Instead of seeking to boost productivity in the non-energy tradables sectors, the government protected agriculture and manufacturing—simultaneously removing their incentive to be efficient and expanding their reliance on subsidies that further drained the rent, as rent cycling theory predicts. In addition, the RBI cost overruns combined with deteriorating global markets to render their contribution to public finances negative rather than positive, as planned.

When energy prices sagged in the mid-1980s and rent recipients resisted cutbacks, the subsidies to the public sector and also to mainly middle-income consumers eroded the accumulated reserves. This tardy economic adjustment ran down the foreign exchange reserves to only $200 million by 1992 compared with $3.4 billion a decade earlier.[25] The windfall consumption expansion mainly benefited the urban middle class by lowering non-energy taxation (income tax and value-added tax) and expanding energy subsidies, which through 1981–83 absorbed one-quarter of the hydrocarbon revenue. Moreover, public sector employment became the largest source of jobs, though many jobs were uneconomic. The perpetual fiscal deficits impeded stabilization and economic recovery. Trinidad and Tobago experienced a painful growth collapse through 1982–93, which cut per capita income by one-third and almost doubled unemployment to 22 percent by 1989.[26] The long-serving Afro Caribbean government was swept from office in 1986, and this ushered in a period of political instability and eventually a constitutional crisis that further impeded economic stabilization.

Table 3.1 shows that economic recovery belatedly commenced in 1993 after a 25 percent depreciation of the real exchange rate. It was, however, propelled by a sustained expansion of investment in natural gas rather than non-energy activity. In 1998, the economy was again destabilized when low oil prices abruptly cut government revenue from hydrocarbons by 6 percent of GDP. The trade gap ballooned, albeit mainly due to the surge in imports to construct gas-based plants, and debt reached 40 percent of GDP. In 1998, hydrocarbons and petrochemicals still generated 46 percent of exports, 21 percent of GDP, and 7 percent of government revenue, and the IMF encouraged the government to prioritize non-oil diversification.[27] However, the un-

expected hydrocarbon windfall of 2004–8 eased reform pressure and tested how much governments like that of Trinidad and Tobago had learned from previous windfalls.

Trinidad and Tobago's Response to the 2004–8 Hydrocarbon Windfall

The Deteriorating Quality of Governance

The quality of governance declined during the 1998–2007 period, so although Trinidad and Tobago retains superior governance indices compared with some other middle-income, oil-driven economies such as Mexico and Russia (see Table 3.2), it lags best practice for mineral economies as set by Chile and Botswana. Moreover, the indices for Trinidad and Tobago declined during this period despite the fact that per capita income doubled and that rising income is expected to improve governance. The memo item in Table 3.2 benchmarks the extent of the deterioration, which was especially marked in respect to the control of graft, the rule of law, and political stability. It is more modest with regard to government regulation and voice and accountability.

The decline in governance was initially associated with heightened political uncertainty. The Indian-dominated government that came to power in 1995 was weakened by allegations of electoral irregularities that surfaced in 2000. Three elections occurred in as many years during 2000–2002 as accusations of corruption undermined the government and returned to power the Afro Caribbean-dominated opposition party that had governed from 1962 to 1986. The business of government was virtually paralyzed for almost one year by noncooperation between the parties after a tied election result until fresh elections in 2002 returned the Afro Caribbean party to power with a slim majority of four seats. The opposition (Indian party) leader was subsequently arrested and briefly detained on charges of having an undeclared overseas savings account. The incoming Afro Caribbean government benefited from the 2004–8 hydrocarbon boom and won re-election in 2007 with almost two-thirds of the seats in parliament, but it too experienced accusations of corruption.

Despite the deterioration in governance, the underlying direction of economic policy remained nominally consistent and continued to prioritize

Table 3.2 Per Capita GDP and Institutional Quality 2007: Trinidad and Tobago and Comparator Economies

Country	*PCGDP (US$ PPP 2007)*	*Voice + accountability*	*Political stability*	*Effective governance*	*Regulation burden*	*Rule of law*	*Control of graft*	*Aggregate index*
Bolivia	4,206	0.02	−0.99	−0.83	−1.18	−0.98	−0.49	−4.45
Ecuador	7,449	−0.23	−0.91	−1.04	−1.09	−1.04	−0.87	−5.18
Azerbaijan	7,851	−1.13	−0.69	−0.66	−0.50	−0.83	−1.04	−4.85
Venezuela	12,156	−0.58	−1.23	−0.87	−1.56	−1.47	−1.04	−6.75
Botswana	13,604	0.49	0.84	0.70	0.48	0.67	0.90	4.08
Chile	13,880	0.98	0.55	1.22	1.45	1.17	1.35	6.72
Mexico	14,104	−0.02	−0.57	0.13	0.39	−0.58	−0.35	−1.00
Russia	14,690	−1.01	−0.75	−0.40	−0.44	−0.97	−0.72	−4.29
Trinidad + Tobago	23,507	0.61	0.08	0.37	0.68	−0.22	−0.19	1.33
Oman	22,225[1]	−1.03	0.76	0.38	0.63	0.73	0.82	2.29
Norway	53,433	1.53	1.28	2.12	1.44	2.00	2.09	10.46
Memo Item								
Trinidad + Tobago 1998	10,145	0.83	0.44	0.01	0.79	0.36	0.15	2.58

Source: World Bank, *Development Indicators 2007* (Washington, D.C.: World Bank, 2007).

1. Oman PCGDP 2006

Note: Index range from 2.5 to −2.5, based on several surveys in each country.

a more competitive and diversified economy but with limited commitment and even less success. The IFIs became the main advocates of economic reform to sustain growth over the long term, whereas domestic governments focused on electoral arithmetic.

Efficient Hydrocarbon Production and Revenue Extraction

Hydrocarbon production and revenue extraction are both efficient in Trinidad and Tobago. The government owns the hydrocarbon resources, but the fact that the reserves are almost entirely offshore has boosted the total capital and expertise required so that governments have had little choice but to rely heavily on foreign corporations for capital, technology, and marketing. State-owned Petrotrin handles government partnerships with international oil companies. Other state-owned companies further downstream include the National Gas Corporation, which distributes gas, and the National Energy Corporation, which manages resource-processing activity through joint ventures with multinational partners. The joint ventures with reputable foreign companies that take a sizeable equity commitment are prudent because the private partners ensure the joint ventures are run commercially.[28]

The government allocates state-owned hydrocarbon fields for exploration through competitive bidding. However, the principal incumbents, BP (via its acquisition of Amoco) and British Gas (BG) benefit from some inertia. BP and state-owned Petrotrin produce 95 percent of the oil in the country and contribute roughly equal shares, and this provides most of the oil processed in the domestic refinery. BP also produces 70 percent of the gas, BG produces 23 percent, and four small companies produce the rest. By 2005, LNG production had expanded to 15 million tons, with the state owning up to 11 percent of the equity in the five LNG trains. The National Gas Corporation distributes the two-fifths of the gas production that is not exported to power generators (9 percent), DRI steel (1 percent), and petrochemical plants: fertilizer (22 percent) and methanol (9 percent). Although domestic industrial gas prices fluctuate with product prices, the low cost of delivery confers a competitive edge to local industrial users, and Trinidad and Tobago captured 3 percent and 5 percent, respectively, of global fertilizer and methanol sales.[29] By the eve of the 2004–8 hydrocarbon boom, the production of oil and petrochemicals in Trinidad and Tobago generated almost 40 percent of GDP, 41 percent of government revenues, and 83 percent

of exports. Admittedly, it generated barely 3 percent of total employment, some 20,000 jobs.[30]

The revenue extraction in Trinidad and Tobago is also efficient though unfortunate timing of lifting agreements has rendered the gas revenue low. The tax regime is profit-sensitive and also moderate in scale, so investors are encouraged to exploit the resources efficiently. The government charges a royalty of one-tenth of the wellhead cost, which is treated as a cost for tax purposes. In addition, the government raises a levy that is less than 3 percent of revenue plus a small fee to cover the Ministry of Energy costs and a 0.1 percent green levy. After taking account of the fixed government imposts, corporate profits are taxed at a rate of 50 percent in the case of oil, plus another 5 percent employment tax. In addition, there is a supplementary windfall tax that is linked to the price of oil and calibrated at 0 percent when oil is $13 a barrel and 25 percent when the price reaches $50 a barrel or more. The total tax take is 80 to 85 percent, within the top quartile of global government takes according to the work of Daniel Johnstone and Emil Sunley.[31] Gas is more lightly taxed than oil, with a negligible royalty, a 35 percent income tax, and no supplementary or windfall taxation.

Consequently, during the initial investor tax holiday, most of any price windfall accrues to the (overwhelmingly foreign) investor while, absent contract renegotiations, almost two-thirds of any windfall will accrue to those investors when the tax break expires. The gas contracts imply that government revenues from the new LNG plants have been negligible during the 2004–8 boom, so the gas revenue the government received during that boom emanated overwhelmingly from previously established fields that were producing around 150,000 barrels of oil equivalent per day, barely one-fifth the projected rate of LNG production. Although total revenue from gas production is three times that of oil, the *aggregate* government revenue from natural gas is less than one-third that of oil. Part of the discrepancy in gas and oil revenue reflects the fact that gas costs more to ship per unit of heat value than oil, and the rapid recoupment of the vast sums invested, mainly by the international oil companies, dominates the initial cash flow. Gas extraction also tends to have a longer and flatter production curve than oil, and this lowers returns and taxable revenue by shrinking the net present value of the gas revenue stream relative to oil.[32] It may have been providential that the gas windfall was muted, given the impact of domestic windfall absorption.

Hydrocarbon Revenue Deployment 2004–8: Saving

Limited as it was by unfortunate timing of the LNG contracts, the 2004–8 hydrocarbon windfall still exceeded earlier booms. Taking 1999–2003 as the pre-boom base period and 2004–8 as the boom years, the energy windfall conferred an extra $6.2 billion (TT$38.9 billion) annually when averaged across those years. Increased hydrocarbon prices augmented the gas sector growth effect to double the share of government revenue from energy. Rising prices first doubled the share to 11.5 percent of GDP, when comparing 2003–5 with 1998–2002, and then almost double it again to average 19.6 percent of GDP through 2006–8.[33] Compared with countries that have similar per capita income and population size, Trinidad and Tobago's share of *non-energy* GDP was almost one-third higher. This amounted to an extra 4.7 percent of GDP, even before adding revenue from energy taxation.[34]

Trinidad and Tobago's government needed to allocate its windfall revenue between saving and consumption as well as between the public sector and private sector. The final column of Table 3.3 provides a crude estimate of the allocation of the annual energy windfall of TT$38.9 billion (in current prices) (the approximate exchange rate is TT$6.30/US$1). Table 3.3 uses a simplified version of the methodology devised by Alan Gelb and his research associates, which assumes that the windfall was responsible for any deviations in the allocation of GDP during the boom compared with the pre-boom allocation.[35] This approach first calculates the actual gain in GDP during the windfall (column 4) and then re-estimates absorption in the absence of extra energy output (column 5). This amount is then subtracted from the actual gain in GDP to yield the increase attributable to the windfall (column 6). The resulting windfall allocations are then calculated as ratios for their shares of the total windfall (column 7) and non-energy GDP (column 8).

