An Analysis of Possible Oil Industry Ownership Structures in Post-War Iraq

by

Rebecca Fortson

December 2004

Department of Economics
Department of International Affairs
The Florida State University

Acknowledgements

First and foremost, I would like to thank my directing professor, Dr. Frank Heiland, Department of Economics, for his guidance and direction throughout the past year. His time and efforts truly made this paper possible. I would also like to thank my committee members, Dr. Mark Isaac, Department of Economics, and Dr. Ljubisa, Department of Russian and East European Affairs, for lending their time and talents to this project. Kathy Scheuch of the Honors Department has been wonderful in smoothing out this process. Thanks are also in order for my boss, Representative Loranne Ausley, and staff members Leisa Wiseman and Elizabeth Kennedy for granting me the time away from the office I needed in order to focus on my paper. Their understanding was essential in the completion of this project. And last, but not least, I would like to thank my family and friends who have supported me throughout the past year as I have worked on this paper. I am truly grateful for all of the assistance I have received along the way.

Table of Contents

Part I: Introduction

Oil is an integral part of our present day society. We use oil for heating, gasoline, and a variety of other functions that play a role in our modern life. Thus, oil is an important commodity worldwide. The country of Iraq is estimated to contain at least 115 billion barrels of oil in proven reserves. This war-torn nation is sitting atop a proverbial gold mine. The potential incomes to be earned from producing oil could provide a catalyst to economic recovery for this country.

This thesis provides an analysis of the recovering Iraqi oil industry under various scenarios of ownership structures, focusing on crude oil production. It discusses the costs and benefits of these ownership structures for the different economic groups involved and the Iraqi people at large. Part II provides historical background of the Iraqi oil industry, from its discovery in the early part of the 20th century to the present. Part III provides a general overview of the oil production process. Part IV discusses four ownership models for the oil industry. Part V provides a general discussion of how these models could be applied to Iraq. Part VI lays out the specific feasibility considerations for each implementation given the current situation in Iraq. Part VII provides conclusions and a policy recommendation drawn from the preceding analysis. We begin with a brief historical background.

Part II: History of Iraqi Oil

Oil in Iraq has played an integral role in the country since its discovery in 1927 to the present day, influencing everything from the economy to politics. As the world's reliance on oil has increased, so has the potential for oil to become an important source of revenue for the Iraqi people. In the aftermath of the American-led war on Iraq, the possibility of oil as a resource to improve the quality of life for the average Iraqi is enormous. However, to understand the role that oil could play, we must understand the part it has played thus far.

Oil first gained its prominence on the world stage beginning in the early 1900's. To this end, French, British, and Dutch interests formed the Turkish Petroleum Company. With the onset of World War I, many major powers began to see oil as the key to military victory, using it to power planes, tanks, and other military assets. As a result, there was a major oil shortage by 1917. Great Britain, which owned the Anglo-Persian Oil Company in Persia (modern day Iran), thought that neighboring Mesopotamia (modern day Iraq), then part of the Ottoman Empire, was an especially promising source for oil, particularly in the northern regions around Kirkuk. However, the Sykes-Picot Agreement signed between the British and the French in 1916 had given the French control of the northern regions.

In 1920 the French and the British signed the Treaty of San Remo, which gave the British control of Mesopotamia, which it re-named Iraq. Just seven years later, in 1927, the Turkish Petroleum Company found oil in northern Iraq,

near Kirkuk. After this discovery, interested parties including the United States, Britain, and France reached what is known as the Red Line Agreement, which gave specific exploration rights to each country in a certain region of the Middle East. However, the Middle Eastern countries themselves were not party to this agreement. From the start, the Iraqi people did not have a say in the distribution of oil resources and revenue.

In 1929, the Turkish Petroleum Company was renamed the Iraq Petroleum Company (IPC). The region of Kirkuk would prove to be an important resource for the IPC, which would begin exporting oil in large quantities in 1934.[1] From the start however, the Iraqi government was at odds with the IPC, feeling that the company put British interests first, chilling relations between the company and the government.[2]

The 1958 Iraqi Revolution set off a chain of events that would greatly impact oil in Iraq, and the lives of the Iraqi people. With the change in regime, the Iraqi government and the still-British con trolled IPC began a series of negotiations that were frequently interrupted by violent conflict. In the midst of these conflicts in 1960, Iraq became one of the founding members of the Organization of Petroleum Exporting Countries, popularly known as OPEC. One year later in 1961, the government passed a law proclaiming that all concession area not in production now belonged to the Iraqi government.[3] Still at odds with IPC, the Iraqi government formed the Iraq National Oil Company in 1964, which

[1] Held, p.136
[2] Held, p.346
[3] Held, p.347

the government granted exclusive oil rights to in 1967, in spite of previous deteriorating agreements made with the IPC.

In 1968 the Ba'ath Party gained political control of Iraq, and was immediately confronted with the on-going oil dilemma.[4] Iraq began negotiations with the Soviet Union, reaching an agreement in 1969 as to oil exploration rights and the construction of a future pipeline. This agreement effectively ended the monopoly that the IPC had on Iraqi oil. However, throughout these negotiations, the oil was not used as a resource to enrich the lives of the Iraqi people; rather, it was used as a tool for political games.[5]

By the spring of 1972, the IPC had finally given Iraq a share in the equity of the company. However, this concession was too little, and came too late; in June of 1972, Iraq nationalized the IPC, removing that aspect of British control from Iraq's government. Though the nationalization put more power in the hands of the Ba'athist Party, not in the hands of the people, the measure was enormously popular throughout the nation.[6]

After the nationalization of the IPC, a 1972 Friendship Treaty signed between Iraq and Moscow guaranteed that Moscow would purchase Iraqi oil. This, along with the favorable terms Iraq had negotiated in the nationalization of the IPC, put Iraq in the perfect position to take advantage of the rise in oil prices that was a result of the Arab-Israeli war.[7]

