

W-W observed that “the results show that ownership by Viacom or ATC significantly influenced carriage decisions. ATC systems had higher probabilities than the average nonintegrated system of offering their affiliated network, Cinemax, and lower probabilities of offering the rivals, Showtime and TMC. Similarly, Viacom systems had higher probabilities for TMC carriage and lower probabilities for Cinemax. All 23 Viacom systems carried HBO, however, and there was no evidence that these systems had higher probabilities of carrying Showtime” (p. 371; Tab 7, Table 9).

Several things should be noted about these results. First, no favoritism or foreclosure was observed for HBO. Second, coefficients of the favoritism and foreclosure variables were rarely significant in the full probit models. They generally became significant only after employing the model selection algorithm, which greatly reduced the number of explanatory variables. Finally, a number of the significant coefficients were not for the vertical integration variables themselves but for these variables interacted with other explanatory variables. In particular, the coefficient of ATC times the logarithm of homes passed was significant in the Cinemax equation and the coefficient of ATC times (system channel capacity less the number of commercial broadcast stations in the market) is significant in the Showtime equation. There were significant coefficients of the “standalone” vertical integration variables only for Viacom in the Cinemax and Movie Channel equations and ATC in the Movie Channel equation. The authors did not explore why the carriage effects of vertical integration were present when the vertical integration

variable was interacted with some variables some of the time and were present without such interaction at other times.

Waterman and Weiss used these results to estimate the magnitude of the effect of vertical integration on the percentage of ATC and Viacom systems that carry either integrated or rival pay networks. They estimated that 13% more ATC systems carry Cinemax, 37% fewer ATC systems carried Showtime, and 40% fewer ATC systems carried The Movie Channel than did nonintegrated systems. Thus, for example, their model predicted that 91% of ATC systems would carry Cinemax while only 78% of unintegrated systems would do so.¹⁴² W-W also estimated that 60% fewer Viacom systems would carry Cinemax and 35% more Viacom systems would carry the Movie Channel than would nonintegrated systems. There were no differences for the carriage of HBO by either set of vertically integrated systems or for the carriage of Showtime by Viacom systems.

While the authors concluded that "Carriage differences were particularly large for the 'companion' networks, Cinemax and TMC" (p. 391), the likely economic effect of all of the carriage differences appears quantitatively small. For example, ATC's failure to carry Showtime as frequently as other systems reduced Showtime's access by about 2.6% of the total cable subscriber universe. Viacom's lower carriage of Cinemax resulted in Cinemax losing access to about 1.5% of the subscriber universe.

W-W used their estimated equations to simulate the effects of vertical integration on the total number of the 4 pay movie networks carried by the ATC and

¹⁴² Thus, when we say that 13% more ATC systems carry Cinemax we mean that the difference in the carriage percentages of the two types of systems was 13 percentage points.

Viacom cable systems. They estimated that ATC systems carried approximately .6 fewer networks and Viacom systems carried about .3 fewer networks than did non-integrated systems. They also estimated an equation in which the dependent variable was the total number of all pay networks carried and concluded that ATC systems carried significantly fewer pay networks -- on average one fewer network -- than did nonintegrated systems. As in the case of the results reported above, this conclusion was based on the fact that the coefficient of ATC times (system channel capacity less the number of commercial broadcast stations in the market) was significant.

Waterman and Weiss also examined the effect of vertical integration on the prices charged by cable operators for the pay networks they carry. Although they apparently expected that vertically integrated systems would charge higher prices for rival networks than did nonintegrated systems, the only significant finding is that ATC systems charged significantly lower prices for The Movie Channel. They did not report these results in detail, however.