Table 3.3 estimates that more than two-thirds of Trinidad and Tobago's hydrocarbon windfall was saved. The rate of saving jumped through 2004–8 and was associated with a sharp rise in government saving that lifted the foreign currency reserves by 16 percent of GDP and the Heritage Saving Fund (HSF) by 8 percent of GDP. The government had already established an Interim Saving Fund (ISF) in 2000 as a cushion against an unexpected negative price shock. The HSF replaced the ISF in 2004 with a mandate to save part of the energy revenue for stabilization, achieve intergenerational wealth transfers, and make strategic investments.[36] The fund automatically

Table 3.3 Estimated Absorption of Trinidad and Tobago's 2004–8 Windfall (TT$b, except columns 7 and 8)

Absorption category	*Base absorption rate 1999–2003*	*Actual absorption 2004–8*	*Absorption rise 2004–8 >1999–2003*	*Predicted gain without energy windfall*[1]	*Absorption gain attributed to energy windfall*[2]	*Estimated share of windfall (percent total)*[3]	*Estimated windfall gain (percent NEGDP)*
Total GDP	55.3	118.9	63.6	24.4	39.2	100	
Non-energy GDP	39.0	64.4	25.4	17.2	8.2		59.3
Energy GDP	16.3	54.5	38.2	7.2	31.0		
Consumption	36.8	59.0	22.7	16.0	6.7	17.0	10.4
Public	6.7	13.1	6.4	2.9	3.5	8.9	5.4
Private	29.6	45.7	16.1	13.0	3.1	7.9	4.8
Investment	12.6	24.8	12.2	5.5	6.7	17.0	10.4
Public	3.0	12.1	9.1	1.3	7.8	19.8	12.1
Private	9.6	12.7	3.1	4.2	−1.1	−2.8	−1.7
Net saving (net exports)	6.5	35.3	28.8	2.9	25.9	66.0	40.4
Unaccounted absorption	n.a.	1.1	0.1	0.3	−0.2	0.0	1.9
Memo Item							
GDP growth rate (percent/yr)	7.6	6.9	−0.7	n.a.	n.a.	n.a.	n.a.

Source: IMF, "Trinidad and Tobago: Article IV Consultation—Staff Report," *IMF Staff Country Report 09/78* (Washington, D.C.: IMF, 2009).
1. Based on constant level of energy GDP and assuming (i) no real growth in energy GDP and (ii) the composition of absorption remains the same in 2004–8 as in 1999–2003
2. Column 4 minus column 5
3. Percentage share of total energy windfall from column 6

receives revenue in excess of 10 percent of budget projections, and by 2008 the HSF had accumulated $2.9 billion, equivalent by then to 11.6 percent of GDP. The fund's average annual rate of accumulation during the boom was almost 2 percent of GDP.

The HSF allocates 60 percent of its revenue to a financial investment portfolio to acquire more liquid assets that are managed by the Central Bank. The remaining 40 percent is allocated to secure strategic assets that are supervised by the HSF board, chaired by the Minister of Finance, which publishes quarterly accounts. In addition to the HSF, the government oversaw an expansion of the official reserves from TT$12.3 billion in 1999–2003 to TT$34.0 billion through 2004–8, a rise equivalent to an extra 5 percent of GDP annually (see Table 3.3). Finally, the saving effort was associated with a contraction in the ratio of public sector debt to GDP from 53 percent at the start of the energy boom to 16 percent by 2008.[37] However, this decline was achieved almost entirely by holding the debt level constant rather than by retiring debt. Worse, the overall saving effort during the windfall *decreased* as the boom persisted, impairing the HSF stabilization role and boosting the procyclical nature of public expenditure.[38]

Despite the government saving effort in Trinidad and Tobago through the 2004–8 boom, IMF projections suggest it has been insufficient. The IMF provided two fiscal projections for assessing the level of public expenditure in Trinidad and Tobago through the mid-2000s.[39] The first approach converts the expected revenue from hydrocarbon extraction into a fund that can sustain non-energy deficits but at a rate that shrinks as the size of both the population and the non-energy sector grow. The second method targets a constant non-energy fiscal deficit ratio that can be maintained indefinitely as population grows and the non-energy economy expands.[40]

The first of the two projections accumulates a fund equivalent to 135 percent of non-energy GDP, which after 2042 (when hydrocarbon production is projected to cease) continues to generate an income at a rate that matches the non-energy deficit. The IMF projects that in order to maintain a non-energy fiscal deficit constant in absolute terms (albeit shrinking in relative terms), Trinidad and Tobago's fiscal deficit should not exceed 10.7 percent of non-energy GDP in the mid-2000s.[41] In fact, the country's non-energy deficit for 2004–8 was around 28 percent of non-energy GDP (and 15 percent of total GDP) as a consequence of sustained public expenditure.[42]

The second projection is even more stringent. It keeps the deficit constant indefinitely as a *ratio* of non-energy GDP (that is, taking account of

growth in population and income), which requires the accumulated sum saved to reach 430 percent of non-energy GDP by the time hydrocarbon production ceases. To meet this condition, the non-energy fiscal deficit must shrink to 4.5 percent, which is the level that the accumulated sum can sustain indefinitely. If the IMF assumptions are broadly correct and Trinidad and Tobago's government persists with the current higher non-energy deficits, an adjustment in the balance of public finances totaling 30 percent of non-energy GDP must be compressed into the period 2008–20 in order to achieve a sustainable position.

Delia Velculescu and Saqib Rizavi suggest the HSF can be improved by initially transferring all energy revenues into the fund and drawing upon it to cover budget deficits only as the permanent income hypothesis (PIH) rule prescribes.[43] They also recommend that HSF assets should comprise bonds and equity (perhaps in the ratio of 60/40) in diverse currencies to earn the target return while limiting risk. A statute should also be enacted to ensure that the assets are not loaned for projects or used as collateral. Finally, any boost to "normal" expenditure from running a sustainable non-energy deficit should take the form of capital rather than consumption. These recommendations are consistent with the principles of the environmental accounting approach to sustainability. For example, investment in both infrastructure and education is preferable to raising public sector wages or expanding consumer subsidies, which came to dominate the deployment of the 1979–81 Trinidad and Tobago windfall and resurfaced during the 2004–8 boom.

Hydrocarbon Revenue Deployment, 2004–8: Domestic Absorption

Adherence to the PIH rule has limited appeal to politicians who must manage coalitions to remain in office. It is too rigid to deal with a situation in which no single political party has a built-in majority, which allows sectional interests to play the largest parties against each other in order to extract concessions for their own groups. In contrast to conditions in Trinidad and Tobago, the longevity of both the Augusto Pinochet regime and its center-left democratic successor in Chile appears to have helped confer a more long-term perspective on politicians regarding rent allocation. At the other extreme, the singular instability of Ecuador's factional politics nudges the government in that country toward short-run allocations that jeopardize future investment and therefore revenue. Trinidad and Tobago

lies somewhere between these two cases because its windfall allocation rules confer higher immediate revenue than the PIH would and that revenue can be invested in government survival. The flexibility also confers scope to boost revenues in the event of strongly deteriorating political fortunes. In addition, these flexible revenues allow the government to target interest groups through an expansion of public sector projects and subsidized consumption of "essentials" that all too often benefit the well off in the name of helping the poor.

Such political considerations have driven the economically suboptimal deployment of the 2004–8 rent windfall in Trinidad and Tobago. One-third of Trinidad and Tobago's energy windfall was absorbed domestically (see Table 3.3, column 7). The extra absorption was shared equally between consumption and investment, but the ratios of the shares of the public and private sectors changed markedly. At the start of the 2004–8 boom, public expenditure targeted reducing poverty and improving health and education rather than, as had been the case in the 1970s, expanding construction and subsidizing loss-making state enterprises. The increased domestic absorption by the public sector during 2004–8 lifted consumption via higher civil service remuneration and an expansion of subsidies on fuel[44] and state-run firms, along with a boost to social expenditure. Public sector wages grew by just under 1.5 percent of GDP during 2004–8, and the rise in public sector transfers (subsidies) totaled 4.7 percent of GDP, pushing them to 8 percent of GDP. The transfers included a 1.4 percent increase in energy subsidies[45] along with a 1.1 percent rise in transfers to state-owned enterprises and utilities, a 1.2 percent of GDP rise in transfers to education and health, and a doubling in unspecified transfers.

After an initial delay, the rate of public investment in Trinidad and Tobago rose very sharply as the boom persisted. The 2004–8 boom was associated with a more than fourfold expansion in public investment that absorbed almost one-tenth of the windfall (see Table 3.4). It lifted public sector investment to parity with private sector investment, but this does not augur well for the economy-wide efficiency of investment because the rapid rate of public investment expansion increased the likelihood of encountering capacity constraints both within the public sector and from private sector suppliers. The principal government justification for the expanded investment was the developmental one of reducing the backlog in transport infrastructure and utilities. But the Inter-American Development Bank (IADB) deplores the inefficiency of public investment in Trinidad and Tobago.[46] It

Table 3.4 Public and Private Investment, Trinidad and Tobago, 1999–2008 (% GDP)

	1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Gross domestc investment	21.1	17.1	19.5	19.2	25.2	16.6	14.6	21.0	24.0	24.2
Public	6.9	5.8	6.0	4.6	4.3	6.3	8.1	10.5	11.8	12.0
Private	14.2	11.3	13.5	14.6	20.9	10.3	6.5	10.5	12.2	12.2
Oil price (US$/b)	18.0	28.2	24.3	25.0	28.9	37.8	53.4	64.3	71.1	97.5

Source: IMF, "Trinidad and Tobago: Article IV Consultation—Staff Report," *IMF Staff Country Report 09/78* (Washington, D.C.: IMF, 2009), 21.

also sharply questions a trend toward increasing recourse to off-budget expenditures that further reduces transparency, which would improve efficiency. Whatever its economic merits, increased government expenditure on consumption (via public sector wage hikes and subsidies) and sharply higher public investment projects carry political dividends that helped the Afro Caribbean government win the 2007 election.

