BENEFITS OF COMPETITION

by

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BENEFITS OF COMPETITION

Zander Arkin

INTRODUCTION

Regulatory reform has, to varying degrees, increased competition in traditionally regulated industries including financial services, transportation, telecommunication and energy. This trend toward deregulation has been driven by improvements in technology and the marketplace as well as cyclical economic and political change. Because traditionally regulated industries are very large and usually provide essential goods and services, their health and efficiency have serious ramification for the economy as a whole and there has been extensive research, analysis, and debate, both ex ante and ex post, concerning the effects of deregulation and the value of competition in different industries and markets. In particular, there has been a great deal of speculation and debate about the results of regulatory reform in the airline, telecommunications, and natural gas industries. Most of the discussion has been critical, concentrating on the costs and difficulties involved with deregulation. Much less has been said about the benefits resulting from regulatory reform and increased competition.

The passage of the Energy Policy Act (EPAct) of 1992 began a new era in electric power competition. The Federal Energy Regulatory Commission (FERC) now has the authority to order utilities to provide transmission service for competitive transactions between independent buyers and sellers of wholesale power. Further, the competitive power generation industry, which began with small scale cogenerators and renewable energy resource technologies under the Public Utility Regulatory Policies Act (PURPA) of 1978, has been expanded to include Exempt Wholesale Generators (EWGs) which do not need to fulfill the same criteria as the original PURPA Qualifying Facilities (QFs). Currently, California and Michigan, as well as a handful of other states, are considering the advent of retail wheeling, allowing end-users to enter the new competitive power market.

The change to a more competitive electric power industry and a healthy competitive power market will require the development of a number of new mechanisms and institutions. Many issues remain to be resolved about the transition, and there is considerable apprehension about the possible problems and costs of electricity deregulation among individuals in government and industry as well as consumers. The purpose of this paper is to describe and evaluate the benefits of increased competition as gleaned from the airline, telecommunications, and natural gas industries, and in so doing, to identify the goals of electricity deregulation.

The benefits that regulatory reform and increased competition typically provide can be classified under three categories. These include "X-efficiency," allocative efficiency, and dynamic efficiency. Each category of benefit is defined and explained in the paragraphs below.
EFFICIENCY AND X-EFFICIENCY

Recognizing that full efficiency is never obtained, X-efficiency is defined as the efficiency with which goods and services are produced given the combination of inputs firms employ in their current operations. When a firm is operating inefficiently, it could produce more simply by improving its use of its given combination of inputs. To the extent that firms do not produce with maximum attainable X-efficiency, both society and firms lose the potential benefits of increased output at no additional cost.

Under traditional regulation, firms in an industry are protected from competitive entry and are guaranteed a return on their investment in exchange for meeting an obligation to serve and other requirements. These protected monopolies and oligopolies lack the incentives of competition to search for savings and are burdened by the need to observe regulatory mandates. Regulated firms typically have high labor costs, low operational efficiency (compared to the potential efficiency of existing operations), must expend resources on recording and reporting data, and incur other costs associated with economic regulation. These costs are passed on to consumers in higher regulated prices. Regulatory reform and the introduction of competition can decrease regulatory burden and increase the incentives to reduce costs by improving the efficiency of their existing operations.

ALLOCATIVE EFFICIENCY

Allocative efficiency requires that firms use the best possible combination of inputs (e.g., capital and labor) to produce a given amount at the least cost. Industry in general is allocatively efficient when resources are allocated to their highest value uses. Under regulation, the prices for labor and capital may become distorted, artificially changing their relative costs. This may occur as labor and management negotiate under non-competitive conditions where management is not so heavily influenced by the need to cut costs as the need to ensure reliable service. Further, the rate at which firms are allowed to expense the depreciation on capital may distort the price of capital from the firm's perspective. The distorted prices for labor and capital which often occur under regulation result in an inefficient allocation and use of resources among firms. The allocative efficiency problems resulting from distorted capital investment incentives under regulation are discussed in more detail below.

Allocative efficiency also pertains to the distribution of finished goods and services within society, where goods and services are efficiently allocated when distributed to all those who value them at least as much as they cost, and, when supplies are scarce, to those who value them most. Regulation can affect the prices of firms' outputs to consumers, either by distorting production costs or through direct price control, causing inefficient allocation of goods and services in the market. The ideal or efficient price in any market is the price that induces individuals to consume the good or service in the quantity at which the marginal cost to society of producing and consuming the good or service just equals the marginal benefit. In traditionally regulated industries, prices are set and changed periodically by government commissions to cover
the total projected expenses of the industry and to provide a reasonable return to the owners of capital. This process is vulnerable to lag behind rapidly changing markets or to err based on inaccurate estimates or predictions of costs. Further, instead of setting prices to induce efficient market behavior, regulated prices are often set to pursue a variety of political and social goals from price stability to income redistribution.

These artificially set prices do not reflect costs and thus send distorted signals to consumers, who are then likely to either over- or under-consume the good or service, depending on the way in which prices have been distorted. This causes economic welfare losses as firms either over-produce, resulting in the marginal value of output being lower than the marginal cost, or under-produce at a marginal cost lower than the marginal benefit to society of producing more. In the latter case, welfare losses take the form of benefits foregone.

In a market which is competitive (and in which there is perfect information and all significant costs are internalized), firms will bid the market price down toward the marginal cost of producing at a given level of output, and consumers will buy up until the point where the marginal benefit to them of consuming another unit equals that price, no more and no less. At this competitive equilibrium, where marginal cost equals marginal benefit, social welfare is maximized and resources are utilized efficiently.

Under traditional cost-plus regulation, the cost of any investment, whether it turns out good or bad, is passed through to consumers in regulated rates that ensure owners of capital a "fair" return on their investment. Traditional regulation therefore places the burden of investment risk on end-users rather than on those making investment decisions and the owners of capital. This reduces the incentives for regulated firms to make careful, efficient investment decisions, and/or places the burden on regulators, rather than on industry and investment professionals, to determine which investment proposals are good and which ones are bad.¹

Further, this system of risk allocation can result in "demand-perverse" pricing. Under traditional rate-of-return regulation, when demand either falls or rises less than projected, regulated per-unit prices are increased to pay for the original investment in capacity. This means that prices are highest when capacity is most available, and lowest when capacity is constrained. This is neither an efficient nor sustainable system.

Finally, a source of investment inefficiency that deserves particular attention in regulated industries is the rate at which firms are allowed to expense the depreciation of plant and equipment. Typically, firms are required to depreciate capital at a constant rate.² Thus, the regulated rate of depreciation is usually artificially slow. This makes capital investments more

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expensive and can lead to over utilization of older, less efficient plant and equipment. Particularly in industries where technological development is rapid (or potentially rapid), this can result in a great opportunity costs to society. Under competition, firms are free to dispense of capital as they wish, and are able to more rapidly write off depreciation expenses, allowing firms and consumers to benefit from more modern and efficient plant and equipment.

By allowing business professionals to make investment decisions on their own and allocating the market risks to professional risk managers and owners of capital, competition ensures more efficient decisions, and relieves consumers of the burden of bad investments.

DYNAMIC EFFICIENCY

Dynamic efficiency is the increase in productivity, or the improved ability of firms to create value with given resources, resulting from innovation. The incentive and ability of a regulated industry to innovate are limited. New initiatives can only be taken if approved by a few top-level industry managers and regulators. Further, since these high level decision makers necessarily get their information from individuals on lower levels and outside of the industry, approval tends to be contingent on there being general support for the change. But change is risky and there are always strong arguments against it. Further, the incentive to innovate is driven largely by the prospects of above average profits, which are limited under rate-of-return regulation. Finally, since regulated industries are usually very large, prospective changes usually imply significant redistribution of existing rights and benefits, resulting in considerable pressure to maintain the status quo.

Under competition, innovation does not require the approval of a small number of top managers or the general support of the whole industry. Individuals and firms can take initiatives on their own, obtaining financing from venture capitalists or other professional investors seeking opportunities for extraordinary returns. Many initiatives fail, and the costs are paid for by those who chose to invest. But those initiatives that succeed often provide benefits to society well beyond those to investors and individual innovators. Not only can dynamic efficiency improvements increase the long-run rate of decrease in per unit production costs, which along with price competition contribute to decreased consumer prices, it can also increase the ability of firms to create value by inducing improvements in the quality and variety of goods and services offered by the industry.

