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Alfred E. Kahn, 1917-2010

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Forthcoming, *Review of Industrial Organization*

ABSTRACT

This article, an introduction to a compendium dedicated to the life of Alfred E. Kahn, reviews his academic research and policy interests and how they evolved, his activities as a regulator and advisor to governments and companies, and the interactions between his real-world experiences and his academic work. Although Kahn is best known for his research on the economics of regulation and his application of microeconomic principles in his role as a regulator and advisor, his academic research portfolio is much more diverse. He also wrote papers on patent policy, economic development, antitrust policy and other topics. Even before becoming a regulator he was actively involved in applying economic principles to regulatory problems as an advisor and consultant. In all of his work Kahn recognized that markets were imperfect, but that policies aimed at improving market performance often made things worse rather than better. His experience as a regulator and consultant strengthened his recognition that the costs of imperfect regulation had to be carefully balanced against the costs of imperfect markets. One had to search for the best that could be done in an imperfect world. Kahn was particularly fascinated by the challenges of designing and implementing policies to govern the transition of industries from regulated monopolies or oligopolies to industries that would ultimately rely primarily on competitive markets to govern their behavior and performance. Fred Kahn was an extraordinary man and he will be missed greatly by his many friends and colleagues representing a wide range of political orientations and approaches to economic and public policy analysis.

Alfred E. Kahn, 1917-2010

by Paul L. Joskow and Roger G. Noll¹

1 Introduction

This special compendium is fondly dedicated to the life of Alfred E. Kahn. The essays were written by Fred's friends and collaborators over several decades, and cover only some of the disparate topics in which Fred made significant contributions as a scholar and policy maker.

Fred Kahn had an extraordinary career as an academic, regulator, advisor to governments and industry, and public intellectual. His academic research demonstrated a strong commitment to the value of applying sound microeconomic principles to public policy issues, primarily to issues associated with the field of industrial organization. Although Fred belonged to the last generation of economists who could attain high status in the profession without making extensive use of formal mathematical and econometric models, the reasoning of microeconomic theory always provided the intellectual framework for his approach to public policy analysis as a scholar, regulator, consultant and advisor. Most of Fred's academic work focused on public policy responses to market imperfections in an "imperfect world" in which perfect competition was not feasible due to the attributes of the products and production processes that characterize most interesting industries. At the same time, his experiences as a regulator and business consultant affected his views on the extent to which strict application of microeconomic principles could solve policy problems in a world characterized by irresolvable market imperfections as well as regulatory imperfections, political constraints, and other non-economic considerations.

Fred's analysis went beyond simply identifying the (second) best economic policies for

¹ Sloan Foundation and Stanford University, respectively. Both authors knew Fred Kahn personally. Fred was Paul Joskow's undergraduate advisor at Cornell and they remained friends during the rest of his life. Roger Noll became friends with Fred in the early 1970s through meeting him at several conferences on antitrust and regulation and, especially after the invention of the Internet, corresponded with him widely on antitrust and regulatory policy. This paper relies both on Fred's written work and conversations and interactions that both authors had with Fred during his life.

markets that are inherently imperfectly competitive. Fred's main focus was on how to use economic analysis to solve public policy problems in ways that recognize a broad array of economic and institutional imperfections (Kahn, 1966). His interest in answering the question "what is the best that we can do in an imperfect world?" never changed. But the scope of the imperfections that he found incorporated into his analysis expanded significantly as he gained more practical experience. And, not surprisingly, his policy prescriptions changed as he expanded the range of imperfections that, he believed, ought to be taken into account.

Fred is best known for his two-volume book, *The Economics of Regulation* (Kahn, 1970a and 1971), and his service as Chair of the New York Public Services Commission (the state's regulator of gas, electric and telephone utilities), the Civil Aeronautics Board (then the federal regulator of the airline industry), and the Council on Wage and Price Stability (the "inflation Czar" for President Carter). But Fred also made numerous contributions on other policy issues as well. While Fred is best known as a scholar for his publications on antitrust and regulation, his early work included articles on the structure and behavior of large firms, patent policy, international trade, and development economics. Here we review many, but not all, of his scholarly contributions and relate them to the policy milieu in which they were written – and that Fred hoped to influence.

2 Early Career

Fred's training in economics began with bachelor's (1936) and master's (1937) degrees in economics from New York University. After a year as a graduate student in economics at the University of Missouri, Fred entered the doctoral program at Yale, where he received his PhD in 1942. Between 1940 and 1945, Fred served short stints at the Brookings Institution, the Antitrust Division, the War Production Board, the U.S. Army, the Department of Commerce, the Commission of Palestine Surveys, and the Twentieth Century Fund. Fred began his academic career in 1945 as an assistant professor and department chair (an interesting combination) at Ripon College, and in 1947 he accepted a position as an assistant professor at Cornell, where he

remained for 42 years and eventually served as Chairman of the Department of Economics and then Dean of the College of Arts and Sciences. Fred retired from Cornell in 1989, but he remained a productive scholar until his last scholarly article appeared in December 2008 at the age of 91.

Fred's first five articles, all in major economics journals, spanned an impressive range of topics: patent policy (Kahn, 1940), the economic viability of the Jewish settlements in Palestine (Kahn, 1944), the implications of the British balance of payments deficit for domestic economic policy (Kahn, 1947), the incidence of import duties (Kahn, 1948), and the evaluation of economic development projects (Kahn, 1951), all published before his first article on antitrust (Dirlam and Kahn, 1952). During this early period Fred also published his first book (Kahn, 1946) on Britain's economic position in the post-War world.

