GOVERNMENT FACILITATION OF MONOPOLY OPERATIONS IN A CHANGING WORLD

by

Kent Vital
Eastern Caribbean Central Bank

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Introduction

The role of government is traditionally seen as that of providing public and merit goods. Governments have also often been seen as facilitators of economic development through the regulation of economic activity. One area where government regulation has been prevalent is where monopolies occur. Some monopoly operations owe their existence or are facilitated through legislation due to the expected benefits of doing so, and where this is the case their activities are regulated by government. Many examples where monopoly operations are facilitated and regulated by governments exist within member countries of the Organization of Eastern Caribbean States (OECS), particularly within the area of utility provision.

It is recognized that the baseline conditions under which government facilitation and regulation of monopoly operations was justified within the OECS countries may have changed. It is therefore incumbent on a government which seeks to maximize economic output to review its' regulation policy to determine its relevance as changes occur in the economy and indeed in the wider world. This paper therefore will survey the likely rationale which lead to the use of legislation to facilitate and regulate monopoly operations in the member territories of the ECCB, discuss the ways in which the environment has been changing, investigate the current and potential efficiency impacts of maintaining a monopoly regime and make recommendations where appropriate. These will however be done using the specific case of the monopoly provision of electricity. The suggestion is that similar types of analysis should be done in other areas of economic activity where monopoly operations are facilitated through legislation. This paper is intended to be a preliminary investigation of efficiency issues surrounding the government facilitation of monopoly operations. In so doing it investigates the case of monopoly provision of electricity within the OECS countries. However a more comprehensive study of the efficiency issues surrounding the monopoly provision of

electricity in the OECS would be necessary to guide governments' future corrective actions.

Structure of firms

Traditional economic analysis of the varying market structures in which firms operate, is usually facilitated by the identification of four major types of business structure – namely pure competition, monopolistic competition, oligopoly and monopoly.

Pure competition (or perfect competition when there is full and quick transmission of information among all economic units) is usually regarded as the most efficient market structure, while monopoly is thought to be the least efficient. Efficiency within the purely competitive market structure arises largely because of the lack of restrictions or the ease with which firms can enter and exit a given industry. The ease of entry or exit to an industry allows firms to respond to market signals - increasing production or entering an industry when the level of profit increases relative to other industries, or decreasing production or exiting the industry when relative profit declines. Thus in the long run purely competitive firms produce where:

$$MR = MC = AC,$$

This mechanism usually results in the most efficient response to signals given by the market for the production of goods and services. Consumers therefore benefit since in the final analysis prices paid will not include abnormal profits. Thus it is thought that non-rivalry among firms due to their insignificance steaming from a large number of firms dealing in a homogeneous product, results in the individual firm selling at a price determined by market demand and supply. The individual firm is unable to influence price, and to survive in the market it would have to utilize the most efficient means of production available to it, which amounts to a further welfare benefit to consumers.

The monopolist is able to exist and persist where entry of other firms in an industry is difficult or barred. This market structure can not always be replaced by a competitive market structure nor is it always desirable to do so. The size of a market and the nature of technology used in production may make it impossible and at times undesirable for more than one firm to operate in an industry. The means through which entry to an industry may be barred varies and ranges from natural barriers (due to limited market size), to the use of legislation and the attempts by firm to keep out rivals. Not withstanding the desirability or undesirability of monopolies, or whether or not it occurs naturally, there are inherent inefficiencies associated with this market structure. The monopolist like the pure competitor will seek to maximize profits and produce where the marginal cost of production equals the marginal revenue (MR = MC). However if these profits are above normal profits – a signal from the market that more goods should be produced, the monopolist has no incentive to respond to the market signals. Thus unlike the pure competitor, he may produce where his marginal revenue and marginal cost exceeds his average cost. This contributes to the inefficient allocation of resources in the economy and reduced consumer welfare as prices paid by consumers may include an element of abnormal profits. Further the monopolist may not necessarily employ the most efficient size of plant nor use the plant at its most efficient level of production since this is not necessary in other that profits are maximized. This is because the monopolist would seek to employ the appropriate plant to produce the profit maximizing quantity and this plant and its level of utilization may not coincide with the most efficient size of plant operated at the most efficient level of utilization. The existence of abnormal profits and the utilization of a plant that is not the most efficient size translate to less than optimal consumer welfare and economic output.

Large-scale production using more advanced technology can lead to reduced unit cost of production and it is often desirable to harness this potential for the overall benefit of an economy. However, depending on the size of a market, realizing such benefit may mean limiting the number of producers in the market, where the output from a single process utilizing the more advance technology (or the large scale method) is large relative to the market size. Hence based on the size of a given market, it is possible for the profit maximizing price of a monopolist producing at his profit maximizing output level utilizing large scale production technology, to be lower than the price that would prevail in a situation where there are several small producers utilizing small scale technology

with higher unit cost of production. Hence monopoly operations can be beneficial and desirable depending on the nature of the technology and the market size.