[4] Tripp, p. 193-195
[5] Tripp, p.205-207
[6] Tripp, p.207-208
[7] Tripp, p.208

From October 1973 to December 1975, the average annual income from oil in Iraq hovered around $8 billion. The government initially used this to support social services, such as infrastructure improvements, and investments in education and social security. At the same time, about 40% of the revenue was used to purchase arms. Though money was being spent on the people, a significant portion of the money earned from oil revenue was spent on arming the country. Money was also distributed to individuals such as Saddam Husain, increasing the power of the small inner circle which governed the country.[8]

Saddam Husain began his rise to power in earnest in 1976, and became aggressive towards neighbor Iran. By 1982, the two were engaged in a bitter conflict. At the same time, Iraq's oil revenue was falling, just as it needed more money to support its military and war operations. In 1983, Iraq had accumulated a national debt exceeding $25 billion.[9] By the end of the Iran-Iraq war in 1988, Iraq's oil infrastructure was severely damaged, and the country lost over $100 billion in the form of these damages.[10] This coupled with the strain of uprisings of Kurdish and Shi'ite groups, resulted in political problems for Saddam Husain and increased national debt for the country. The gains realized by the people of Iraq after the nationalization of oil, were slowly slipping away.[11]

By 1990, Saddam Husain realized that his country was in dire need of revitalization. Looking to increase oil revenues, Iraq began lobbying OPEC to restrict oil output in order to raise prices, placing pressure especially on small,

[8] Tripp, p.214-215
[9] Tripp, p.235
[10] CIA World Factbook
[11] Tripp, p.248-259

neighboring Kuwait. When Kuwait refused to acquiesce to Iraq, Husain ordered the invasion of Kuwait in early August 1990, and annexed Kuwait. This proved to be a strategic mistake on the part of Saddam Husain, bringing about a war led by the United States. Not only did Iraq lose the war, but sanctions were also imposed on the country.[12]

Iraq now suffered doubly – from a huge war debt, and from United Nations imposed sanctions on trade and weapons. United Nations sanctions against Iraq made trade difficult throughout the 1990's; Iraq therefore controlled its trade of oil predominantly through OPEC. In 1992, in an attempt to improve the plight of the Iraqi people the United Nations offered to establish an oil-for-food program, which Husain rejected. It was not until 1996 that the Iraqi government relented, and agreed to the United Nations plan, which Husain saw as a possible beginning to the end of sanctions. Therefore, Iraq signed agreements with France and Russia to ensure a market for its oil once sanctions were lifted.[13] Though the intention of the food-for-oil program was to help the Iraqi people, it is unclear how much help actually trickled down to the average citizen.

In March of 2003, the United States invaded Iraq in the Second Gulf War, and captured Saddam Husain in December 2003. The Ba'ath Party was driven out of power, and a provisional government installed until an elected government could be voted on. However, the new government will face many of the same challenges that Iraq has faced for centuries. Today, the country is composed of 24 million people, 97% of whom are Muslim. 60-65% of the Muslim population

[12] Tripp, p. 250-253
[13] Tripp, p. 260-264

are Shi'ite, but have been governed by the Sunni minority, which make up about 32-37%. There is also a significant Kurdish minority in the northern part of the country, near Kirkuk, one of the major oil fields in Iraq. Major oil fields exist too in the traditional Mesopotamia area between the Tigris and Euphrates Rivers south of the Sunni Triangle. The new government will face the challenge of governing a diverse nation and rebuilding a damaged oil industry.

Though Iraq has received promises of aid from the United States, the Iraqi economy will need more than aid packages to fully recover. The export of oil would be an excellent way to boost the economy, which has traditionally relied on oil for its income. 95% of foreign exchange earnings in Iraq have come from oil,[14] and with increased exploration and production, these earnings could potentially increase significantly. The revenue generated from the oil production could be used to benefit the Iraqi people in various ways, such as improved infrastructure, for example.

[14] US Energy Information Administration's Country Analysis Brief of Iraq

Part III: An Overview of the Oil Production Process

Oil is a mixture of hydrocarbons formed underground over millions of years, beginning with plant and animal remains. Intense heat and pressure transform the sediment from these remains into hydrogen and carbon compounds, or hydrocarbons, which combine in various forms, including crude oil, natural gas, and even diamonds. When crude oil is formed, the oil migrates slowly from high pressure conditions upwards to lower pressure conditions. Often, the oil is stopped by reservoir rock, porous sedimentary rock, where it pools and accumulates. It is from these reservoirs that oil is extracted, and they mark the starting point for the oil production process.

Oil exploration seeks out reservoirs where oil is present. Geological and geographical surveys of an area are conducted. From those surveys, potential areas of interest are further studied, often using a seismic survey. The seismic survey uses sound waves to study the layers of rock, using response times to calibrate the rock. Core sampling is also employed, which involves removing an actual piece of the rock.

After the initial exploration, a well is drilled, usually between 3,000 and 16,500 feet deep. A drilling rig is used to drill the well; since this is a sizable machine, which requires roads to be transported on, as well as complex mechanical parts, and a crew to conduct the drilling, this represents a significant capital investment. After the initial well, or exploration well, is drilled, if the presence of oil is

confirmed, appraisal wells are drilled to ascertain the size of the field. If an oil field is developed, further wells are dug for the purpose of producing oil, called production wells. Multiple factors must be considered before developing an oil field, including extraction costs, transportation costs, and potential profits.

Once a field is developed, and production wells are drilled, a configuration of pipes and valves known as a “Christmas tree” are used to control the oil flow from each well. The oil either flows naturally to the surface, or is brought to the surface mechanically, often through a pump. Once the oil is pumped to the wellhead, it is transported via pipeline to a gathering station. At the gathering station, oil from several wells is gathered; the oil and the gas are separated, and the water is drained off. This crude oil is then ready to be transported by pipeline to a refinery. The pipeline is generally at least 3 feet in diameter, with pumping stations set up at specified intervals along the pipeline to ensure continual oil flow. Pipelines such as this represent a significant investment, and are usually undertaken by several companies willing to provide the substantial capital investment required to build and maintain these pipelines. See map B for a map of Iraq’s pipelines.