Of Fred's early publications, his article on patent policy is the only one that fits squarely in the field of industrial organization. Fred's patent paper, published while he was still a graduate student, makes a strikingly contemporary point. Fred argues that the American patent system retards innovation and perpetuates monopoly because it rests on the incorrect assumption of the single, independent, self-contained invention. According to Fred, the more common example is an invention that is in "large measure the work of others... and which can be completed only by the work of others who come after" (Kahn, 1940, p. 482). By failing to take into account the cumulative, multidimensional and interactive nature of technological innovation, the system can give the owner of a single, not terribly important innovation a roadblock against further progress. The consequences of this fundamental flaw are "too many worthless patents... too many vaguely drawn, excessively broad, uselessly narrow, wholly unworked patents" (Kahn, 1940, pp. 483-4), leading to excessive and expensive litigation that causes the patent system to be biased in favor of large, established firms. The article also explores the implications of patent pools, which Fred sees as a rational response by holders of groups of interconnected patents to overcome the coordination and negotiation problems of cross-licensing, but also as a threat to competition.

Fred's work on the British economy, although not really in the field of industrial organization, has intellectual connections to his later work. The principal focus of these articles is why Britain's relative position in the world economy was in decline and what can be done about it. His main target is British industrial policy, which he criticizes for being excessively backward looking. Fred offers the analogy that just as the British military planned for World War II by figuring out better ways to fight World War I, British economic policy focused mainly of preserving the structure of the 19th Century British economy, thereby making Britain increasingly irrelevant to the modern world economy. With hindsight about Fred's later work on how to deregulate, his article and book on Britain are distant mirrors of his later argument that deregulation is hampered by the failure of policy makers to "let go" of regulation in the process of trying to find a smooth pathway to a deregulated market.

3 Antitrust

Fred's early academic career coincided with major changes in the application of the antitrust laws, especially the application of Section 2 of the Sherman Act, Section 7 of the Clayton Act, and the Robinson Patman Act after World War II. Two especially important policy changes were, first, substantial reductions in the market share of a firm and the level of concentration in an industry that antitrust enforcement agencies and the courts used to determine whether firms had monopoly power, and, second, new categories of conduct by firms with high market shares that could lead to antitrust sanctions. The changes in antitrust law during this period demonstrated increasing suspicion of long-term contracts, exclusive dealing arrangements, price differences that could not be justified by cost differences (price discrimination), vertical mergers, and non-standard contractual terms that could be interpreted as having been "imposed" by a firm with monopoly power on suppliers and customers to inhibit competition. Cases that exemplify these changes were *Alcoa*, *United Shoe*, *A&P*, *U.S. Steel*, *International Harvester*, *American Tobacco*, *Griffith*, *Paramount*, *International Salt*, and *Standard Stations* (for an analysis of many of these cases, see Kahn 1953, 1954).

The expansion in the kinds of firms and conduct that could run afoul of the antitrust laws was extremely controversial then as it is now. An example is the especially heated debate about the *A&P* decision between the team of Joel Dirlam and Fred Kahn (1952a, 1953) defending the outcome and MIT economist Morris Adelman (1949, 1953) attacking it. While perhaps not as exciting as contemporary debates about the best GMM estimator for a multinomial logit model of the demand side of a differentiated product industry, these guys really got into it at both the analytical and personal level.

3.1 The Academic Debate about “New” Antitrust Policy

The sides in the debate over the “new” antitrust policy were the ancestors of a similar debate today. On the “right” (the early “Chicago School”) were economists and lawyers who believed that the new policy would reduce industrial performance by constraining efficiency-enhancing behavior. On the “left” (then the “Harvard School,” now the “Post-Chicago School”) were economists and lawyers who, by contemporary standards, viewed firms with moderately high market shares and industries with modest levels of market concentration as inviting targets for antitrust enforcement because they believed that these measures were reliable indicators of excessive prices, X-inefficiency, exclusion of entrants, and an “unfair” competitive environment, especially for small firms. Because computers were rare and not sufficiently advanced to support more than rudimentary econometric estimation, empirical analysis to support the positions taken by both sides was minimal, and the disagreements between the schools arose primarily from different anecdotes, theoretical approaches, and ideologies rather than from systematic empirical analysis of the effects of firm size, market structure, and the conduct at issue on market performance.

Fred’s 1950s publications on antitrust policy were mostly on the “left,” although his support of the new antitrust policies was not unqualified. Fred analyzed the post-War antitrust cases from the perspective of what he thought antitrust policy should do in a world in which perfect competition is not attainable, pure monopolies rarely exist (except when created by

government), and direct regulation is highly inefficient. In this sense, his formulation of the problem was quite contemporary.

Fred was a fan of J. M. Clark's analysis of overhead costs (1923) and Clark's (1940) search for a practically useful definition of "workable competition," the imprecise concept of an acceptable degree of imperfect competition. Fred shared Clark's view that policy prescriptions regarding the conduct of firms should reflect the attributes of products and costs that made perfect competition infeasible. In Fred's almost institutionalist view, conditions in every market are "in large measure *sui generis*" (Kahn, 1953, p. 35), a view that was fashionable at the time but that largely has dropped out of contemporary academic antitrust discourse.

While Fred believed that in most situations production costs and/or product attributes made perfect competition infeasible, he was not an admirer of "monopolistic competition" theory. He noted that "the courts have not followed the lead of the theory of monopolistic competition..." and "have been wise not to do so" (Kahn, 1953, p. 34). Monopolistic competition theory was based on assumptions for which he had little patience, such as free entry, zero profit long-run equilibrium, and the absence of sunk costs, price discrimination and strategic behavior by firms. He viewed the quest for "workable competition" as requiring an exploration of whether certain types of firm conduct improved welfare or reduced it, recognizing that behavioral responses by a large firm or a dominant group of firms that departed from simple models of competitive spot markets could be either good or bad for consumer welfare.

