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Monopoly in telecommunications: The case of Greece

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MONOPOLY IN TELECOMMUNICATIONS:
THE CASE OF GREECE

by

Peter Spanos

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Abstract
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The main point of this paper is that politicians use the telecommunications industry as a tool for the implementation of social policy.

In order to do this they need to control it. Since this cant be done through the bureaucrats in the administration of the industry, they control the industry by legislating the market as a monopoly.

This means that politicians prohibit entry in this market. The usual justification behind this is that this market is a natural monopoly and it would be better to protect it. They (politicians) use the concepts of decreasing costs and sustainability to support their claims.

These arguments stand only for the case of a market which is a natural monopoly. In our historical analysis we found nothing to support the claim that the telecommunications industry is a natural monopoly. On the contrary, in any time, any place where competition was allowed it occured. Moreover, it fostered both technological change and better service.

In the case of Greece the telecommunications industry followed exactly this pattern. Even from its beginning it was used as a tool from the politicians (inefficiently) and never got the chance to provide for the development of the economy. It is only in the last year that a privatization move might allow competition to make part of the market more efficient. If this works we might see it more in the future.
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Dedication
To my family.
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I. Introduction

Any economist interested in the telecommunications industry of Greece will be struck by how little\textsuperscript{1} basic economic research has been published on this important industry.

It is strange that even internationally, in the hundred-odd years since Bell filed his patent, not many articles concerning the industry appeared in professional economic journals. Unlike other public utilities, little empirical work on the telephone industry has been conducted. This lead J. Bonbright to complain that:

"the telephone industry, despite it's vast facilities for statistical and economic research, has never seen fit to publish elaborate studies of it's cost functions."\textsuperscript{2}

That was in reference to the U.S. industry, which had already a long history, dating back to the beginning of the commercial telegraph service in 1845. In the last 146 years the U.S. industry has gone from monopoly to competition to a cartel to a duopoly to a dominant firm structure to competition to a regulated monopoly to a regulated dominant firm. It thus provides ample opportunity for examining changes in structure, with increases and decreases in concentration under both free and regulated conditions.

Almost the exact opposite has happened in Greece, the lack of competition in the industry, for all these years, has prevented the kinds of market experiments from which economists can get enough information to study the industry. Since there was (and still is) only one firm in the Greek telecommunications services market this prevents researchers from forming an opinion about the exact
state of the market. The lack of data about alternative pricing strategies (as in the U.S. or other countries with more than one carrier) aggravates this situation. The introduction of competition (that is planned to be incorporated in future years) will provide researchers with information for testing some of the hypotheses that have been stated but not tested.

The idea that is the basis of the methodology followed in this study is drawn from the industrial organization branch of economics. But this study does not belong to the field. I/O provides us with a theoretical (conceptual) and empirical insight into the relationships among the structure, conduct and performance of an industry of privately owned firms. But we believe that the expansion of this study with the use of a fully developed I/O model will be beyond its scope.

Early I/O work on telecommunications focused on industry structure (primarily market share and the height of barriers to entry) as the primary determinant of industry performance. But the industry's changing boundaries, that came along with the increased possibilities of use of telecommunications that computer technology provided, meant that previous work was lacking in explaining the new market structure that emerged.

Chapter II will begin our analysis with a presentation of the evolution of market structure in a group of four of the most advanced countries in the world. We will emphasize the common points and differences in an effort to enable the reader to understand better the material that will follow. It will also provide
some of the background information needed for the comprehension of this material.

Chapter III discusses the history, laws, regulations, market structure, etc., that is considered necessary for understanding the case of Greece. All this is presented along with some information regarding the present condition and the way that the Greek market seems to be headed, in the future.

The following chapter (Chapter IV) presents the model that we will use, preceded by a discussion on the reasons why we picked this particular kind of model. In this model it is assumed that the firm is a publicly owned legislated monopoly. It is managed by utility-maximizing employees and monitored by vote-maximizing politicians. We believe that the telecommunications industry presents a great opportunity for politicians to obtain political benefits. And this is the driving force behind state ownership in the case of Greece.

Finally Chapter V offers a comparison of the assumptions stated and the conclusions drawn from the model, with the reality faced in Greece. This final part provides a number of implications for economic theory and economic policy. The two are closely intertwined, but there is no attempt to present a detailed recommendation for policy since we believe that it will again lead as beyond the scope of the paper.
II. Examples

a) U.S. experience

The early telephone story in U.S. helps us understand how market power can be created and destroyed. The telephone was not a direct substitute for telegraph but only a complementary product. The displacement of Western Union by Bell as the dominant telecommunications supplier indicates the difficulty of protecting monopoly power against technological innovation.

The history of the development of the telephone also helps us understand how a firm can use temporary monopoly power to generate long-range barriers to entry. The temporary patent monopoly (from 1876 to 1894) on telephone sets allowed Bell to establish a monopoly of telephone exchange service in which much greater barriers to entry existed. Thus, the development of the interconnected telephone network was able to provide continuing market power after the expiration of the fundamental Bell patents in 1893 and 1894.

Overall barriers to entry, even though high, were not prohibitive. Moreover there were also incentives to entry because of the high profitability of the Bell system.¹ In 1894 eighty commercial systems and seven mutual systems were established, primarily in areas without Bell service. By the end of that year, the new entrants had a total of 15,000 telephones installed (an average of 172 telephones per system) for a combined market share of 5 percent.²

The success of the first challengers of Bell subsequently induced widespread entry. Bell (now called American Telephone &
Telegraph Company) still had a very big part of the market but there was a reduction in its market power, after the expiration of the patents.

Three kinds of entry into the telephone business occurred. We shall only list them, in order of importance. The first, and by far the most important, was the formation of new companies to establish commercial telephone systems. The second type of entry was through the establishment of a cooperative to develop a mutual telephone system. And the third type of entry was through the establishment of farmer lines.

Competitive systems were established at an increasing rate between 1895 and 1900. A total of 199 new commercial telephone systems were begun in 1895, 207 in 1896, 254 in 1897, 334 in 1898, 380 in 1899, and 508 in 1900. The systems extended to all areas but were concentrated in the Midwest. By 1900 telephone competition was widespread. The independents controlled 38 percent of the telephones installed in the U.S. By 1902 three thousand non-Bell commercial telephone systems had been established. As the competitive movement gained strength, the Bell challengers moved from the small towns to the major cities.3

A major problem for potential entrants was interconnection which was technically feasible at the time but as long as the Bell system was so much larger than it's competitors, Bell gained an advantage by refusing it.

To restore its market power in telephones, AT&T had to eliminate the direct competition of the other companies and increase the barriers to entry. Mergers were the easiest method of
eliminating direct competition, but they would have been of little help if they induced further entry or antitrust action. Thus an adjunct of this merger policy was the acceptance of regulation which allowed the mergers to proceed without antitrust attack.

Technological change could also threaten AT&T and this could not be stopped with the usual market-manipulation and price-competition eliminating "tools" (like predatory pricing, mergers, local regulation and regional monopolies, ...) that AT&T was using at the time. So after 1934 AT&T started using the power that the F.C.C. had, by exchanging its patent protection for more regulatory protection. Federal regulation allowed AT&T to defeat (temporarily) the challenge of technological change. At that time the F.C.C. could be considered as being "captured" by AT&T. This is the way Stigler expressed it in his "capture theory of regulation".

The F.C.C. not only protected AT&T's market position, but also slowed the spread of microwave technology. Without this intervention, microwave networks would have spread rapidly during the late 1940's.

On January 14, 1949, the Justice Department filed a Sherman Act antitrust suit against AT&T and Western Electric. After this, negotiations begun that led to a Consent Decree in January 1956. This Decree restricted AT&T to regulated activities and essentially accepted the company's position that regulation was a substitute for antitrust.4

AT&T's general strategy was to delay, restrict, and reduce the incentives for, entry in the market, in order to compensate for the reduced regulatory protection. Nevertheless a few years later AT&T
did not hesitate to try and use successfully this same "reduced" regulatory protection when its market power was again in danger from potential new entrants, who were using the (then) new satellite communications technology.