Monopolies tend to pick a given direction for the future and stick to it. This can never be optimal ex ante in the face of uncertainty. The needs and tastes or consumers change over time, as do the technology and capabilities of the industry. Further, consumers value having a

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3 Ibid. pp. 273-5.

variety of options to choose from. Variety, "matching multiple products to the heterogenous needs, desires, and risk-bearing capacities" of different customers, is one of the most valuable attributes of a healthy competitive market. Allowing for choice provides opportunities and incentives that induce people, and firms that serve them, to operate more efficiently. Competition for customers will induce firms not only to improve the quality, but the variety of its products and services. The traditional "one-size-fits-all" tendency of monopolies is thus replaced by niche competition and the relentless search by competing firms for market share.

The following sections of this paper will describe the benefits of competition in the airline, telecommunications, and natural gas industries, as well as the experience with privatization and deregulation of the electricity industry in the United Kingdom. As mentioned above, there remains a great deal of debate *ex post* about the successes and failures of regulatory reform in the many industries which have undergone the transition from regulation to greater competition. In general, is very difficult to identify and isolate the effects of deregulation from the effects of changes occurring independent of deregulation, such as other public policies affecting the industry, overall macroeconomic conditions, and endogenous technological and social change. The analysis becomes particularly difficult where deregulation has been accompanied by substantial changes in firms' operations and the quality and range of goods and services offered by the industry. 

Throughout this paper, arguments will be presented based on simple and straightforward interpretation of available statistics and other evidence.

THE AIRLINE INDUSTRY

Prior to deregulation, the Civil Aeronautics Board (CAB) restricted entry into the industry by requiring airlines to petition for route authority, or the right to provide service between two cities. Petitioning firms would have to prove that entry into a route was "in the public interest" and would not harm incumbent firms. This involved an expensive, time consuming, often arbitrary process with uncertain results, making attempts by new firms to enter the market extremely difficult. For established firms, authority to provide service on "dense," lucrative routes was difficult to get, especially since there was usually a healthy incumbent serving that route. Route authority for service to small communities on "thin" routes was easier to get, and carriers serving such routes were often subsidized by the CAB. Sometimes, authority to serve a lucrative route was granted to boost up a financially distressed carrier, rather than on the merits of the proposal.

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Firms were subject to traditional cost-of-service regulation and fares were set to ensure profit, rather than reflect costs, producing inefficient market signals. For example, if airline load factor (the proportion of seats filled on aircraft) went down, increasing average costs, that was grounds for a fare increase, resulting in demand perverse pricing.\textsuperscript{8} Generally, fares for all markets were adjusted evenly across the board, rather than individually to match costs for each route or market. This entailed a great deal of cost shifting. Long-haul fares were set above cost to subsidize short-haul fares. Similarly, dense markets were used to subsidize thin markets. Thus, short-haul passengers over-consumed air travel and long-haul passengers under-consumed air travel, resulting in allocative inefficiency.

Everyone paid the same price for a ticket on a particular route regardless of when they bought the ticket or when they travelled. Because tickets for a mid-day flight bought ahead of time by discretionary vacation travelers were less valuable to them than the same tickets bought at the last minute by non-discretionary business travelers, this uniform pricing of tickets also resulted in an inefficient allocation of resources. Unable to independently set prices, carriers serving the same connection competed by increasing flight frequency, which decreased load factor, decreasing X-efficiency and increasing costs and fares. The obvious problems in the interstate market under CAB regulation, and the apparently lower prices and healthy profits which characterized the unregulated intrastate market, spurred the move to deregulation.

In 1976, the CAB began to deregulate the industry by relaxing operating requirements for charters, which began to compete with large carriers on major routes for discretionary travelers. Large carriers were then allowed greater flexibility in offering discount fares for passengers who could purchase tickets far ahead of time and meet minimum stay requirements. In 1977, the CAB began to allow carriers more discretion to choose which routes they served, began considering fare proposals in awarding route authority, and made it easier in general for firms to receive route authority. The results of these early steps were positive, with increased traffic and lower fares despite an increasing rate of inflation.\textsuperscript{9}

In October 1978, the Airline Deregulation Act (ADA) was passed, initiating the phased elimination of the CAB and economic regulation of the airline industry. The CAB’s authority over routes ended in 1981, and its authority over fares ended in 1983. Carriers are now allowed free entry to whatever route they wish to serve and are free to set whatever fares they choose.

The Transformation and Improved Efficiency of Airline Operations

Competition among airlines has resulted in more efficient route structures, flight scheduling, and greater labor productivity. Figures 1a-1d show the trends in various measures of efficiency in the airline industry beginning in 1960. Revenue passenger miles per dollar of airline expense increased at a compounded annual growth rate of roughly 2.42 percent between 1963

\textsuperscript{8} \textit{Ibid.}, pp.51.

\textsuperscript{9} Airline Deregulation Act of 1978, 92 Stat. 1705.
and 1976 and 2.08 percent between 1976 and 1989. Labor productivity as measured by revenue passenger miles per employee increased at an annual rate of 2.27 percent between 1976 and 1992. The annualized productivity increase figure for the period between 1960 and 1976 was roughly 6.3 percent. Fuel efficiency as measured by BTUs per passenger mile increased at an annual rate of 1.07 percent between 1960 and 1976, and 2.8 percent between 1976 and 1991. Finally, the efficient use of capacity as measured by load factor increased from an average of roughly 53 percent during the pre-deregulation period between 1960 and 1976, to an average of over 62 percent in the 1976-1993 period.

While the expense and labor figures for the post-deregulation period are slightly lower than the corresponding pre-deregulation figures, several factors must be kept in mind when comparing them. Jet propelled aircraft, which generally fly faster and farther on less fuel than pressurized, turbo-prop engine aircraft, were first introduced into airline fleets during the sixties, and had already come to dominate the fleets by the early 1970s. This provided massive efficiency gains to airlines, dramatically decreasing the amount of labor hours and fuel used per passenger mile. Also during this time, the airline industry along with the rest of industry, enjoyed great
efficiency gains from the increased use of computers, which also lowered the amount of labor required per passenger mile. Increased use of jet engine and computer technology are likely to have been the most significant factors behind the decreased costs and increased labor productivity during the 1960s and early 1970s.

The efficiency gains achieved during the post-deregulation era have not received such large contributions from exogenous technological development. Instead, the nearly comparable rates of efficiency improvement in labor productivity and general expense, and the increased rate of fuel efficiency improvement and load factor, have been due to the elimination of unnecessary costs, development and implementation of hub-and-spoke networks and management’s vigorous search for savings throughout airline operations.

Employee Productivity

![Graph: Nominal Airline Wage Growth](image)

Under regulation, management had granted labor extremely generous compensation packages, favorable work rules, and considerable job security. In 1984, labor consumed an estimated 35% of every revenue dollar, constituting the single largest item of expense for airlines.\(^{10}\) Price competition, combined with the financial distress the industry suffered during the severe recession in the early 1980s and 1990s, forced management to seek, and labor to agree to, new terms between them. In general, labor has accepted lower wage growth and more flexible work rules in exchange for equity and profit sharing plans.\(^{11}\) The reduction in wage growth for airline employees during the 1980s is represented in Figure 2. In the period between 1972 and 1982, before the renegotiation between labor and management, airline wages grew at a compound annual rate of 6.58 percent. Since 1982, wages have grown at roughly 1.3 percent annually.

Since labor constitutes a large portion of total costs in the airline industry, bringing wages down to competitive levels represented a highly significant cost reduction. The increased incentives provided to workers through employee shareholder plans and profit sharing, and the flexibility given to management in deciding how to productively utilize labor have also contributed to productivity gains. Also important to note, the Bureau of Labor Statistics’ labor productivity figures measure output per employee and do not account for the increased use of

\(^{10}\) Value Line, January 1984.

\(^{11}\) Value Line, January 1984.
part time labor in the 1980s. Labor productivity figures for that period, therefore, understate actual improvements.

**Hub and Spoke Technology**

Hub-and-spoke networks only came into extensive use after deregulation when airlines were allowed the freedom to choose which routes they served. This innovation has allowed airlines fuller utilization of larger, more efficient airplanes by making it possible to fly passengers from various origins or spokes to the hub, and send the combined traffic onto the major destinations to which most are headed. As stated above, estimates for load factor, or the proportion of seats filled on airplanes, for the 17-year period following deregulation from 1976 to 1992 averaged 60.3%, compared to the average of 53.6% for the period between 1960 and 1975. This efficiency improvement occurred despite the significant decrease in demand for air travel during the severe recessions of the early 1980s and the late 1980s and early 1990s. Hubbing, and the increased efficiency in aircraft utilization, no doubt contribute to the continued increase in the rate of fuel efficiency improvement.