To the end of his career, Fred was critical of much of the "Chicago School" analysis of antitrust policy, especially its benign view of vertical restraints and exclusionary conduct, so his assessments of the developments in the new antitrust policy of the 1950s were generally favorable. His book with Joel Dirlam (Dirlam and Kahn, 1954) was especially critical of conduct by firms with market power that harmed small competitors and excluded entrants. An example is their disapproval of selective price cuts by incumbents in response to competitive entry by low-cost firms when the price cuts are not cost-justified.

Fred did not accept the view of some other “Harvard School” members that “big is necessarily bad” or even that monopoly power always should be curtailed (Kahn, 1953, 1954). Instead, he believed that antitrust should be concerned about the way market power is obtained or maintained. According to Fred: “If monopoly elements inevitably pervade the economy and are in some measure essential to a good performance, it would clearly be quixotic to attack monopoly power *per se*” (Kahn, 1953, p. 35). He defended the decisions in *United Shoe* and *Alcoa* not because he believed that the market shares of the defendants – in the range of 85 to 90 percent – were intolerably high, but because the defendants engaged in conduct to preserve their dominant market shares in ways that were not derived from superior efficiency (Kahn, 1953, pp. 30-1). Fred believed that in most cases the best approach to regulating private business was “to establish fairly definite standards in statutory law, leaving businessmen free within those limits to pursue their own interests” and that “such standards can only be standards of *conduct*” (Kahn, 1953, pp. 41-2, emphasis in original).

Another area in which Fred was not fully in line with some “Harvard School” members concerned antitrust policy about vertical integration. Fred not only saw both “Chicago School” benefits and “Harvard School” costs arising from vertical integration by firms with market power, but he also saw a “perplexing problem... that in their manifestations and exercise the competitive advantages stemming from gains in efficiency attributable to integration are in practice inseparable from the merely strategic advantages” (Kahn, 1953, p. 46). For this reason, he rejected a policy that would prohibit firms from exploiting the strategic advantages of vertical integration that also created efficiency benefits.

During the 1950s and 1960s, the threshold of market concentration that both economists and the courts used to indicate the likely presence of market power was quite low by contemporary standards. In 1968 the policy of the Department of Justice was to challenge all mergers in which each of the merging firms had a market share exceeding 5 percent, regardless of the extent of concentration in the market (U.S. Department of Justice, 1968, p. 6). The poster child for an excessively low concentration threshold was the denial of a proposed

merger by two super-market chains in Los Angeles, Von's and Shopping Bag, in 1960 and affirmed by the Supreme Court in 1966. At the time the market share of the merged firm would have been around 8 percent in a market in which no firm's share exceeded 8 percent (Wiley 1988). Two decades later Von's was permitted to acquire the Los Angeles stores of the largest chain in the market, Safeway (the two firms merged completely in 1997).

Fred did not express support for using a low market-share threshold as an indicator of market power, and more generally he believed that neither a high market share nor a high level of market concentration was a reliable indicator of whether conduct should be subject to antitrust sanction. Instead, he advocated his version of an "intent" standard, by which he meant whether the primary effect of the conduct is to reduce competition (Kahn, 1953). Nevertheless, he did regard markets as potentially vulnerable to anticompetitive conduct with market shares and concentration ratios that are now regarded as too low to confer significant market power. For example, his article on natural gas (Kahn, 1960) cites four-firm and eight-firm concentration ratios of 40-50 and 70-80 percent, respectively, as troubling; however, an article on gasoline pricing (Dirlam and Kahn, 1952b) concluded that, except for isolated problems in some areas, the petroleum refining industry was workably competitive in the modal regional market, which contained eleven major firms controlling 85 percent of sales and, in one region, a single firm with a market share of 20 percent.

Following from his focus on conduct, not market concentration, and his recognition of both benefits and costs from vertical integration, Fred was an advocate of the rule of reason (Kahn, 1953, pp. 48-54). Fred believed that one had to look at the facts in each case to decide whether conduct caused anticompetitive harm. While Fred recognized that consumers might benefit from some non-standard contractual arrangements (e.g. exclusive dealing and long-term contracts), he did not articulate why and when these might be welfare enhancing. Fred viewed exclusionary contract terms as suspicious if they were utilized by a firm with a large market share or a small group of firms with a large aggregate market share. Fred had faith that

the courts could successfully use the rule of reason process to root out exclusionary conduct that reduced welfare.

3.2 The Counter-Revolution

Beginning in the 1970s, both economists and the courts grew increasingly critical of the new post-war antitrust policy. Many of the changes in antitrust policy during the post-War period are now widely viewed as too restrictive, confusing protecting the competitive process with protecting competitors, and reducing rather than increasing consumer welfare. Many of the then-new antitrust cases are now viewed as reflecting a failure to understand the efficiency reasons that motivate firms to use a variety of contractual arrangements, to integrate vertically, and to respond to entry as they do. The post 1970 changes in antitrust policy reflect "new new" theoretical and empirical methods for analyzing the static and dynamic attributes of markets characterized by imperfect competition, sunk costs, strategic behavior, vertical and horizontal externalities, etc. (Joskow, 2002, 2010). Another important change since the 1960s is a significant increase in the thresholds for market share and market concentration that trigger concern about the adequacy of competition.

Did Fred's views move to the "right" along with those of the economics profession and the courts? This question can not be answered comprehensively based on his publications. After the mid-1960s, Fred's written work that dealt with antitrust policy was based on his experiences as a regulator and focused on applying antitrust in regulated industries, and especially during the transition from regulated to deregulated markets. Fred argued that antitrust could play an important role in facilitating effective deregulation. These works reveal that his views about antitrust had evolved somewhat, but still reflected a deep skepticism of conduct that plausibly could be exclusionary.