Other market structures within which firms operate lie between the extremes of perfect competition and monopoly, each with a varying degree of efficiency. The challenge to policy makers is to maximize economic output and growth. For the production of private goods it must therefore be ensured that production mechanism responds appropriately to market signals. Within a free enterprise system much of this is automatically accomplished through the market mechanism in cases where purely or perfectly competitive market structures prevail. The market mechanism however fails to perform optimally within other market structures. Thus given that given most firms within the OECS operate within market structure that are not perfectly or purely competitive, the challenge to effectively supplement the operation of the free enterprise system with effective regulation remains. Governments therefore need to occasionally assess whether their interference in the operation of the market is beneficial to their economies.

A broad overview of the competitive environment in the OECS

Monopolies exist within several areas of activity. In the cases where monopolies have been facilitated through legislation, output is often intended for the domestic market and there is some measure of price control and regulation, at least in theory. Such control is be exercised either through the specific legislation or agreement facilitating the operation or through the public Utilities Commission in the case of utilities. Electricity, water and sewage, and telecommunication services are provide by monopoly operations facilitated by government legislation. There are also a few monopolies within the islands, which are not facilitated through legislation.

Apart from monopoly operations, competitive conditions within the islands are far from ideal. Business structure is characterized mainly by oligopoly and imperfect competition. Purely competitive conditions prevail most closely within the production and sale of agricultural products on the domestic markets and within the domestic transport sector. Much of agricultural output is however produced for sale on the export market. Export sales of major agricultural produce is often performed by a single body, most often a statutory body or government controlled company. Despite preferential access for much of these agricultural exports, they have to compete with a number of other international sources of supply.

The territories, being extremely small and open depend heavily on imports. Competitive conditions among importers are extremely critical as it can impact on the cost of living, the distribution of income, and the cost of production and hence the competitiveness of exports. On most islands a few large firms, who are also often the major distributors, wholesalers and retailers, have dominated the import trade. There is no evidence of price wars among many of these importers suggesting that there may be a high degree of informal collusion.

Competitive conditions within most other area of economic activity appear to be oligopolistic especially where output is largely sold on the domestic market. Industries which are externally driven or export lead such as the tourism and manufacturing industries, compete on the international or regional market.

We will now proceed to look at the case of monopoly operation within a few specific areas of economic activity. The study can subsequently be expanded to cover other areas.

A brief description of public utilities monopolies

Monopoly operations exist within several areas of economic activity through the OECS countries. Here we will however focus only on public utility operations

There are monopolist producers of most utilities within the OECS Countries. In all territories there is a sole producer and distributor of electricity to the public. In three of

...the islands – St. Lucia, Dominica and Grenada production and distribution of electricity to the public is done by the private sector, while it is done within the public sector for the other islands. In all cases entry to the market is protected through legislation or/and specific agreements with the Governments. In most of the territories there is provision within the law for the operation of a Public Utilities Commission with powers to regulate the rates charged by public utility operators, as well as the standards of services provided. In practice many of these Public Utilities Commissions are dormant or appointments to the commission are not made as required. Price regulation for electricity services has therefore been largely performed through the minister responsible for public utilities based on the specific agreements with the utility companies or the monopoly legislation.

The distribution of water to the public is undertaken by monopolies in all of the islands. In all cases the service is undertaken by a government department or by a public sector enterprise. Like is the case with the provision of electricity, the price of water services has to be approved by the minister responsible for infrastructure.

A private sector monopolist in each island provides telephone services, except in for Antigua where a public enterprise monopoly provides local services. Agreements with the governments grant exclusive rights to one provider.

In most islands there are no exclusive rights or agreements for the provision of television services. In most islands however one firm providing cable television dominates the industry.

The environment which facilitated the development of monopolies

We shall focus here on the underlying conditions, which were likely to have lead to the granting of exclusive rights by governments of OECS countries to operations in the provision of utilities.

Economies of scale

Within conventional methods (based on the technology available at the time) of the provision of various types of utilities (e.g. using diesel generators or hydro-electric plants to generate electricity) the average cost of production of a unit of output can be minimized for a critical size of plant. The output from such a critical size plant is often much too large for the purposes of most consumers or perhaps even for the needs of the largest manufacturing concern or hotel in the OECS region! Alternatively it can be said that up to some output level, more and more efficient sized plants can be employed in the production of electricity as the required output increases. This suggest that the needs of several consumer can be more efficiently provided for by using a critical sized plant, compared with the individual production by each consumer using such a critical sized plant or using smaller sized plants. The term "Critical sized plant" is thus use in a relative sense, i.e. relative to the local market size and not necessarily from a global perspective. Further maintaining excess capacity to meet unforeseen circumstances can be more efficiently managed by a large producer supplying to several consumers compared with smaller producers selling to smaller groups of consumers. Given the small size of OECS market, such conditions made it desirable to concentrate production in the hands of one producer. During the period when much of the utility operations were first established in the OECS region, alternative technology utilizing alternative sources of energy such as sun light or wind were highly cost inefficient for large or small scale production and hence conventional technology thrived.