Once the crude oil is piped to the refinery, the first step in conversion is distillation. In distillation, the crude oil is broken down into fractions, or into its different constituents. The crude oil is heated and then put into a fractionating column, or a distillation column. The temperature in the column is hottest at the

bottom, where the crude oil is heated, and the temperature gradually falls closer to the top of the column. Within the column are horizontal trays; the temperature of the trays decreases with each layer. As the crude oil reaches its boiling point, fractions of the oil evaporate; each fraction rises until it reaches the tray with the temperature just below its own boiling point, at which point it condenses and cools. The higher the fraction rises, the lighter it is. Refinery gas is the highest fraction, while heavy gas and oil are siphoned off from the base. The biggest demand is for the lighter fractions, those that are extracted at the lowest temperatures at the top of the column, such as fuel oil, which can be converted into highly demanded products such as gasoline.

After the crude oil is distilled, downstream processing is used to further transform heavy oil into lighter, more highly valued oil. "Cracking" breaks down these heavy fractions further, often through catalytic cracking, which uses a catalyst to break down the fractions without changing the chemical itself. Thermal cracking techniques can also be employed, which break the molecules down using heat.

Refining also requires a significant capital investment. However, crude oil retains little market value until it is refined into lighter, more useable fractions. Therefore, many oil producing countries are beginning to significantly invest in the refining industry. Refining is the stage of oil production that gives oil its market value.[15]

[15] Information in this section was obtained through a variety of sources, including Jones' Oil, Shell Oil brochure, and the RAND study.

Part IV: Structures of the Oil Industry

A.) Economics of Oil Production

Using a basic production function with two inputs (for more information on production function, see Varian, p. 320), one can reasonably assume that the oil output in the Iraqi oil industry is a function of capital (K) and two types of labor: skilled (LS) and unskilled (LU).

$$Y= F(K,LS,LU) \qquad (1)$$

Within the production function, there is some degree of substitutability between the various components. On the whole, the industry appears to be more capital-intensive than labor-intensive. For example, according to Shell Oil Company's OIl brochure, constructing a pipeline calls for a significant capital investment, but maintenance and labor costs are relatively low after completion. Sources such as the RAND study for the Fossil Energy Liquid Fuels Program of the U.S. Department of Energy's National Energy Technology Laboratory emphasize the importance of technology in the oil industry.[16] However, labor is also an essential component; without engineers and tradespeople to apply the technology, the production process could not be complete.[17]

[16] see pages 13-58
[17] RAND, p. 56-58

In the oil industry, as in other industries, it may be reasonably assumed that the firm wishes to maximize profits.[18] The total revenue is the price multiplied by the production function.[19]

$$TR= P * F(K,LS,LU) \quad (2)$$

The total cost is the rental rate of the capital (the interest rate), and wages paid to both skilled and unskilled workers.

$$TC = C(r, ws,wu) \quad (3)$$

Thus, the profit maximization problem for the firm can be represented by the following equation:

$$\max ? = TR-TC \quad (4)$$

or

$$\max ? = P * F(K,LS, LU) – C(ws, wu, r) \quad (5)$$

In the oil market, the firm is usually a price taker, meaning that the price of the oil is set on the world market by the forces of supply and demand, and no one firm is able to affect the price by itself.[20] Therefore, for this study, we will view the price as a given in the profit maximization problem.

Both the level of output and the total costs could vary depending on factors such as labor supply, and the availability of capital. For example, the

[18] For a generalized discussion of profit maximization by the firm, see Varian, Ch. 19

[19] This reflects a short term static view; in the long term, because oil is a depleting resource, a dynamic view would provide a more accurate description of the optimal production of crude. Given significant proven oil reserves and the indication of significant unproven reserves in Iraq, a static view – at least for the Iraqi oil industry overall - seems appropriate for the foreseeable future. However, it is noted that the policy recommendations derived from this primarily static view of the oil production process in this thesis are subject to this limitation. A discussion of the intertemporal considerations of the use of a depleting resource can be found in Chapter 3 of Griffin & Steele's Energy Economics and Policy.

[20] For more information, see Griffin & Steele's Energy Economics and Policy

rental rate of capital could fluctuate depending on investor confidence. These implications will be discussed more fully below.

B.) Labor Market Implications

In broad terms, two types of labor are needed in the oil industry: skilled and unskilled labor.

Skilled labor, such as geologists and engineers, are needed for highly technical jobs, such as mapping out oil fields, constructing pipelines, etc. As the industry evolves, high skill labor would be required to design and implement the newest technology and procedures.[21] Since there will be less workers with the skills necessary to complete such jobs, there is a smaller supply to fill the demand for this type of labor; thus, the wages of highly skilled workers will be substantially higher than that of low-skill workers.[22] For instance, according to the US Department of Labor Bureau of Statistics as of May 2003, within the US Pipeline Transportation system, of over 7,000 jobs in the industry, about 450 of these are management positions with a mean annual salary in the $90,000s. About 60 professionals in math and computer science operations are employed with a mean yearly salary of over $66,000. There are roughly 400 architects and engineers in the industry, making an annual mean salary in the $70,000s. Highly skilled workers in construction, production, and transportation can bring in a mean salary of up to $78,510 annually. These wages are significantly higher than those paid to low-skill labor in the industry.

[21] See RAND, Shell Oil Company
[22] For example, see RAND p.56-57

Though their wages are not as high, low-skill labor is essential; tradespeople are needed in the actual construction of pipelines and refineries, to run equipment and to provide facility and pipeline maintenance and security among other things.[23] For jobs such as this, it is reasonable to assume the majority of a given population either has the skills or can easily acquire the skills necessary to fulfill these types of jobs; therefore, there must be a larger supply of low-skill labor, which drives the wages for this type of work down.[24] The US Department of Labor Bureau of Statistics May 2003 indicates that for the Pipeline Transportation system, about 1/3 of those employed in the oil industry work in construction, production, and transportation, and earn a mean annual salary starting at $29,610, and ranging mostly in the $30,000s.