**Competition and the Search for Savings**

Airlines have also found other ways to reduce costs and improve efficiency. Since deregulation, airlines have increased their use of smaller jets such as DC9s on routes where distance and traffic levels make the larger 747s and DC10s less economic. Airlines have also moderated their use of jets in many thinner, short-haul routes in which they had been deployed under regulation, replacing them with pressurized, turbo-prop engine aircraft. For these shorter stage lengths, jets are less fuel efficient than turbo-prop engines and do not save as much time as they do on longer hauls. While passengers on these routes may dislike being deprived of jet service, using jets on these routes at frequencies suitable to serve business travelers is not yet economic. Airlines have also been actively retiring or selling older aircraft, and replacing them with new more efficient ones. In purchasing the new aircraft, many firms have begun to buy aircraft in large lots for less cost per aircraft, and then sell or lease unneeded ones to other airlines. Changes in aircraft procurement, use, and fleet configuration under competition have therefore also contributed to improved efficiency and lowered costs. 

**Pricing**

The efficiency gains and cost reductions resulting from increased competition have been translated through price competition into an overall increase in the rate of fare reduction for

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12 ATA Statistics for Scheduled Airlines.

The efficiency gains and cost reductions resulting from increased competition have been translated through price competition into an overall increase in the rate of fare reduction for air travelers as shown in Figure 3. During the post-deregulation period between 1976 and 1993, average fares as calculated by yield per passenger mile, decreased in real terms at an annual rate of 2.57%, which compares favorably with the annual rate of 2.45% for the period between 1960 and 1976. Again, in interpreting and comparing these figures, it is important to keep in mind the great cost reductions the industry experienced during the jet and computer revolutions under regulation, which came through to consumers in lower regulated fares.

Perhaps even more important than the overall fair decreases has been the greatly expanded flexibility in determining fares and the increased use of discriminatory pricing in the form of restricted discount fares as shown in Figure 4. In 1977, discount traffic accounted for roughly 37% of all traffic, and the average discount was 32.6% off full fare. In 1993, discount traffic amounted to 90.7% of the whole, and the average discount took 66.6% off full fare. Since the marginal cost of an airline seat is very small, little more than the cost of ticketing, a meal, and a little fuel, and airline seats are instantly perishable commodities, airlines have very strong incentives to fill scheduled flights as much as possible. By restricting discounts to passengers who can buy tickets a certain amount of time in advance and meet minimum stay requirements, airlines seek to attract passengers with higher price elasticities of demand or who otherwise would not travel at full coach fares, increasing the number of passengers and the on each flight. Average load factor in 1975, before so much discounting of fares was allowed was roughly 55%, but by 1993 it was roughly 62%, a significant improvement in X-efficiency. These new passengers are mostly vacation or discretionary travelers, or other customers on the margin who can meet the requirements for discount purchases. In effect, discount fare customers are offered a different service than full fare customers, and therefore represent a separate market for air travel.

Some have argued that the benefits of the increase in discounts have mostly gone to people who would have travelled anyway, and that the savings to consumers do not represent a
significant welfare gain, but are mostly an income transfer or a dilution of corporate profits.\footnote{\textit{see Brenner, Melvin, \textit{Airline Deregulation: A Case Study in Public Policy Failure}, Transportation Law Journal, 1988, vol. 16, pp. 200-233.}} Were this the case, the decrease in average fares would still constitute an improvement as relief to consumers from monopoly or otherwise supracompetitive fares. However, a greater proportion of people are flying than before deregulation, and more specifically, a greater proportion of travelers are choosing to travel by air rather than other modes of long-distance transport. As Figure 5 illustrates, the proportion of adults who reported having travelled by air in the last twelve months has increased significantly since deregulation, from 24\% in 1974 to 33\% in 1993. As shown in Figure 6, there has been no significant increase in passenger miles traveled on intercity busses, and there has been a large decrease in passenger miles travelled on Amtrak concurrent with continued vigorous increases in passenger miles traveled by air. This suggests that air travel has become a more attractive and accessible option to a wider range of customers.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure5.png}
\caption{Airline Penetration}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure6.png}
\caption{Air Transport vs. Competing Modes}
\end{figure}

Further, by restricting the number of discount seats on flights leaving during peak periods, airlines increase the availability of seating for passengers willing to pay the full coach fare during preferred travel times. This has increased the average fare on flights during periods where capacity is constrained, in effect resulting in a system of peak load pricing which helps to ensure that limited capacity is allocated to those who value it most. Pricing flexibility has resulted in improved efficiency of airline service allocation. Also, soliciting these additional ticket sales contributes to increased load factor, thereby lowering the average cost of airplane seats overall.\footnote{\textit{Supra note 7, pp. 62-64.}}

It has been suggested that unbridled price competition has been mainly responsible for the many bankruptcies, mergers and acquisitions which occurred during the 1980s, and has resulted in high levels of concentration with attendant higher average fares at many major airports. The implication has been that larger, stronger airlines have concentrated their operations
in particular airports, moved smaller, weaker competitors out with "to-the-death" price wars, and established "fortress hubs." Having dominated the markets on the routes extending from the hub, the airline then charges supracompetitive fares. The extra profits earned might then be directed toward below cost fares on more competitive routes to drive out competition and establish dominance in those markets as well.16

The General Accounting Office has performed a series of studies which conclude that fares at concentrated airports are significantly higher, 34% in 1992, than fares at airports where competition is greater.17 As shown in Table 1, the average yield per passenger mile at Charlotte airport, at which USAir enjoys 93% of the market share, was 28.1 cents, which was a full 71.4% higher than the overall yield at unconcentrated airports of 16.4 cents. To some extent the differences in costs are due to the differences in operations between concentrated and unconcentrated airports. Concentrated airports may have a larger proportion of short-stage flights, which have a higher cost per-mile than longer flights. When the GAO study attempted to control for these differences by comparing fares for flights of equal distance, the difference in average

### Table 1
Yields at Concentrated Airports

<table>
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<tr>
<th>Airport</th>
<th>Dominant Share 1988</th>
<th>Dominant Share 1992</th>
<th>Yield Cents</th>
<th>Difference from Average</th>
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<tr>
<td>Atlanta</td>
<td>92%</td>
<td>88%</td>
<td>27.7</td>
<td>69.2%</td>
</tr>
<tr>
<td>Nashville</td>
<td>62</td>
<td>77</td>
<td>23.1</td>
<td>40.9</td>
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<tr>
<td>Detroit</td>
<td>59</td>
<td>73</td>
<td>18.9</td>
<td>15.2</td>
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<td>Raleigh-Durham</td>
<td>69</td>
<td>82</td>
<td>25.7</td>
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<td>21.3</td>
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<td>Memphis</td>
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<td>Denver</td>
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16 see Dempsey, Paul, Airline Deregulation and Liaizes-Fare Mythology, 1991.

fares between concentrated and unconcentrated airports was still a significant 23%. The fact that concentration has been increasing at these airports since 1988 suggests the problem is getting worse instead of better. How much of this increased concentration is the direct result of deregulation and how much is attributable to other causes is uncertain. However, two factors have clearly contributed to the problem. First, the CAB, and then the Department of Transportation, which took over the CAB's anti-trust responsibilities after its dissolution in 1986, approved a total of 50 mergers and acquisitions between 1979 and 1988. This was a lapse in anti-trust enforcement, and not a problem resulting from deregulation per se.

Further, the lack of available take-off and landing slots and gates at major airports has also created a serious barrier to entry in many markets, even for willing and able competitors. This lack of investment is perpetuated because at many major airports, dominant carriers have long term contracts granting them majority in-interest rights allowing them to veto new spending projects that would increase capacity to be used by competitors. Again, this is not a problem of deregulation per se, but rather a problem inherent in the lag in investment in airport capacity.

Service

In general, despite pressure to cut costs, airlines have been able to respond positively to competition by improving quality of service. As shown in Figure 7, the number of complaints per ten thousand customers enplaned had decreased from 8.6 in 1978 to 1.2 in 1993 (data is not available for previous years). Ticket oversells on peak load period flights, which result in passengers being "bumped" from their scheduled flight, have also decreased. There were 6.7 ticket oversells per one thousand customers in 1978. This number has steadily decreased since then, reaching a significantly lower 1.1 in 1993. This has been partially due to the flexibility airlines have in the pricing and

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19 Ibid. pp. 3.
20 see Kahn, supra note 10.
restriction discount seating described above which has allowed airlines to better manage capacity. Competitive pressure to avoid such service lapses has no doubt also been an essential factor.