Investment cost

The investment cost of establishing plants or production and distribution systems of critical size has been high. Given the importance of utilities as inputs in all sectors, it is desirable to minimize their costs. It was against this backdrop that governments sought to attract and encourage investments by utility companies, and sought to guarantee the success of such firms by protecting them from competition. Such protection was provided

through legislation and other special agreements. In some cases sole rights to produce have been granted for considerable long periods. For example one utility company in one OECS countries was granted sole rights to generate and distribute electricity over a period of eighty years in that country!

Nature of distribution – unsightliness – safety - space

Apart from issues of production scale and investment cost, it did not appear practical to allow more than one operator within each type of utility to distribute. This was related to the type of technology existing at the time, the means of distribution, which involved the use of poles and overhead lines in the case of electricity and telecommunications. Space constraints (e.g. for the placement of poles and the running of lines), safety concerns and aesthetics, were perhaps the major considerations. It was perhaps most convenient to allow a producer who was given sole rights to produce a given utility, to also be the sole distributor.

Environmental factors

There are also environmental factors, which makes it desirable to control the production of the various utility types. For example the generation of electricity using diesel generators is a noisy process and has the potential for causing land and air pollution. Restricting the number of operators would be one means, to facilitate more effective control and regulation of electricity production and hence its impact on the environment.

The changing environment and efficiency concerns

The business environment is continually subject to changes and so governments should continually seek to ensure that their economic infrastructure adapts as such changes take place. It is important that governments recognize that changes do occur and make every effort to anticipate such changes in order to effect necessary changes in its economic infrastructure, so as to avoid the erosion of competitiveness. A country which does not adapts to changes on a timely basis is not likely to catch-up with more developed countries or is more likely to fall behind those that are less developed. The following examines how the regional and international environment has changed and is likely to change within the electricity generation and distribution industry.

Changes within the electricity generation and distribution industry

Changes in technology

The dominance of hydroelectric and diesel generation of electricity was largely because these methods were the most cost efficient means of technology available to small islands such as those of the OECS. However the efficiency of the production of electricity using alternative technology and sources of energy is continually being improved. For example, considerable strides have been made over the past two decades in the generation of electricity using solar and wind energy and hereby the cost efficiency gap between the generation of electricity using solar or wind energy and generation using traditional technology is closing rapidly. Further, many alternative technologies and sources of energy hold other advantages over the traditional forms of electricity production. For example electricity generation using solar energy is more environmentally friendly compared with some traditional methods. Additionally, improvements in technology has meant that the gap between the minimum average cost of smaller size plants (in terms of output capacity) and the optimal size using traditional technology is also closing. What this means is that if such improvements in technology continue, a given market size will be able to accommodate an increased number of efficient producers.

The 1973 oil crisis gave a huge push in the drive to reduce dependence on oil by either developing alternative technologies which utilize alternative energy sources or by developing technologies that are more efficient in oil consumption. This drive was particularly strong in the United States of America (USA). According to a paper from the US Department of energy (Issues for Renewable Fuels in Competitive Electricity Markets),

"The tripling of oil prices precipitated a need for numerous rate increased by electric utilities because oil was being used to fuel many power plants. In the wake of the oil embargo, the goal of national energy policy was to foster an adequate supply of energy at reasonable costs. As a result, interest in renewable energy rose sharply during the 1970's. A strategy to achieve that goal was to promote a balanced and mixed energy resource system. The development of renewable energy – which reduces dependence on fossil fuels, does not need to be imported, and generally produces fewer and less toxic fuels – became a national priority."

In 1978 the National Energy Act was introduced in the USA and one of its major objectives was to reduce the USA's dependence on foreign oil and its vulnerability to interruptions in oil supply through the development of renewable and alternative energy sources. Under the "Public Utilities Regulator Act of 1978 (PURPA) – a statute under the National Energy act of 1978, utilities were required to purchase electricity from certain qualifying facilities at the utilities' avoided cost, i.e., the cost to the utility if it had generated or otherwise purchased the power. Some avoided cost purchase contracts, particularly in California, were very favorable to renewable technologies. The development of renewable energy in the USA was also aided by federal and state incentives such as tax credits. However by the end of the 1980's, with declining natural gas prices setting the value of avoided costs, renewable facilities had difficulty competing in electricity markets on the basis of price alone.