Perhaps Fred's strongest continuing disagreement with the Chicago School is its dismissal of the significance of predatory and exclusionary pricing. Fred (1991) disagreed with the Supreme Court's observation in *Matsushita* that "predatory pricing schemes are rarely

tried, and even more rarely successful.” He offered as counter-examples several selective price cuts by incumbent airlines on routes served by entrants that either drove entrants with lower cost from the market or caused them to become price followers rather than price competitors (see also Kahn, 1999).

Fred also was critical of what he believed had become lax antitrust enforcement against exclusionary practices by firms controlling "bottleneck" or "essential facilities.” Fred regarded access to some facilities of newly deregulated monopoly utilities as essential for competitive entry, and believed that forcing utilities to share these facilities at reasonable rates was desirable, especially given that a regulated utility acquired its dominance not because of superior efficiency but “merely because of its inherited franchised monopoly” (Kahn, 2001, p. 18). Consequently, he supported “a softening of the essential facilities doctrine” for newly deregulated utilities, but with the proviso that prices must cover costs.

Fred’s support for active antitrust enforcement during the transition to deregulation was a consequence of his view that regulators should stop micromanaging regulated firms as quickly as possible. Fred believed that the failure of regulators to “let go” seriously threatened the transition from regulation to competition, and his views on what constituted "workable competition" during such a transition clearly accepted high thresholds for market share and market concentration for drawing lines between adequate competition and undesirable monopoly power (Kahn, 1991, 1992, 1998, 2004, 2006). Overall, Fred preferred reliance on imperfect antitrust enforcement to what he viewed as a tendency for imperfectly informed regulators subject to political pressures to keep their fingers (or feet) on regulated industries in transition to competition for too long.

4 Regulation

Fred’s writings on the importance of antitrust supervision of deregulated industries naturally leads to Fred's research on regulation and deregulation. Beginning in the late 1950s,

Fred's publications turned away from antitrust, and by 1970 his work almost exclusively focused on economic regulation and deregulation.

4.1 Natural Gas

Fred's first publication (Kahn, 1960) on price regulation examined regulation of the field price of natural gas. The 1954 *Phillips* decision ruled that the Federal Power Commission (FPC) had the authority and obligation to regulate the field price of natural gas sold in interstate commerce. The main goal of Fred's paper is to evaluate the arguments for and against cost-based regulation of natural gas field prices. The article observes that because oil and gas are jointly produced, setting cost-based prices for gas inevitably involves an inherently arbitrary allocation of joint costs. Fred noted that, as of 1960, production of oil and gas was badly distorted by other policies, notably the depletion allowance, production controls and import restrictions. These policies led to the unusual combination of excess domestic investment and elevated prices (compared to the world market). Fred concluded that the principal explanation for rising natural gas field prices was increased demand facing inelastic supply, although he also expressed concern that the control of gas supplies was sufficiently concentrated among a handful of oil companies that strategic withholding of supply also may be a factor.

Fred expressed serious doubts about whether natural gas prices should be regulated. Fred states that because gas producers earn "large economic rents and possibly monopoly profits..., I am skeptical that economics can be said to dictate a policy of laissez faire" (Kahn, 1960, p. 509). According to Fred, one major reason to hold down gas prices is to compensate for the excess production of domestic oil and gas that arises from other policies. Yet Fred also observed that regulation probably would be unnecessary if the oil and gas industry were not subject to these other policy distortions. "If these other distortions were eliminated,... it would make a good deal less sense... for the government to hold down the price of gas... The time may be ripe to consider a more fully competitive way of life for this industry" (pp. 516-17).

Fred's skepticism about the wisdom of natural gas field price regulation is surprising (at least to us). In general, Fred was sympathetic to proposals to transfer economic scarcity rents from producers to consumers or, at least, to society at large. For example, Fred favored the proposal by the Ford Foundation to capture the cost reduction in the national distribution of network television programs due to the introduction of communications satellites and to transfer at least some of the cost savings to public broadcasting (Dirlam and Kahn 1968). His grounds for reaching this conclusion were that cost reductions would simply increase the profits of broadcasters because an increase in supply was blocked by spectrum allocation, that the spectrum that was the source of scarcity rents was a public resource, and that taxpayers had covered most of the cost of developing communications satellites.

Fred also later advocated capturing the scarcity rents from natural gas for consumers in his expert testimony in the so-called area rate proceedings at the FPC. At first the FPC pursued the idea of setting prices on a firm-by-firm basis, which Fred roundly criticized as unworkable (Kahn, 1960). In the area rate proceedings the FPC sought to establish a ceiling price for each major gas field. Fred devised what he regarded as an elegant method for setting prices to extract the rents from production in low-cost areas without creating excess demand, which essentially amounted to a two-part tariff in which a low price was set for "old" (low-cost) gas and a high price was set for "new" (high-cost) gas, thereby causing the marginal price to equal the marginal cost of production (Kahn, 1970b).

Fred's proposal was adopted by the FPC, but because the two-part tariff was used to calculate a blended average price in downstream markets, Fred's elegant theoretical solution became a practical nightmare. We now know that regulation of natural gas, while transferring scarcity rents to established consumers by keeping prices from rising to competitive levels, also led to serious shortages, inefficient non-price rationing and inefficient patterns of consumption among different users. Most economists soon concluded that this regulatory effort to capture the infra-marginal rents was a big mistake (Breyer, 1982, Chapter 13; Breyer and MacAvoy, 1973; MacAvoy 2000), and policy makers eventually agreed. Field price regulation was

gradually reversed beginning in the 1980s, with complete decontrol of natural gas field prices in the early 1990s.

In later years Fred spoke little about his role in the regulation of natural gas. We suspect that he would say that it worked in theory but not in practice, being critical of the FPC for taking so long to make decisions, failing to measure costs properly, failing to take account of market clearing conditions, and failing to take actions that would translate tiered field prices into downstream prices with the right incentives. The field price case appears to have been his first experience with the imperfections of regulation as a counterweight to the imperfections of competition and the challenges of applying clever theories in practice.