Private consumption also rose because non-energy taxation became a smaller share of the country's GDP. Although non-energy taxes rose, in absolute terms they were surpassed by an even faster expansion in energy tax revenue. Non-energy taxation grew slower than GDP, so its share fell by 5 percent of GDP in 2004–8 compared to its share in 1999–2003, and this intensified a trend that had preceded the boom. The private sector also experienced a marked surge in saving during the 2004–8 boom, but this did little to boost private investment, which fell short of the predicted outcome in the absence of the windfall (see Table 3.3, column 5). The gap between private saving and private investment is partly attributable to the energy sector's dominance of private investment in Trinidad and Tobago. The private sector ended a period of rapid construction just as the boom took off and began to recoup the massive front-loaded funds invested in the LNG project. The gap is also partly due to the continued perception by the private sector of disappointing returns in the non-energy economy. One result of this singular pattern of absorption was a marked fall in the share of total investment in GDP during 2004–5, after which a modest recovery set in that was for the most part due to the sharp expansion in public investment that dominated total investment.

Consistent with the rent cycling theory, inflation accelerated as the labor market tightened and unemployment was cut in half to 5 percent of the workforce, lowering investment efficiency. The incoming government in 2003 stoked inflation with a 15 percent increase in public sector wages (to reward a key political constituency), and inflation reached double figures by 2008. The rise had demonstration effects throughout the private sector so that economy-wide wage inflation outstripped gains in productivity. Meanwhile labor shortages emerged in energy and finance even as surplus labor persisted elsewhere, indicating that overall the workforce is underskilled. Total employment expanded by around 10 percent during 2000–2008, but the structure of employment shifted away from tradable activity, which points to Dutch disease effects, an outcome consistent with the 30 percent strengthening of the real exchange rate during the boom (see Table 3.1, line 12). Although employment in oil and gas grew by one-third, its modest total (20,000 workers) could not prevent the overall contraction in the tradables sector workforce caused by the net fall of employment in agriculture and manufacturing (see Table 3.5). Employment in agriculture shrank by one-third, which was linked to the demise of Caroni sugar, and manufacturing employment stagnated. Meanwhile, the cyclical construction sector doubled its employment to one-fifth of the total, an amount almost equivalent to the economy-wide increase in employment. A similar number of jobs were created by government make-work programs. Table 3.6 confirms the manifestations of "Dutch disease" by tracing structural change in terms of value added.

The impact of the 2004–8 boom proved timely for economic growth: the investment in gas production from 1999 to 2004 had created its own boom that drove the economy at a rate of 7.6 percent per annum, and the windfall sustained a similar growth momentum until the end of 2008. When the major energy investment in LNG ceased, increased domestic revenue absorption sustained GDP growth of 6.9 percent annually in 2004–8. Growth in the energy sector decelerated abruptly in 2008, however, due to the softness of oil prices and to capacity constraints on petrochemicals. GDP growth slowed to 0.5 percent.

Overall, despite a high rate of saving through the 2004–8 boom, insufficient windfall revenue was saved to prevent the deployment from being procyclical. Trinidad and Tobago's economy experiences the highest volatility within its region, an outcome that fiscal policy has accentuated rather than muted.[47] This trend continued into the 2008–9 downswing, albeit in

Table 3.5 Employment Trends, Trinidad and Tobago, 1999–2008 (1,000s)

	Unemployed	*Total employed*	*Construction*	*Oil and gas*	*Agriculture*	*Manufacturing*	*Transport + communication*	*Other employment*	*Total workforce*
1999	74.0	489.4	67.1	15.1	39.6	53.6	35.8	269.4	563.4
2000	69.6	503.3	69.7	15.9	36.4	55.6	39.2	285.9	572.9
2001	62.4	514.1	78.8	15.5	40.1	53.9	38.9	285.3	576.5
2002	61.2	525.1	75.6	17.2	36.1	56.6	41.8	296.4	586.2
2003	62.4	534.2	80.0	16.1	31.4	55.8	41.6	307.3	596.6
2004	51.2	562.4	91.1	18.6	26.0	60.3	41.6	322.9	613.5
2005	49.7	574.8	101.8	19.3	25.0	56.6	41.8	327.1	623.7
2006	39.0	586.6	104.6	19.7	25.8	56.2	42.7	335.6	625.2
2007	34.5	587.9	110.2	21.5	22.4	55.4	41.5	336.5	622.4
2008	30.4	594.0	117.7	19.8	25.2	56.0	42.2	332.3	624.3

Source: Central Bank (2009).

Table 3.6 Structural Change by GDP/NEGDP Ratio, Trinidad and Tobago, 1999–2008

	1999	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
GDP (percent GDP)	42.89	51.37	55.00	56.29	71.17	82.65	100.39	122.11	137.43	151.36
Non-energy	76.0	69.1	71.6	73.4	64.2	61.9	53.9	50.6	53.7	52.8
Energy	22.5	31.3	28.3	26.2	35.9	39.1	46.0	49.2	45.1	46.5
Non-energy GDP (percent NEGDP)										
Agriculture	2.5	2.0	1.8	1.9	1.5	1.2	0.9	1.0	0.7	0.6
Manufacturing	10.4	10.2	10.3	10.9	10.8	12.2	9.8	10.1	10.9	9.2
Construction	10.5	10.8	11.1	9.9	11.4	11.6	13.8	13.9	15.6	17.9

Source: IMF, "Trinidad and Tobago: Article IV Consultation—Staff Report," *IMF Staff Country Report 09/78* (Washington, D.C.: IMF, 2009).

reverse as cutbacks deepened the growth deceleration. In 2009, the government responded to a projected deceleration in the rate of economic growth to 2 percent by reducing public expenditure by 2 percent of GDP and permitting a modest increase in the overall fiscal deficit projected at 1 percent of GDP. The IMF recommended a further cut in public spending of 4 percent of GDP through the medium term in order to trim the non-energy deficit to at least 8.5 percent of GDP as an *interim* step toward a more sustainable balance.[48] Wary of its declining popularity ahead of elections, however, the government preferred to trim public sector investment, embracing public/private partnerships in an effort to minimize the impact of the cuts while still maintaining higher social spending.[49]

The imperative to maintain political support in Trinidad and Tobago has deflected public windfall expenditure from efficient wealth creation, which rent cycling theory warns against. Unfortunately, data regarding public spending on programs such as health, education, and social security are incomplete and cannot be used to measure changes linked to windfall expenditure.[50] However, the levels of such expenditure on the eve of the boom appeared to lag behind the mean for upper-middle-income economies even though Trinidad and Tobago is one of the wealthiest in this group and might be expected to have ratios above the mean. Yet despite being one of the region's richest countries, education enrollment lagged, yet the share of GDP allocated to subsidies doubled in real terms through the boom.[51] By far the biggest increase in windfall expenditure was in public investment projects, which garner more political support for the ruling regime than national programs do because the latter tend to benefit all voters alike rather than just potential supporters.

The prime domestic constituencies that benefited from the increased windfall expenditure have been middle-class consumers, the urban unions, and businesses. Consumers benefited from the reduced ratio of non-energy taxation that the increase in energy revenue made available and from fuel prices subsidized below global levels, both of which benefit the urban middle class disproportionately, as discussed earlier. Traditionally, each main party favored a specific set of unions based on differences in the ethnic composition of the union membership. The Indian party favored rural workers and the Afro Caribbean party favored the predominantly urban civil service. Although restructuring of the sugar industry during the boom severely weakened the agricultural unions, the civil service unions remain a political force to be reckoned with.[52] Public sector workers tend to be well remuner-

ated compared with the national average, and their importance within the economy confers strong capacity to trigger wage inflation. Whereas the economy-wide real unit cost of labor had been falling prior to the 2003 public sector wage hike, it subsequently began to rise at a rate that outstripped inflation. Higher wage costs, falling unemployment, and supply bottlenecks from boom-driven growth in public expenditure combined to strengthen the real exchange rate and neutralize the beneficial competitive effect of the 25 percent real depreciation in 1993.

Public investment has also proved a double-edged sword. Despite relatively high levels of public spending for a country of its per capita income, Trinidad and Tobago had until the 2004–8 windfall experienced a low rate of public investment that, worse still, had earned relatively poor returns in education, health, and economic infrastructure services.[53] In this context, the sharp rise in public investment through the boom does not augur well for the efficiency of resource use. Nor does the political emphasis on investment projects in order to woo business support and create employment in construction appear to have translated into improving the competitiveness of the business environment. Rather, as rent cycling theory predicts, it has bestowed favors on specific firms at the expense of efficient wealth creation. Trinidad and Tobago performs poorly as a business environment, notably in terms of registering property, enforcing contracts, closing businesses, and firing labor.

Far from boosting competitive diversification, economic growth during the 2004–8 boom was dominated by the energy sector and mainly by domestic expenditure of government energy revenue rather than the multiplier from directly linked oil supply activity. The energy sector has developed only low-end linkages to the domestic economy, such as manufacturing simple plastic products such as garden furniture, rather than more sophisticated activity such as geological modeling, deep-sea drilling, and energy equipment manufacturing.[54] Aside from energy, an IADB study of revealed comparative advantage found few prospects for Trinidad and Tobago, which performed worse than any other economy in the Latin American and Caribbean region.[55] Public expenditure grew to account for almost 50 percent of non-energy GDP and crowded out private investment, which is also constrained by apprehension over rising crime, underinvestment in infrastructure and human capital, the appreciating real exchange rate, inadequate bank regulation, and the ballooning non-energy fiscal deficit.[56] Competitive diversification of the economy remains an aspiration rather than a priority.

Conclusions

Rent cycling theory suggests that Trinidad and Tobago has faced high risk of deploying its hydrocarbon windfalls maladroitly due to a combination of high point source rent, ethnic diversity, statist policy, and a young, ethnically diverse parliamentary democracy. Certainly, the deployment of the 1974–78 and 1979–81 windfall revenues left a disappointing legacy. Extraparliamentary protests in 1970 rattled a cautious government into pursuing statist and populist policies from 1974 to 1981 that caused over-rapid domestic absorption of the rent through expanded consumer subsidies and (loss-making) state enterprises, many in resource-based industries. The strategy entrenched rent-seeking interests and intensified Dutch disease effects, which triggered a protracted growth collapse from 1982 to 1993 that cut incomes by one-third. It also destabilized the polity as the two main political parties, each rooted in a major ethnic group, vied to co-opt one or more rent-seeking political factions. Growth finally resumed after an IFI-backed depreciation of the real exchange rate in 1993 and, perhaps more significantly, as natural gas exports expanded.