In February 1966 the F.C.C. ruled that M.C.I. qualified to undertake microwave services but objections by the regulated AT&T carriers raised questions of fact that required a series of hearings. These were held in early 1967. In August 1969 the commission affirmed the examiners' decision on a 4-3 vote so M.C.I. was able to enter the market. From now on long-distance communications services were subjected to competition as was the provision of terminal equipment. This happened partly as a result of technological change but also because of actions of the Justice Department. The F.C.C.'s role in establishing a competitive market was to remove the regulatory barriers to entry rather than to positively promote free competition.  

The competitive interaction of the computer and communications industries, with devices like modems, faxes, multiplexers (packaging of signals), etc..., provides another example of a change in industry boundaries. Technological progress resulted from these new products which incorporated a mixture of computer and communications capabilities. Computer technology became competitive with communications technology and provided potential new entrants as in the satellite case. The final product required computers and communications as inputs. Because firms in both industries expect the new products incorporating combined computer and communications capabilities to be a large portion of
total demand, they have moved toward providing products that combine both inputs. Firms in both industries thus become competitors for the final product (services), and insofar as they attempt to provide the inputs themselves, they become competitors in the basic products (the hardware) as well.

b) European experience

Telephone and telegraph development occurred with much greater government involvement in Europe than it did in the U.S. In most countries, private companies played an initial role but were eventually absorbed into a government monopoly highly protected from competition.

U.K.: The early British telephone development was based on the American inventions of Bell and Edison. In 1878 an agent for the Bell company began negotiations with the British Post Office over rights to establish a telephone system. No immediate agreement was reached so Bell formed a company after a few months, and began building telephone exchanges. In 1878 the Edison Telephone Company was formed with rights to the Western Union-owned Edison patents and the two companies began competition.

The Post Office then filed a suit against the companies at the end of 1879. The suit alleged that the telephone service was in fact a "telegraph" service and therefore covered by the Post-Office monopoly on the carriage of "letters" (the telegraph had earlier been declared to be a form of "letter" and therefore rightfully a part of the Postal monopoly). While the suit was in progress, the
two companies merged to form the United Telephone Company (U.T.C.). At the end of 1880 the court ruled in favor of the Post Office and granted a monopoly which applied to any existing and future methods of communicating by electricity.

In the spring of 1881 the Post Office and U.T.C. reached an agreement on the terms of telephone development. U.T.C. continued the development of telephone exchanges under a very restrictive Post Office license. This uncertainty over future Post Office action induced a short-term profit maximizing behavior from U.T.C.

In 1911, the government acquired U.T.C. and the telephone system was brought under direct Post Office control.\(^6\)

The Post-Office monopoly of telephone service in the U.K. continued until the 1980's. A lack of decisions in the Seventies as to what kind of digital switching system would be adopted in Britain had as a result nearly a decade of potential development wasted in indecision, before a final commitment was made to System X in 1977. It was well understood at various points in the 1970's that the efficiency of the phone system in Britain was falling behind not only that of the U.S. and Canada but also those of Sweden, France, Germany and Japan.\(^7\) The 1977 decision to go for System X was, however, by no means the end of the difficulty. In fact, like other digital switching equipment, System X was slowed down by software difficulties.

In the Eighties changes start happening at a faster pace. In July 1981 the Telecommunications Act took the telecommunications function out of the Post Office and established it (temporarily) as a new nationalized industry, called British Telecommunications. In
October 1981, a licence to operate a competing national network was granted to Mercury.

In July 1982 the White Paper\textsuperscript{8} outlined the conclusions of a debate as to the direction of the developments in the British telecommunications industry. The main points are outlined below:

1. The public sector borrowing requirement problem was quoted as the main reason why B.T. must become a public company, able to borrow and to raise its own capital without government interference.

2. Fifty-one percent of the shares would be sold on the market, after which "the government will keep control over the commercial decisions of B.T. plc"

3. Because B.T. would be dominant in the U.K. market "for some years yet", a new Office of Telecommunications would be required to regulate telecommunications on the model of the Office of Fair Trading.

A new Telecommunications Bill began its Parliamentary passage in November 1982. This along with a Court of Appeal ruling, against the Post Office Engineering Union, on 9 November 1986 gave a sign of the "new" way of thinking.

At that time the "Littlechild Report",\textsuperscript{9} was produced. This called for a "retail price index minus x" pricing formula for B.T. This was the time that B.T. was making the most of its era of commercial monopoly profit.

In August 1984 three events occurred which established Britain new pattern of a regulated telecommunications duopoly:

1. B.T. became a public limited company
2. Mercury came under the 100 percent control of Cable & Wireless.

3. The new Office of Telecommunications (OFTEL) began its regulatory duties.

In October 1985 the interconnection of Mercury with the B.T. network was a fact.

In early 1989 B.T. announced a withdrawal from equipment export ambitions in favor of a business investment strategy. This new policy can be seen both in the purchase of 22 percent of McCaw Cellular Communications and the interest in the buyout of WilTel (both foreign and very promising investments).

FRANCE: The telephone was first exhibited in the International Paris Fair in 1878.

The government offered a restrictive five year licence, without a monopoly guarantee. Any company interested should pay a royalty of 10 percent of gross receipts to the government. At the end of the five year period, the government would have the right to purchase the system from the company and enter the business itself without payment for patent rights.

During 1879 three separate firms were licensed, based on the Bell, Edison and Gower patents. All three companies were merged together in 1880. In 1884 the company franchise was extended for another five years. This uncertainty induced the company to pursue only sort-run profits.
The long-distance service proceeded even more slowly because of the government's concern to protect its telegraph revenues.

The telephone system was nationalized in 1889. But this takeover did little to improve the French telephone system. This happened mostly because the government did not want the responsibility to raise capital or bear risk.

Telecommunications were neglected in the post-war reconstruction of France. The modernization of the telephone network did not figure among the priority programmes adopted by the DeGaulle governments.

In the 1950's and 1960's, research was still not accompanied by strong domestic demand or state support. None the less the Centre National d'Etudes des Telecommunications (C.N.E.T.) became a major research center in fiber-optics, telecommunications satellites, and data transmission technologies. All this research lead to French advances in the Information Services Digital Network (I.S.D.N.) in the 1980's.

In 1987 a big change in policy came in the shape of a huge program of privatizations. The Presidential elections in May of 1988 gave the Presidency again to F. Mitterrand, so the previously developed plans were not interrupted. A few months later M. Rocard (leader of the Socialist Party) formed a "coalition" government which formed a committee to prepare the changes of the 1986 communication law. This law amending the 1986 law, was adopted by the National Assembly in 21 December 1988. It's main provision was the replacement of the Conseil National des Communications et Liberte (C.N.C.L.) by the Conseil Superieure de l'
Audiovisuel (C.S.A.). C.S.A. is to act as a regulatory body for the preparation of a new law on telecommunications for the Nineties.

**Sweden:** The Swedish government neither began telephone development nor limited the initial telephone activities of private companies but Bell was not granted a patent monopoly in Sweden.

In 1883 the General Telephone Company was formed to compete with Bell in Stockholm and undercut the Bell rates by 30 percent. Bell made no response to the General threat and retained its old rates. By the end of 1884 the size of General's system was almost three times the size of Bell's. In 1890 General acquired a controlling interest of the Bell Company.