Taking advantage of the federal and state incentives, private industry in the USA responded by pioneering new renewable energy technologies and applications. There was also a significant increase in the USA federal government's budget appropriation for research, particularly between 1974 and 1979.

In the USA water from conventional hydroelectric power plants is the major renewable source for electricity production probably because of its relative abundance. According to the US Department of Energy, "Electric utilities have historically devoted few resources to non-hydroelectric renewable energy sources. This is because, in general, these facilities are small in size and more expensive per unit of output than larger central stations. Federal and State incentives have, however, resulted in the development of some non-hydroelectric renewable power plants by electric utilities. In California, with state incentives and favorable climate conditions, electric utilities have developed geothermal, solar, and wind facilities."

The relevant inference that can be made concerning the likely future course for the further development of alternative electricity generation technologies based on the experience following the 1973 oil crisis is that there are likely to be further improvement in technology. This is likely to be so as the developed countries which are net importers of oil continue to seek to reduce their dependence on oil. In the USA there have been a number of proposal since 1998 (both at the federal and state level) any of which if implemented is likely to give further impetus to the development of more efficient alternative and renewable energy technologies. For example the Clinton administration plan – "Comprehensive Electricity Competition Plan", which was released in 1998, contains three major aspects as follows

- Renewable Portfolio standard: This is a market-based strategy to ensure that renewable energy constitutes a certain percentage of total energy generation or consumption.

- Public Benefit Fund: The administration's plan supports the creation of a $3billion Public Benefit Fund (PBF) to provide matching funds to states for low-income assistance, energy efficiency programmes, consumer education, and the development and demonstration of energy technologies, particularly renewables. The PBF would be a 15-year programme.

- Net Metering: This refers to the concept that a facility is permitted to sell any excess power it generates over its load requirement back to the electrical grid to offset consumption.

Currently the employment of renewable technologies (such as those which rely on wind and solar energy) requires a high capital outlay, but relatively lower operation and maintenance cost is needed compared with conventional technology. This makes these types of technology relatively more attractive in the long-run. It is worth noting too that site-specific conditions are critical to the economic feasibility of renewable electric generating plants. However renewable energy generating plants continue to make advances, thereby increasing their efficiency and lowering their cost. However in many areas of the world outside of some niche market applications, they are still not yet economically competitive with conventional sources of power. It is however expected that as manufactures become relatively more familiar with the production of these relatively new technologies capital cost is likely to decline through "learning by doing". Further plans such as the Comprehensive Electricity Competition Plan" proposed by the Clinton Administration in the USA are likely to serve as catalyst in this process.

The recent sharp increased in crude oil prices in 2000 as a result of the controls on production by the Organization of Petroleum Exporting Countries (OPEC), serves to remind the world of potential oil price vulnerability. This could bring about increasing pressure on the external and internal balance of countries with high in-elasticity of demand for oil. As oil prices rise, alternative electricity generation technology will become increasingly feasible. Reducing oil dependence in and of itself is a desirable objective for OECS governments, which are non-oil-producing countries.

It is thus desirable that OECS economies be sufficiently flexible to adapt to these possible changes in technology. While these countries are not major innovators and are not likely to be in the foreseeable future, they must however seek to fully utilize and attract investment in new technology with the potential to increase or at least to maintain their international competitiveness. Such adaptation to new technology has the greatest potential in a competitive environment.

Additionally the degradation of the world environment has come to the fore in recent years. There has been extreme concern over global warming and environmental pollution. The burning of fossil fuels has long been seen as one of the contributing factors to global warming. Oil may continue to be the principal source of energy so long as it remains relatively cheaper than the alternative. However, it is conceivable that with the increasing degradation of the environment world government could put measures in place to curb the use of oil and to encourage the use of more environmentally friendly sources of energy such as solar energy. Measures to curb the use of oil could include environmental taxes on the production of equipment, plant and machinery directly dependent on the used of oil. These sorts of measures may become increasingly attractive to developed countries as they continue to reduce their dependence on oil, by for example the increasing use of nuclear energy. The OECS would be well advised to consider these issues and seek to make its economic infrastructure more flexible and adaptable to these potential changes.

Technological improvements are not limited to the field of solar energy. There have been considerable strides in technology related to wind energy, biomass energy, natural gas energy geothermal energy and small-scale hydroelectric generation technology. Governments need to be aware of current research initiatives and need to begin to assess the appropriateness of the various technologies to their physical environments.

Changes in market size

Further while absolute populations in most OECS territories have grown very little, the output of electricity has grown significantly faster. Much of the growth in the market is attributable to the growth in tourism activity. The following table show how population, output of electricity, and stay-over visitors has grown between 1977 and 1997 in OECS territories.