The response of Trinidad and Tobago to the 2004–8 boom was more circumspect than the reaction to the 1970s boom. In this respect, Trinidad and Tobago was unlike regional comparators Bolivia, Ecuador, and Venezuela. Trinidad and Tobago hydrocarbon *extraction* relied heavily on international oil company investment and has been efficient while the tax regime secured a share of hydrocarbon revenue that is near the global average.[57] Although the unfortunate timing of recent natural gas projects diminished the scale of the rent, the rent *deployment* has been unsatisfactory because an effective pro-growth political coalition has yet to emerge. Although two-thirds of this rent was saved, public expenditure was still excessive and procyclical, lifting the non-energy fiscal deficit to three times what the hydrocarbon resource can *constantly* maintain (4 percent of non-energy GDP). The reason lies in a political economy that prioritizes coalition maintenance at the expense of long-term development. Concerns about political survival prompted governments to maintain support by accommodating rent-seeking groups, notably the unions, important private businesses, middle-class consumers, and smaller political parties that represented special-interest groups. The doubling in per capita income through the 2004–8 oil boom was associated with a decline in governance indices and may yet prove ephemeral, like that of the earlier booms. Dutch disease effects perpetuate the country's disap-

pointing progress with the competitive diversification of the non-energy economy.

Trinidad and Tobago's experience underlines the need to expressly complement economic reform with a political strategy to manage rent-seeking recipients. The country requires a dual-track strategy that can grow a dynamic market economy and build a pro-growth political constituency that eventually neutralizes rent-seeking interests. Countries as diverse as China, Mauritius, and Malaysia achieved this through a dual-track strategy that grew a dynamic market economy in special economic zones and postponed confrontation with rent-seeking interests in the rent-distorted economy until the dynamic sector grew a strong political constituency. One of Trinidad and Tobago's main parties should espouse such a dual-track strategy.

4

The Illusion of Unlimited Supply: Iran and Energy Subsidies

Ahmad Mojtahed

Iran, one of the world's largest energy producers, also has some of the world's lowest domestic energy prices. This would seem to be an economic advantage, but the Iranian government has kept energy prices artificially low through a series of subsidies. These subsidies have created significant distortions in Iran's economy, including an inflation rate that reached 25.4 percent in 2009.

The Central Bank of Iran in 2008 estimated the annual amount of energy subsidies in Iran from 2001 to 2007 (see Table 4.1). Energy subsidies increased from $15.2 billion in 2001 to $87.6 billion in 2007. These figures mean subsidies increased from 7.6 percent of Iran's GDP to 26.2 percent of its GDP during this period. By any economic standard, this amount is too large and indicates inefficiencies and a waste of resources in the Iranian economy.

The costs of these subsidies are profound. The Iranian Oil Ministry estimates that the Iranian government as recently as 2005 spent more than a third of its budget on energy subsidies—an astronomical sum that amounts to almost a quarter of Iran's GDP.[1] In addition, Iranians have become accustomed to low energy prices and use more energy than they would if domestic prices were more in line with prices on the international market. Iran's total domestic energy consumption growth rate was 6 percent from 2000 to 2006, which is very high with respect to other countries. Even though it has some of the world's largest energy reserves, Iran's largest im-

Table 4.1 Energy Consumption, Prices, and Subsidies in Iran (2001–7)

Year	*Total final consumption (barrel of oil equivalent)*	*Domestic energy price (rials/liter)*	*International energy price (rials/liter)*	*Energy subsidies ($ billion)*	*Subsidy as percent of GDP**
2001	149.9	230	687	15.2	7.6%
2002	165.7	259	1,281	21.1	13.2%
2003	174.4	318	1,391	22.6	12.2%
2004	189.3	360	1,966	24.8	15.8%
2005	201.2	356	3,003	59	23.5%
2006	208.4	352	3,449	70.1	25.9%
2007	214.7	382	4,206	87.8	26.7%
Average growth rate	6.2%	9.3%	37.6%	35.6	26.2%

Source: Central Bank of Iran, Energy Subsidies Report, Tehran, 2008.
*Iran's cumulative total energy subsidy from 2001 to 2007 was $446.1 billion.

port in terms of value is petroleum products. Iran has oil and natural gas that remains to be developed, but the state will not meet increasing domestic demand through drilling alone.

Several members of the Iranian political and economic elite have identified the problems that energy subsidies have created for Iranian society and want to eliminate them. During President Ahmadinejad's second presidential term, the Iranian Parliament began to consider a bill that would increase the price of gasoline to $0.43 a liter—still well below the price in most countries, but a 396 percent increase for Iranian consumers. Some projections suggest this type of change could cause a short-term contraction in Iran's GDP, but some economists disagree and stated "an increase in energy prices decreases its consumption and causes increase in efficiency and production."[2]

This kind of dramatic economic change presents significant political obstacles. The Iranian government will need to offset these changes through other economic and transportation policies, including the expansion of public transportation in cities and the development of energy conservation policy in industry and housing.

This chapter examines Iran's recent history of energy subsidies, proposals to reduce these subsidies, and attempts to bring Iran's energy prices more in line with international norms.

Iran's Energy Background

With a population of 71.5 million and area of 1.64 million square kilometers, Iran is among the world's twenty largest countries in both population and size. Iran is also a resource-abundant country with vast energy reserves and minerals such as iron, copper, zinc, and chromium. Iran's proven natural gas reserves in 2006 totaled 28.1 trillion cubic meters, which is 17 percent of the world's total reserves and ranks second only to Russia.

In addition, Iran's oil reserves of 137.5 billion barrels are the fifth largest in the world. Iran is currently the fifth-largest oil producer and the fourth-largest oil-exporter in the world.[3] With its fast population growth, industrialization, and electrification of rural areas, Iran faces a high rate of domestic energy consumption. With the depletion of Iran's existing oil fields, there are increasing demands for investment in new oil fields and for maintaining the production of existing fields with new technology such as gas injection. Iran faces real challenges in sustaining its current level of oil exports and meeting domestic demand at the same time. Iran's oil income increased dramatically during the first decade of this century and reached $82 billion in 2007 thanks to higher oil prices. Due to high domestic consumption in Iran, however, most new oil production went to meet domestic demand and compensate for depleted oil wells.

The Iranian government's policy of setting energy prices has had an important impact on energy consumption in the country. Iran's fuel prices are among the lowest in the world. Tehran's policy of keeping oil product prices constant or making only small price increases has kept gasoline and gas oil (diesel oil) prices low in Iran despite significant increases in oil prices worldwide. This policy has also dramatically increased demand for all types of energy in Iran compared to demand in other countries. Iran's "energy consumption intensive"—a measure of the use of energy for producing one unit of goods and services—was one of the world's highest in 2006.

To combat the hyperinflation that has plagued Iran during the last twenty years, Tehran has controlled energy prices—regardless of the impact this policy has had on domestic energy consumption or world market prices. These energy subsidies were popular among Iranian government officials and lawmakers until recently. But with dramatic changes in world oil prices and Iran's domestic energy consumption rates, attitudes have changed. In the government's Third Economic Development Plan (2000–2004) and Fourth

Economic Development Plan (2005–9), reducing energy subsidies has been a priority.

Energy Production

Among Middle Eastern countries, Iran ranks second among oil producers and first among natural gas producers. Iran's vast resources in oil and natural gas have not been fully explored, and every year a new discovery adds to previous reserves. In addition to oil production activities onshore, Iran is actively involved in offshore oil exploration in Persian Gulf areas belonging to Iran or close to maritime borders.

But Iran is behind the other Caspian countries in oil development due to a number of problems. (The northern part of Iran borders the Caspian Sea.) The legal status of Caspian seabed resources remains unclear. In addition to Iran, there are four other states—Azerbaijan, Kazakhstan, Russia, and Turkmenistan—that have claims on the Caspian's undersea resources. Access to known resources located in disputed border areas has not been resolved.

The second problem is a technical one. Iran's oil and gas resources in the Caspian Sea are located in deeper water than hydrocarbon deposits in other parts of the sea. Therefore, Iran needs special drilling equipment, which only recently became operational after a more than five-year delay. Because most of Iran's oil and gas activities have been concentrated in the southern part of the county, Tehran still needs to develop new facilities—including ports, pipelines, and refineries—for oil and gas development in the north.

With new oil-extraction technology and more investment in secondary recovery by gas injection and other methods, Iran could increase the oil recovery rate in its fields from around 16 percent to 30 percent. This would mean a considerable increase in production, but there are several obstacles to this goal. Most notably, U.S. sanctions on Iran have prevented international oil companies from investing in Iran, and Iran's constitution bars the government from granting concessions to foreign oil companies, as had happened prior to the 1979 Iranian Revolution.

In the last decade, Iran has invested heavily in natural gas exploration. This strategy is intended to increase the amount of natural gas available for domestic energy consumption and keep oil exports at a high level. Furthermore,

Table 4.2 Oil and Gas Production and Consumption in Iran (oil in 1,000 barrels per day; gas in billion cubic feet)

Year	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*
Total oil production	3,765.39	3,799.99	3,523.97	3,833.03	4,104.21	4,238.58	4,148.69	4,033.85	4,174.44
Oil exports	2,517	2,515	2,174	2,407	2,616	2,682	2,494	2,326	2,419
Natural gas production (dry natural gas)	2,127.4	2,330.8	2,648.6	2,860.5	2,962.9	3,563.3	3,835.2	3,951.7	NA*
Natural gas consumption (dry natural gas)	2,221	2,478.4	2,798	2,910	3,020.8	3,615.5	3,839.1	3948.2	NA

Source: Energy Information Administration (EIA) (2009); International Energy Outlook 2009, EIA.
*NA=Not Available

developing Iran's petrochemical industry, which is thought to add more value to the economy than oil and natural gas exports, is an industrial development policy priority. A new technology that substitutes natural gas for naphtha as a main input for petrochemical products gives Iran, which has the world's second-largest natural gas reserves, a potential cost advantage over many petrochemical producers in Europe and elswhere.

Iran's most important gas reserves are located in South Pars, a Persian Gulf gas field it shares with Qatar. Tehran has prioritized exploration of this field and declared twenty-five phases for production,[4] with more than 500 million cubic meters of production per day. Iran succeeded in developing ten phases and is negotiating with other countries to develop the remaining ones.

There are many other onshore and offshore gas fields in Iran that require new technology and heavy investment in exploration, pipelines, refineries, and other facilities to reach their final stage of development. Table 4.2 shows Iran's oil production, oil exports, natural gas production, and natural gas consumption from 2000 to 2008. Note that Iran imports slightly more natural gas than it exports.

Energy Consumption

Iran's total domestic energy consumption growth rate from 2000 to 2006 was 6 percent, which is very high in comparison to other countries. In 2007, the world's primary energy consumption grew by 2.4 percent to 11.1 billion tons of oil equivalent. During that year, Iran's primary energy consumption amounted to 182.9 million tons of oil equivalent, up by about 1.8 percent from the previous year. The annual growth rate has varied between 2000 and 2006. Some years it exceeded 10 percent, but in 2003 it was less than 1 percent, according to Iranian Energy Ministry reports (see Table 4.3).