In 1884, the state telegraph agency recognized that telephone service was a threat to telegraph revenues. This same year the telegraph agency was awarded monopoly rights to all long-distance telephone wires with a law. This law stated that the use of long-distance lines would be restricted to subscribers to government exchanges. Thus the government monopoly over long-distance lines (enforced by legal right) was to be used to develop a monopoly of local exchanges through competitive pressure. The small companies that had established systems in individual Swedish cities sold them to the state, but the General Telephone Company resisted takeover. The government established competing local exchange service within Stockholm using reduced rates and the long-distance privileges as incentives to gain new subscribers.
In 1891 General Telephone agreed to sell all lines over seventy kilometers from Stockholm to the government in exchange for rights for General's customers to use the government long-distance lines. Extensive competition between the government exchange and General followed the agreement. Both companies cut rates and introduced a variety of technological improvements, but it was the government agency that finally won the competition war. The General company merged into the government agency completing the government monopoly of the Swedish telephone system.

The early competition helped Sweden in establishing an extensive telecommunications network. Today Sweden has one of the most advanced networks and Swedish telephone usage per capita is one of the highest in the world.

Sweden also takes part in many European space programs, by being a member of the European Space Agency (E.S.A.), the EUREKA program and almost any other European space effort.15

Today even though the government tries to cut down on the subsidization of telecommunication services, Sweden is still among the leaders in the field. The standard of telecommunications services is very high and it seems that it will most probably be in the future too.

c) Lessons from these examples

There are three points which can summarize the intuition we obtained from these examples. The first one is that in all countries, even though the conditions might differ (in some cases
significantly), competition arose when allowed. Moreover there is little indication that the telecommunications market is any more of a natural monopoly than many other industries with large privately-owned and relatively unregulated firms such as the manufacture of steel, automobile, or chemical products. And last but not least, in all cases presented, both technological change and better service were fostered by competition. We shall now present more detailed arguments to support these claims.

The invention of telephone in the U.S. and the early competition between Western Union and Bell gave the U.S. an early lead in telephone development between 1895 and 1906.

The significance of competition is even more apparent in the figures for different parts of the U.S. than it is in the aggregate figures. The government agencies in Europe concentrated their efforts in the major cities, and especially in the capital. In contrast, competitors in the U.S. put most of their effort into developing the rural areas and small towns and were less successful in competing with Bell in the major cities. By 1902 Iowa had twice the development of New York with one telephone per 19 persons provided by a total of 170 different systems. The rate of telephone development under competition was higher than under private monopoly, while development under private monopoly was higher than under government monopoly.

With competition, low prices and the striving for competitive advantages induced rapid development. The existence of several companies allowed various beliefs as to the elasticity of demand to
be tested and prevented slow growth through a mistaken belief that the demand was inelastic.

A private monopoly will in general charge higher prices than competitive companies, and will therefore have a lower level of equilibrium demand, but it must attempt to satisfy this demand in order to maximize profits and reduce the incentive for another company to enter the business. The monopoly will generally be able to finance rapid development so long as it is profitable.

A public monopoly with a legal barrier to entry may on occasion develop its industry rapidly with low prices and good service, but there are no economic forces to require it to do so. If the public agency is unable to float its own securities, so that it depends on public appropriations for capital, it is likely to encounter difficulty gaining enough capital for rapid growth regardless of the profitability of its operations. It may be forced to expand only through reinvesting operating profits (as in the case of French telephones) and thus be limited to a growth rate equal to its profit rate. It lacks the private monopolist's incentive to satisfy demand in order to prevent competition, but may make some effort to satisfy existing demand in order to avoid political criticism or, even worse, political cost. The evidence would appear to support the claim, however, that these political pressures are less potent than the profit motive as a force engendering good service and technological change.

Market power in Europe came primarily from government franchise. The Swedish agency used price warfare and systems advantages of its protected long-distance system to extend its
monopoly to local service in Stockholm. In France, there was no need for government agencies to develop strategies to extend their power because they were granted full authority over development by the state. The government agencies used their market power to protect themselves from risk rather than to maximize profits.

The development of long-distance telephone service in Europe provided the most contrast between Europe and the U.S. In the U.S., long-distance technology was pursued as a source of post patent market power without concern for protecting telegraph physical capital or the human capital of telegraph employees and engineers. In Europe, long-distance technology was dependent upon telegraph interests because the same organization provided telegraph and telephone service.

III. The case of Greece

Telephone service was first provided in Greece in 1892, with law BNZ/1892. More specifically this law stated that the privilege of establishing telephone networks belonged to the State, but it also allowed the establishment of small networks for private use. In addition it was stated that the cities in which telephone exchanges would be installed will be specified by ministerial decrees, and any conflicts with the interests of the Post Office will be dealt by decisions of the Grand Jury. Moreover this law specified that the supplier of telephone service was going to be a monopoly.

The establishment of the first network took place in 1895 and it consisted of two primary switching boards in Athens and Piraeus,
with 60 lines.¹ So the introduction of the telephone in Greece was delayed for almost 16 years beyond its invention by A. Bell. By that time significant advances had been made and were in use in other countries, especially in long-distance telecommunications. In spite of these, the development of the long-distance network in Greece did not start until the end of the century and even then everything was developing slowly.

In 1900 a new law (ΒΥΞΗ/1900) specified the way the long-distance network was going to be established, but this was more of an afterthought since a rudimentary long-distance telephone network already existed. This law basically specified the administrative organization of what was previously the Postal and Telegraph Service and had very little to do with the actual telephone service.

It was not until 1908 that a law, ΓΣΟΖ(3277), specifically concerning the organization of the telephone service, was enacted. But even then this law was aimed more at relaxing the dissatisfaction of the parties opposing the government in the parliament than as a real concern for the future of the telephone service in Greece. The period shortly before the first W.W. was politically unstable and the interest of the politicians at the time was not really inspired by this new "gadget" (technology if you wish). The politicians were more interested in using the telephone service as a vote collecting instrument. The law contained a specification regarding the qualifications of the telephone exchange personnel. Only people having a degree for teaching in the elementary school were going to be employed in these positions.
This might sound strange (and it is) but, considering the fact that almost 99 percent of the graduates in that field were politically "friendly" to the governing party, again from another similar process when they tried to enter the Teaching Academy, it makes almost perfect sense. The governing party was intent upon employing only people that supported it, so they passed an inconspicuous law that would make the whole process legal and politically more acceptable. Anyway, international relations were not at their best in the area, and the beginning of a new war with Turkey overshadowed the first really long-distance telephone operations (at least for the Greek standards of the time) of the new lines from Athens to Patras and from Athens to Thesaloniki, in 1911.

After the Balkan wars and immediately following the first W.W. there was an effort for a faster development of the telephone service. This came primarily from an effort to modernize and organize the education of the personnel working in the telephone service. The new and expanded borders of Greece meant that a larger area needed telephone service. But since the personnel available from the Postal and Telegraph Service were not qualified for the task, and the existing telephone service personnel were not enough, there was a need for additional educated personnel. So in 1917 a new law was voted (1003/17), which specified the details of a new educational establishment which would supply the personnel that would cover this excess demand. But even then the development was not very rapid.
By 1920 the rural areas had only 5267 telephone lines and even by 1930 there were no more than 14695 lines. The slow increase of the number of lines was due to the fact that the technology used was old. The administration still preferred the more labor intensive old technology since it gave more possibilities for influence and political benefits. In 1929, the protection of the government monopoly and the details concerning the employment of the personnel occupied in this monopoly were specified in law 4275/29.

After 1930 and until the beginning of W.W.II the telecommunications field in Greece developed quite rapidly (at least in comparison to the previous era). The total number of telephone lines went up from 14600 to 58000 and most of the new exchanges were automated. At the same time the total number of long-distance international calls went from 630000 to 3.45 million.

This new boost in the rate of development of the telecommunications field came primarily from changes in the market structure. At this time two companies, the "New-Adwerp Telephon and Electrical Work" of Belgium and "Siemens & Halske" (S&H) of Germany were competing for the contract to construct the "new" Greek telephone network.