Labor costs will vary however in different countries, depending on such factors as labor laws, unions, and availability of other jobs. Therefore, though these figures are representative of the US, they may be lower in other countries. If other countries have lower labor costs, that could bring down total costs.

The oil industry generates a significant number of jobs. For example, in the US in 2002, the oil and gas extraction industry offered about 123,000 jobs. About 60% of these jobs were filled by large companies that employed over 50 workers. Earnings potential on average range from $10.71/hour for roustabouts and office clerks, to $52.87/hr for managers.[25] Wages and job availability will vary according to company and country. However, if, as is assumed in this paper,

[23] See RAND, p.57-58
[24] For a general discussion of wages in the Labor market, see McConnell, Ch. 6
[25] Bureau of Labor Statistics, US Department of Labor

each firm in the industry is maximizing profits, one can further infer that labor costs are somewhat similar across the industry.

C.) Capital Market Implications

The oil market is very capital intensive. Capital is needed in the oil industry to finance equipment used to extract the oil, such as drills; means to transport the oil, such as pipelines; and facilities and equipment to refine the oil, such as the distillation column. According to Shell Oil Company, as technology advances, equipment that replaces the need for labor is becoming increasingly popular, such as automated drilling rigs, for example. Such investments are extremely costly; for example, drilling a well costs millions of dollars, using expensive rotary drilling tools. It is reasonable to assume that a firm would only undertake such investments if the expected returns are high.

The capital needed to finance the industry seems to be most often provided by private investors. Kuwait, for example, generated capital for its oil industry by bidding to private investors.[26] However, loans are available to countries through sources such as the International Monetary Fund and the World Bank. Generalizations across the industry seem to indicate a stronger source of capital investment from the private sector, but each country should be taken on an individual basis.

Another component that could affect the rental rate of capital is security. As a firm's level of confidence in the security of its investments decreases, it is reasonable to assume that the rental rate of its capital will increase. For example,

[26] Kuwait Oil Industry, US Library of Congress

in the United States, insurance is available to businesses through firms such as St. Paul Travelers.[27] Law enforcement and the judicial system provide confidence that acts such as vandalism or robbery can be appropriately dealt with. In a country lacking such systems, it might be more difficult for a firm to attract capital; therefore, it may be assumed that the capital the firm is able to obtain will come at a higher price to reflect a higher risk and greater level of uncertainty.

A stable financial market is also essential to investor confidence. Banking should be available to investors, either through central banks, such as the Central Bank of Kuwait,[28] or private banks, such as Citibank.[29]

Once capital is generated, who receives the profits of that capital depends on who provided the investment. If private corporation X invested in the oil industry in country Y, then X would receive profits from the oil industry, and Y would receive profits in the form of taxes, license fees, etc. For example, in Saudi Arabia, Saudi Aramco is the national oil firm that dominates the oil industry in the country and controls 98% of Saudi Arabia's oil reserves, though Aramco has awarded contracts to private companies such as Technip-Coflexip. The Saudi Arabia General Investment Authority taxes company profits at a rate of 30%, and in January 2001, estimated that its foreign investment commitments "had reached $1.6 billion, including 53 licenses."[30] Thus, both private investors and the states can potentially profit from the industry.

---

[27] more information available on website at http://www.stpaultravelers.com/business_insurance/specialty/oil_and_gas/

[28] for a list of national banks and monetary authorities, see http://www.onanda.com/site/centralbanks/

[29] more information available on website at: http://www.citicorp.com/domain/stage_nf.htm

[30] EIA, Saudi Arabia Country Analysis Brief

D.) Output Market

For the purpose of this thesis, It is assumed that the firm in the oil market is a price taker, meaning that it must take the price set by world supply and demand. The assumption here, for the sake of this paper, is that each firm is small relative to the overall industry supply.[31] Output will in part be determined based on the capacity of the industry, where factors such as technology will come into play. For example, a firm that can raise enough capital to develop and utilize new technology will be able to produce more output than one using outdated equipment and methods. Output will also be affected by world supply and demand; price will be affected by how closely supply equals demand.[32]

E.) Ownership Structures

Several possible ownership structures could arise in the oil industry. These include a state-owned industry, a competitive industry composed of private firms, or government-owned, but outsourced to private firms.

[31] this does not take into account cartels, such as OPEC; for more information on the role of OPEC in the oil industry, please see Griffin and Steele's Energy Economics and Policy, Ch. 4
[32] For a generalized discussion on the effects of aggregate supply and demand on pricing, see Farmer, p. 122-127

I. State-Owned Industry

In a state-owned industry, the government controls the production and sale of the resource. Under this system, any profits derived from the industry would go straight to the government, which could then be used for further investment in the industry, public works, or however the government sees fit. Since barriers to entry in the oil market are high due to the capital investment needed, and the permits required to extract the oil from the land, a state-owned industry would more easily be able to conquer such barriers. For example, it might be easier for a government to procure a loan to finance oil exploration and drilling than it would be for a small firm to raise the necessary funds to enter the oil market.

Countries that are members of cartels, such as OPEC, must cooperate with the cartel regarding output levels. If the oil industry is state-owned, it would be easier to coordinate with such organizations than if several private firms comprised the industry in the country.

It must be taken into account, however, that if the government owns the industry, profits may not be maximized; effective oversight might not take place, making inefficiencies and corrupt practices more likely. For example, according to Griffin and Steele's Energy Economics and Policy, politics in areas such as personnel could result in inefficient hiring practices, with emphasis on patronage, political favors and seniority. According to Griffin and Steele, national oil companies are "grossly inefficient as judged by standard tests of business performance," for several reasons. One, for example, is that public companies are more risk averse than private companies. The Minister of Oil will still receive

his salary whether his country produces 2.5 million barrels a day or 4.0 million barrels a day; there is no financial incentive for the Minister to risk the political fallout that is possible if a risky investment goes wrong, or if an investment that has the potential to have high returns in the long-run has only a small yield in the short run.