Iran's refined petroleum product consumption grew by 3 percent between 2000 and 2007. The growth rate of these products—which include gasoline, diesel oil, liquid gas, heavy oil, and kerosene—varied. In some years it was negative, but in most years it was positive and even reached 7.7 percent in 2005. In addition to low prices, the growth rate for these products can be attributed to urbanization and the lack of adequate public transportation in Iran's big cities.

Promoting natural gas production and consumption is the core of Iran's energy policy, both domestically and internationally.[5] Iran—with vast

Table 4.3 Annual Growth Rate of Energy Consumption in Iran (%)

Year	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*Average growth*
Refinery products	6.30	–2.77	3.75	1.71	3.13	7.68	5.13	–1.00	3.0
Natural gas	15.42	3.55	12.72	9.39	15.41	7.40	15.93	17.79	12.21
Electricity	6.17	9.72	6.10	3.41	8.71	5.28	4.98	8.79	6.65
Total energy consumption	12.97	1.94	10.79	0.84	8.97	5.52	1.48	5.38	5.99

Source: Iranian Energy Ministry, Annual Energy Balance Sheet, Tehran, 2008.

natural gas reserves and a strategic location between seven countries and several seas—can play an important role in the region. Iran exports natural gas to Turkey, Azerbaijan, and Armenia, and at the same time imports natural gas from Turkmenistan and Azerbaijan. Iran is also negotiating to export natural gas to Pakistan, India, Bahrain, the United Arab Emirates, Kuwait, and Oman. Iran, Turkey, and Turkmenistan are planning to transport Iran's and Turkmenistan's natural gas to Europe.

Iran's natural gas consumption grew by an average annual rate of 12.2 percent from 2000 to 2007, the highest among all energy sources in Iran. The natural gas consumption growth rate reached 17.8 percent in 2007, the highest in last eight years, due to very cold weather. This growth in natural gas use resulted from the government policy of promoting natural gas consumption by building networks of pipelines to substitute natural gas for refined petroleum products in household consumption, power plants, industry, petrochemical production, and public transportation (substituting compressed natural gas for gasoline and diesel oil in buses and taxies in cities). It is expected that Iran's natural gas consumption rate will continue to grow by more than 10 percent in some years if supply is sufficient.

From 2001 to 2007, Iran's annual electricity consumption grew by an average of 6.6 percent, the nineteenth-fastest rate in the world. The high rate of population growth since the Iranian Revolution, low electricity prices, electrification of rural areas, and the substitution of electricity for diesel oil in the agricultural sector are the most significant factors causing Iran's high rate of electricity consumption growth. Iran faces electricity shortages in peak hours, even though it has made large investments in power plants, exports

electricity to neighboring countries (particularly Iraq and Pakistan), and exchanges electricity with other counties (notably Turkey and Azerbaijan).

Iranian Studies on Energy Production, Consumption, and Subsidies

Iranian government institutions regularly commission and publish studies related to the state's energy consumption and production patterns. Iran's Ministry of Oil, the National Iranian Oil Company (NIOC), and other affiliated companies have conducted several studies about the high demand for fuel in Iran and the impact a price hike on refinery products would have. In one 2005 study[6] about gasoline price adjustment using an econometric method (ARDL), researchers estimated that price elasticity for gasoline in the short run is inelastic (0.12), which means a price increase does not affect consumption much, but in the long run it increases to 0.22. The income elasticity for gasoline in the short run and long run is 0.48 and 0.88, respectively, indicating that gasoline is an inelastic commodity and is considered a necessity good. What this means is that in the short run, any increase in gasoline prices does not decrease consumption. An increase in income, on the other hand, has a more significant affect on demand for gasoline.

Another factor in this study is the number of vehicles using gasoline as fuel. If the stock of vehicles in Iran increases 1 percent, per capita demand for gasoline will increase 0.35 percent in the short run and 0.66 percent in the long run. Therefore, any policy that expands public transportation or substitutes old cars with new and more efficient ones will help reduce the demand for gasoline.

Using different methods, the study's authors showed that the price adjustment effect in this model is 0.54, meaning that 54 percent of disequilibrium resulting from the quantity of petrol consumption in each period would be eliminated in the long run. Thus, they argued that the effect of real price adjustment on the consumption of gasoline and other refinery products would occur quickly and be completed in less than two years. In contrast to other studies that suggest that price increases would not have an effect on consumption, this study suggested that if Iran increased real gasoline prices gradually from 800 rials to 6,000 rials per liter in five years, per capita consumption would decrease from 2,170 liters to 1,732 liters, a 20 percent reduction. But if these increases happen all at once, the per

Table 4.4 Results of Different Energy Price Increases (%)

Different scenarios	*Household inflation*	*Intermediate inflation*	*Total inflation*
Energy price increases based on Third Development Plan	1.21	1.32	2.53
Gasoline and diesel oil price increases in five steps	4.65	5.56	10.21
Gasoline, diesel oil, kerosene, and heavy oil price increases in five steps	7.10	8.53	15.63
Gasoline price increases in five steps	2.46	3.13	5.59
Gasoline price increases in one step	5.22	7.51	12.73
All energy prices increase to Persian Gulf FOB* price in one step	72.40	58.60	131.00
Gasoline, diesel oil, kerosene, and heavy oil price increases in one step	40.50	41.00	81.50

Source: Iranian Oil Ministry, "The Study of Energy Carriers' Price Increase on Inflation and Budget Expenditures of the Urban and Rural Families," Tehran, 2005, 94–95.
*FOB (Free on Board) is used in conjunction with a port of loading, under the International Chamber of Commerce standard. Indicating an FOB port means the seller pays for transport of the goods to port of shipment plus loading costs, and the buyer pays costs of marine freight transport, insurance, unloading, and transport from arrival port to final destination. Passing of risks occurs when the goods pass the ship's rail at the port of shipment.

capita consumption of gasoline will decrease even further—28 percent in five years.

In a study conducted by the Iranian Oil Ministry in 2005, researchers showed that if there were a 20 percent price increase for all refinery products, the average inflation rate would increase by 1.32 percent for intermediate sectors and 1.21 percent for households.[7] Among all economic sectors, the transportation and construction sectors would be affected most by price changes (see Table 4.4). Inflation is already a significant problem in Iran, as it reached 25.4 percent in 2009.

The total inflation under different scenarios of energy price increases ranged from 2.5 percent to 131 percent. The highest inflation would occur if all energy prices increased immediately to Persian Gulf FOB prices. But Iran's Oil Ministry researchers realized that a price increase alone will not decrease energy consumption, and it would not be a good policy unless

accompanied by the expansion of public transportation in cities, railroad expansion, the optimization of energy consumption, and energy efficiency in industry and housing. In addition, the Iranian government must implement some protective measures to help low-income groups in order to prevent price increases from having undesirable effects.

Finally, the Oil Ministry report suggested the creation of a special fund or account for revenues generated by energy price adjustments. A board of trustees would supervise the account and spend the money in five areas:

1. The development and improvement of public transportation systems in all metropolitan areas
2. Direct energy subsidies to low-income families
3. Improvement of the environment and institution of pollution controls
4. Investment in new refineries and new technologies for old refineries
5. Investment in new energy-conserving technologies

An Iranian National Oil Company study titled "The Importance of Energy in National Economy" estimated the revenues that would be generated if Iran raised all refinery products' domestic prices to their 2006 global market prices. Table 4.5 shows the domestic and international (Persian Gulf FOB) prices for refinery products in 2006. Iran's Central Bank estimated the country spent $87.8 billion dollars in energy subsidies in 2007 alone. A separate 2005 Iranian Oil Ministry study reviewed all types of government subsidies during the government's Second and Third Development Plans. The share of energy subsidies out of total subsidies in the Second Development Plan continuously increased from 85.4 percent in 1996 to 92.4 percent in 1999. In the Third Development Plan (2000–2004), the share of energy subsidies decreased, but it was always above 90 percent of total subsidies. In the first year of the Fourth Development Plan, it reached an unprecedented 95 percent, which was due to higher oil prices in international markets. It is important to note that because Iran's exchange rate was fixed until 2000, energy subsidies were hidden. These subsidies became transparent when they were based on the market exchange rate. Also, this oil ministry study did not account for the opportunity cost of oil used in refineries.

Moreover, the share of Iran's GDP that went to energy subsidies increased substantially, from 5.54 percent of GDP in 1992 to 13.93 percent of GDP in 1993. It decreased during the period from 1993 to 2001 but remained above 10 percent on average. It then increased again and reached 16.9 percent in

Table 4.5 Prices of Refinery Products in Iran and International Prices, 2006

Refinery products	*Iran domestic price per liter (rials)*	*International price per liter (rials)*	*Percentage difference in prices*
Gasoline	800	3,510	339
Diesel oil	165	3,816	2,213
Heavy oil	95	2,213	2,242
Kerosene	145	4,016	2,343
Liquid gas	258	2,039	690

Source: Iranian National Oil Company, "Importance of Energy in the National Economy," Tehran, 2006.

2004. Based on Iranian Oil Ministry calculations, energy subsidies increased from 24 trillion rials in 2001 to 184 trillion rials in 2004, which was 36.2 percent of all general budget expenditures.[8] Meanwhile, the amount of budget expenditures on capital investment increased from 24 trillion rials to 99 trillion rials in the same period, and this constituted less than 20 percent of total budget. So during this period, the Iranian government spent more on energy subsidies than on capital investments.

The Central Bank of Iran also developed a computable general equilibrium (CGE) model in parallel with input-output tables to study and compare the results of the energy price changes on inflation. In 2008, the bank consolidated the results of those models with another model of financial programming and policy (FPP) to estimate the demand-side effect of price changes. It concluded that inflation would increase as a result of energy price changes, but the extent of the increase would depend on energy prices and many other variables, including the feedback of the demand for energy.

Energy Subsidies

Iran has spent a large amount of its oil wealth on direct and indirect subsidies. Many economists consider this policy to be a waste of money and an inefficient means of promoting economic growth and income distribution.[9] In the long run, these subsidies cause budget deficits and chronic inflation. Iran's budget depends heavily on oil revenues, which means price fluctuations

in oil markets bring instability to government expenditures and hamper economic growth. This economic policy, based on a model of promoting income distribution above economic growth, cannot continue in the long run, and Iran will be obliged to change it sooner or later. This is not an easy decision. And even if the Iranian government reaches this decision, there are many controversies over how to change the policy.

On one side, economists argue in favor of reducing energy subsidies, which account for more than 85 percent of the country's total subsidies—more than the government spends on subsidies for bread, drugs, fertilizer, edible oil, and other products. These economists argue that energy subsidy reduction would increase government revenues and reduce energy consumption, which has caused environmental problems in the country and forced Iran to import large amounts of oil products from abroad. Even with Iran's large petroleum reserves, oil products are now the country's top import in terms of value.