In 1930, with law 4547/30, S&H got a monopoly contract with the Greek State. This contract allowed S&H to be a monopoly in the construction, service and exploitation of the "rural Greek automated telephone network" and had a working life of 38 years. In the same law the rights to the exploitation of the long-distance network and of the international calls were also given to S&H, for a ten year
period. This second part of the contract was cancelled in 1934, four years after it's implementation.

The terms of this contract were stated in a way that the rights of exploitation of the network by S&H could be used for a much longer time than the original 38 years. The outcome of W.W.II and the disintegration of S&H allowed the Greek government to declare the cancellation of the contract and order the seizure of the property of S&H in Greece.

Throughout this period, telecommunications in Greece were officially administered by the same General Director as the Postal and Telegraph Service. The only change throughout this period was that after 1914 this General Director was a member of the, then new, Ministry of Transportation and Communications.

W.W.II was a big step backwards in the development of the Greek telecommunications network, especially for the long-distance part of it. During the first year all investment in new lines stopped, except for those used by the army. After the end of 1941, when Greece was under military occupation, and until the end of the war, the occupational forces either took or destroyed a large part of the equipment used in the long-distance network. In addition the civil war that followed the occupation completed this destruction. So after the end of that period the long-distance network in Greece was practically non-existent.

There was a good opportunity though for the establishment of a new and very updated network. The pressure of the war speeded up the evolution of long-distance communications and the demand
for more and better quality telephone lines stimulated development of telecommunications services in U.S., U.K., etc.

Unfortunately in Greece there were not enough funds available and the creation of the new network took place very slowly. Most of the required investment funds were initially supplied from the State Budget with some very limited help from the Allied Forces (UNDRA, credit of the import-export Bank (1945-49), ...). Until the middle of 1949 there were no major improvements in the existing network (just some steady but slow development). The Marshall Plan was supposed to provide a very large part of the much needed funds for the creation of the new network. But it also called for a centrally administered and regulated organization to create and execute the new investment plans.

This Organization (O.T.E.) was established in 1949, with law 1049/49. From this point on, telecommunications in Greece operated under an independent administrative body, with full operative and economic autonomy. The law specified self-regulation but O.T.E. was (and still is) government-regulated. It was also specified that O.T.E. would have the legal form of a corporation with one share, owned by the Greek State. Moreover, this law also gave O.T.E. a monopoly of telephone services in Greece. O.T.E. somehow "merged" the operations of organizations, administrative bodies and corporations already existing within the Greek territory, which used to supply telecommunication services.

From 1949 to this day not many things have changed in the way the field of telecommunications is managed in Greece. Telecommunications services and pricing policy were, and still are,
seen by the politicians mainly as a way of attracting more votes. Thus they were never given the opportunity to become what they could really be, a boost for the economic development of Greece. Various laws concerning the industry were voted during that time. In 1955, law 3171, took some areas of the industry out of the "administrative umbrella" of O.T.E. It specified that O.T.E. had no rights on the telecommunication networks of the Armed Forces, the Railroads (O.Σ.E.), the electricity company (Δ.E.H.) and in the one used to receive and transmit messages for the Commercial Navy. In 1968 and 1973, with laws A.N.301 and N.D.165, O.T.E. was given a more independent administrative framework (at least it was so specified).

It was not until the beginning of the last decade that some substantial changes appeared. Before the Socialist Party came to power, in 1981, they complained that policy in the field of telecommunications was inadequate. A new law concerning O.T.E. was passed, in 1983, and specified that O.T.E. was going to have its administrative organization changed. More changes were also expected. But radical changes never materialized, not even after the Presidential Decrees 58 (1985) and 112 (1988) that complemented the original law of 1983. All of these just specified that O.T.E. was going to be a socialized organization with a complex administrative organization made by 6 different bodies. These are:

1) The representative committee of social control (ΑΣΚΕ)
2) The regional committees of social control (ΠΕΣΚΕ)
3) The Board of Directors
4) The General Director
5) The Managing Board

6) The representatives of the personnel.

What can really be considered a favorable outcome of the "new" policy of this decade was the decision to follow the example of countries like France and Italy and try to create a national "flagship" company in the field of telecommunications. The company that took this role was "Intracom S.A.". It evolved within this period from a small assembly manufacturer to a multibillion corporation with extensive production facilities, a very good R&D department and specific production contracts with companies like I.B.M. and Siemens. But this alone is no justification for all the telecommunications policy of the previous government.

Developing telecommunications was, and still is, a priority for most of the European countries. In Greece, unfortunately, in the last decade, there has been no real development, since investments in the field have been quite low. Moreover the administration of O.T.E., that was responsible for the key decisions on these investments, was just a "political marionette", so a lack of long-term planning, on its part is evident.

The change of political parties in the government, in 1990, seemed to promise many changes. Among them telecommunications was announced to be a key sector in the new investment program. Unfortunately, until now (1991) there has been no real change, apart from a change of the administration of O.T.E. and a rise in the telephone rates to cover the budget deficit. It is a sad fact that, even after these rises in rates, only 80 percent of the total amount needed for investment in 1991 will be covered by O.T.E. The rest
will be supplied either by debt or from the Mediterranean Development Plans of E.E.C.

The current government attributes the "time lag" of change for the telecommunications industry in Greece to the fact that the utility (O.T.E.) is still operating under the previous "five year economic development plan (1989-1993)". The plans for 1989 and 1990 are a thing of the past and 1991 is almost over. The change of government and administration in the utility necessitated the reconstruction of the final part of the "five year plan".

The initial plan had proposed, among other things, investments of up to 420 billion drachma. These would be covered from the E.E.C. through the Mediterranean Development Plans (189 billion drachma, in total). But this subsidization proved to be an overestimate. The actual subsidization from the E.E.C. for 1992 and 1993 will be 16.7 billion and 7.7 billion drachma respectively (with a provision to be slightly higher). So for 1992 and 1993 where even more investments were proposed than for the earlier years of the five year plan, there seems to be an estimated deficit in the budget of the utility of 38 billion and 41 billion drachma respectively.

The reconstruction of the final part of the "89-'93 plan" shows a definite intention to improve the telephone service. This "new plan" allows for the installation of 270000 lines (230000 of them will be digital) in 1991. Some new international services will also be provided, such as:

a) (1) A satellite TV link between Greece-Cyprus.

(2) A mobile satellite station for image and data transmission.
(3) An international Lines' Switching Board.

b) Multiplexing of digital lines.

c) Underwater digital lines with the cable network EMOS-1.

And also some completely new (at least for Greece) services, such as:

a) Expansion of the HELLASPACE network. A network that sends "telex type" messages in big packages, so that it reduces the cost to the user.

b) (1) Installation of the HELLASCOM network (for data transfer).

(2) Construction of video-conferencing studios.

(3) Installation of VAS systems, such as:

- Video-text.
- Electronic Mail
- Digital Directory Assistance Service (DAS).

For the following years (1992-1993) the revised plan allows for the introduction or expansion of the following services:

1. Centers and modems for HELLASPACE.

2. HELLASCOM (expansion).

3. HELLASTEL (video text) (expansion).

4. DAS (expansion).

5. Introduction of GMDSS (security systems).

6. Reconstruction of HELLASRADIO.

7. Telepaging (The system HERMES, used all over Europe will be introduced).

8. Mobile Telephones (Construction of network bases for introduction of the GSM (European) system).
9. Development of the trunking of lines.

10. Introduction of calling cards.

11. The digital field (network) that has already begun to be installed in Piraeus will expand in other areas of Athens as well.

Of course some things, like the subsidization of lines that are close to the borders did not change. This policy, of keeping the rates low (in some cases even below cost) for some areas of "national interest" has not changed over many years. This policy will most probably not change in the near future. The effort to keep the rural lines at a lower rate has been a policy of all the recent governments. This has come about partly as a result of the policy of decentralization that became a necessity after the Sixties' migration of much of the population to the major cities.