II. Private-Industry

In privately owned industry, two types of situation could arise: One, a single, privately-owned company could dominate the market; or two, a competitive market could arise.

i.) Single Private Firm -- If a single private firm dominates the industry in the country, the producer would first have to overcome the high barriers to entry. If the government charges a high fee in order for the firm to obtain the rights to develop oil, and then taxes the firm's profits, then the government could benefit from this source of revenue (however, the government could do this also within a competitive industry). However, if a single firm is responsible for the entire oil industry in a country, it would have less incentive to create safe working conditions for laborers, or to pay decent wages since there would be no other options for workers in the industry.

If the private firm is in collusion with a corrupt government, then several problems could result. For example, there might not be sufficient oversight. Financial incentives might cause government officials to look the other way when it comes to issue such as enforcement of taxes, or safety concerns for workers. Also, a

private company would be less concerned with the political implications of its actions. For example, if a private company concludes that it would be too costly to produce (or not produce) a certain amount of oil, it will likely do so, regardless of international opinion. And if, on the other hand, once a private firm has dominated the industry, if the government and the firm do not cooperate, or are on bad terms, production could be slowed, creating inefficiencies in the process.

ii.) Competitive Market -- In a competitive market, multiple producers facing a horizontal demand curve would compete to offer the best quality product at the lowest cost to attract consumers, and would e forced to pass along cost savings in the form of low prices to the consumers. Once firms overcome the barriers to entry, the government could benefit from revenues generated by taxes and fees. In a competitive market, inefficiencies and corruption are less likely to occur because each firm will have the incentive to maximize profits and follow labor practices that will attract and retain quality workers. However, it could still be difficult to ensure cooperation in the international arena, such as OPEC membership, for example. Profits would accrue to the private company, but the government may also profit through taxes and fees.

III.) Government-Owned Out-Sourced Industry

A third possible option is a government-owned industry that is outsourced to private producers, i.e. the government owning the oil industry and leasing the rights to the industry to a private company, such as ExxonMobil. Under this system, the government would benefit from ownership rights, taxes, and industry oversight, easing political concerns. The private company would have an incentive to maximize profits and take risks, therefore increasing potential returns while keeping total costs as low as possible. However, too much government regulation could result in decisions by firms not to enter the market, in which case oil fields may not be developed, and many of these benefits may not be realized.

A possibility to consider under a system such as this would be a system in which citizens of the country receive a dividend of the profits, such as that used in Alaska. Alaska created a Permanent Fund to distribute dividends from oil revenues to its citizens in light of exploding oil revenues. Such a system does allow for private ownership and investment, while ensuring that the citizens of the developed area profit from oil revenues as well. However, the government must have an effective mechanism to distribute such revenues and ensure that all citizens receive their share of the profits.

Part V: Application of Oil Industry Models to Iraq

A.) Current State of Iraqi Oil Industry

The Oil and Gas Journal estimates Iraq to have 115 billion barrels of proven oil reserves, as well as the potential for more in areas of the country where oil exploration has not yet occurred. As of March 2004, Iraq was producing about 2.4-2.5 million barrels per day, well below its peak production amount of 3.7 million bbl/d in December 1979. This is due to a combination of factors, including the use of outdated technology, damaged infrastructure from three wars in the past two decades, and a lack of funds to provide new technology and needed repairs. In August 2003, the Coalition Provisional Authority, which governed Iraq at the time, estimated that it would cost $1.44 billion to rehabilitate the Iraqi oil industry. Under the “Restoration of Iraqi Oil” Program (RIO), the US Army Corps of Engineers supervised reconstruction work performed under contract by Kellogg Brown & Root (a subsidiary of Halliburton), and Parsons and Australia’s Worley. The International Energy Agency estimates that in order for Iraq to return to its peak production capacity of $3.7 million bbl/d by 2010, an investment of at least $5 billion must be made.

In 1972, Iraqi oil was nationalized, and headed by the Iraqi National Oil Company (INOC), which was dissolved in 1987, and merged with the Ministry of Oil. In early March 2004, US oil advisor Robert McKee indicated that Iraq was considering bringing back the INOC, “helping set up a mechanism that allows

[Iraq] to have a state oil company, but allows a significant outside investment into the industry." Several companies are currently involved in Iraqi oil production at all stages of the process, and contracts had been issued to several foreign countries before the war, including Russia and China. However, in the aftermath of the war, it is unclear as to which contracts remain valid. The Iraq State Company for Oil Projects has already begun issuing bids for fields, such as Khurmala (in Kirkuk), Suba-Luhais (in southern Iraq) and the Hamrin field (north of Tikrit).[33]

These considerations provide the background to the discussion of how ownership structures affect oil production in Iraq, and play a crucial role in the outcome of the recovery of the Iraqi oil industry. The structure of the oil industry in post-war Iraq will prove vital in determining the level and quality of recovery that the country can achieve. As discussed in part III, there are four types of ownership structures that this paper surveys in relation to the Iraqi oil industry. They include state ownership, private ownership (by both a single firm and under competition) and government out-sourcing. I will now apply to post-war Iraq the basic structure of each of these, outlined in Part III.

[33] Above information available in the US Energy Information Administration's Iraq Country Analysis Brief, available on the EIA website at: http://www.eia.doe.gov/cabs/iraq.html.

B.) Model Applications

1.) State-Owned Industry

Under the state owned industry model, the state government of Iraq would control the production of oil in the country, most likely through a mechanism such as the Iraqi National Oil Company. As the sole producer of oil in the country, the government would control the use of the factors of production, including labor and capital.

Options for generating revenue could include loans from entities such as the United Nations or the World Bank. It may be comparatively easier for a state to raise funds through international aid, than it is for a private company to raise capital. However, the ease with which the state could garner these funds, and the relatively low impact of defaulting on loans, late payments, and other such actions could result in inefficiencies if the government does not use the capital wisely.