Higher oil prices on the international market in 2007 and the first quarter of 2008 raised Iranian energy subsidies considerably. Iran's Ministry of Oil estimated that these subsidies reached $100 billion in 2008, which accounted for almost 25 percent of GDP. However, lower oil prices in 2009 reduced Iran's energy subsidies to an estimated $35 billion in that year.

Due to the relative low price of all types of energy in Iran, reducing subsidies cannot be accomplished solely by encouraging people to conserve energy. In particular, Iranians need to change their habit of using energy-intensive equipment and appliances in households and industry. Also, most of the energy used in Iran is nonrenewable energy.

Those who favor continuing energy subsidies at the current level in Iran argue that price increases would cause hyperinflation and that low-income families would suffer most. These supporters of subsidies have suggested that any energy price adjustment must be gradual and carefully planned to take into account social welfare considerations and avoid pressure on the poor. In particular, they argue public transportation must be developed adequately before any changes happen and that industry must be compensated for making changes from old technologies to new ones (in order to preserve their comparative advantage over imports). Despite these reservations, recent developments in international oil markets and studies showing problems with energy subsidies have generated strong support among Iranian politicians and economists for the elimination or reduction of these subsidies.

However, people have different views on how—and how quickly—to implement these changes.

The consequences of Iran continuing its current energy pricing policy of subsidizing artificially low prices can be outlined as follows:

- A high rate of domestic energy demand would continue, and scarce energy resources would be overutilized.
- Nonrenewable energy resources could be exhausted in the near future.
- Pollution from use of fossil fuels could increase health problems and other external costs. In 2005, the World Bank and Iran's Environmental Protection Agency estimated the cost of gas emissions in Iran to be $7.1 billion. Based on U.S. Environmental Protection Agency coefficients, these costs were estimated to reach $18 billion in 2007.
- A fair income distribution policy would not be achieved. High-income groups use more energy and benefit more from some subsidies than low-income groups.
- Smuggling of all refinery products, especially gasoline and diesel oil, to neighboring countries, would occur. Significant differences between domestic and international energy prices tend to increase this.
- Energy-intensive industries crowd out labor- and capital-intensive industries and discourage conservation.
- Subsidies produce budget deficits in the short term and hindered economic growth and employment in the long run.
- Iran would not be motivated to develop new types of energy or renewable energy (such as solar, wind, etc.).
- Large energy subsidies would hinder domestic investment in energy industries (such as oil, gas, and petrochemicals) and cause a slow rate of growth in this sector due to low domestic prices.

Iran's continuation of energy subsidies during recent years of increasing international oil and gas prices has increased the gap between domestic and international prices. This causes price distortions, which decrease relative energy prices compared to other domestically produced commodities. Accordingly, continuing this energy subsidization policy has become a heavy economic and political burden. The costs of changing the policy increase every year and force the government to postpone an important decision in order to avoid undesirable social and economic consequences.

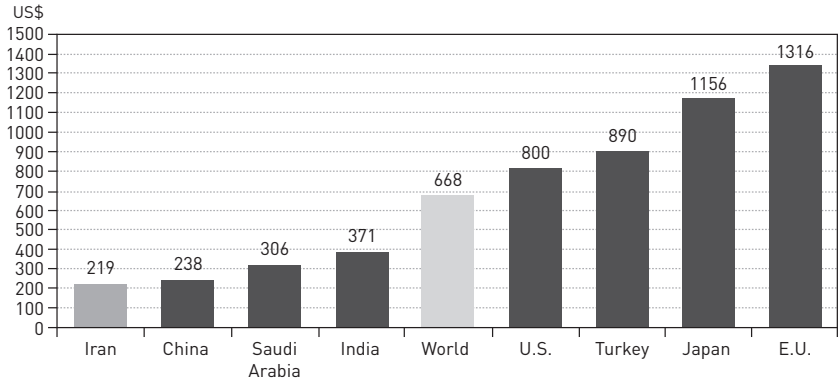


Figure 4.1 Energy productivity based on GDP in selected countries, 2007. BP Statistic, June 2008 in World Economic Outlook.

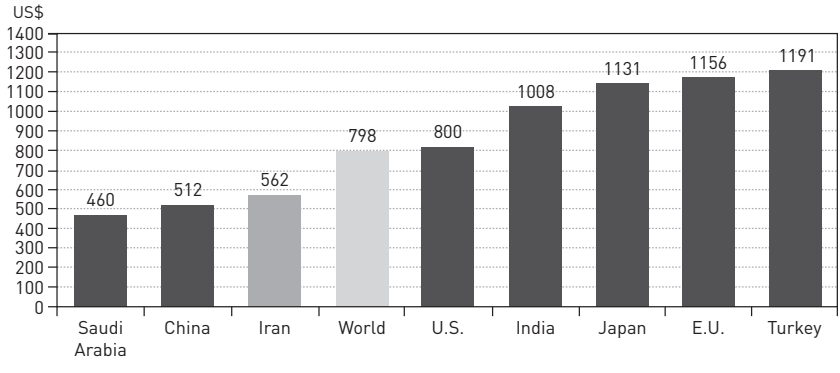


Figure 4.2 Energy productivity based on GDP calculated on PPP in selected countries, 2007. BP Statistic, June 2008 in World Economic Outlook.

Energy Efficiency in Iran

A 2007 review of energy consumption in Iran shows that energy productivity in Iran was only $219.[10] That means for every barrel of oil equivalent of energy consumption in Iran, the country produces $219 in GDP. Iran's energy productivity is less than that of India, Saudi Arabia, and China. The world average is $668, and the EU's average was $1,316 (see Figure 4.1). However, in terms of purchasing price parity (PPP), Iran's energy productivity is better (see Figure 4.2).

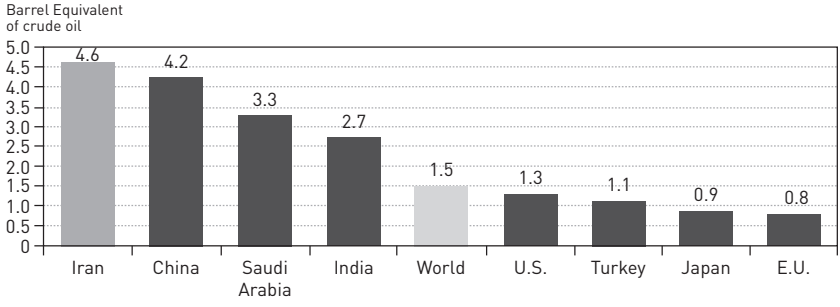


Figure 4.3 Energy consumption intensive based on GDP in 2007 (barrel of crude oil equivalent per $1,000 GDP). BP Statistic, June 2008 in World Economic Outlook.

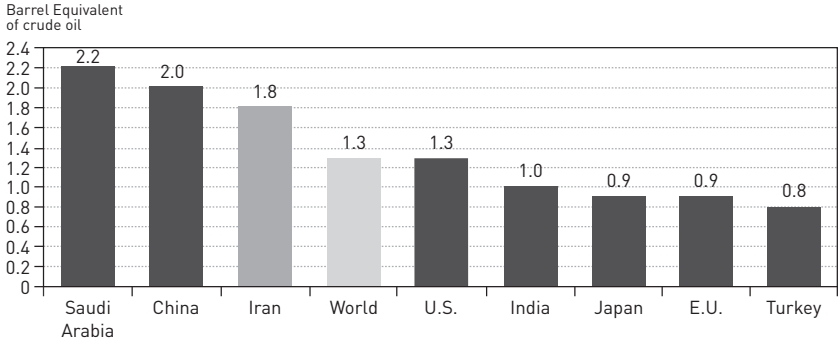
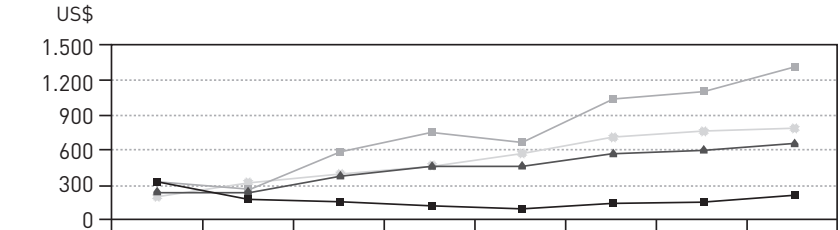


Figure 4.4 Energy consumption intensive based on GDP calculated on PPP in 2007. BP Statistic, June 2008 in World Economic Outlook.

The use of energy for producing one unit of goods and services is called "energy consumption intensive." There are several ways to measure it. One method is the amount of energy use (in barrels of crude oil equivalent) needed to produce $1,000 of GDP. In 2007, the figure for Iran was 4.6. The comparable figure for India was 2.7, the world average was 1.5, and Japan and the EU were at 0.9 and 0.8, respectively (see Figure 4.3). In terms of GDP in PPP, Turkey with 0.8 is in better position than the EU, Japan, India, and the rest of the world's average. Iran, at 1.8, is above the world average but requires less energy than China and Saudi Arabia to produce $1,000 of GDP (see Figure 4.4).

Energy consumption intensive in Iran, which is among the lowest in the world, hasn't improved much in recent years. Between 1980 and 2000, it decreased, but since then it has increased. The reason for this improvement



	1980	1985	1990	1995	2000	2005	2006	2007
Iran	327	185	166	133	109	150	169	219
World	242	246	384	471	467	580	609	668
E.U.	329	270	595	764	677	1.052	1.117	1.316
U.S.	210	327	403	477	580	724	775	800

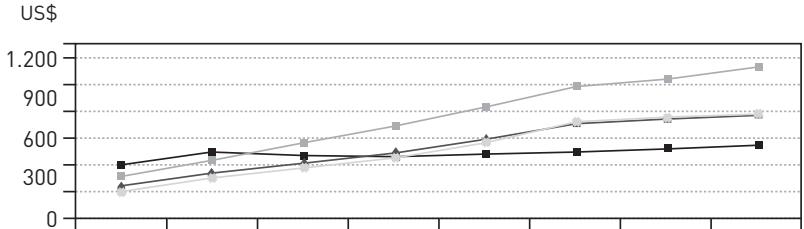
Figure 4.5 Productivity trends in energy consumption in selected countries, 1980–2007 (GDP per barrel of crude oil equivalent). BP Statistic, June 2008 in World Economic Outlook.

is not an increase in efficiency but an increase in international oil prices,[11] which were 250 percent higher in 2007 than in 2000. Hence, due to lower oil prices in 2008 and 2009, we expect lower energy consumption intensive in Iran during these years (see Figure 4.5).