4.2 Good Regulation in Theory and Practice

In 1968 Fred published his first article on traditional public utility regulation in which he discussed the conditions under which Alvin Klevorick's (1966) proposed "graduated fair return" could deal effectively with the incentive under rate-of-return regulation to adopt excessively capital-intensive production technology. Soon thereafter Fred published his *magnum opus*, *The Economics of Regulation* (Kahn 1970a, 1971), which is encyclopedic in its coverage of the traditional set of issues in public utility regulation. Volume I focuses on the application of microeconomics and some principles from the emerging field of finance to the regulation of prices and profits of a regulated firm. Volume I is very much a normative analysis of how economics *should* be used to regulate prices for *de facto* legal monopolies. Although Volume I covers the problem of establishing a utility's revenue requirement (including calculating the cost of capital and applying the "used and useful" test), the main focus is on regulating the regulated firm's price structure: the application of marginal cost pricing principles to conditions of variable demand with non-storable output (a generalized peak-load pricing problem), and the selection of the optimal menu of prices that allows a regulated firm to recover its costs under conditions of declining average cost (a multidimensional second-best pricing problem).

As in Fred's writing on antitrust policy, *The Economics of Regulation* explicitly recognizes that non-economic considerations play a role in regulating monopolies. The end of Volume I and much more of Volume II (*Institutions*) examines competitive entry in "natural monopoly" markets, the response to entry by a regulated incumbent, and vertical integration by a regulated monopolist. Most of the applications of this analysis are in telecommunications, railroads, trucking and airlines, where competition as an alternative or complement to regulation was just emerging as both an academic and a policy issue. However, the role of interest group politics and the implications of imperfect and asymmetric information, which became major topics in the economics of regulation in the early 1970s, are not discussed in either volume.

Fred became Chairman of the New York State Public Service Commission in 1974, where he endeavored to apply the principles of Volume I to public utilities, primarily to electricity and telephone companies. Among other things he pursued the application of the marginal cost pricing principles that were developed extensively in Volume I of *The Economics of Regulation*, pursuing initiatives to introduce peak load pricing for electricity and new rate structures for local telephone service, including unbundling charges for directory service. The changes he proposed were controversial and faced intense opposition from various interest groups. Applying the principles in practice turned out to be harder than doing so in theory due to the challenges of getting agreement about the measurement of the relevant costs, demand elasticities, and distributional impacts, navigating the constraints created by the lengthy and complex administrative procedural requirements, and overcoming efforts by interest groups to deflect, if not derail, policy change. The challenges of applying microeconomic theory in practice are reflected in two articles about the rate structure in communications (Kahn and Zielinski, 1976) and in Fred's Ely Lecture to the American Economic Association (Kahn, 1979).

4.3 Airline Deregulation

In 1977, Fred became the Chairman of the Civil Aeronautics Board (CAB), which had regulated fares and entry for the nation's interstate airlines since 1938. (Technically the CAB was created in 1940 when it was split off as a separate agency from the Civil Aeronautics Authority, which was created in 1938.) Much had already been written by economists about the inefficiency of airline deregulation (e.g. Levine, 1965; Eads, 1972; Douglas and Miller, 1974). By the time Fred became CAB chair, the consensus view among economists was that air transportation could be provided by many competing firms, that CAB regulation had led to excessive fares, underutilization of capacity, excessive operating costs, inefficient route structures, and distorted technological change in the commercial aircraft industry, and that the CAB served more to protect the airlines from competition than to promote consumer welfare. The remedy favored by most economists was to deregulate airline prices and entry.

Upon becoming chair of the CAB, Fred did not immediately propose deregulation of fares and entry. One problem was that whether the CAB legally could deregulate the industry under the prevailing statute was debateable, assuming that he could get his fellow commissioners to agree to do so. Instead, he initially promoted "light-handed" regulation that gave airlines the opportunity to apply to offer a wider range of fares subject to various restrictions on, for example, length of stay, refunds, and advance purchase requirements. But Fred immediately had to confront the question of how, under existing law, to evaluate applications for such flexible fares as well as applications by established airlines to serve new routes and new airlines to enter. At first, Fred tried to apply economic principles ---"marginal costs with wings" --- to ensure that fares at least covered marginal cost. He also had to grapple with powerful incumbent airlines, which opposed entry into their markets, in the context of a regulatory framework that had historically applied "need" criteria to such applications (which were almost always rejected).

Fred quickly realized that trying to pursue light-handed regulation governed by a clear set of marginal cost pricing principles was not practically feasible in an industry with competing airlines operating over thousands of routes and costs that could not be allocated in a non-

arbitrary way among routes and passenger classes. Fred also was concerned about small communities that feared that they would lose air service or would be serviced by only a single airline that could charge monopoly prices even without serious entry constraints. Nevertheless, he and his colleagues realized that the costs of continued regulation exceeded the costs of market imperfections, and they moved quickly to deregulate fares and entry as much as they could within the limits of the law, though opponents argued that they had in fact exceeded their legal authority. Fortunately, the possible legal hurdles were quickly resolved when Congress passed the Airline Deregulation Act of 1978, which formally put a stamp of approval on the CAB's deregulation program, established a procedure for protecting service to small communities, and formally phased out the CAB by 1984.

The initial experience with fare flexibility and relaxed restrictions on entry were quite favorable for almost all concerned. Average fares declined, incumbent airlines expanded service, and airline profits rose. We must recall that the 1970s and early 1980s was a period of rising inflation coupled with slow growth and rising unemployment, which created political problems for Presidents Nixon, Ford and Carter. Government efforts to control wages and prices accelerated under Presidents Nixon and Ford, but with little effect. Fred's efforts to deregulate airline fares as chair of the CAB in 1977 and 1978 were popular and, more importantly, led to lower prices during a period of rising inflation. Could Fred's magic be applied more broadly to inflation generally? Jimmy Carter and his advisers thought so.