. Labor conditions under a government-owned oil industry, however, could substantially benefit workers. The government is more likely to hire workers within the country, which would provide its citizens with jobs. However, if the government is corrupt, jobs might not be efficiently allocated, going instead to family members, friends, or political allies. These concerns aside. the government could offer its laborers reasonable working conditions, pension plans, a minimum salary, and other measures to attract quality labor. Political pressure by the electorate would increase the likelihood that the government

would act in such a manner to benefit the workers whose votes determine who takes office. The citizenry could therefore benefit substantially in this regard; wages from these jobs would be used by households to purchase goods, which injects the money back into the economy, benefiting also retailers, farmers, and other producers of goods consumed by the oil industry workers

In a state-owned industry, the government controls all of the factors of production, and will thus reap all of the profits from the industry. These profits could be used in several ways, such as re-investing in the industry, investing in infrastructure, social programs, or distributing wealth amongst the people of the country. However, in generating these returns, governments tend to be more risk averse than private companies. As a result, government-owned companies may make decisions that have less risky consequences, but also yield lower returns.

As a member of the Organization for Petroleum Exporting Countries (OPEC), a state owned industry would also serve as the entity ensuring cooperation with OPEC regulations.[34] In addition to implications of compliance with OPEC, as well as the role of international diplomacy in production, there are political implications to take into consideration as well. These can include issues such as patronage, public opinion, and international relations. A government is more likely to consider such consequences when making production decisions than is a private corporation that does not have to answer to other countries or to an electorate. Thus, it is reasonable to assume that a government is not necessarily motivated

[34] It should be noted when discussing the role of OPEC in any of the models, that since December 2003, OPEC restrictions on output have not applied to Iraq, according to the EIA.

solely by profits, which also creates an environment where inefficiencies may occur

2.) Private Industry

Under private ownership, two different scenarios are likely to arise: a single private firm dominating the industry within the country, or multiple firms entering the industry. Each has different considerations that should be taken into account.

i.) Single Private Firm

For a single private company to emerge as the sole producer in Iraq[35], the company would have to overcome significant barriers to entry, such as generating the amount of capital required to repair existing infrastructure and to produce the oil itself. If the corporation is large enough to take over production of oil in the country, it may have sufficient funds to come up with the capital on its own. However, the corporation might also need to borrow money from a bank to provide additional capital.

At this time, the banking system in Iraq is not very developed, so it is likely that the loans would come from banks outside the country, such as CitiBank or Deutsche Bank. When issuing these loans, expected returns and security concerns will likely be reflected in the conditions of these loans. Given the current atmosphere of civil unrest, as well as damage inflicted upon oil facilities by

[35]A point to bear in mind is that although the firm might hold a monopoly in the country, it is assumed for the sake of this paper that the firm is a small player in world demand, whose output will not by itself affect world supply. Therefore, though the firm may act as the only player in the oil industry within the country, it will not behave like a monopoly.

rioters, looters, and insurgents, a private company could find it difficult to secure a loan for the capital investment at a reasonable interest rate.

In terms of the amount of capital needed, present estimates of repair costs as mentioned at the beginning of this section run in the billions of dollars; this would represent a significant investment. Thus, a company is likely to undertake such an investment only if it can expect to reap substantial profits. With the exception of fees and taxes paid to the government, the company would receive the profits generated by the industry. The firm would need to obtain government licenses to produce in the fields, as well as licenses perhaps to use pipelines and docks for tankers to transport oil, or even to sell the oil extracted to consumers in other countries. The firm would also probably be required to pay the government a percentage of the profits in the form of taxes. The Iraqi government would likely benefit somewhat from license fees, but would stand to profit substantially more from taxes. Tax revenue could be used to invest in infrastructure repair, welfare programs, the education system, public works, and other such programs to benefit the citizenry as a whole.

Under a single private firm however, assuming there is not a good substitute for the type of work generated by this production, the firm will have less incentive to provide good working conditions for laborers. Because the firm does not face competition from other firms in attracting quality workers, standards for working conditions could be substantially lower than those under the government (which though it is not competing with other firms, has political incentive to provide good working conditions), or under competition with other

firms. To maximize profits, the firm might cut back on worker salaries, giving the laborers less money to inject back into the economy through the purchase of goods and services. Oversight would be needed to ensure safe working conditions for those employed by the firm.

Government oversight of the firm overall would in all probability occur since the oil industry is so important to Iraq; however, if there are corrupt officials in the government, than such oversight might be ineffective. The tenuous situation in Iraq at the present brings this possibility into question. A private company is also less likely to be concerned with OPEC guidelines, international relations (beyond demand for oil), or public opinion; therefore, the company will be motivated solely by profits.

ii.) Competitive Industry

In a market with multiple producers of oil in Iraq, like that in which a single private producer were to exist, companies would need to overcome significant barriers to entry. These are high barriers to overcome, especially in generating sufficient capital to repair damaged infrastructure, provide new technology, and to cover costs associated with oil production. Firms could feasibly find it difficult to generate this type of capital, and if they could not generate the capital themselves, would likely turn to a bank for a loan. The same banking concerns that apply to the single private firm would apply here as well.

Again, firms will likely undertake this type of investment only if expected returns are high. Government licenses would again likely be necessary in order

to operate, and profits would probably be taxed, as in the case of the single private firm. Taxes imposed on the firm by the government would reduce the returns to owners, but the government will benefit from the use of such revenues, and may apply those towards the public good. Thus, the private firms would reap whatever profits are leftover after fees and taxes, and the Iraqi government would benefit from the collections of this revenue. As would be the case under a single private producer, the government could use this revenue for infrastructure improvements, public works, and social programs to benefit the whole of society.

Competition would also likely ensure better conditions for workers, since companies would be forced to compete to attract a quality labor pool. This could benefit workers in the form of better benefits and higher wages, injecting more money into the economy as a whole, and thus benefiting producers in other sectors as well.

International cooperation and domestic opinion would still be an issue if the companies are operating outside the purview of the Iraqi government. The state would have less control over decisions with diplomatic consequences, or that affect the electorate. This barrier could be overcome by government regulation and oversight; however, given the volatility of the current situation within the country, enforceability and corruption could be major concerns.