Moreover, the same situation is true for energy consumption intensive based on GDP in PPP. The figure for Iran increases from 399 in 1980 to 500 in 1985 and decreases in 1990 and 1995 to 476. However, it went up to 562 in 2007, an increase of 17 percent. Between 1980 and 2007, the world, the EU, and the United States increased their energy consumption intensive by 312, 350, and 380 percent respectively (see Figure 4.6).

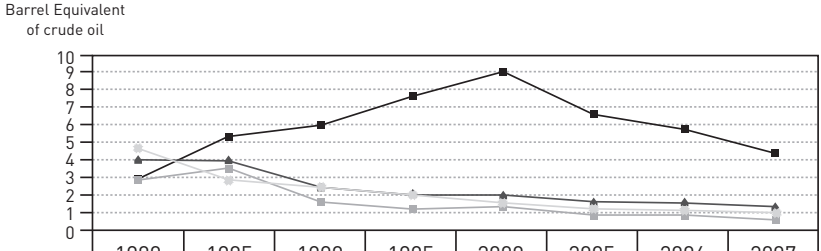
We can see the same scenario in terms of trends in energy consumption intensive in Iran and other countries. Iran's energy consumption intensive (per barrel of oil for $1,000 of GDP) increased from 3.1 to 9.2 between 1980 and 2000, decreased after that, and then improved to 4.6 in 2007, still above the figure for 1980. The same figures for the world, the EU, and the United States show that productivity improved considerably in all these contexts. The global average improved from 4.1 to 1.3, the EU improved from 3.0 to 0.8, and the United States improved from 4.8 to 1.3 (see Figure 4.7).

In terms of GDP in PPP, Iran fairs better in terms of energy productivity. Iran's energy consumption intensive improved from 2.5 to 1.8 between 1980 and 2007, but Iran's energy consumption is still less productive than most



	1980	1985	1990	1995	2000	2005	2006	2007
Iran	399	500	476	476	487	506	526	562
World	255	348	428	511	610	720	759	798
E.U.	321	437	576	701	840	1.000	1.064	1.151
U.S.	210	327	403	477	580	724	775	800

Figure 4.6 Productivity trends in energy consumption in selected countries, 1980–2007 (GDP based on PPP calculation per barrel of crude oil equivalent). BP Statistic, June 2008 in World Economic Outlook.

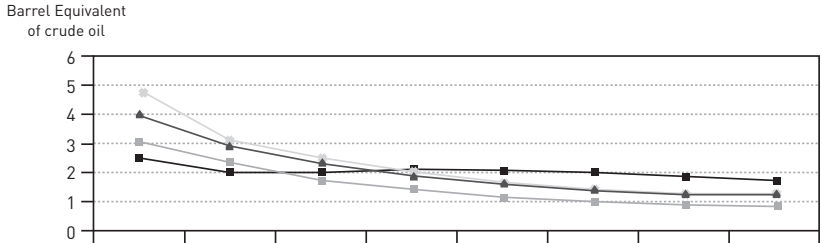


	1980	1985	1990	1995	2000	2005	2006	2007
Iran	3.1	5.4	6.0	7.5	9.2	6.7	5.9	4.6
World	4.1	4.1	2.6	2.1	2.1	1.7	1.6	1.5
E.U.	3.0	3.7	1.7	1.3	1.5	1.0	0.9	0.8
U.S.	4.8	3.1	2.5	2.1	1.7	1.4	1.3	1.3

Figure 4.7 Trends in energy consumption intensive in selected countries (barrel per $1,000 GDP). BP Statistic, June 2008 in World Economic Outlook.

other countries. The same figures for the world, the EU, and the United States were 1.3, 0.9, and 1.3, respectively, in 2007 (see Figure 4.8).

Figure 4.9 shows energy efficiency as the relationship between the price of gas oil and energy productivity based on GDP produced per barrel of crude oil equivalent. With an increase in gas oil prices, energy productivity in Iran has increased substantially, but efficiency has slowed. This trend



	1980	1985	1990	1995	2000	2005	2006	2007
Iran	2.5	2.0	2.1	2.1	2.1	2.0	1.9	1.8
World	3.9	2.9	2.3	2.0	1.6	1.4	1.3	1.3
E.U.	3.1	2.3	1.7	1.4	1.2	1.0	0.9	0.9
U.S.	4.8	3.1	2.5	2.1	1.7	1.4	1.3	1.3

Figure 4.8 Trends of energy consumption intensive in selected countries, 1980–2007 based on PPP. BP Statistic, June 2008 in World Economic Outlook.

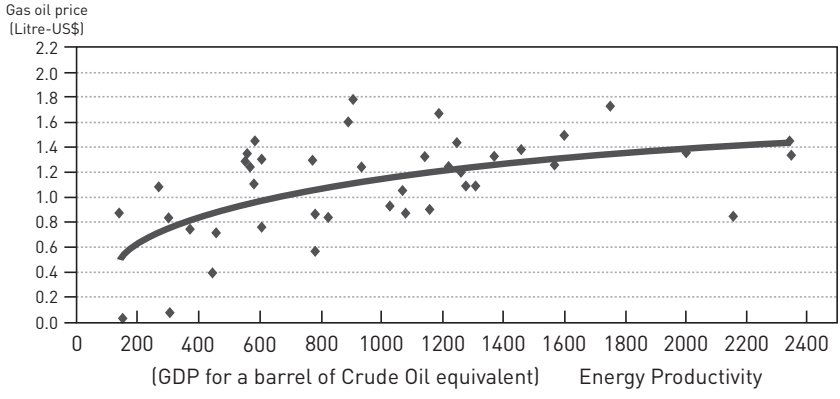


Figure 4.9 Relationship between price of gas oil and energy efficiency. BP Statistic, June 2008 in World Economic Outlook.

shows that we cannot expect energy price increases to translate into productivity increases indefinitely.

The gap between Iran's domestic energy prices and international prices has increased considerably. Figure 4.10 shows the trends of energy prices domestically and internationally between 2001 and 2007. Due to Iran's energy pricing policies and rapid increases in international energy prices, the

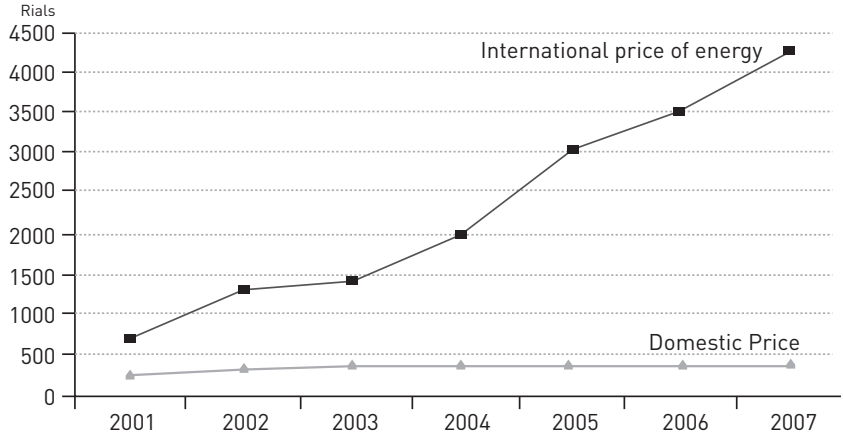


Figure 4.10 Comparison of Iran and international energy prices. Central Bank of Iran.

gap has widened. This trend shows that price adjustment is very important for the health of the Iranian economy and that government inaction has had a high opportunity cost.

With respect to the present (unfortunate) situation of energy efficiency in Iran, any delay in the decision to change the country's energy subsidization policy would result in high costs to the Iranian economy in terms of wasted energy, inefficiency in production and consumption, and lost opportunities.

However, if Iran is going to adjust energy prices, it needs to take a few important items into consideration:

- Due to Iran's long delay in adjusting its energy prices, any increase in prices will require social and political support for economic restructuring.
- The indirect effect of energy price adjustments on households depends on macroeconomic policy. Therefore, Iran needs to introduce a comprehensive package that includes new fiscal and monetary policies.
- The government must protect low-income groups that would suffer the most in the short run.

In many developed and developing countries, there is a substantial tax on fuel consumption. Governments impose taxes on fuel consumption for several reasons, including to generate income for the government; to conserve

energy; to address environmental and health considerations; to increase investment in highways and transportation; and to encourage the development of alternative sources of energy. Because there is an inverse relationship between energy intensity and prices, higher prices decrease energy intensity. Accordingly, Iran is obliged to adjust energy prices to decrease energy intensity.

Development Plans and Energy Subsidies Laws

Under Iran's Third and Fourth Development Plans (2000–2004 and 2005–9, respectively), lawmakers required the government to adjust energy prices. The Third Development Plan, required the government, until the second year of the plan, to study the subsidies targeted to basic commodities, including wheat, sugar, dairy products, drugs, fertilizer, pesticides, and energy. After completion of the third year of the plan, the subsidies system was supposed to change according to the following goals:

- Rationalizing subsidized commodities prices to prevent smuggling to neighboring countries
- Encouraging the production of domestically subsidized commodities
- Reducing upper-income groups' share of subsidies and increasing lower-income groups' share
- Gradually replacing subsidies with welfare projects
- Financing infrastructural investment and employment
- Developing production and employment by way of soft loan facilities from revenues generated by the elimination of subsidies

In practice, the Iranian government decreased subsidies by gradually increasing the price of some refinery products and other commodities, but it was short of a total elimination of energy subsidies. In Iran's 2000 parliamentary election, fundamentalists won a majority in the Seventh Parliament and passed a bill to freeze the prices of all refinery products, electricity, natural gas, water, communications, and some government services, and this reversed changes in prices anticipated in the Fourth Development Plan (2005–9). In addition, Article 95 Section B of Iran's Fourth Development Plan ordered the government to establish justice and social stability and to reduce the income distribution gap. The government was required to allocate funds

generated from subsidies reduction and other social funds toward achieving these goals.

In the past ten years, Iranian governments and lawmakers have showed their intention to reduce energy subsidies and allocate the funds directly to needy people to reduce income inequality. But due to differences between the parliament and the executive branch on how to implement the laws, energy subsidies have continued.

In 2008, Iran's government decided to eliminate energy subsidies after one year of research. It put together "The Economic Transformation Law," a package of reforms on monetary issues, customs, labor rules, taxes, productivity, and energy subsidies. This bill was presented to Parliament in January 2009 as a top priority.

Parliament approved the energy subsidy bill on January 22, 2010, and it was supposed to be implemented on March 21, 2010. But the government decided to postpone it until December 2010. It is a multidimensional piece of legislation that will have a very important impact not only on Iran's economy, but also on social and political developments in the country. If it fails to achieve its goals or faces difficulties, the government might stop or postpone the implementation of part of the law as has happened in similar previous cases (for example, the value-added tax law). If this happens, the energy subsidy problem will continue to waste resources and hinder the Iranian economy.