In 1978 President Carter appointed Fred as Chair of the Council on Wage and Price Stability and Advisor to the President on Inflation (the "Inflation Czar"). Of course, the regulatory constraints that kept airline fares high were quite different from the economic and institutional factors that led to high inflation. And the rate of change in the CPI actually increased significantly during Fred's tenure as Inflation Czar from 1978 to 1980. Actions by the Fed in 1981 to raise interest rates led to a deep but brief recession but also dramatically brought wages and prices under control. Fred was certainly frustrated by his job as Inflation

Czar since he knew that there was little that he could do other than jawboning. If he had any doubt about the limits of microeconomic regulation, this experience ended it.

Fred returned to his beloved Cornell in 1981 to resume teaching, research and consulting. While Fred wrote a few popular pieces on inflation and some of its implications, he quickly returned to problems of regulation and, in particular, deregulation. Of course, after its initial success, airline deregulation took some unexpected turns. New airlines entered the market, but most of them quickly went bankrupt, as did several established trunk carriers. Average fares stayed lower than they would have been under the old CAB pricing formulas, but the movement to hub and spoke systems created many hubs in major cities which were dominated by one or two carriers that charged higher fares than prevailed in routes out of more competitive airports (Kahn, 1993). Other problems that cast a cloud over airline deregulation arose from the rise of computer reservation systems that were controlled by incumbent airlines, reduced service and increased prices in small communities, and, as a result of bankruptcies and mergers, increased concentration in many routes and cities.

Neither Fred nor the economists who studied the airline industry before deregulation foresaw the structural changes that would take place in the airline industry or the competitive issues that arose as the industry structure changed. The prevailing view prior to deregulation was that entry would be easy since airplanes could be moved from one route to another very quickly and the cost of entry at small scale was believed to be relatively low, providing a constraint on prices even if concentration levels were high. Many economists viewed the airline industry as "contestable" (Bailey and Panzar, 1981; Baumol, Panzar and Willig, 1982). As a result, the rising concentration in major hubs and routes was not regarded by many as a valid indicator of market power. This view of competition in the airline industry has been subject to considerable empirical analysis and criticism (e.g. Borenstein, 1989 and 1991), including an early critique by Fred (Kahn, 1987). Economists now widely understand that the airline industry is neither perfectly competitive nor contestable. As one of the founders of contestability

theory expressed the matter, competition in airline markets “is explained better by models of oligopolistic behavior than by contestability theory” (Bailey, 2002, p. 12).

Airline markets are imperfectly competitive because they are subject to network effects and barriers to entry, and are characterized by price discrimination and other attributes that would not be observed in perfectly competitive markets. So, did Fred make a mistake in supporting airline deregulation (and by extension trucking and railroad deregulation)? Fred forcefully defended airline deregulation long after these attributes of the industry became apparent, “boldly stating my essential conviction: airline deregulation has been a nearly unqualified success” (Kahn, 2004, p. 3). His argument was simple: consumers benefitted significantly from lower fares, airline traffic increased as a result of lower fares, airline costs (controlling for fuel costs) per passenger declined, aircraft were more fully utilized, and market power could not be too much of a problem overall as airlines continued to find it challenging to earn enough money to cover their costs. Competition was not perfect, but from the perspective of consumer welfare competition was better than regulation.

Fred’s experience as a regulator and Washington insider taught him many things that would affect his work during the rest of his life. This new learning included an increased appreciation of the technical challenges associated with applying normative microeconomic theory in practice, given the regulatory tools and the imperfect information about costs, demand, technological change, and competitive dynamics that were available to the regulator. Not only were regulators imperfectly informed about key variables, they suffered from an asymmetry of information between regulators and the firms they regulate. This view of regulation is now widely accepted in both normative and positive research on regulatory mechanism design and the evaluation of regulatory effects (e.g. Baron and Meyerson, 1982; Laffont and Tirole, 1993). These challenges are amplified by interest group politics, mediated through legislative oversight committees, through the executive appointment process, and post-regulator consulting and employment opportunities. The role of interest groups too is

now incorporated in both normative and positive research on regulation and its effects (e.g., Noll, 1989; Peltzman, 1989).

4.4 Telecommunications

Fred had a long-standing relationship with the American Telephone and Telegraph Company (AT&T) and its post-divestiture offshoots, starting with his appointment to AT&T's Economic Advisory Council from 1968 to 1974 and resuming in the 1980s through expert testimony on behalf of the divested Bell Operating Companies before the Federal Communications Commission (FCC) and various state regulatory authorities. Unlike his academic work in other areas, nearly all of Fred's publications on telecommunications policy are closely linked to his consulting activities.

Although Fred wrote about telecommunications in *The Economics of Regulation* and in trade publications during the 1970s, all of his major academic work on telecommunications was published after the 1982 settlement of the government's antitrust case against AT&T and the company's subsequent divestiture in 1983. This massive restructuring of an industry that had been a vertically integrated monopoly for nearly all of its history, combined with competitive entry into all of its products and services as well as the change from analog to digital technology, provided an excellent opportunity for Fred to apply both the economic principles discussed in the *Economics of Regulation* (especially Volume II) and his experience as a regulator to an important and challenging new set of economic problems.

Despite his relationship with AT&T, Fred was in favor of efforts to restructure the Bell System and to encourage competitive entry by temporarily restricting the participation of the divested Bell Operating Companies in competitive markets (Kahn, 1987). While Fred acknowledged a "small but positive probability that ten or twenty years from now we will look back and conclude that the entire venture was a ghastly mistake," he also regarded as "a sign of good mental health that we seem to be spending little time looking back and asking ourselves

whether the course on which we have embarked in telecommunications is the right one” (Kahn, 1984, p. 139).