Table 1 Population

	1977	1997	% Growth
Anguilla	6,840 (1984)	11,915	74
Antigua	62,627	68,890	10
Dominica	71,480	75,700	5.9
Grenada	90,500	99,500	9.9
Monsterrat	11,494	3,500	(69.5)
St. Kitts and Nevis	44,500	42,280	(5.0)
St. Lucia	110,100	149,621	35.9
St. Vincent	95,162	111,663	17.3

Source: Eastern Caribbean Central Bank – National Accounts Statistic 1998 Publication

Table 2. Electricity Generation ('000Kwh)

	1977	1997	% Growth
Anguilla	5,240 (1984)	28,074	435.7
Antigua	34,125	126,025	269.3
Dominica	18,276	65,783	259.9
Grenada	21,561	97,255	351.1
Monsterrat	9,390	10,159	8.2
St. Kitts and Nevis	22,000	110,700	407.2
St. Lucia	49,880	213,147	327.3
St. Vincent	19,607	80,220	309.1

Source: Eastern Caribbean Central Bank – National Accounts Statistic 1998 Publication

Table 3. Stay-over visitor arrival ('000)

	1977	1997	% Growth
Anguilla	10.81 (1984)	43.18	299.4
Antigua	67.41	211.44	213.7
Dominica	19.55	68.6	205.9
Grenada	28.5	110.75	288.6
Monsterrat	9.9	5.53	(44.1)
St. Kitts and Nevis	15.4	91.6	494.8
St. Lucia	66.37	253.37	281.8
St. Vincent	19.4	65.14	235.8

Source: Eastern Caribbean Central Bank – National Accounts Statistic 1998 Publication

It can be seen that for all the islands with the exception of Monsterrat, electricity generated more than tripled over the 20-year period. Thus the size of the market for electricity grew significantly and this may have been due partly to the growth in the tourism sector. If we argue that in 1977 it was desirable to grant monopoly power to the electricity companies to operate due to the limited market size relative to the most optimal size plant necessary to meet market requirements at that time, and if at that time the companies were profitable, then the following inferences may be made base on the subsequent growth in the market size.

- First unless there were further opportunities to employ more optimal size plants directly as a result of the growth in the markets (and there may have been), then it means that the growth in the markets could have facilitated increased competition in the production of electricity. Assessing whether more efficient plants could be employed as the market grew is a matter for the engineers and this paper doesn't have

the benefit of such expertise. Further, it would be necessary to determined whether improvements in technology lead to smaller optimal plant sizes as this may further strengthen the argument for increased competition in the face of market growth. Even so however the absolute most efficient size of plant may still be much too large to meet the requirement of Small markets as those of the OECS.

- At the time of writing data on the profitability of firms were not available. If the monopoly firms were however not profitable during the first few years of their operation due to limited market size, but were expected to have a positive present value of cash flow over a reasonable period of time (say 20 years – assuming projection for growth in market size) then it may be argued that protecting their monopoly status was desirable over such reasonable period. It is however doubtful that the growth in electricity generated and demanded was anticipated to the extent realized either at the commencement of the operations of the electricity companies in the OECS or in 1977. A much lower projection for growth in electricity output may have been used in the present value of cash flow calculation, and hence the argument for increased competition in the face of significant market growth may still be valid. Further the nature of the agreements between the governments and the electricity companies and the nature of the regulations governing the sector ensured that the firms earned a positive rate of return in most if not all years. Thus given higher that expected market growth there may have thus been a case for relaxing such regulation within a reasonable time frame.

- Thirdly if indeed there were increased opportunities to employ more optimal sized plants directly as a result of the growth in the market, the continued support (facilitation through legislation and by direct agreement with governments) for monopoly operation in the electricity generation industry would have been justified, but it should have resulted in increased benefit to consumers and hence to the economy. If it were to be determined that increased opportunities to employ more optimal sized plants were available and were indeed used, then it would have to be further determined whether such benefit accrued to consumers. The information to assess whether more optimal sized plants were used as market size increased is not available at the moment. Further, a determination of wether consumers benefited would also necessitate an examination of several other cost factors which affected the price charged to consumers. Such information is not currently available.

- Fourthly if there were increased opportunities to employ more optimal sized plants directly as a result of the growth in the market, but if these did not result in increase benefits to consumers then it means that governments' interventions (regulations) was inappropriate or ineffective. We shall shortly turn to the question of the in-effectiveness of governments' regulations.

Clearly more information is necessary to arrive at conclusion as to whether the market has grown sufficiently to justify liberalization within the electricity industry in the OECS countries. Notwithstanding this unavailability of information we will shortly examine the question of the appropriateness of regulations within the sector.