Competition has also led to an increase in the variety of price and in-flight service options air travelers can choose from. Under regulation, customers could basically choose between first class and coach. Options now include no-frills service (no meals and no checked baggage), economy class, business class, and first class.\textsuperscript{22} Airlines also now provide a wider range of video programming and access to mid-flight telephone communication. Different airlines have also experimented with different food service options.

The successful development and implementation of hub-and-spoke networks has contributed to improvements in service quality in several ways. Under regulation, passengers travelling from medium and small airports to large airports outside their region had to travel on a local or regional carrier to a large regional airport where they had to switch to a large trunk airline in order to continue on to their ultimate destination. Because of the lack of coordination between local carriers and trunks, this often involved long lay-overs, misplaced baggage, and long walks between gates or terminals.

By scheduling and coordinating departures and arrivals from various spokes, airlines have decreased the need for passengers to switch airlines, decreased lay-over time, and increased convenience of intercity connections between smaller airports and major airports. In the second quarter of 1978, before the passage of the ADA, 40% of passengers switching planes had to switch airlines. By 1983, this number had decreased to 15%. The combining and coordination

<table>
<thead>
<tr>
<th>Airport Category</th>
<th>Weekly Departures</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Hub</td>
<td>63484</td>
<td>103063</td>
</tr>
<tr>
<td>Medium Hub</td>
<td>19731</td>
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<tr>
<td>Small Hub</td>
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<tr>
<td>Non-Hub</td>
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<td>29271</td>
</tr>
<tr>
<td>Total</td>
<td>126014</td>
<td>181852</td>
</tr>
</tbody>
</table>


\textsuperscript{22} see Kahn, supra note 10.
of traffic at hubs has also increased the number of available origin/destination combinations.23

Along with the improved coordination and convenience of hub service, competition has bought with it an increase in flight frequency, shown in Table 2, as airlines compete to provide customers with more choices for times of departure and return. Between 1978 and 1987, the number of weekly departures from large hubs increased 62%, departures from medium hubs increased 56%, and from small hubs 42%. There was a slight (1%) attenuation of scheduled large carrier airline departures from non-hub airports during this period. Overall, however, between 1978 and 1987, the number of weekly departures increased by 44%.

Increased frequency of scheduled flights, combined with airport capacity constraints, especially at major hubs, has contributed to increased congestion and delays. With so many arrivals and departures lined up back-to-back, filling all available take-off and landing slots, a delay caused by weather or random lapse in operations can snow-ball through an entire day, causing delays all the way down the line during high traffic periods. As shown in Figure 8, in 1988, only 78.7% of scheduled flights met the standard of coming within 15 minutes of their scheduled time. Without increasing airport capacity (or decreasing flight frequency), this problem is a difficult one for airlines to solve on their own. However, airlines have tried, and by 1993 on-time performance had increased to roughly 82%. As airports increase their capacity, this problem will continue to decrease and on-time performance will most likely improve.

23 Weiss and Klass, pp. 52.
Many have raised concern over the effect of increased competition on airline safety. The implication has been that airlines have tried to increase profit margins by sacrificing safety margins. A dramatic increase in the number of near mid-air collisions (N.M.A.C.) between 1984 and 1987 shown in Figure 9 drew particular attention to this possibility. However, the rate of N.A.M.C.s is subject to weather conditions that affect visibility as well as capacity constraints in air traffic control, which were a particular problem in the mid-1980s. To what extent the increase in N.M.A.C.s in the mid-1980s was attributable to cost cutting or these other factors is uncertain, but airlines have clearly improved the overall safety of air travel since 1978 as shown in Figure 10. Between 1978 and 1992, the accident rate per million miles flown dropped from 0.008 to 0.004. The decrease in passenger fatalities during this period was even more dramatic decreasing from 0.0062 per 100 million passenger miles to 0.0007. Statistics on N.M.A.C.s are not available for the pre-deregulation period, but with the exception of the extraordinary difficulties occurring in the mid-1980s, N.M.A.C.s have decreased from 0.019 per 10 million miles flown in 1979 to 0.0062 in 1992. These figures make it hard to sustain the notion that airline deregulation has harmed air travel safety. Instead, it is evident that the industry has improved safety overall, while at the same time decreasing costs to consumers.

Investment

Unable to compete on price, regulated airlines invested in large fleets and operations to increase flight frequency. This resulted in decreasing load factors and increasing average costs, which were grounds for fare increases under regulation. With this assured recovery of expenses, there was no strong incentive for efficient investment in and use of capacity. Higher costs of lower load factors and over-investment in new planes were passed on to consumers. After deregulation, airlines assumed the risks of losses and potential rewards for any capacity investment and utilization decisions they made. Airline management, under pressure from shareholders, now has strong and clear incentives to try to make efficient decisions, and to

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change investment and utilization plans when they make mistakes.

Between 1978 and 1990, domestic airline capacity, as measured by available domestic passenger miles, increased nearly 90%. Insufficient demand combined with fierce price competition has kept fares low and made it difficult for airlines to recover these expenses, and in the recessionary years during the early 1980s and 1990s, the industry reported net losses as shown in Figure 11. Airline management has responded quickly, cutting back service on less profitable routes and disposing of less efficient, unneeded aircraft. After record losses in operating profit in 1990-91, the industry posted record gains in operating profit in 1993, and forecasts suggest a return to full, net profitability in 1994.25

Summary

Airline deregulation and competition have produced significant efficiency improvements, lower fares, and improved service to the market. Lingering problems, caused partially by factors not directly related to airline competition, such as anti-trust enforcement and airport capacity expansion and utilization, have made the results less than ideal. However, no market is perfect, and what must be considered is whether the results under competition are, overall, superior to those under regulation. In the case of airline competition, the answer clearly appears to be yes.

THE TELECOMMUNICATIONS INDUSTRY

Since 1934, when President Roosevelt established the Federal Communications Commission, through 1984, AT&T was effectively the sole supplier of telephone services and equipment throughout almost all of the United States. During this period, AT&T was fully integrated, developing and manufacturing its own technologies and equipment through its subsidiaries, Bell Labs and Western Electric, and providing both local and long distance telephone service. It was protected from competitive entry and was assured profits under traditional "cost-plus" regulation. Rates were not matched to costs, but were set artificially to even out differences from region to region. Specifically, service to rural areas, where the average

costs of providing service were high, was subsidized by urban areas where average costs were low. Also, business rates were set higher than residential rates. Finally, and perhaps most importantly, rates for long distance service, the costs for which declined rapidly during the 1960s and 1970s, were kept above cost to subsidize the maintenance of low rates for local service. Due to the rapid improvements in technology developed by AT&T’s Bell Labs, and AT&T’s faithful commitment to its public service obligation, overall costs and rates steadily decreased throughout the system, which steadily grew throughout the country. Most people were very satisfied with their telephone service and proud of AT&T as a model corporate citizen.  

The only people who were not entirely happy were those who wished to enter the telecommunications market. A series of court decisions and regulatory actions brought about in response to complaints and law suits filed by would-be competitors to AT&T have lead to the dismemberment of the AT&T monopoly and the introduction of competition in nearly all markets for telecommunications equipment and services.

The progression began in 1955 with the Hush-A-Phone decision. Hush-A-Phone had marketed a cup-like device that attached to the speaking end of telephones to muffle the sound of a telephone conversation. AT&T had always prohibited the attachment of "foreign" devices to customer premises equipment, which was all owned by AT&T and leased to end users. In its decision, the court ruled that as long as no harm was done to AT&T's equipment or system, AT&T could not prohibit the use of non-AT&T telephone equipment.  

Then, in the 1970s, as the development of telecommunication technology began to overlap more and more with computer technology, regulators were faced with a dilemma. The 1956 consent decree had restricted AT&T to only regulated activities. To classify a new, high technology product as part of the computer industry would restrict AT&T from that market, while classifying it as a telecommunications product would exclude companies like IBM from the business. Neither of these options seemed feasible or desirable from either a political standpoint or technological standpoint. In 1980, the FCC introduced the Computer II rules, which forced AT&T to set up a separate unregulated subsidiary that would develop and manufacture all terminal equipment as well as other related computer technologies. This completed the transition to a competitive equipment market which began with the Hush-A-Phone decision.

Long-distance competition originated with the Specialized Common Carrier decision in 1971, which allowed competitive entry into the market for private long distance communication service, and required local interconnection but left the terms up to the carriers.