The modernization and expansion of the existing network, are not the only things that the government has in mind, as we have seen. The most interesting change in the telecommunications industry of Greece in the last year has been the deregulation of a part of the market. A network of cellular telephones is planned to go into operation in two years. An invitation to submit tenders has already been issued.

This cellular telephone system, involving the use of cordless telephones, will be developed in Greece by two competing companies in cooperation with O.T.E., who will hold a 39% to 44% interest in the project.

The companies will have to pay some operation fees to O.T.E., which is also going to have the right to a percentage of their profits.
Subscribers to the service will be able to choose between the two companies, which will work under a competitive market scheme. It should be noted that this will be the first time that a part of the telecommunications market will not be immediately controlled by O.T.E.

If the funds needed for the implementation of all the parts of the "new plan" can be found, then the direction telecommunications are headed in Greece is indeed the right one. This can be seen from the forecasting that the technical department of the "Ministry for Transportations and Telecommunications" made, about the condition in which the telecommunications network is going to be at the end of this five year period. A summary of this forecast can be seen at the end of this paper in Table 1.

The concept of deregulation has nothing to do with the 1992 deadline, for free trade, imposed by the E.E.C. Actually this is practically not a deadline anymore since most of the changes that were expected, all over Europe, have either happened or will happen, before and after 1992. There is an effort to make this transition as smooth as possible so that the negative impact that might be found in some sectors from the "shock-period" will be minimized. Anyway, there will be no effect from this so called "1992 frontier" in the telecommunications services market, since supply of such services has been explicitly excluded as something which will be open to competition. Where there might be an effect is in the hardware market. The unification of the European market provides many market possibilities for the big European telecommunications companies. It will certainly change the supply
side of the market, since the access to other European markets will be even easier for these companies. The fact that Sweden is a possible future E.E.C. member makes this unified market even stronger and the potential effect of free trade even greater. We believe that the expected changes in the hardware market will have an effect also in the market for services. Just as the change in industry boundaries that came with the arrival of microwave and computer technology affected the telecommunications services market, the unified Euro-market will also affect the market for telecommunication services in the future. The change may not be as much or as immediate but the changes will come, and we believe that we should expect, if not help it.

IV. Economic Model

a) Why legal barriers to entry?

We are interested in analyzing a publicly-owned legislated monopoly supplying telecommunication services. We decided to focus on this kind of firm mainly because it is what exists now in Greece, and not because we believe that, for any of the vague reasons of "destructive competition" or "wasteful duplication" or "very small market size", this industry should be a protected monopoly.

The traditional "justification" for the existence of a publicly-owned monopoly protected from competition by law (a "legislated monopoly" for short) in the telecommunication industry is that telecommunications is a "natural monopoly". But while the features
of natural monopoly may very well explain the existence of a monopoly telecommunications services supplier, like O.T.E. (Telecommunication's Organization of Greece), they are not sufficient to explain the need for its legal protection from competition. If O.T.E. is a natural monopoly then its dominant industry position should provide it, by itself, with enough protection from competition. Thus it should need no extra protection, in the form of legislation, from market forces.

But there are some cases where a legislated monopolistic market (i.e. with legal entry restrictions) can be more efficient than the same market without restrictions. In fact what is required is quite a paradox, since on the one hand monopoly production should be the least-cost way of supplying the entire market, but on the other hand the monopolist is not able to survive if one entrant (or more) is allowed to compete away some of its customers. This is called "creamskimming" in the economic literature.

Following Hartley & Trengove (1987) some simple examples can illustrate the arguments that have been proposed to justify legal protection from competition. At their most persuasive, these arguments provide necessary, but not always sufficient, conditions for entry restriction to be an efficient way to organize the market. The consequences of restrictions on entry could be so detrimental to efficiency that they end up doing more harm than good. In all our examples we assume that all parties have access to the same kind of technology, something which is not too unrealistic.
One of the simplest ways to illustrate the argument is when both the monopolist and the potential entrant are supplying only a basic local telephone service for households with one line per household.

We suppose that the technology used is such that there are large fixed costs associated with producing any non-zero level of output, while variable costs per unit of output are constant. Then average cost per unit of output is declining as output expands, and the industry will be a natural monopoly. The cost of the exchange would constitute a fixed amount which must be incurred, but which might not increase until many additional households are connected. The variable cost will be the cost of adding a household to the existing network. In such a case the average cost will decline continuously with output and the monopoly will be immune to challenge by potential entrants using the same technology.

If we assume that variable costs rise as the number of employees increases, say because of increasing principal/agent problems, or increasing management and information costs, then we will have another version of the model, again with a large fixed cost, but now the variable cost per unit of output will increase as output expands beyond some level. We illustrate this type of outcome in Figure 1, where average costs as a function of output, AC(q), will initially decline, but they will eventually rise as the variable costs become a greater part of the average cost with increases in output.

For levels of output at least up to \( q_m \), cost minimization will require that all output be produced by one firm. For further
increases in output, average costs of production will begin to rise. Eventually output will reach a level \( q_1 \), where it will be cost minimizing to have two equally-sized firms supplying the market. At the level of output, \( q_1 \), the savings in variable costs from operating two smaller firms will just offset the fixed cost of starting an additional firm. Further increases in output beyond \( q_1 \) will be supplied optimally by two firms up to some new output level, say \( q_2 \), beyond \( 2q_m \), when three firms will be optimal, and so on.

Now we assume that the demand can be written as a function, \( d(q) \), and that it intersects the average cost curve \( AC(q) \), at a level of output, \( q_e \), between \( q_m \) and \( q_1 \) (see Figure 2). We assume that the (government-owned) monopolist makes zero profits and supplies all that is demanded at the price he sets. Then output will be \( q_e \) at the price \( AC(q_e) \). By the definition of \( q_m \), as the output level at which average costs are minimized, the average costs for the monopolist \( AC(q_e) \) must exceed the average costs at the smaller level of output \( q_m \). An entrant could produce \( q_m \) and cover its costs by charging \( AC(q_m) \). This price would undercut the monopolist and, if some of his customers left him to buy from the entrant, the monopolist would not be able to cover his costs at the initial price. It would be more efficient to produce the whole output with one firm, but if there is freedom of entry into the industry, that firm would not appear to be in a secure position. The monopoly then is said to be "unsustainable".

Up till now, in our example, we were faced with economies of scale, as a result of the fixed costs. If we assume that the monopoly
FIGURE 2
is supplying several products simultaneously, like trunk and local calls, data transmission, and broadcast of TV and radio signals, then we may face a case with economies of scope. Production is said to be characterized by economies of scope when the costs of producing two or more goods in specified quantities in separate firms exceeds the costs of producing those same outputs in one firm. Economies of scope arise when the same facilities can be used to produce multiple outputs.

In this case we suppose that the costs of production are characterized by economies of scope up to some point, but eventually average costs begin to rise, with increasing output, for one or more of the jointly produced outputs. Again the monopolist can be undercut by a potential entrant producing outputs at a level where average costs are at a minimum. This multi-product monopoly is not "sustainable" even though it is a more efficient way of serving the market.

As we have seen, there are cases were legal restrictions on entry can be justified, on grounds of economic efficiency. But there is still open the question of what will be the cost of these restrictions. If the industry behaves like (or is close to) a "natural monopoly", then the costs, in terms of resource misallocation, might be small. If not, then the potential costs can be anything from big to substantial, depending on the case.

In the case of the telecommunications market we found in our brief historical analysis nothing to support the claim that it is a natural monopoly. On the contrary, we have seen that everywhere
competition was permitted it occurred and it also fostered both technological change and better service.