It should also be noted that not much has changed with regards to the means of distributing electricity, and hence it still remains difficult to allow more than one distributor of electricity within a given space. However the means have long existed for the separation of the production of electricity from its distribution.

Efficiency Concerns within the Electricity Generation Industry

Notwithstanding the benefits from large-scale production, which may be potentially passed on to consumers, monopoly operations are frequently associated with inefficient economic production as noted in the first section of this paper. The persistence of abnormal profit is a prime indicator of such economic inefficiency, as the economy is unable to respond to the market signal to produce more of the product. Further, the monopolist may not necessarily use the most efficient size of plant nor might he operate it at the most optimal output-level. It is perhaps due to these potential allocative and

productive inefficiencies that many government have sough to regulate the price charged and output produced by these monopolies.

While the economies of scale to be derived from large scale production was part of the original rationale for the granting of exclusive rights to one operator to generate electricity for resale, these rights made possible through government legislation in and of themselves has the potential to lead to other inefficiencies particularly where attempts are made to regulate price and output. The following investigates this potential more fully.

Price is often regulated through the specific legislation granting monopoly power, or the specific agreement between governments and the given utility operator. Provision to regulate price is also allowed for through the public utilities commission in most islands. However, the burden of proof often rest upon the utility operator. In many instances the regulation of price is based upon an allowable "rate of return on investment". This approach essentially guaranties some basic return to the operator no matter what the cost, no matter how inefficient the operator. There are usually no conditions within the agreements concerning the efficiency of the operator. So long as the operator can verify his cost of operation then he is entitled to a return on his investment which is to be reflected through the price charged to consumers. This approach therefore gives the operator no incentive to be efficient and could partly or entirely erode the economies from large-scale production. The potential negative impacts of the price regulation (where control is exercise through a "target rate of return") can be demonstrated using Diagrams 1 and 2.

In diagram 1, the monopolist is faced with demand curve "d" and "AC1" and "MC1" illustrate his average cost and marginal cost respectively. AC1 represent the normal average cost curve where points along the curve show the minimum average cost of producing a given level of output assuming that no inefficiency is built into the system of production. The profit maximizing price and output of the monopolist would therefore be at p1 and q1. Suppose that at p1 and q1, the profit equal to area "abcP1", surpasses the target rate of return, then the monopolist will be required to lower price, hence reducing the rate of return. Ideally consumers would benefit not only by the reduced price but also by consuming a larger quantity. At any price below p1 if the monopolist rate of return were below the target rate, then an increase in price up to price p1 (it could also surpass p1) would result in the monopolist earning a greater rate of return. This pricing behavior however has the potential to be counterproductive in at least four ways.

First the monopolist has no incentive to remain efficient. Average cost could rise due to inefficiency, as long as price could be set at a level where the targeted rate of return is achieved. Alternatively the monopolist has the incentive to hide profits as cost. This is illustrated in diagram 1 where the monopolist average cost and marginal cost curves shifts to AC2 and MC2 respectively. We will refer to AC2 and MC2 as apparent cost curves. Potentially as shown in the diagram, price could rise to p2 and quantity fall to q2, so long as the profit of the monopolist given by the area "defP2" is equal to the target rate of return. Thus the consumer welfare could decline compared with the position where there is no price regulation! Further it means that some of the initial benefit of large-scale production may be eroded!

Secondly the monopolist would have no incentive to become more efficient through research or the use of more advance technology. This is based on the reverse of the above argument. If we assume that at the initial position p1, q1 given curves AC1, and MC1, the profit of the monopolist is just equal to the target rate of return, then a fall in cost to AC3 and MC3 would mean that the monopolist could earn greater profits by producing a greater quantity and selling at a lower price p3. However since this new profit level would result in a rate of return above the target rate, then the monopolist would be required to lower the price below p3, which would theoretically result in the same rate of return as before the fall in cost occurred! Thus the monopolist would have no incentive to seek to improve his technology or his system of operation. Thus the economy's export sector could potentially become less efficient than that of its competitors if such competitors have adopted improved technology and more efficient systems.

Thirdly, initial high cost due to "teething" problems on inexperience may be perpetuated as long as the initial operation results in a rate of return equal to or more than the target rate of return. This could reduce consumer welfare, partly erode some of the initial benefit of large scale production and make the economy's export sector relatively less efficient in comparison to its competitors.