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29 *Specialized Common Carrier Service*, 29 F.C.C. 2d 870 (1971).
This proved unsatisfactory to would-be competitors, who felt that AT&T was not providing interconnection of comparable quality with its local networks. A lawsuit filed in 1974 by Microwave Communications Incorporated (MCI) alleging that AT&T was restricting access to its local facilities, thus acting anti-competitively in the long distance service market, led to the formal break-up of AT&T and the explosion of real competition in the telecommunications market.\textsuperscript{30}

The MCI suit resulted in the Modified Final Judgement (MFJ) and the 1982 consent decree. Under the MFJ, AT&T divested itself in 1984 of its 22 local service operations and the United States was divided up into 160 local service areas called Local Access Transport Areas (LATAs). The local operating companies were organized under seven regional holding companies which remain regulated monopolies and are prohibited from providing long-distance service between LATAs. In addition to its long-distance operations, AT&T was allowed to maintain its unregulated research laboratory and equipment manufacturing subsidiary, and its specialized communication service subsidiaries. AT&T was also released from the 1956 consent decree which restricted it from unregulated businesses in general.\textsuperscript{31}

The MFJ allowed unrestricted entry into the market for ordinary long distance service, and facilitated the rapid development of competition by mandating local operating companies to build additional switches to provide equal access to their networks to originate and terminate long distance calls. Though AT&T's long distance and other businesses were now fully open to competition, AT&T, which in 1984 still controlled the vast majority of the long distance market (90%), was defined as a "dominant carrier" by the FCC, and kept subject to traditional regulation. AT&T's interstate long distance competitors were, and remain, unregulated by the FCC.\textsuperscript{32}

### Competition and the Increased Range and Improved Quality of Products and Services

Competition has contributed to rapid and dramatic enhancement in the quality and range of products and services offered by both local and long-distance companies, as well as equipment manufacturers. As shown in Figure 12, since the Computer II decision, private investment in telecommunication equipment research and development has nearly doubled in real terms, from around $2.7 billion in 1980 to $5.1 billion in 1991. In addition to the improved quality of basic telephone service, such as quicker dial tones and clearer transmission, typical residential customers can choose from among a myriad of telephone equipment from digital, multi-mailbox answering machines, to devices which inform users of the number from which an incoming call has originated. In 1992, the value of U.S. telecommunication equipment

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\textsuperscript{31} \textit{Ibid.}

\textsuperscript{32} \textit{Ibid.}
Service options now include features such as call waiting, conference calling, and, most importantly, countless customized rate plans. Further, many firms now offer on-line information services, rapid data transmission, and video conferencing. Perhaps the most impressive new business to emerge in the post-divestiture era has been that for cellular communication, pioneered in 1984. In 1993, service was initiated for two million new subscribers, raising the total number of cellular customers to 13 million.\textsuperscript{34}

Competition and the search for economies of scale and scope have induced a frenzy of combinations among all manners of firms involved in message, voice, and video transmission, and information services, and other electrical technologies. In 1993, nearly 50\% of all mergers and acquisitions involved communications companies.\textsuperscript{35} The recent acquisition of McCaw Cellular by AT&T is one of the largest in corporate history. Other such combinations include British Telecom's $4.3 billion investment in MCI, and MCI's investment in NEXTEL.

Because of the rapid changes that have occurred in the industry in terms of both the range and quality of products and service and the number and profiles of the firms in the market, available data with which to analyze the effects of the MFJ and the 1982 consent decree is limited in quality. Further, the on-going transitions taking place are accompanied by a fair amount of confusion and companies are likely incurring significant expenses to get re-oriented. However, we can infer from the rapid growth of new telecommunications businesses described above that deregulation and increased competition will create benefits by allowing the different businesses of the former AT&T monopoly as well as new competitors to find and use new opportunities in the market to create value. As the industry continues to make progress in re-configuring and re-orienting itself, there will likely continue to be increased benefits from competition.

\textsuperscript{33} Bureau of Census, Census of Manufacturers 1992.

\textsuperscript{34} Standard and Poors Industry Survey, Telecommunications, November, 1993.

Repricing, Competition and Long Distance Rates

As mentioned above, under regulation, interstate long distance telephone service was priced high above costs. During the 1970s when incipient competition in long distance service was inducing innovations and reducing costs, the additional revenue was used to keep local rates low. One result of this cost-shifting was under-utilization of long distance service by consumers.

Since divestiture, regulators have begun to allow regulated long distance rates to move closer to costs. They have done this by allocating more and more of the local systems' non-variable costs to subscriber-line charges on local bills, and gradually decreasing the share of costs that are paid by long distance carriers for access to local networks. At the same time, the long-distance market has become increasingly competitive, as shown in Figure 13, with AT&T's rivals rapidly gaining market share. In 1984, AT&T controlled over 90% of the market as measured by toll service revenues.

By 1991, AT&T's share had decreased to roughly 62%.\(^\text{36}\)

The decrease in cost shifting, combined with increased competition has resulted in dramatic decreases in long distance rates. Intrastate long distance rates, which are regulated by states, have not been allowed to fall as fast as rates in the interstate long distance market, in which only AT&T is regulated. The relative changes in nominal interstate and intrastate long distance rates, as well as the trend in local services rates, are shown in Figure 14.\(^\text{37}\)


\(^{37}\) Intrastate long distance rates are still regulated by state Public Utility Commissions, will still engage in cost shifting from local service to long distance rates. While intrastate long distance rates have decreased since divestiture, the change has not been as large as that for prices in the interstate market. See Crandall, Bob, After the Breakup, 1991.
The post-divestiture decrease in interstate long distance rates for both AT&T and MCI, its largest competitor, can more clearly be seen in Figure 15, which shows the trend in the cost for a 10 minute daytime phone call from New York to Los Angeles between 1960 and 1991. In the period between 1960 and 1980, the period before the MFJ, AT&T’s nominal price for this call during daytime, or prime hours, fell at an annual rate of roughly 2.18%. During the period between 1980 and 1991, the nominal price fell at an annual rate of roughly 4.8%. There is a hump in the trend showing an abrupt increase in the regulated AT&T rate, which in turn allowed its competitors’ to increase rates in the early 1980s. The rate increase was due to a number of factors including the lagged effects of inflation in the 1970s, abnormally high interest rates in the early 1980s, the costs of decommissioning customer premises equipment, and changes in the way system costs were allocated between local and long distance service. As access charges continue to be reduced and operational efficiency and technology improvements spurred on by competition continue to lower costs, long distance rates will likely continue to decrease.

Although a substantial portion of the decreases in long distance rates have been the result of the decreases in access charges, and the attendant increases in subscriber line charges, the savings to consumers from lower long-distance rates have more than offset the increased expense to consumers. As shown in Figure 16, the inflation adjusted household costs for telephone service decreased at an annual rate of 0.9% between 1980 and 1992. While this is lower than the annual rate for the period between 1960 and 1980 of 3.3%, the decrease in overall telephone costs to

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38 Trends in long distance rates for other city pairs reported in the FCC’s Common Carrier Statistics closely match this trend, and it is therefore used as a generally representative example. See FCC Common Carrier Statistics, Historical Data, 1993.

39 This information obtained by personal phone conversation with James Land from the Industry Analysis Division of the FCC, July, 1994.
households between 1980 and 1992 understates the increased savings to telephone service consumers because it does not account for numerous discount options, periodic rebates, and incentive based promotions which long distance carriers have offered since divestiture. Neither does it account for the benefits from the improvements in service quality discussed above which have accompanied real price reductions under competition. Finally, the rate of decrease in household expense for telephone service as measured by the CPI does not correct for the increase in overall telephone usage, discussed below, which has accompanied rate reductions.