Many econometric studies have attempted to test for the presence of natural monopoly in telecommunication services. However Evans & Heckman (1983) have raised very serious doubts about the relevance of most if not all of these studies. They all measure the output as a weighted bundle of goods. In a simple example Evans & Heckman show that the industry would appear to display economies of scale even though one good is produced under constant returns to scale and the other under diseconomies of scale.²

Specifically, consider a firm producing two outputs. One, say good A, can be produced with constant returns to scale and another, say good B, with decreasing returns to scale. If demand shifts from good B to good A then fewer resources could be used to increase the output of good A than are released by the decrease in the output of good B. Thus the weighted bundle of outputs can expand while the level of employment of factors in the industry contracts. This way the industry would appear to display economies of scale even though this is certainly not the case. The end result of this simple model is that any econometric study of the industry which has not taken this multi-product aspect into account must have its results reappraised under this "new" point of reference.

Another problem shared by many econometric studies of the telecommunications industry is that they take local and trunk calls as the only joint products. However, these have been identified as separate products only for regulatory purposes. From an economic
point of view, many other categorizations - such as voice versus data, business versus household calls, and calls classed by time of day or day of the week - would make more sense.

Moreover, if as a result of rate of return regulation or any other "external" interference, the firm does not attempt to minimize total cost, then estimates based on a total cost function might be invalid due to the existence of a bias due to the Averch-Johnson (1962) effect. The model Averch and Johnson used specifies that, when a firm is under a regulatory constraint, it will use more than the optimal amount of capital.³

Finally the fact that the existing data has been generated by monopoly suppliers legally protected from competition casts serious doubt on whether smaller more competitive and innovative firms would display the same cost characteristics. This concern seems particularly relevant in the case of a publicly-owned legislated monopoly. Protection of any monopoly (public or private) from market competition will reduce incentives to control costs and increase efficiency. These problems are aggravated when the monopoly is publicly-owned. The owners of a private firm always have an incentive to control costs and increase revenue. In a large privately-owned firm, the owners of the firm are not the managers, and the managers will have an incentive to increase profits so as to maintain their position and salary at the expense of profits. This tendency is mitigated, however, by the threat of takeovers.

In a publicly-owned firm the taxpayers are the nominal "owners" of the firm. However, the absence of an organized market where rights to the profits are continuously traded raises the costs
of obtaining information on managerial performance. Furthermore, taxpayers are not in a position to make a capital gain on an investment by buying an increased share in the firm and improving the performance of management. Although politicians will have some incentive to monitor the publicly-owned enterprises, this will tend to be with the aim of forcing the enterprise to cross-subsidise some groups of consumers in order to ensure that the political or social objectives of the government are fulfilled. These objectives will most probably come at a significant resource cost, something that the present economic situation of Greece cannot support, at least for a long time.

We now wish to briefly present a model of this process of political oversight of the telecommunications industry originally discussed by Hartley & Trengove (1986).

Instead of focussing on the various efficiency arguments as a justification for public ownership and legal restrictions on competition, which we already have shown to be weak, we will turn our attention to the redistributive abilities of the control of such a monopoly. This will help us explain some features of the behavior of O.T.E. which are not consistent with the assumption that O.T.E. is maximizing economic efficiency. Evidence of that is the fact that some of the tariffs charged are more closely related (approximately) to average cost pricing than marginal cost pricing.
b) Monitoring the state enterprise

We shall keep the same framework as in Hartley & Trengove (1986) and assume that the "politicians" determine the prices at which the output of the utility (in our case telecommunication services) will become available to the general public (consumers). At the same time we assume that the utility administration decides the quantity of that output (adjusted for "quality" conditions which are difficult to measure) that will be available for consumption at that price.

By using the S. Peltzman (1976) method it is supposed that the "politicians" maximize political support, given by:

\[ G = G[CS_1, CS_2; \pi - M], \]
\[ G_{1,1} > 0, G_{1,2} > 0; G_2 > 0. \]

where \( CS_1 \) is the consumer surplus that group1 gets from the consumption of the utility product, \( CS_2 \) is the consumer surplus of group2, \( \pi \) is the difference between total revenue and total cost of the utility, and \( M \) is the government expenditure on monitoring. The argument \( \pi - M \) represents the interests of the taxpayers or those of the marginal recipients of general government expenditure. Finally \( G_{1,1} \) and \( G_{1,2} \) are the differential political influence of the consumers of the utility output.

Following the literature on the behavior of trade unions, it is also assumed that the objective function, that the workers of O.T.E. aim to maximize, is \( V(w, L) \) with:

\[ \frac{\partial V}{\partial w} > 0, \]
\[ \frac{\partial V}{\partial L} > 0, \]
where L is the number of employees of the utility, and w is the wage paid to them. The overall objective function of the utility balances the interests of the workers with those of the management which is assumed to desire additional output. This leads to an indirect objective function $F(w, L)$ with:

$$F(w, L) = E(L, V(w, L)),$$

$$\frac{\partial E}{\partial L} > 0,$$

$$\frac{\partial E}{\partial V} > 0,$$

$$\frac{\partial F}{\partial w} > 0,$$ and

$$\frac{\partial F}{\partial L} > 0.$$  

This will represent both the preferences of the administration of O.T.E. (directly) and the preferences of the workers or at least those of their union (indirectly).

By assuming that the analysis is made in a short-run time horizon we allow only one factor of production to vary and this is labor. Investment problems were ignored in this model only to keep the analysis simpler. This means that there will be no X-inefficiencies, which usually arise due to inappropriate factor input mixes. But there can still be inefficiency due to an inappropriate output level. So total costs will be $wL$ and the output will be given by the short-run production function, $Q(L)$ where $Q(L)/L$ increases monotonically up to some value $L^*$ and then decreases monotonically to 0 as $L$ tends to $\infty$, $Q(0) = 0$, and $Q(L)/L$ tends to $Q'(0)$ as $L$ tends to 0 with $0 < Q'(0) < \infty$.

A case of third degree price discrimination is discussed in this model. That is, there are two distinguishable consumer groups, each of which can be charged a different price. The politicians are setting
prices, and the level of monitoring, while the utility determines output and wages. Our attention is restricted to the simplest case where the politicians monitor only total output, although it might be possible for them to monitor also the amount of rationing to each consumer group.

The problems of the utility and politicians' optimization are then presented. They are two distinct problems, even though they are very closely related.

It is assumed that the utility maximizes \( F \) subject to:

a budget constraint:

\[
w(L_1 + L_2) = p_1Q_1(L_1) + p_2Q_2(L_2)
\]

two demand constraints,

\[
Q_i(L_i) \leq D_i(p_i) ; i = 1,2
\]

and the monitoring condition,

\[
Q_1(L_1) + Q_2(L_2) \geq D_1(p_1) + D_2(p_2) - H(M)
\]

It is assumed that a common wage is paid to both employee groups, and that demand and supply are independent (each demand depends on its own price only and so does the corresponding output). 7

Politicians face a different maximization problem. They are choosing \( p_1, p_2 \) and \( M \) to maximize:

\[
G(L_1(p_1,p_2,M)) = \int_0^{D_1^{-1}(q_1)dq_1} p_1Q_1(L_1(p_1,p_2,M)),
\]
subject to the constraints: $M \geq 0$ and $w(p_1, p_2, M) \geq w_0$.

Although there appear to be numerous possibilities, the structure of this optimization problem is discussed in terms of the response of utility employees as politicians lower the output prices. The way this discussion proceeds is by examining one by one the various possible cases. First it is assumed that there is no monitoring and no rationing. Both $p_1$ and $p_2$ are initially set so high that the outputs to both groups of consumers are constrained by demand. As prices are lowered O.T.E. may begin to ration one or maybe even both consumer groups. Then the case in which politicians monitor the output that is consumed by both consumer groups is examined and finally the case where the more subsidized group is the one that is rationed.