Fourthly, the potential exist at the commencement of the monopoly operation, that the price could be set at too high a level, i.e. where a lower price level could result the same target level of return. For this to occur the initial price would have to be set above the profit maximizing monopolist price. This price would result in a lower level of profit compared with the profit maximizing position. However, if it results in the monopolist earning the targeted rate of return then there would be no profit incentive to lower price. This out-turn could result where return are projected base on too low a level of demand, with the price is set at the level that would result in the targeted rate of return. This is illustrated in diagram 2 where at a price p2 the profit (area P2abc) is just equal to profits at price p3 (area P3def). Consumers and the economy would be better off at price p3, purchasing a greater quantity q3. Consumers and the economy would therefore be worst off if price remains at p2 and quantity lower at p3, compared with the position at p3, q3 or with the position at p2, q2 which would occur without price control. Subsequently if realized demand is higher the demand initially projected price would have to be adjusted as higher profit than anticipated are realized. However the initial situation could provide the basis for high cost and inefficiency to be perpetuated.

Other efficiency Concerns

While most electricity legislation in the OECS allows for the production of electricity for own (domestic) use, it does not allow for the sale of excess domestic production to the utility company. For those persons who may want to produce for themselves perhaps using alternative technology, the benefit of doing so can be diminished if their unused production is wasted or if there is significant excess capacity. Some legislation requires the minister's approval for the purchase of electricity generation equipment even for the production for "own use".

Monopoly electricity operations can stifle enterprise and limits consumer choice while eliminating other benefits to the economy. For example some consumers may wish to purchase power from environmentally friendly sources and may not mind paying a premium price. Monopoly (as currently regulated within OECS countries) may thus stifle the development of enterprise wishing to provide electricity using environmentally friendly energy sources and in so doing reduce the benefits to the economy in terms of pollution. Consumer choice is also reduced.

Recommendations

Governments need to clearly set its objective function in devising the strategies it may adopt with regards to the electricity generation and distribution sector. Objectives may vary and may include any combination of the following.

Cost minimization – this has implications for the cost of living as well as the competitiveness of the economy. In this regard it would be necessary to put in place measures to move production to more efficient levels and to give the maximum incentive for the economy to quickly take advantage of technological improvements. An understanding of the resources available to the economy to generate electricity must also be considered.

Reducing the vulnerability to oil shocks, by reducing the dependence on oil as an energy source - in this regard the economic infrastructure must be flexible enough to quickly adapt to technological improvements, or to sustained movements in oil prices.

Maximizing economic benefits - this would require looking beyond the explicit cost of production and seeking to arrive at shadow prices. In this regard the impacts on health, the environment, and waste disposal among others, must be considered in terms of the type of technology to be adopted. The benefits from marketing a more environmentally friendly destination must also be considered.

Where the environment has so changed that the argument in favor of monopoly no longer holds, then it would be necessary to encourage competition. An explicit determination of this would require further study including engineering inputs. One way in which competition could be encouraged however is through the repeal of legislation, which grants monopoly power to firms and restricts competition, or the re-negotiation of exclusive agreements. With regards to the production of electricity, this measure by itself will not be sufficient to bring about increased competition. The distribution arrangement would have to be modified – most likely there would have to be a single distributor with appropriate safety and other regulation in place. Several producers could then supply through a single distribution system. Liberalization within the electricity generation industry would also require that further consideration be given to issues of the number of firms that the market could accommodate, means of discouraging collusion, encouraging the development and use of clean and renewable energy.

Where the environment have not yet changed sufficiently to justify increased competition, but where there are clear trends that such changes are inevitable, then it would be necessary to begin to engender the appropriate environment for competition. Legislation facilitating monopoly operation and agreement granting exclusive rights to produce electricity should be critically evaluated and amended or renegotiated as necessary. Appropriate and flexible mechanism could also be built into regulations so as to maximize economic benefits from the monopoly operations while allowing the potential for increased competition. We shall turn to one such suggestion shortly.

The potential efficiency impact of monopoly operations, will vary with the means through which price is regulated. Where price is regulated by means of a "target rate of return to investment", we have seen that efficiency impacts may be ambiguous. On the one hand such price regulation could lead to lower price paid for electricity and larger quantities consumed if the monopolist acts as if he is profit maximizing. On the other hand a "targeted rate of return" objective enforced by legislation may lead to behavior that reduces economic efficiency and consumer welfare. Efficiency impacts under other price regulatory regimes can be investigated, but in most cases it can be shown that there will be some potential for the regimes to have a negative impact. The final impact of the regulation is therefore likely to be ambiguous. Hence in cases where monopoly operation could potentially result in lower average cost of production such that consumers are likely to benefit, price regulation may be undesirable due to the uncertainty associated with its impacts. An alternative to price regulation, which may be considered, is the use of taxes on profit in conjunction with subsidies provided to selected consumers to meet social objectives.