3.) Government-Owned Out-Sourced Industry

The Iraqi government could also take ownership of the oil industry, and issue contracts to private companies to produce the oil. The government seems to already be headed in this general direction, as it has already begun to open bids to develop specified areas of the country. Under this system, private companies would submit bids promising to produce a certain amount of output for a given price. The government takes the best bid, and then repays the owner the bid price. When the oil is sold, the owner and the government receive profits. Private companies issuing bids would have an incentive to offer the most output at the lowest price in order to win the government contract, thus the state would be better assured that the money that is spent on the industry will be used effectively.

Labor conditions could be dealt with in a variety of ways. As the government would be the issuer of the contracts, it could require that certain salaries, work conditions, or benefits packages for employees be met by the companies that receive the contracts. The companies themselves could let market forces set these standards as they compete for the best quality labor. Or a combination of minimum requirements or guidelines set by the government as well as competition amongst the firms could be used to attract potential employees, while ensuring adequate work conditions. As in the previous models, wages would be injected back into the economy as laborers use their earnings to purchase goods and services, further vitalizing the economy.

The international climate, public opinion and other such issues would come into play as the decisions regarding the industry would be made ultimately by the government. Nonetheless, they will not be the driving force behind industry, since the actual production will be performed by the private companies. This would presumably create ease in cooperation with international entities such as OPEC, the United Nations, and other countries.

It has been suggested by L. Paul Bremer III, the former American administrator in Iraq, that the country could use a model much like that of Alaska, whereby dividends are divided among the citizenry. It is important to bear in mind when attempting to distribute revenue to individuals that the Iraqi government does not at this time have a census, or authoritative records of the population, including addresses, etc. At the present, this would be a difficult goal to attain. However, in the future, as the country prepares for elections, records prepared for the purpose of voter registration should alleviate this concern. A more important question, perhaps, is whether funds would be better spent on public works projects, or in providing dividends to individuals. There are some important differences between Alaska and Iraq. First, Alaska has a stable government at both the federal and state level. Alaskans thus benefit from a public education system, social security, a health-care system, government-maintained roadways and transportation systems, utilities, a system of law, and other such securities afforded by a reliable government. This presumably allows these citizens to derive a greater amount of utility from the dividends they receive, than if the government kept that money for services that are already available to them. In

contrast, Iraq does not have a secure government at the present time, though the country is working in that direction. It lacks the institutions, social programs and infrastructure available in Alaska. This is an important difference that should be considered when weighing the possible benefits of investing in public works versus distributing individual checks.

We will now turn to an analysis of the application of the various oil market models for Iraq.

Part VI: Feasibility Analysis

In its 2004 Budget, the Republic of Iraq set forth “five core principles guiding Iraq’s economic policy agenda.” They are: Economic openness; private sector development; international integration; public sector transparency; and a safety net for the poor. When analyzing the various models presented in this paper, these goals will be kept in mind when determining the best possible ownership structure for the Iraqi oil industry, both in the short-term and in the long-term.

A.) Government-Ownership

At the present time, Iraq is in an intense period of transition, as problems of civil unrest and general instability plague the country. The Iraqi government has upwards of $100 billion in debt, and is relying upon other countries and international organizations to provide debt forgiveness and additional loans. Although the government could likely raise capital through international donors conferences, and loans from international institutions, there is no guarantee that the funds will be utilized effectively. The new government could foreseeably be especially vulnerable to inefficiencies, political pressure, and perhaps corruption, making profit maximization unlikely under this system. Though workers would benefit under this system, patronage and other such political concerns could determine who gets which jobs at what salary. In addition, the first of the two goals presented in the Iraq Budget advocate private sector development. State ownership of the oil industry would seemingly contradict such goals. Therefore,

government ownership is unlikely to be the model under which the industry will maximize profits which could be used towards re-building the country.

B.) Private Ownership

i.) Single Private Firm

Under this model, the company undertaking the production of oil would face the problem of raising capital, unlike in the government-ownership model, where the government would be required to raise the necessary capital. However, given the concerns discussed in Part IV, it could be difficult for a firm to generate the necessary capital. In the event that such a firm does enter the market as the sole producer, that company will receive the majority of the profits, with the government collecting revenue in the form of fees and taxes.

Government oversight, as discussed above, would be necessary under this model. However, effective oversight might not occur for several reasons. For instance, the government officials in charge of such oversight may be corrupt, and could neglect to enforce regulations on the firm. Another scenario that could play out is one in which the government is unable to properly punish non-compliance out of the necessity to keep the sole producer generating output. Though the government may impose high standards, enforcement could be difficult.

In addition to these concerns, laborers would not benefit from the bettwe working conditions possible under government ownership or competition. Thus, workers are unlikely to substantially benefit under this model, meaning that the

economy as a whole would not benefit as much without the economic stimulus provided by household spending.

Also, given Iraq's precarious position in the international community at present, it would seem unwise to allow a single private firm unconstrained by diplomatic concerns to take over the production of the oil industry. This could strain relations with OPEC, other governments, and the like. In light of all of these concerns, it would seem that this model would not be the best possible choice of ownership structure for the industry.

ii.) Competitive Market

In a competitive market, like in the single private firm model, the generation of the necessary capital would be a burden on the private firms, not the government. However, given security concerns, it could be difficult to attract private investors, both domestic and foreign, especially given the possibility that the firms could face substantial losses from looting, terrorist attacks, and other security concerns. Without an effective system of law in place, these companies would have no recourse in recouping their losses should such an incident take place. Though under competition, the government would receive revenue in the form of fees and taxes, these security concerns would likely make it extremely difficult to attract such investors.

If capital was generated however, laborers could stand to benefit significantly from the possible scenarios laid out in Part IV. Competition for labor amongst firms and/or government regulations could provide stable jobs and income, which could be re-injected into the economy to stimulate other sectors.

It should be borne in mind that international diplomacy is of paramount importance at the moment. This model does not allow for much government intervention, which could complicate foreign relations.

Though this model would be in keeping with the country's goal of private sector development, it seems that because of the concerns laid out above this would not be a viable option in the short-term. However, it should not be ruled out in the long-term as security improves and the governmental situation domestically and abroad is improved.