Until the last part of the model the political trade-off between consumer surplus and taxation was incorporated in two distinct ways. The trade-off was explicit whenever the monitoring expenditure was non-zero, and it was implicitly embodied in the assumption that utility costs match revenues so that any capital investment is funded by the taxpayers. In the last part it is assumed that the politicians have available explicit tax/subsidy instruments to enable them, if they so desire, to make sure that the utility raise enough revenue from its operations to fund any necessary capital investments.\(^8\)
The budget constraint then is revised to:
\[ w(L_1 + L_2) \leq (p_1 - T)Q_1(L_1) + (p_2 - T)Q_2(L_2) \]
where \( T = t_p \) is the per unit tax levied on output (equal to a tax on turnover at a rate of \( t \) per cent). From the utility's point of view a change in \( T \) has the same effects as an equal but opposite change in \( p \) except that the demand and monitoring constraints are not changed. So, if the utility is constrained by demand, or is monitored, changes in \( T \) will affect only the wages, while changes in \( p \) will affect both wages and output.

The politicians problem now has one more first-order condition, which corresponds to the additional decision variable. In this case politicians will choose \( p_1, p_2, T, \) and \( M \) to maximize:

\[
\begin{align*}
G &= \int_{0} Q_1(L_1(p_1,p_2,M)) \frac{D_1^{-1}(q_1)}{dq_1} - p_1Q_1(L_1(p_1,p_2,M)) \, dq_1 \\
&+ \int_{0} Q_2(L_2(p_1,p_2,M)) \frac{D_2^{-1}(q_2)}{dq_2} - p_2Q_2(L_2(p_1,p_2,M)) \, dq_2 \\
&= T(Q_1(L_1)+Q_2(L_2))-M \\
\end{align*}
\]

s.t. \( w \geq w_0, \)
\[ M \geq 0. \]

As before first the case where there is no monitoring by the politicians is considered, and then the case where there is monitoring. In this first case so long as output is constrained by
demand, decreases in price increase output, while increases in taxation decrease wages and leave supply unchanged. This means that politicians will decrease p and increase T so that if ultimately a demand constrained solution comes up it must be the case that w is driven to w₀.

In the case where politicians find it worthwhile to monitor the utility it is implied that wages are set at w₀. While previously taxpayers could only be advantaged by reductions in the monitoring expenditures, at a consequent cost to consumers, now the availability of a tax offers the possibility of improving the position of both groups. This might happen, because of a rise in price along with an increase in monitoring (to raise supply) so that the net changes to consumer and the government budget surplus are non-negative.

Finally, the "civil service" variant of the model is discussed (i.e. the case where political support could be maximized by the setting of a zero price and subsidizing the whole wage bill of the utility).

But the tolerance of taxpayers to further subsidies will eventually diminish sufficiently to offset the political gains from increases to consumer surplus. Or it might be the case that the demand for the unpriced bureaucracy output might be totally satisfied. In either case wages will exceed the competitive level and there will be queues for civil service employment positions.
c) Concluding remarks.

The model presented so far displays two major characteristics. Firstly, it assumes objective functions for both politicians and state enterprises that reflect different incentive structures, inherent in the state-owned enterprise. As a result of this, these objective functions deviate from profit maximization. Second, they allow the two sets of decision makers to have control over distinct decision variables. Thus the model is able to explain a number of real world attributes of these institutions, provided the initial assumptions also are consistent with the real world. Some of these are:

- demand is frequently rationed by means other than price;
- a major focus of the monitoring effort of politicians is their endeavor to force the utility to supply output at the specified price, without excessive demand rationing, or other forms of product quality degradation;
- utility workers may earn wages above the competitive level, though the monitoring efforts of politicians may reduce or even eliminate those wage "rents";
- when utility prices are used as a means of cross-subsidizing different consumer groups, those benefiting from the subsidy will frequently be subjected to quantity rationing by the utility;
- when consumers are a favoured (disfavored) group, the size of their implicit subsidy (tax) will vary inversely with their elasticity of demand;
• the interest of managers in the consumption of non-pecuniary benefits can lead to over-expansion of production and an inappropriate choice of factor inputs;
  • this over-expansion of production can also be associated with a failure to value capital inputs in the absence of explicit shareholders;
  • because of the political imperative to keep the prices of utility outputs low, utilities operating in regions of short-run increasing returns will have prices equal to average costs, no wage rents and no demand rationing;
  • It is also shown in the Appendix part of the Hartley & Trengove (1986) model that the utility will generally have a clear incentive to achieve engineering efficiency for a given factor input mix, but it will have a lesser need for experts in the selection of economically efficient input combinations. This means that there will be implications for the way certain skills are rewarded within the hierarchical structure of the utility.

There are also implications for the distribution of benefits arising from the use of the public enterprise form to provide the service demanded by consumers. One way of measuring these distributional effects is to compare the outcomes for each interest group against their prospects in the event that prices were set equal to marginal costs and rationing was eliminated while the politically more favoured consumer group(s) is (are) likely to be advantaged. The employees and managers of the utility are also likely to prefer a publicly owned monopoly to competitive private firms. When marginal taxpayers are a more diffuse group than
consumers, they are likely to have less political influence. As a result they will most probably be called upon to fund capital investments of the enterprise while consumers are offered output at subsidized prices.

Finally, it must be emphasized that the model presented describes a class of government interventions which are different from market outcomes. This means that there will be a cost due to inefficient resource allocation. The origin of the institutions being studied ought to be related to the rearranged distributional outcomes. As a matter of fact almost any outcome can be rationalized using a sufficiently complicated objective function for the politicians. Unfortunately this will come at the cost of producing few refutable propositions.

V. Conclusions.

In the last part of this paper we ask if any or all the arguments presented above agree with what really happens in Greece.

Let's start with the assumptions, made at the beginning of the model about the objective function that the workers of the utility, or their union representatives, aim to maximize. The assumptions that their utility is increasing as higher and higher wages are obtained and more and more workers are employed is consistent with the attitude that the workers of O.T.E. seem to have. In recent years the union representatives of the workers of O.T.E. have definitely shown with their attitude that they are looking for higher
wages and a bigger labour force, actually their latest strike was motivated from their demand for higher wages.

The assumptions made about the objective function of the utility are next. The fact that the interests of both the management and the workers are represented in this objective function is absolutely correct but in the case of O.T.E. this does not cover the whole picture. This is because the decision process involves also the representative committee of social control (ΑΣΚΕ) and the regional committees of social control (ΠΕΣΚΕ). These committees represent (or are supposed to represent) the interests of the consumers of the utility output and the taxpayers.

Throughout the presentation of the model it was assumed that the capital stock was fixed. This meant that the only factor of production (that could be changed) was labor. Actually it would be good to include variable K in the model but it is very difficult to do so because discussing investment introduces intertemporal dimensions to the problem and vastly increases the complexity of the analysis.

The assumption that the politicians set the prices for the output of the utility is absolutely consistent with the case of Greece. Actually the rates that O.T.E. is charging are considered by the politicians to be a "tool" for the implementation of the public policy that is deemed appropriate.

Another assumption that we made was the one that suggested that the administration of the utility is deciding on the amount of output that the utility will produce, after the politicians set the price for it. This can be considered as true and consistent with
reality since O.T.E. can always ration the supply of output if it wants to, so practically it decides on the amount of output taking the prices as given.

After having checked the assumptions of the model for consistency (and indeed they are consistent), we shall continue with the checking of the intuition behind the conclusions of the model. Practically there are nine concluding points and they are all summarized in the last part of the previous section. We are going to check them one by one, starting from the top and working our way down to the end.

As we have seen demand is indeed rationed by O.T.E. in Greece. There is excess demand not covered from O.T.E.; in 1988 there were 1 million applications for a telephone line that where "on hold" (both for business and households). The development plan for the next few years specifies that in 1993 there will be only 300,000 applications "on hold", mainly from households. As usual there is a tendency to satisfy first the business demand for telephone lines. And while in 1988 the average waiting period was 5.5 years, in 1993 the estimated average waiting period will be 1 month for business lines and 4-6 months for households. Thus, the first of the concluding points is true for the case of Greece.