Repricing, Competition, and Consumption

![Graph 1](image1)

![Graph 2](image2)

Long distance rate reductions have resulted in an increase in long distance consumption toward its efficient level, as well as a general increase in household consumption and the reduction in household expense for telephone service shown above. The trends in local, and interstate and intrastate long distance consumption, as measured in dial equipment minutes (DEM), is shown in Figure 17. The annual rates of increase for local, interstate and intrastate long distance for the period 1980 to 1991 were 2.2 percent, 9.15 percent, and 6.86 percent respectively. The figures for local service do not include the growing proportion of local service emanating from private networks, estimated at 25 percent in 1991, and therefore understate the overall increase in usage.40 As shown in Figure 18, telephone penetration, or the percentage of households consuming telephone services, has also increased in the post-divestiture era, from 91.8 percent in 1984 to 94.2 percent in 1993, demonstrating continued increase in access to telephone service. While both these figures illustrate significantly increased consumption, the interesting change is the proportion of consumption represented by long-distance. In 1980, interstate long-distance comprised 8 percent of total consumption. By 1991, it had come to be 14% of total consumption. Also, consumption (measured in DEMs) per household has increased by over 25% over this period. This dramatic increase in household consumption of telephone service has no doubt contributed to the slightly lower rate of decrease in household expenditures evident in the

40 Crandall, supra note 23, pp.
Future Regulatory Reform and Increased Competition

In 1991, the FCC responded to the encouraging changes occurring in the market by introducing incentive regulation, placing a cap on the rates AT&T charges, and allowing it to pursue above average profits by lowering its costs. The cap formula basically mandates decreased in real rates by restricting AT&T rate increases to the increase in the CPI less 2%. A similar system has been initiated by several states for regulating intra-state long distance rates. As long-distance competition continues, rates may fall faster than the cap, making the cap practically irrelevant.

The twenty-two local bell operating companies (BOCs), which AT&T was forced to spin off, are organized under seven Regional Holding Companies (RHCs), Ameritech, Bell Atlantic, Bell South, NYNEX, Pacific Telesis, Southwestern Bell, and U.S. West. Each BOC provides local service as a franchise within one or more of the Local Access Transport Areas (LATA) established under the 1982 decree. BOCs were originally restricted from entering certain other businesses, including equipment manufacture and information services, and were prohibited from competing in inter-LATA long distance service. The rapid development of new infrastructure and technology under competition have made regulation of local companies less and less necessary and desirable. Local companies have developed the capacity to compete in long distance service, and competitive firms are pressuring to be allowed to provide local service using microwave technologies and fiber optic infrastructures already put in place in some large cities to serve high volume customers. Figure 19 shows the aggressive deployment of fiber optic cables that has taken place since divestiture on the part of both local and long distance companies. Between 1985 and 1991 interexchange carriers and the BOCs have increased the size of their fiber optic cable networks by 473% and 1066% respectively, dramatically increasing their capacity to provide a wide range

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41 This household consumption figure based on author's calculation of total DEMs consumed (1,732 billion in 1980, 2,521 billion in 1991) divided by total U.S. households (80,776 million in 1980, 94.312 million in 1991). See U.S. Statistical Abstract, 1993, pp.55. Admittedly, this does not account for business usage, but the inaccuracy of the calculation should be offset by the increasing number of DEMs not accounted for provided and consumed through private networks.

of services requiring rapid transmission of dense signals. The restriction on entry of BOCs into information services was lifted in July, 1991. Currently, there are several proposals under consideration in the U.S. Congress to allow BOCs to enter long distance competition and for competitive companies to provide ordinary local service.

Summary

Telecommunication deregulation has really only just begun. The industry is still in a state of transition from full regulation to partial regulation under the terms of the MFJ and the 1982 consent decree. The industry is also preparing itself for the equally significant regulatory changes which are pending. Nevertheless, benefits have clearly resulted from regulatory reform and increased competition in more efficient pricing for telephone service and increased consumer choice. This is apparent in the growth of the telecommunications industry and the increase in consumption of telecommunications goods and services. Future increases in competition in the industry and further reform are likely to contribute to continued technological development, lower costs, and enhanced service.

NATURAL GAS

The case of the natural gas industry includes a similar trajectory of moving from a highly regulated structure to a mixture of regulation and competition. The transition has many lessons for the electric industry.

Toward Deregulation

Until 1978, the natural gas (NG) industry was regulated from the wellhead to the burner tip. State public utility commissions (PUCs) regulated the local distribution companies (LDCs) which purchased all NG supplies, transportation, and other necessary services as a bundled product from the pipeline companies. The Federal Energy Regulatory Commission (FERC) regulated interstate NG pipeline transportation service and rates. The FERC also regulated the wellhead price of NG sold by producers in the interstate market.

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43 Ibid.
44 This section draws heavily from GAO, Costs, Benefits, and Concerns Related to FERC's Order 636, 1993.
45 This authority was originally granted to the FERC as the result of the 1954 Supreme Court ruling in Phillips Petroleum v. Wisconsin, 347 U.S. 672 (1954).
Intrastate NG wellhead prices were not regulated, however. Thus, intrastate market prices for NG rose above interstate prices which were kept artificially low through price controls. This resulted in supply imbalances and an inefficient allocation of NG supplies as producers dedicated more and more output to intrastate markets, and did not produce enough gas to satisfy the demand in the interstate markets. Curtailments became routine in the interstate market. In 1973, the Federal Power Commission (FPC) began to require interstate pipeline companies to file special reports known as Form 16 so that the FPC staff could ensure that pipelines were pursuing, as best they could, contractual remedies to compel deliveries by producers to minimize curtailments. Despite this, the magnitude of the supply shortage in the interstate market increased significantly each year. Figure 20 shows the reported magnitude of the curtailments during the period 1973-1977. The 1976-77 curtailment of 3,853,886 Mmcf was nearly 17% of total consumer demand for that year.\textsuperscript{46}

In the Form 16 reports, pipeline companies were also required to forecast the magnitude of the supply shortage for the coming year, and submit plans which established the order in which customers would be curtailed. During the unusually cold winter of 1976-77, supply shortages were much higher than projected, and net importing states such as Ohio suffered unprecedented supply curtailments. Many customers, including manufacturers without fuel switching capability, were subject to unexpected curtailments, resulting in loss of production and employment. In response to this severe inefficiency, and to pressure from many pipeline companies, Congress and the FERC initiated a series of regulatory reforms designed to increase reliance on market forces in NG production, and modify the regulation of the interstate pipelines so that NG supplies could be bought and sold more freely and competitively.

The progression began with the Natural Gas Policy Act (NGPA) of 1978 which established a pricing schedule for NG intended to encourage the development of NG supplies, particularly from hard to reach sources for which especially high prices were allowed. This contributed to substantial wellhead price increases between 1978 and 1984, during which time the average real price of wellhead gas rose roughly 80% as shown in Figure 21.\textsuperscript{47} More importantly, Section 311 of the NGPA allowed pipelines to transport NG as an unbundled product. For the first time, certain customers were able, with the consent and cooperation of the pipeline company, to buy NG supplies directly from producers among whom they could shop.


\textsuperscript{47} Increases in the price of oil during this time also contributed to rising NG prices.
around for the best available price.

The first beneficiaries of this change were large industrial end-users and electric power utilities which had fuel switching capabilities. As supply prices began to rise in the late 1970s, transportation and distribution companies became concerned that these customers would seek alternative power sources. To avoid losing all revenues from these high volume customers, and to maintain pipeline load factors sufficient to efficiently and reliably transport gas, pipelines and LDCs began to market "transportation only" service to retain these customers.

By 1984, industrial users purchased over 25% of their NG supplies from a non-pipeline source in a competitive NG supply market. Electric utilities purchased over 30% of their NG supplies competitively. With the advent of competitively bought and sold NG, the average real wellhead price of NG began to decrease as shown in Figure 21. In response to this positive development, and continued pressure from many in the industry, the FERC issued Order 436 in 1985, which encouraged interstate pipeline companies to offer LDCs the same option to purchase NG supplies separately from pipeline services as well.

Although during the 1984-1992 period pipeline customers still had the option to purchase NG supplies as part of a bundled product from the pipeline, there was a rapid increase in NG bought "off-system" from third parties offering competitive contracts for NG supplies as shown in Figure 22. In 1984, over 25% of NG delivered to industrial end-users was purchased from NG marketers or directly from producers. By 1992, this figure had reached nearly 70%. Similarly, between 1984 and 1992, the proportion of NG supplies bought "off-system" by utilities increased from 30% to 50%.

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48 EIA, Natural Gas Annual 1992.
nearly 64%. The Energy Information Administration recently began reporting the proportion of unbundled gas bought by commercial end-users, which rose from 7% in 1988 to nearly 17% by 1992.