As an alternative if price regulation is to be maintained (particularly where a target rate of return is employed), limited deregulation in conjunction with "the target rate of return" control can be implemented. Under this approach the electricity companies could be made to buy at its "own production equivalent cost" any excess supply produced by non-utility producers. A non-utility producer is one who does not produce for direct distribution to clients. For example large businesses can be permitted under the legislation to supply their own electricity requirements. Since many of these businesses already keep stand-by electricity generators, such an allowance within the legislation may not require a significant new capital outlay on generators. The non-utility firm would thus be left with the option to continue the use of its generator for emergency (stand-by) purposes or to use it for its regular needs. It can be expected that the non-utility company will only use it generators for regular use if it could do so profitable i.e. if the cost of doing so is less that the price it would have to pay to the utility company. Now if the economic rational for maintaining monopoly utility operations is valid then it would be normally expected that most large firms in the context of the OECS would be unable to supply their own electricity requirement more cheaply than purchasing from the monopoly utility companies. If they are able to do so and if they are able to supply excess

production profitable to the utility companies, then it would mean either that there is no economic justification for the legislative support of the monopoly operations of the utility companies or that there is significant inefficiency in the operations of the utility companies.

Thus under the above approach the utility company maintains it monopoly status and its profits would not be unduly affected by other producers since they must sell to the utility company at the utilities company's own cost of production. The beneficial impact of this approach is that it can make the impact of "target rate of return" regulatory price controls more effective and more certain. This is because, if the monopolist operates inefficiently due to the pricing behavior identified earlier, it increases the likelihood of viability of the non-utility producers as it will have to pay at its higher than necessary cost. The economy would benefit through lower cost of production as production by the utility company is replaced with production from non-utility producers. Off course excessive inefficiency by the utility company would most likely lead to their demise since the price which they would have to be permitted to charge (based on the target rate of return) would have to rise by more and more as more is produced by non-utility producer. Off course the higher the price charge by the utility company, the more profitable it would become for non-utility producer to operate. Ultimately there would be pressure for the utility company to increase efficiency if it is to survive. Similarly there would be reduced incentives for the monopolist to disguise profits as cost. If the monopolist attempts to disguise profits as cost, the profitability of non-utility producers would attract more producers and would thus cut into the monopolist disguised profits.

To complement the "limited liberalization approach" and to ensure that it works well it would be necessary to separate the distribution and the generation aspects of the monopoly utility operation into distinct operations. This would facilitate the purchase of electricity from non-utility producers and ensure that the distribution operations can survive independently in the event of the demise of its production operation.

Notwithstanding the above discussion, is it necessary to maintain monopoly legislation? To place the question differently, Would those monopolies which are protected through legislation, likely to survive as monopolies without the protection of such legislation? Under the initial conditions under which many of the monopolies in the OECS were established and protected by law, it was likely that they would have survived as monopolist over a considerable period of time without the protection of the legislation. This is because many of these operations would have turned out to be natural monopolies perhaps only after a relatively brief period of protection. This may have been particularly so in the areas of electricity generation and telecommunications where the nature of the technology in use when the operations were set up, as well as size of the markets facilitated the development of natural monopolies. Hence it may not have been necessary to maintain monopoly legislation beyond perhaps only a few years necessary for these monopoly operations to be able to survive as natural monopolists. Additionally, if such monopoly firms earned a sufficiently high return to their investment - say of approximately 20 per cent annually, then they would have recouped their investment within less that ten years. Hence particularly where regulations allow firms to set prices based on a target rate of return, protection through legislation for the purpose of allowing firms to recoup investment should not require protection beyond ten years. Further, after a period of protection which would have allowed an investor to recoup his investment, if without the protection of legislation, the economy could have accommodated more than one operation within the given area of activity, then preventing the economy from so adapting through legislation would reduce consumer welfare and economic efficiency.

In the absence of monopoly protective legislation, an economy is likely to more readily adapt to changes in the prevailing business environment. Thus in light of the above discussion it appears that it is not necessary on economic grounds to maintain monopoly legislation to facilitate the production of electricity. It may be more productive to allow the market to determine the survival of monopolies. A more in-depth study would however be necessary to confirm this. Further where it may still be desirable to maintain legislative support for monopoly electricity operation, price regulation as is now currently

administered in most OECS countries is not recommended. Alternative regulatory regimes could be developed such as was described above.

There are other areas of economic activity within the OECS where monopoly operations are facilitated through government legislation. Theses include the commercial trade in basic food items and the export of agricultural produce, and telecommunications. As the technical, social, institutional, business and economic environment changes, the relative desirability of maintaining legislative support for monopoly operations within these areas will also change. Each area needs to be looked at separately to determine the relevance or the appropriate mode of government intervention. The case of the electricity industry is thus instructive.

Bibliography

Information downloaded from the "web-site" of the US Department of Energy on"Issues for Renewable Fuels in Competitive Markets" was utilized in the preparation of this paper.