The second point suggests that a large part of the monitoring effort of the politicians revolves around an attempt to force O.T.E. to supply output at the specified price, without excessive demand rationing or other forms of product quality degradation. This is true in our case, the political cost of dissatisfied consumers (which are
also voters) is high enough to justify this monitoring effort on the part of the politicians.

The next concluding point is also consistent with our case. Utility workers are also voters and we know that it is quite common for state owned enterprises to pay salaries above the competitive level. That's why there is excessive demand for these positions. These wage "rents" come mainly, at least in the Greek case, from "feather-bedding" and excessive overtime. It is also stated in the model, that the monitoring efforts on the part of the politicians may eliminate the wage "rents". In fact the increased monitoring from the politicians did not completely eliminate those wage rents, in Greece, it only reduced them a bit. Something which is still within the outcomes allowed by the model.

The fourth concluding point is also consistent with the Greek case. This point states that if a consumer group is more subsidized it will be the one that will also be more rationed. In our case the lines that are out in the countryside, away from the city centers, are the ones that are subsidized compared to the urban lines. We can consider this to be the case in Greece because even though consumers pay the same rates for the use of both lines the actual cost for installing a line high up in a mountain or in a small island near the borders is higher than the cost of a line in the center of Athens. If we also consider that in the investment program of O.T.E. the main targeted areas are mostly urban we can see why the rural (subsidized) lines are also (and will be) more rationed.

The next point is only partially consistent with what happens in Greece. Let's first consider business lines to be the favored group
and the household lines to be the disfavored one. This is true because of the policy of less rationing of business lines than the household ones. An application for a business line is satisfied always much faster than one for a household line. A large corporation with many lines and heavy traffic has a much lower elasticity in its demand for telephone service (since usually the total cost of the telephone lines occupied is quite low compared to the total revenue of the company) but it pays the same rates as a small company with one line and a very low amount of traffic. On the other hand in the case of the unfavored group (household lines), when the elasticity of demand for telephone service is low and that is in the higher incomes (usually with more than one line per household) then the rates are becoming higher and higher. While when the elasticity is high (for example in a low income household with one line and low traffic) then the rate is the lowest possible.

The next two points can be considered at the same time since they can be considered as interconnected. The interest of managers in the consumption of non-pecuniary benefits might lead to overextension of production which can be associated with a failure to value capital inputs. In Greece the expansion of production will mean higher income for O.T.E., since it is not working to full capacity and it is facing a market with excess demand. This higher income usually means that the managers of the utility will be able to enjoy more non-pecuniary benefits. Better offices, more assistants (i.e. less work for them), higher social status (from managing a bigger firm),... are only a small part of these non-pecuniary benefits.
This overexpansion of the output can be associated with a failure to value the capital inputs, since there is an absence of explicit shareholders (the holder of the sole share of O.T.E. is the Greek State). This as a result might lead to inappropriate choices of factor inputs (factor mixes) and thus to inefficiencies and social costs.

The eighth point is one that we can't say whether it is consistent or not with the case we are examining and that's because the assumption on which it is based on does not hold in our case. Since O.T.E. is not operating under increasing returns\(^3\) we can't say anything about the rest of this point. We can just remark that there is a tendency towards average cost pricing. Actually this is one of the goals that the current administration has set for the future\(^4\), but there are still wage "rents", and there is still demand rationing.

The last concluding point seems to hold true in our case. It is not only the budget of O.T.E. that is externally specified (from the politicians). Sometimes the governmental policy is such that it specifies the exact amounts of capital and labour that will be used. This means that the factor input mix will be specified and that the best thing O.T.E. might do is to achieve at least engineering efficiency, for the given input combination.
Table 1. Condition of the telecommunications network in Greece at the end of 1993.

1. Telephone (voice) lines:
   a) Lines per 100 people.
      - 1988  38
      - 1993  55
   b) Telephones per 100 people
      - 1988  43
      - 1993  64
   c) Percentage of network digitized
      - 1988  ---
      - 1993  22%
   d) Unsatisfied applications for a line (connection).
      - 1988  1000000
      - 1993  300000 (no unsatisfied applications for business lines).
   e) Average waiting time
      - 1988  5.5 years.
      - 1993  1 month for business lines
               4-6 months for residential lines.
   f) Line problems per year per line.
      - 1988  .59
      - 1993  .35
   g) Repairs completed within 3 days.
      - 1988  84.6%
      - 1993  95%
h) Unsuccessful calls.
   - 1988  >3%
   - 1993  ≈1%

2. Telegraph lines:
   - 1988  2196087 telegrams
   - 1993  continuous reduction

3. Teletypes:
   - 1988  24138 lines
   1942 unsatisfied applications for a line.
   - 1993  <30000 lines
   ≈300 unsatisfied applications.

4. Fax lines:
   - 1988  2805 installed by O.T.E.
   15000 total in Greek market
   - 1993  25000 installed by O.T.E.
   100000 total in Greek market

5. Paging
   - 1988  3064 subscribers
   301 unsatisfied applications
   - 1993  15000 subscribers
   no unsatisfied applications

6. Video conferencing:
   - 1988  1 studio
   - 1993  4 studios owned by O.T.E.
   5 privately owned studios
7. Data transmission
   a) HELLASPAC
      - 1988  ---
      - 1993  6200 subscribed
   b) HELLASTEL
      - 1988  ---
      - 1993  1600 subscribed
   c) HELLASCOM
      - 1988  ---
      - 1993  1500 subscribed

8. ISDN
   - 1988  ---
   - 1993  "Pilot network" (experimental) with
           400 subscribed.

9. Nominal rates of return to the capital
   - 1988  10%
   - 1993  11%
Endnotes

Chapter I

1. At least compared to the size and the importance of the sector.

Chapter II


2. Ibid., p.p. 33-35.


13. The transistor was "invented" in 1947 (in the Bell Labs), the microprocessor in 1971, the integrated circuit in 1959. The first transistor system developed by C.N.E.T. dates from 1957. In 1985, telecommunications equipment accounted for 26 percent of the consumption of integrated circuits in France.


**Chapter III**


**Chapter IV**

1. Strictly speaking, the efficient level of output for the monopolist will be where the demand curve intersects the the marginal cost curve. Since this point is also between $q_m$ and $q_1$, the argument will not be affected. Note that for $q_e$ between $q_m$ and $q_1$, marginal cost (and the efficient monopoly price) will exceed the average cost and the monopolist will be making a positive profit.


4. We should note however that S. Peltzman includes firm profits in the political support function to represent the self interest of the regulated firm, whereas we include profits to represent the interests of taxpayers.
5. The extension to three or more groups of consumers is straightforward though tedious.

6. The approach is unsatisfactory to the extend that no attempt is made to detail the workings of the political "black box", represented by G. One study which does this is Denzau & Mackay (1980), though the structure it seeks to analyze is rather different from the one conceived in this paper.

7. These assumptions can be relaxed, but at some cost of additional mathematical complexity, and without adding much insight.

8. Ideally, we would endogenize the level of capacity expansion to meet increases in demand. However, this would take us beyond the present analysis.

9. For example, in those instances were consumers appear to benefit little from public monopoly, yet workers receive wages exceeding the competitive level, our model might imply a degree of irrationality of political behavior since politicians would then prefer a competitive market and possibly even private monopoly. Of course this defect can be remedied by introducing the interests of the utility employees into the political support function.

Chapter V

1. We are not the first to do this, but unfortunately we find it quite rarely implemented in the economic literature that was reviewed.
2. The assumption of a single factor of production ruled out the possibility of "X-inefficiencies".