The Iranian Government's Plan for Energy Subsidies

In January 2009, the Iranian president introduced a bill to Parliament to provide "targeted subsidies" (cash payments) to low-income groups that would suffer the most from energy price adjustments. The Parliament nominated an ad hoc committee to review the bill, and after some changes it became a law at the beginning of 2010. The law includes the following features:

- Over the next five years, the prices of gasoline, diesel, heavy oil, liquid gas, and kerosene must gradually increase to reach 90 percent of the Persian Gulf FOB price, taking into consideration economic circumstances.
- The price of crude oil to Iranian refineries must be 95 percent of the Persian Gulf FOB price.

- The domestic price of natural gas must equal 75 percent of the export price.
- After five years, the domestic price of electricity and water must equal the costs of production. Also, for different geographic regions, different electricity and water prices can be charged.
- In order to encourage investment, Iran's domestic natural gas price for manufacturing industries, refineries, and petrochemical industries must be 65 percent of the Persian Gulf FOB natural gas export price (without transportation costs).

Revenues generated by these price adjustments would be distributed according to the following categories:

- Up to 50 percent of revenues would be paid directly to low-income families in cash or in kind or would be spent on a comprehensive social welfare system, health insurance coverage, housing assistance, and employment.
- The government would be permitted to spend 30 percent of revenues on energy optimization and conservation, including technology improvement, renewable energy development, and compensation of utility companies' losses. In addition, the government is authorized to spend funds on public transportation, agricultural and industrial production, industrial bread producers, and electronic services to reduce the use of vehicles.
- Under Article 11 of the "targeted subsidies" law, the government can spend 20 percent of the generated revenues for general budget expenditures.

The law is a part of the Fifth Development Plan, which was approved by Parliament in 2010, but its implementation was delayed until March 21, 2011.

Different economists have different projections regarding the impact these energy price adjustments would have on the Iranian economy. Economic growth would be reduced between 3.4 and 3.7 percent. Inflation would increase 15 to 24 percent in a country where the inflation rate was already 25.4 percent in 2009. Anticipated revenues generated by the scheme would be around $40 billion, with 50 percent distributed to households, 20 percent to the government, and 30 percent to industries affected by the price adjustment.

The consequences of the energy price adjustment on consumption, production, employment, and other economic factors are not yet clear, and predictions are only speculative. Complex interactions between economic variables and the current world economic crisis introduce additional uncertainties. The Iranian population's reaction to the implementation of the law also remains to be seen. However, most Iranian politicians and economists agree that reform is necessary and that any delay imposes a heavy burden on the Iranian economy and future generations.

The Ministry of Economic Affairs and Finance is the principal authority for implementing the law, with cooperation from other government ministries. Implementing the law may not be an easy job. Even if the government implements it properly, the potential impact of undesirable potential outcomes—such as inflation and unemployment—are not clear. The law's timetable, the sequence of implementation, and the payment system for people in the bottom half of the economy are very important concerns and must the scrutinized at every stage of implementation. The Iranian government can build on the similar experiences of other countries and international institutions to increase the plan's efficiency.

Determining Energy Prices in Iran

The formula Iran uses to calculate energy subsidies is based on the opportunity cost of energy—that is, the difference between the domestic price of oil products and FOB prices in the Persian Gulf. Also, natural gas prices are calculated based on 80 percent of export prices, and electricity prices are determined by the costs of production. Due to the high rate of inflation in Iran, any price changes must take inflation into account. Therefore, an increase in energy prices must be real (taking into consideration the consumer price index) and not merely nominal.

The exchange rate also plays an important role in determining prices. Even price increases based on Persian Gulf FOB energy prices are not sufficient for adjustment. Despite wide differences between world inflation rates and Iran's domestic inflation rate, the Central Bank in Tehran has kept the rial exchange rate almost constant in the last five years (it has devaluated only 15 percent). This policy causes Iran's exchange rate, which is supposed to be a floating rate, to become overvalued and not reflect the real value of the rial.

Table 4.6 January 2010 and Projected Energy Prices

Energy carriers		*Present*		*Suggested price*		*Percent change*
		Rials	*US$**	*Rials*	*US$*	
Gasoline (1 l)		1,000	0.11	4,000	0.43	396
Diesel (1 l)	Non-power plant	165	0.02	3,500	0.37	2,122
Heavy oil (1 l)	Non-power plant	945	0.10	2,000	0.21	212
	Power plant	945	0.10	2,000	0.21	212
Kerosene (1 l)		165	0.02	3,500	0.57	2,122
Liquid gas (1 l)		288	0.03	2,000	0.21	695
Natural gas (1 m^3)	Non-power plant	110	0.02	1,300	0.14	1,182
	Power plant	110	0.02	1,300	0.14	1,182
Electricity (1 kw)		165	0.02	1,000	0.11	606

Source: Iranian Ministry of Economic Affairs and Finance, A Report on Energy Subsidies, Tehran, 2008, and author's calculations
*US$1= 9,500 rials

The annual amount of Iran's energy subsidies has gone from $100 billion in February 2008, when international oil prices were at their highest level, to around $40 billion in 2009. Because oil prices fluctuate, any estimate of future subsidies is a rough approximation and could vary up to 50 percent with oil price changes.

Table 4.6 shows January 2010 energy prices in Iran and the prices projected by some experts during the first year of the proposed energy subsidy reduction law. According to the Iranian government's Fourth Development Plan, Iran's domestic energy prices were supposed to gradually increase every year and reach Persian Gulf FOB prices by the end of the plan. However, the Seventh Parliament introduced a bill in 2003 that changed the previous law on energy price reforms. This law froze the price of seven items including refinery products, natural gas, electricity, and water in 2004. Members of Parliament argued that annual price increases raise people's inflationary expectations and cause accelerated inflation. In 2005, the first year that the law was implemented, inflation decreased to the lowest level in five years (11.9 percent). But due to government fiscal and monetary expansionary policy, inflation increased in subsequent years. Many economists argue that the first-year decrease was the result of previous monetary and fiscal policy and cannot be solely attributed to the law.

The energy price freezes halted the projected plan for investment in infrastructure, public transportation, and energy conservation. Shortages of electricity in 2008 were attributed to the delay in finishing power plants under construction due to lack of adequate financing. In 2007, the government introduced rationing coupons—for the first time since the end of the Iran-Iraq war in 1989—for gasoline and then diesel oil, with a small increase in prices compared to the high rate of inflation in the previous five years. (Inflation rates were 13.5, 18.4, 25.4, 10.8, and 12.4 percent, respectively, in 2006–2011.) However, the government increased gasoline prices by only 25 percent in June 2007 and has kept them at that level until the implementation of the targeted subsidy law on December 21, 2010, despite the more dramatic increase in oil prices worldwide. With introduction of the subsidy law, the gasoline prices have more than quadrupled. The price of gasoline was approximately $0.7 per liter ($2.50 per gallon) in May 2011, when it was just $0.1 before 2009 and about $0.3 in late 2010.

In November 2008, the Iranian government introduced the nonrationed gasoline price, which was four times the coupon price. The ration system has created a black market for petrol. But by introducing nonrationed gasoline, prices have decreased on the black market. Black market prices are still above subsidized prices but are below the nonrationed price. In fact, the amount of gasoline rationed per month (80 liters per car) increased to 100 liters after nine months. Later, the government allowed an additional 100 liters of gasoline to each car for New Year's trips and another 100 liters for summer trips. The result of this rationing system was a 20 percent reduction in gasoline consumption, which can mainly be attributed to a reduction in smuggling to neighboring countries and not a decrease in consumption.

A week before the targeted subsidies were introduced, the government ordered the banks to pay any individual who had been pre-registered and opened a bank account a two months cash subsidy in the amount of 820,000 rials, which is the equivalent of $82.

The government also introduced two different prices for gasoline and diesel oil. The ration price was 4,000 rials for gasoline and 1,500 rials for diesel, which were 4 and 9 times more than the previous prices. In addition, the non-ration prices were 7,000 and 3,500 rials, which were respectively 7 and 21 times more than the previous ration prices. The prices of electricity and natural gas for home and industrial consumption have increased substantially under a complicated formula. All refinery products prices have increased significantly. The reforms went further than energy carriers, and

the subsidy cuts also included bread and water. To help low-income families the government added an additional 40,000 rials into the previously set level of cash handout per person.

According to the official data, since the implementation of the subsidy law in December 2010, the daily gasoline consumption has declined by 12 percent to 54 million liters in April 2011 from 61 million liters a year earlier. The government has saved $1.8 billion just on fuel consumption as a result this policy.[12] This was accompanied by increased inflation, though the level of inflation was below the anticipated mark due to to the price control by the government.

Conclusions

Energy subsidies in Iran have increased substantially in recent years—from $15.2 billion in 2001 to $87.8 billion in 2007—due to increases in consumption and oil prices.

The Iranian government's Third and Fourth Development Plans laid out policy changes for domestic energy prices. First, these prices were supposed to increase gradually along with international prices. However, members of Iran's Seventh Parliament overwhelmingly approved a bill in 2003 to freeze the price of energy and some other public goods in order to curb inflation. At that time, the annual rate of inflation was around 13 percent.

As a result, the gap between Iran's domestic energy prices and international prices became wider, and domestic consumption increased substantially. Due to the limits in Iranian oil refineries' capacity and the delay in constructing new oil and gas refineries, Iran became an importer of refinery products, particularly gasoline and diesel. But the rationing program introduced in 2007 for gasoline and in 2009 for diesel reduced domestic consumption by 20 percent.

Finally, in response to several studies by Iranian government agencies, the president decided to overhaul the government's energy pricing policy by introducing comprehensive legislation on "economic transformation." Parliament approved it on January 5, 2010, and the Council of Guardians ratified it one week later. The law included the energy subsidy plan that has been implemented since December 2010. It changes universal energy subsidies to targeted subsidies in order to compensate low-income families and increase energy productivity in Iran. The government postponed the implementation

of the law for nine months in order to pay direct cash handouts first and then increase the prices. It was a wise policy and did not cause social disturbances. In 2011, the implementation of subsidy cuts was in full swing, which is a move in the right direction from an economic point of view but it might be politically difficult to sustain the speed of subsidy reform due to the social and economic consequences.

Therefore, the execution of this law to eliminate or reduce energy subsidies completely must take into account the reaction of consumers, producers, and investors (domestic and foreign) into consideration. In spite of many studies on this subject, we cannot predict with certainty the outcome of the law. In practice, even a comprehensive, carefully designed, and properly implemented law may require adjustment. The timing and the speed of price adjustments are of the utmost importance. The evaluation of the results of the subsidy law implementation needs more time but it seems that the government is cautious about price changes and price adjustment taking into account views of customers and producers. At this time, the gradual approach to subsidy cuts seems to be the most balanced option for continuing the started process.