However, the post-Order 436 market was still not in balance as LDCs were still under pressure to buy gas supplies from pipeline companies along with reserve capacity in order to ensure access to uninterrupted, or firm service during periods of peak demand. Many pipeline customers had not switched from bundled firm transportation service and NG supply to unbundled firm transportation and cheaper NG supply bought from other sources because firm sales service was more reliable and flexible than firm transportation service bought separately to transport NG from other suppliers. This kept producers and marketers not affiliated with pipelines at a disadvantage in the market for NG supplies during peak periods and prevented beneficial transactions from taking place.\footnote{FERC Order 636, 18 CFR Part 284, pp. 33.}

In 1993, FERC took action to correct the inefficiencies remaining in the market and to complete the transition to NG supply competition by issuing Order 636. Order 636 requires pipeline companies to unbundle services, price each one separately, and offer these unbundled services to customers on demand.\footnote{The rates pipelines can charge for each of their unbundled services as well as bundled services remain regulated.} Under the open-access rule in Order 636, pipelines must offer firm and interruptible transportation service of equal quality to all customers regardless of whether they have bought their NG supplies from the pipeline or not. In addition, any unused capacity owned by a firm service customer may be resold at rates as high as those charged by the pipelines in a secondary market for released capacity. The transportation rate structure has been changed to separate fixed costs from variable costs. Order 636 encourages pipeline construction and the development of market centers or "hubs" where several pipeline companies can interconnect, allowing a large number of buyers and sellers to transact in a competitive market for NG supplies.

The Competitive Market for Natural Gas Supplies

With the advent of open access and competition in the NG futures contract market came the NG futures contract market, which opened in the New York Mercantile Exchange (NYMEX) in April 1990, and the options market, which opened in October 1992.\footnote{The delivery point for the NG futures market is located at the Sabine Pipeline Company's Henry Hub, near Erath, L.A. see EIA, Natural Gas Issues and Trends, 1992, pp. 98.} Competition in the spot market keeps natural gas prices down at competitive levels, and provides undistorted signals for producers and consumers. The futures and the options market allow producers and consumers to
manage price risk in the volatile spot market, and secure more or less stability depending on their individual preferences. The number of NG futures contracts, or open interest in the futures market, has been increasing rapidly since 1990, growing from 503,000 in April, 1990, to 126,713,000 in January, 1994, as shown in Figure 23. These markets for fixed-price natural gas are increasingly active and liquid, with roughly 4 million futures contracts traded in 1993, up 705% from 1991.53

**Figure 23**

Open Interest in the Natural Gas Futures Market

<table>
<thead>
<tr>
<th>Year</th>
<th>Open Interest (000)</th>
</tr>
</thead>
<tbody>
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<td>1990</td>
<td>503</td>
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<tr>
<td>1991</td>
<td>9,140</td>
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<td>1992</td>
<td>19,200</td>
</tr>
<tr>
<td>1993</td>
<td>68,943</td>
</tr>
<tr>
<td>1994</td>
<td>126,713</td>
</tr>
</tbody>
</table>

Source: Energy Information Administration, 1994

**Competition, NG Supply Contracts, and Consumer Choice**

Competitive NG marketing has lead to the development of custom tailored NG supply contracts, which allow customers to choose the best combination term length, price, volume, and service options to meet their particular needs and risk preferences. A variety of price caps and "collars" are currently available which allow buyers and sellers to limit the price fluctuations for NG supplies delivered during the term of a contract to a specific range. Indexing options that base the price of delivered NG on the price of alternative fuels or an endogenous economic conditions specifically affecting the health of the buyer's business are also available. For example, a soybean producer may index the price it pays to fluctuations in the soybean futures market. NG price insurance reimburses buyers if the price of NG goes above an agreed upon level. The variety and flexibility of pricing options allow for efficient risk management and allocation.

Most contracts provide for the delivery of a specified volume of natural gas on a daily or monthly basis. Simple "swing" clauses allow customers, such as LDCs, some variation to meet unforecasted demand by providing the option to buy additional supplies, up to a certain amount, directly from the provider. Some contracts have "take-or-release" clauses whereby the purchaser, such as a marketer, agrees to make every reasonable effort to buy a specified volume of gas from a supplier. Yet, the supplier has the right cancel the contract or reduce the volume of gas available under the contract if the buyer does not take the stipulated amount, relieving the buyer from paying for unwanted amounts. Many contracts incorporate "diversion" clauses, which are arrangements to divert gas from one buyer to another in the event of an unexpected increase in need. The receiving customers pay for the service, and the supplying customers, a plant with fuel switching capability for example, get paid for any additional cost incurred.

The competitive market for NG supplies and supply/service contracts have improved

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supply reliability and allocative efficiency. Since the mid-1980s, there have been no supply shortages in the market. Further, competition and open access has allocated NG price risk to NG marketers and other professional risk managers who maximize welfare in the NG market by providing NG supply on terms most valuable to individual consumers.

Natural Gas Transportation and Services

The rates charged by pipeline companies remain regulated, although Order-636 mandates a new "straight fixed-variable" rate (SFV) system in order to ensure that prices provide undistorted signals for the efficient allocation of, and investment in, pipeline capacity. Under SFV, firm service customers must pay for the fixed costs of the system under a separate demand charge for pipeline capacity during peak periods. Unneeded capacity may be resold by firm service customers on a secondary market for released capacity at rates as those allowed by regulators to the pipelines. This is intended to provide undistorted price signals, facilitating the efficient allocation of existing pipeline capacity, and efficient investment in new capacity.\[54\]

In addition to transportation service, pipeline companies may also provide a variety of unbundled services including storage, load balancing, processing, compression, and capacity release at regulated prices. Third parties such as producers, LDCs, and NG marketers may compete to provide any of these services. Separating out each service allows customers to make better decisions about which services to purchase and how much to pay. Competitive provision will push prices to their efficient levels at or near marginal cost, and will improve the quality and range of services provided. Re-bundling of these services is done increasingly by marketers who provide different combinations of these services in custom-tailored contracts along with NG financial services.

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\[54\] Although FERC's new straight fixed variable rate design only allocates about 90% of pipelines' fixed costs to the demand charge, this will, however, involve a significant shifting of costs from customers of interruptible service who pay only the commodity charge (typically industrial end-users and electricity generators) to customers of firm service who pay the demand charge (typically LDCs serving residential customers). There is ongoing disagreement about the ramifications of this change in terms of efficiency. Some argue that 100% should be allocated to the demand charge because firm service customers' demand determines the necessary capacity on the pipeline and the related fixed costs. Others argue that allocation more of the fixed costs to firm service customers is not optimal from either an efficiency standpoint or a policy standpoint. See GAO, Costs Benefits and Concerns Related to FERC's Order 636. 1993. pp. 34-35.
Increased Use of Storage and Efficiency Improvement

Storage service has become an increasingly important service in the competitive NG market. As shown in Figure 24, storage activity as measured in the volume of NG injections and withdrawals, has been increasing relative to total deliveries to consumers. Storage is a cost-effective way for buyers and sellers to hedge against seasonal price variation and general price risk. Storage service can also be used by customers to reduce the need for expensive "swing" contracts and pipeline capacity reservation. It can also contribute to supply reliability and transportation efficiency by facilitating better system balance. High volume storage is being used increasingly to smooth out seasonal variation in NG production, increasing the efficient use of production capacity. In 1985, utilization of productive capacity was roughly 70 percent. By 1993, capacity utilization had reached 87 percent with reliability being maintained by increased use of storage.\(^5\) Figure 25 shows how seasonal variations in production have been decreasing as the use of storage has increased. Smoother production generally allows for more reliable and sustainable wellhead yields. Pipeline companies, NG producers, NG marketers, and independent storage operators are all planning and developing new storage facilities to increase the availability of this valuable service.\(^5\)

Summary

The results of regulatory reform and increased competition in the NG market have been decidedly positive. NG supply and service competition and open access to pipeline transportation have resulted in improved efficiency and enhanced service quality.

During the period from 1984 to 1993, average real wellhead prices decreased by roughly 44% (see figure 21). Between 1984 and 1992, delivered gas prices for utilities, industrial

\(^5\) See EIA, Natural Gas Issues and Trends 1994, Chapter 1.

end-users, commercial end-users, and residential end-users, declined in real terms by 52%, 50%, 35%, and 29% respectively as shown in Figure 26. It is difficult to isolate the causes of price changes in NG supplies. However, efficiency improvements certainly contributed to decreased costs, and open access and price competition quickly passed these savings on to consumers.

Despite the positive results of deregulation in the natural gas industry thus far, some have expressed concern that the reduction in operational control under Order 636, combined with an increased number of buyers and sellers, will increase the potential for transportation bottlenecks or other threats to the delivery of gas supplies. But the extreme winter 1993-1994, during which electricity supply was curtailed all along the mid-Atlantic region, had no NG supply interruptions, an encouraging contrast to its performance during the winters of 1970-1971 and 1976-1977 before deregulation began.