Waterman and Weiss concluded that their basically negative results for the effect of vertical integration on prices may be explained by the fact that published prices may not reflect actual prices and that integrated networks can still be favored through more aggressive marketing efforts. In order to address this hypothesis, therefore, they also estimated the effects of vertical integration on subscribership of those networks that cable systems choose to carry. They found that the coefficients of the variables representing vertical integration "are almost never significant, indicating that the most important effects of vertical integration on

subscribership are though carriage, and that...marketing behavior...is not sufficiently similar across systems for its effect on penetration to be identified.” (pp. 387-388) Despite this result, the authors perform still another test of the effect of vertical integration on subscribership by setting the vertical integration variables equal to zero in both the penetration and carriage equations, that is, to assume that the vertically integrated MSOs act like the average nonintegrated MSO.” (p. 388) In these tests, they found that “predicted ‘normal’ subscribership rates are lower for the affiliated networks; that is, these MSOs appeared to favor their affiliates with respect to overall marketing behavior. With respect to rivals, we see that ATC systems would have higher expected penetration for Showtime had they behaved like the average nonintegrated system and Viacom systems would have a higher expected penetration for HBO.” (pp. 389-390) Nonetheless, the differences in penetration rates seem small (the highest being about four percentage points).

The conclusions the authors drew from these results are quite ambivalent. They argued, for example, that “vertical integration serves to resolve vertical contracting externalities of some kind in the cable industry,” (p. 391). However, they also noted that “even if our results are due to transactions efficiencies, static economic welfare could rise or fall as a result of the particular price and subscribership effects we observe...or as a result of any change in product variety....” (p. 391)¹⁴³

Interestingly, they argued that “...any favoritism of even a very similar affiliated product by an information provider with local monopoly power is

¹⁴³ The citations omitted are to Salinger's paper on Edgeworth's paradox of taxation and to the optimal product variety literature.

undesirable on freedom-of-expression grounds. (Let us say, for example, that we are concerned with news, rather than movie, channels.) Such favoritism might be judged particularly harshly if unaffiliated products are not available in the integrated firm's local market or perhaps are driven from the industry altogether." (p. 392) Finally, the authors noted that "A history of integration into both pay and basic networking by MSOs... suggests that integration may promote innovation and, in that respect, may serve to increase product variety and economic efficiency." (p. 392)

D.H. Waterman and A.A. Weiss, Vertical Integration in Cable Television, (Cambridge, MA: MIT Press, 1997)

In addition to reporting the results of Waterman and Weiss, "The effects of vertical integration between cable television systems and pay cable networks," Journal of Econometrics 72 (1996), on the effects of vertical integration on the carriage of pay networks, this book provides evidence on the carriage of basic and hybrid networks. The method of analysis was basically similar to their analysis of pay service carriage except that the authors "make no a priori assumptions about which other networks might be close substitutes for the networks at hand. Hence, while the models for the premium networks included variables for ownership of presumed rivals, those for the basic and hybrid networks included only variables for MSOs having a 5% or greater equity ownership in a network" (pp. 94-95). Thus, W-W did not test whether vertically integrated cable operators disfavor rival services, but only whether they favor the services with which they are affiliated.

W-W analyzed the carriage of eight basic or hybrid networks: CVN, AMC, BET, QVC, Discovery, MTV, VH-1, and Bravo, involving fifteen instances in which a

cable operator had an ownership interest in the program service. Two of these fifteen were discarded from further analysis because the carriage rate of a vertically integrated operator was 100%. In the remaining 13 cases, “nine showed significantly higher actual carriage than the normal; two differences were insignificant; and in the remaining two cases, carriage by the integrated MSO was significantly lower than the normal” (p. 95) (Table 6-4).¹⁴⁴ W-W also noted that “[o]ur analysis is likely to overstate the integrated versus nonintegrated carriage differences for basic networks in general, since more widespread basic networks would be less likely to have significantly different carriage rates on vertically affiliated than on unaffiliated cable systems.” (pp. 95-97)

W-W also reported descriptive statistics on carriage differences for 16 integrated basic and hybrid networks (Table 6-5): “In fourteen of the sixteen cases, systems having a vertical affiliation carried the network more frequently. Those data also suggest a tendency for higher total carriage rates to be associated with lower carriage differences between MSOs with and without ownership affiliations. In seven of the eight cases in which... a network had at least 90% cable household coverage overall, carriage rates exceeded 90% on both the affiliated and unaffiliated MSOs” (p. 98). Thus, although W-W concluded that vertically integrated MSOs favor affiliated basic services, “[t]he differences appear to be very minor... for more widely distributed basic networks” (p. 98).¹⁴⁵

¹⁴⁴ Statistical significance refers here to cases in which a coefficient was significant at the .10 level in a 2-tailed test.