C.) Government-Owned Out-Sourced Industry

Under a model of government ownership, with the actual production out-sourced to private companies, the government would likely issue bids that companies would compete for, as it is doing so presently, choosing the company with the lowest costs to provide the service. Under this system, more companies are likely to bid because this would guarantee a return, despite the current security situation. For example, even if an oil rig is destroyed by insurgents, the company would still have its government contract, which would provide it with a safe net. Also, the government might have more ease in raising funds than the companies bidding for the jobs. Though profits might not be maximized, as under competition, profits are still more likely to be maximized under a private company than under the government.

Under this system, the government would receive the profits from production, after contracts are paid out. Given the fact that oil revenues can not

be collected for debts until 2007, according to UN Resolution 1483, the revenues generated could be continually re-invested in the industry, and used also to benefit the people through public works and social programs.

Also, since the government would be the entity issuing the contracts, it would still exercise a degree of control over output, meaning that international diplomacy and public opinion could still be taken into account.

Nobel prize laureate Vernon Smith, a professor at George Mason University, has researched the possibility of applying the Alaskan oil model to the situation in Iraq.[36] Under this type of model, individual Iraqis would receive dividends. However, given the differences outlined previously between the current situations in Alaska and Iraq, it would seem that at this time, Iraqis would benefit more from a social infrastructure than from dividends. Therefore, for the time being, funds should be invested in the country as a whole rather than distributed amongst individual citizens. However, it is a possibility that could be considered in the future, when the country is more stable.

The economic goals set forth in the 2004 budget would be satisfied under this model, while allowing the state to retain a degree of control with the added benefits of using private companies to produce the oil. Given that this allows for the state to generate capital, and for the added efficiency of production by private firms, in addition to the benefits for laborers, in the short-term, this would seem to be the best model for the industry.

[36] For more information, see Vernon Smith's December 22, 2003 article in the Wall Street Journal entitled, "The Iraqi People's Fund."

Part VII: Conclusions and Policy Recommendations

Given the capital intensive nature of the oil industry, it is necessary that whichever ownership structure is taken, that the producer be able to provide the capital with which to repair damaged infrastructure, improve technology, and produce the most output at the lowest possible cost. In generating this capital, it should be kept in mind that the security situation in Iraq is tenuous at best at the present, which could have a negative effect on potential investors.

While Iraq has a heavy debt burden currently, oil revenues may not be taken to repay debts until 2007. Thus, profits generated from this industry may be used to re-build the country. The economy is in disarray; in order to benefit the people of Iraq, in keeping with the fifth and final economic goal of the Iraqi government, the economy needs revitalization. The potential wealth to be generated from oil revenues could provide this revitalization.

At the present, profits would most likely be maximized if the government owned the oil industry, and out-sourced production to private companies that would bid for the right to develop certain areas. The country seems to be moving in this general direction, with talks of bringing back the INOC, and bidding processes beginning for certain oil fields. This ownership structure would allow the government to retain a degree of control, while enabling market forces to begin to work in the country.

In the long run, improved security and a more stable government should allow for easier generation of capital. Privatization under such circumstances would offer maximum output at the lowest possible cost, maximizing profits for

the companies, and generating revenues for the government in the form of taxes. Competition for labor would benefit workers, and household spending would benefit the economy as a whole. In keeping with the countries economic goals, a long-term goal of privatization would allow the economy to recover, and move towards an open market.

It should be recognized that as a government and a country in transition, Iraq faces many challenges along the way; privatization and a market economy will not happen overnight, especially following a heavily centralized regime. However, government out-sourcing in the short-run, with a long-term goal of privatization would offer the country the chance to maximize oil revenues, and in turn use those funds to rebuild Iraq.

Bibliography

1.) Brue, MacPherson, & McConnell. Contemporary Labor Economics. McGraw-Hill/Irwin. New York, New York. 2003.

2.) Bureau of Labor Statistics, US Dept. of Labor. *Career Guide to Industries, 2004-05 Edition, Oil and Gas Extraction.* http://www.bls.gov/oco/cg/cgs005.htm 2004.

3.) Central Intelligence Agency. World Factbook. Available online at: http://www.cia.gov . 2003.

4.) Crémer & Salehi-Isfahani. Models of the Oil Market. Harwood Academic Publishers. Chur, Switzerland. 1991.

5.) Energy Information Administration. *Iraq Country Analysis Brief.* http://www.eia.doe.gov/cabs/iraq.html 2004.

6.) Energy Information Administration. *Oil Market Basics*. http://www.eia.doe.gov

7.) Energy Information Administration. *Saudi Arabia Country Analysis Brief.* http://www.eia.doe.gov/emeu/cabs/saudi.html 2004.

8.) Farmer, Roger. Macroeconomics. South-Western. United States of America. 2002.

9.) Griffin & Steele. Energy Economics and Policy. Academic Press, Inc. New York, New York. 1980.

10.) Hamermesh, Daniel. Labor Demand. Princeton University Press. Princeton, New Jersey. 1993.

11.) Held, Colbert. Middle East Patterns. Westview Press. United States of America. 2000.

12.) Jones, Peter. Oil: A Practical Guide to Economics of World Petroleum. Woodhead-Faulkner, Ltd. Cambridge, England. 1988.

13.) Perloff, Jeffrey. Microeconomics. Addison Wesley Longman, Inc. United States of America. 2001.

14.) Peterson & Mahnovski. RAND Science & Technology. New Forces at Work in Refining: Industry Views of Critical Business Operations Trends. For National Energy Technology Lab, US Dept. of Energy. RAND Publishers. Santa Monica, CA. 2003.

15.) Republic of Iraq. 2004 Budget. Minister of Finance, Minister of Planning. 2003.

16.) Shell Oil Company. *Oil* brochure. Available online at: http://www.shell.com. 1998.

17.) Tripp, Charles. A History of Iraq. Cambridge University Press. 2000.

18.) US Library of Congress. *Kuwait Oil Industry.* http://countrystudies.us/persian-gulf-states/21.html

19.) Varian, Hal. Intermediate Microeconomics. W.W. Norton & Company, Inc. New York, New York. 2003.