The post-Order 636 market is still relatively new and many of the benefits of competition have yet to be realized. The future development of market hubs and pipeline and storage capacity will increase the level of competition by broadening the geographic area over which NG supplies are traded and the number of buyers and sellers able to bid for any one transaction. As competitive NG market participants progress along the learning curve, they will improve the efficient use and development of production and transportation capacity, and develop more cost-effective ways to buy and sell NG supplies. Finally, aggressive profit seeking will aid in the development of new markets for NG such as those for fuel cell technologies, alternative fuel vehicles, NG powered cooling systems, and other appliances.

ELECTRIC POWER IN THE UNITED KINGDOM

The changes in the structure and operations of electricity markets in other countries provide examples of the benefits of competition. Prominent competitive electricity markets exist in Argentina, Chile, England and Wales and Norway. Australia and New Zealand, among others,

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57 Delivered gas price includes supply costs, pipeline transportation and storage costs, and LDC transportation and storage costs. This price does not include the price paid to marketers by end-users in fees. EPA, Natural Gas Annual, 1992.

58 This section draws mainly from Professor Littlechild’s 1993 paper and Alex Henney’s July, 1994 article in Regulation, “Challenging the Status Quo: Privatizing Electricity in England and Wales. Data was taken from U.K. Annual Energy Statistics and from the International Monetary Fund’s International Financial Statistics.
are in the process of restructuring. Here, a summary of the experience in the British case, based largely on the evaluations of the British regulator, illustrate the early potential for benefits from competition.

**Privatization and Restructuring**

Before privatization, the Central Electricity Generating Board (CEGB) owned and operated the entire generation and distribution system, shifting costs among customer classes and providing subsidies to British Coal. In 1990, the CEGB was split into four separate companies: The National Grid CO. (NGC), which owns the 400- and 275-Kv high-voltage grid and 2.1 Gw of pumped storage. NGC is owned, in turn, by the 12 Regional Electric Companies (REC) but is structured legally to be operationally independent and to provide nondiscriminatory service at published prices. Coal and oil fired generation was distributed between two entities, 29 Gw going to National Power and 18 Gw going to PowerGen. Nuclear Electric owns 8Gw of working reactors and has a 1.2 Gw reactor under construction.

The system is based on a competitive Pool, providing merit-order dispatch, aggregating load, reserves, and capacity margins, and providing spot prices that can be used as markers for supply and transmission contracts. In addition to the three British generating companies, the two Scottish companies, Electricité de France, and a growing number of IPPs are all able to sell into the Pool via the NGC. Buyers above a certain level of demand can purchase from any regional company or generator, or they can buy directly from the pool. In all cases, suppliers pay published charges for use of transmission and distribution systems.

"Supply" competition, or competition for customers, is being introduced in stages. Up until March 30, 1994, only 5000 customers with demand in excess of 1 MW, accounting for roughly 30% of total consumption, were included in the competitive market. Since then, it has included 50,000 customers with a minimum demand of 100 Kw each, comprising roughly 50% of total consumption. On April 1, 1998, all 22 million customers will be included in the competitive market.

Retail bypass has opened up the business for electricity supply competition where electricity may be bought wholesale and sold to retail customers by entities other than the RECs. Thus, the primary role played by an REC may be reduced to that of a wires company as their customers increasingly buy power supplies independently and pay the REC only for transmission service. In addition to the three British generating companies, the two Scottish companies, Electricité de France, and IPPs are all able to sell into the Pool or directly to customers via the NGC.

**Increasing Competition in the Market**

Nearly one third of the customers above 1 MW, accounting for nearly half the supply in the competitive market, have chosen suppliers other than their local REC. This demonstrates
that buyers are willing and able to benefit by competitively shopping around for power. The combined market share of National Power and PowerGen in 1990 was 78%. By 1993, Nuclear Electric and other generating companies had increased their market share to 32%.

By 1995, five new stations built by PowerGen and National Power, 11 new stations built by IPPs together with RECs, increased capacity at Scottish Hydro Electric, and a new Nuclear Electric plant are expected to have come on line. This is a significant rate of new entry for the U.K. power market, improving the prospects for healthy competition and disproving the argument that the competitive market would be too risky to stimulate new investment.

**X-efficiency Improvements Under Competition**

Firms have become leaner and more efficient under competition than they were before privatization. 47,000 had been employed by the CEBG before 1990. Its successor companies employ only 26,000. National Power and PowerGen increased output productivity by roughly 13% in 1991-1992. Nuclear Electric has improved its efficiency, reducing costs by 20% since 1990.\(^59\) In addition, older plants are being retired and operation of the pool is increasing the efficient use of capacity. Figure 27 shows the trend system load factor from 1985 to 1992. Between 1990 and 1992, system load factor, shown in Figure 27 jumped from .622 to .676, significantly higher than any other year since 1963 in the U.K.

**Rate Changes During the Current Transition to Competition**

The government’s objective to protect investors, British Coal, and Nuclear Electric from sudden losses during the transition required government franchise contracts and price-control formulae which have resulted in 3% real increases in rates paid by tariff customers in the first three years. In general, it seems small customers paid most of these transition costs. Smaller industrial customers in the 1 to 5 MW range gained from a 14% real decrease in their rates from 1990 to 1992. Benefits to large customers from supply competition have thus far been offset by the loss of preferential treatment enjoyed under the CEBG, although their rates are roughly the same as they were in 1989-1990. In 1993-1994, cost reductions began to be passed on to smaller

customers, and they will benefit more when regulators review REC rate formulae in the future. The trend in rates for different customer classes is shown in Figure 28.

**Service Quality**

Service quality has been maintained, and in many cases improved since privatization. This improvement has been facilitated and measured through a set of service standards established in 1989. There are two types of standards, Guaranteed Standards, which include ten measures of service which must be met for each individual customer. These standards include such service requirements as restoration of supply within 24 hours after a fault has occurred in the distribution system and prompt investigation of voltage complaints. Companies which fail to meet any one of the ten Guaranteed Standards in the case of any one customer must pay a penalty. There have been significant improvements in all ten Guaranteed Standards between 1991 and 1993. In addition, there is a set of Overall Standards, which do not apply to service for every individual customer, but rather apply to customers in general. These standards include such requirements as restoration of supply following a system failure within 3 hours for a minimum percentage of cases. Since 1991, OFFER has increased the stringency of these standards, and, in general, companies have been able to significantly improve, and in many cases achieve performance high above the standards. Also, disconnections in England and Whales are now 75% lower than before privatization. In Scotland, disconnection has fallen 82%. Customers surveys conducted by OFFER indicate that while 6% of customers said they were dissatisfied with service overall, 45% said they were either totally satisfied or very satisfied.

**Summary**

The U.K. example demonstrates that healthy competition in both supply and generation are possible in the electricity industry. The transition was recent and the results are still developing, but the first four years have shown signs of real improvements in industry productivity and service quality. Ratepayers, who were burdened with most of the transition costs, have not yet benefitted directly from lower rates, but it appears that in the near future rates will decrease. More efficient investment in capacity and the retirement of the most inefficient power sources promise long-run savings and other improvements that would not have been attained under the previous system.

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CONCLUSION

The above sections have reviewed the results of deregulation and increased competition in four industries. Each case has been very different from the others, but in each one we have seen some common results. Firms have pursued and achieved improvements in X-efficiency, streamlining operations, using fewer inputs at less expense to produce at a given level. Competition has also allowed greater opportunity and incentive for innovations resulting in dynamic efficiency improvements. Firms have improved or altered the technologies they use, and have searched for and found new ways to serve the needs and desires of the market. The result has been a wider range of higher quality goods and services and increased customer choice.

Under competitive pressure, firms have passed the savings from efficiency gains on to customers in lower prices. Prices in the market more closely reflect the cost of providing the product or service to the individual customer, producing undistorted market signals and improving the allocation of resources in the market. Further, where regulation of capital investment has been eliminated or reduced, the risk has been shifted from rate payers to professional managers and stakeholders. This provides stronger incentives and clearer signals for more efficient investment decisions, promising greater savings to consumers and society in the long-run.

Already, incipient competition in the U.S. electric power industry has begun to produce some of these benefits. Investments are being made in more efficient plants and operations; new technologies, such as smaller scale generation plants, are being deployed to take advantage of new opportunities resulting from deregulation; and the concept of supplying electricity as a service, rather than simply a commodity, is rapidly developing. Radical changes continue to occur as competition increases and the market begins to restructure, but the goals are clear, and past experience suggests that the prospects are good that increased competition in the electric power industry will result in greater benefits to society in the future.