Most of Fred’s published research on telecommunications deals with regulating the price structure of incumbent local exchange carriers that retain substantial market power. Fred recognized that at the time of divestiture local exchange carriers faced some potential competition for local access and toll services, but his early focus was similar to his main concern at the New York Public Services Commission: to rectify an irrational pricing structure that had been inherited from the long era of a vertically integrated regulated monopoly (Kahn, 1984). Fred’s objective was to enhance efficiency by bringing each price more in line with the marginal cost of the associated service. Attainment of this objective required three changes. The first was to eliminate all forms of rate averaging, whereby access charges did not reflect variations in costs among geographic areas, due primarily to the length of the connection between a customer and the local switch, but also due to design characteristics of the local network, such as whether lines were buried or strung on telephone poles or whether customer lines were combined (“concentrated”) between the customer and the local switch. The second was to undo a half-century of price distortions arising from the use of usage charges on long-distance calls to subsidize the fixed cost of local access. The third was to introduce prices for all types of usage that reflected marginal cost, including peak-load pricing for local calling.

Fred’s most exhaustive treatment of the local service pricing problem (Kahn and Shew, 1987) was written at the beginning of the movement to a digital network. Digital technology brought several important changes and challenges to telecommunications regulation. One was a change in the cost structure – a reduction in costs generally, and a shift in the cost function in which a larger proportion of costs were fixed. An example of the quick and profound change in cost structure is the evolution in Fred’s analysis of the merits of local measured service (LMS) charges. In 1984 Fred endorsed LMS, especially peak-load charges (Kahn, 1984), but three years later he observed that the cost and demand for calling “make the narrow economic case for LMS an extremely modest one” (Kahn and Shew, 1987, p. 235).

Another implication of digital technology was the prospect of an entire new range of uses for the telecommunications network, based upon communication between computers rather than between ordinary telephone instruments, that vastly increase the demand for communications capacity, swamping its use for ordinary voice telephony. The fall in unit costs of digital transmissions coupled with rising demand created the prospect for replacing regulated monopoly with unregulated competition, but for the first decade or so after divestiture the extent to which this would occur and, if it did, the speed of the transition were uncertain: “we simply do not know whether large parts of the business may really be natural monopolies” (Kahn and Shew, 1987, p. 192). As a result, “the makers of telecommunications policy confront something of a dilemma: most of them are unwilling to deregulate completely until they are confident that the markets are capable of being truly competitive; but they are unlikely to be able to find out unless they deregulate” (Kahn and Shew, 1987, p. 192).

At the time Fred believed that a possible escape from the regulator’s dilemma was to base prices on the principle of economic efficiency, using a three-step process. First, the regulator must calculate the cost of an efficient network, defined as “minimizing the combined costs of access, calling, and the newer services” (Kahn and Shew, 1987, p. 228). Second, regulators should calculate “first-best” prices based on the long-run, forward looking marginal costs of this efficient network. “Economically efficient pricing looks not to the past – not to how we got where we are – but to the future; efficiency requires that prices tell customers what incremental resources society *will* use if they take more of the good or service in question, what resources society *will* save if they consume less of it” (Kahn and Shew, 1987, p. 224). Third, because “first-best prices of telephone services are unlikely to provide the revenues to which the telephone companies are entitled...” (Kahn and Shew, 1987, p. 247), use “second-best” pricing to meet the firm’s revenue requirement. The two candidates for the second-best pricing structure, for which Fred did not express a clear preference, were Ramsey prices and declining block rates. In both cases, although imposing the same price regulation on both incumbents and entrants was acknowledged to improve efficiency, Fred concluded that in

telecommunications “other, more compelling considerations... favor continuing to exempt entrants from price regulation” (Kahn and Shew, 1987, p. 249).

Fred believed that this three-step approach “would be consistent with either ultimate outcome – an essentially deregulated, competitive industry or thoroughly regulated monopoly, or some combination of the two” (Kahn and Shew, 1987, p. 193). In short, if regulator’s simply set the “right” price structure and allow entry to occur against the incumbent monopolist in any market, the “right” market structure will evolve from the competitive interactions among the incumbent and the entrants.

As noted above, Fred also supported the line-of-business restrictions in the AT&T divestiture. “The notion that preserving competition requires keeping the Bell Operating Companies (BOCs) out of areas in which they would compete with companies that depend on them for access to local networks is fully consistent with the philosophy of antitrust laws” (Kahn, 1987, p. 1060). According to Fred, “the Bell System *did* use its control over access to the local exchanges to impede competition. Thus, to remove, in the interests of competition, restrictions on the permissible activities of the BOCs actually threatens the fair competitive opportunities of rival purveyors of some of these services” (Kahn, 1987, p. 1061).

One instrument that, in principle, could be used by an incumbent local exchange carrier to thwart competition in markets for value-added products that require local access as an input is exclusionary pricing of access. The idea that efficient price regulation would solve this problem was confronted by the FCC. The BOCs proposed the “efficient components pricing rule” (ECPR) to solve this problem. ECPR essentially requires sufficient margins between wholesale interconnection charges for access and retail prices for services that use access to recover the incremental cost of the value-added service (Baumol and Sidak, 1994).

Fred agreed that ECPR, when properly implemented, would allow competitors to survive if they were as efficient as the incumbent in providing the new service because the latter effect depended only on maintaining the appropriate margin between wholesale and retail prices; however, Fred also pointed out that the ECPR as proposed would enable the incumbent to

preserve the monopoly profits on value-added products by including these lost profits in the wholesale price of access (Kahn and Taylor, 1994). Thus, ECPR “will not fulfill the other important function of competition – the erosion of monopoly profits” (Kahn and Taylor, 1994, p. 230). Moreover, “by preventing competition from driving prices to marginal cost, it preserves the allocative inefficiency inherent in the preexisting price structure” (Kahn and Taylor, 1987, p. 233). Thus, Fred concluded that efficient access pricing required not only setting the retail price margin so that the incremental cost of the value-added service was recovered, but also effectively regulating the wholesale price of access so as to exclude from the wholesale price the incumbent’s lost profits due to retail competition.

The issue of regulating the price of inputs to competitors came to an ugly crescendo with the passage of the Telecommunications Act of 1996. The stated goal of the Act was to encourage competition in all aspects of telecommunications. Competition in local access and cable television was facilitated by removing entry barriers and by creating a “competitively neutral” system for subsidizing access in high-cost areas. The carrot of the possible removal of the line-of-business restrictions on the BOCs was used as an incentive to induce them to accommodate entry into local access. Finally, BOCs were required to unbundle the local access network, subject to FCC regulation of the prices of the unbundled network elements (UNEs), thereby allowing competitors to enter without building an entire local network. The Act was maddeningly vague about how the FCC was supposed to regulate these prices, permitting prices to be based on costs but disallowing rate-of-return regulation.

The FCC’s general approach to the UNE pricing problem was consistent with Fred’s earlier suggestion that prices be set equal to the long-run incremental cost of service; however, the details of how this principle would be implemented were hotly contested, with different companies producing wildly different methods to implement the principle (see Kahn, Tardiff and Weisman, 1999, for examples). Eventually the FCC settled on a procedure that it named Total Element Long-Run Incremental Cost (TELRIC), which was the forward-looking long-run incremental cost of the most efficient technically feasible local network, as determined by

computerized engineering cost models (see Rosston and Noll, 2002, for a description of TELRIC and a discussion of the arguments for and against it). The FCC's rationale for this approach was that it avoided pegging the price of a firm to its own costs, thereby providing an incentive for cost reductions, and that it emulated a competitive outcome. Incumbent carriers argued that TELRIC rates would not allow them to recover the costs of an existing network that was efficiently designed when it became operational.

Fred believed that TELRIC was a terrible idea because the concept of a "blank slate" local network – one that was designed from scratch using the best available technology for the local market as it exists at this moment – is unrealistic and impractical, and that attempting to require that prices satisfy this standard inevitably would lead to an implicit subsidy for competitive entrants (Kahn, Tardiff and Weisman, 1999). Although Fred had co-authors, we suspect that he was the author of the clever term that the article uses to describe this procedure: TELRIC-BS. Fred's preferred alternative was to use price-cap regulation in which total revenues from all local access services, including the UNEs, were capped by the actual costs of the local network, subject to an annual rate of decline based on the historical rate of technological progress in local network costs.

As time demonstrated, the intense, decade-long debate about pricing UNEs bore no fruit. Entry by constructing new networks that combined entrant-owned elements with selected UNEs never became an important element of local access competition. By the time the long legal battles over UNE pricing were resolved, cable companies had begun to bundle telephone, television and Internet access services, voice over Internet protocol (VOIP) had emerged, wireless telephony had taken off to offer significant competition against wireline access, and voice telephony had become an incidental use of the telecommunications system. Looking back, we now know that the single best decisions that the FCC has made in the post-divestiture era consist of creating a reasonably competitive wireless telecommunications industry and refusing to regulate it. Retrospectively, the intense debate over TELRIC and UNEs now seems quaint, illustrating primarily the inherent myopia of the regulatory policy debate

arising from its inability to anticipate, let alone plan for, significant technological changes even when their imminent arrival is apparent.

Fred's last major academic publication dealt with the most recent intense policy debate before the FCC: the proposal that the FCC should take steps to guarantee "network neutrality" for all uses and users of telecommunications services. Fred entered this debate by acknowledging that he "was for a long time far from having a satisfactory grasp of what exactly that means or why its advocacy has taken on an almost messianic ardor" (Kahn, 2006, p. 175). At the root of the problem is that different people use the same term to advocate different and largely unrelated policies. Among the policies that are advocated under the banner of network neutrality are: (1) use of the Internet should be free because of its social significance; (2) Internet access providers should not be allowed to engage in price discrimination among either content providers or content users; (3) Internet access providers should not be permitted to vary service prices to reflect differences in the cost of those services (including a prohibition against "priority" or peak-load pricing); and (4) Internet access providers should not be permitted to engage in exclusionary practices in either access prices or interconnection arrangements against competing content providers. The key point in Fred's analysis is that only the first issue is unlikely to be handled satisfactorily in a reasonably competitive market for Internet access, and that reasonable competition among cable, wire-line and wireless carriers is likely to be present for the vast majority of customers. In any case, Fred argued that antitrust, not regulation, is the most effective policy for dealing with exclusionary practices.

Fred concluded that because Internet access is now competitively supplied, the time has come to replace regulation with antitrust. To eliminate ambiguity about the status of exclusionary practices (price squeezes, discriminatory access), Fred advocated a new statute, patterned after the statutes that pertain to the Federal Trade Commission, that simultaneously eliminates telecommunications regulation and establishes clear standards for exclusionary conduct by an Internet access provider that would be subject to antitrust sanctions. With this article, Fred returned full circle to the core principles that he had espoused in the 1950s when

he first began to write articles about antitrust and regulation.

5 Conclusion

Economists of Fred's breadth and influence are rare. In reviewing his career, we are impressed equally by three characteristics of Fred's work. The first is his fidelity to the application of microeconomics in public policy and his advocacy of economic efficiency as an instrument for improving consumer welfare. The second is the evolution of his thinking in response to his encounters with the real world, which sometimes caused him to change his positions but never caused him to change his core principles. The third is his felicitous writing style. Not everyone could have come up with "marginal costs with wings."

Fred was more than a dear friend; he was a national treasure. We miss him deeply.

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