¹⁴⁵ Carriage differences in excess of 10 percentage points were found for AMC, MTV, VH-1, QVC, Encore and Bravo. Note that these were raw differences and not differences obtained from a statistical model of carriage propensities.

As in the article discussed above, W-W examined the effect of vertical integration on the number of services carried by a cable system. Separate sets of equations were estimated for basic networks, premium networks, pay-per-view (PPV), and all cable networks combined. In addition, results were presented separately for all cable systems and for systems with more than 54 channels and for several alternative definitions of vertical integration: number of network affiliations; affiliated with any network; and having more than a 5% or more than a 20% interest in any network (Table 6-6).

W-W summarized their results as follows: "...the signs of nearly all coefficients are negative. Although only some of the coefficients are statistically significant and the signs and magnitudes of insignificant coefficients should not be taken as definitive...[t]he data... suggest that integration tends to reduce cable network carriage. The magnitudes of the negative effects on cable network carriage, however, are mostly quite small...an average system would have to have twenty network affiliations to reduce [the number of networks carried] by one network. The effects appear to be smallest for basic cable networks as a group and insignificant for the relatively sparsely offered PPV networks. The effects were largest for premium networks. For example, systems in MSOs affiliated with two premium networks carried an average of .5 fewer premium networks in total" (pp.99-100).

Although the W-W results for basic services differ from those of other studies, the differences may be smaller than first appears. Most basic services with high overall carriage rates were not included in the W-W sample and other data

suggest that carriage differences for these services are small. Indeed, they cannot be large if carriage rates for unintegrated systems are high. Services with large differences tend to be those where unintegrated systems have relatively low carriage rates. If this were all that was happening one should observe more total services being carried by integrated systems. Instead, W-W found that the number of basic services carried was approximately the same for integrated and unintegrated systems. This implies that integrated systems are substituting integrated for unintegrated services, with little or no effect on the total number of basic services being carried.¹⁴⁶

Despite these findings, W-W reached essentially the same policy conclusions as in their article cited above. In particular, they argued that "Under reasonable assumptions, an initial increase in efficiency due to integration can increase the likelihood that integrated cable operators will carry affiliated networks and can reduce the likelihood of unaffiliated network carriage as well as the total number of networks offered" (p. 103). Thus, they concluded that "it seems very likely that the observed [carriage] differences reflect both efficiency and strategic factors" (p. 105).

Two other conclusions by W-W are relevant. First, W-W "find theoretical support and anecdotal evidence that vertical contracting problems motivate carriage

¹⁴⁶ It should be noted here that some of the difference between the results for basic and pay services may reflect the different way in the two sets of services are marketed. Because basic services are sold in a bundle, a reduction in the internal transfer price of a vertically integrated basic service may actually benefit other basic services. This occurs if the lower wholesale price leads to a lower retail price for the bundle, and thus an increased number of subscribers. What is not clear is why this does not lead to a larger number of basic services being offered by vertically integrated cable systems. One possibility is, however, that the some vertically integrated basic services have very close substitutes, so that the number of such services that any operator is willing to carry is fixed.

and marketing decisions of vertically affiliated cable systems, presumably to the benefit of subscribers in the cost and quality of cable service. Moreover, the tendency for carriage differentials to be smaller for better established, more widely distributed basic cable networks again suggests that in terms of programming content, the end result of the strategic behavior we do encounter is probably not much different from what we would observe in the absence of integration” (p. 105). “Second, any programs that replace unaffiliated cable networks on a menu may improve the diversity of program content or audience appeal. That is, eliminated cable networks are likely to be closer substitutes for affiliated networks than any new additions that replace them” (p. 106).

By way of summary, W-W’s argument appears to be as follows: (1) vertical integration (efficiently) reduces the price charged by a program service to its affiliated cable systems; (2) the lower wholesale price leads to a lower retail price and a shift in demand toward the integrated service; (3) the efficiencies of integration also generate a more attractive menu for subscribers; (4) the resulting shift in demand away from other services makes their carriage less profitable; and (5) the carriage of some rival services may therefore become unprofitable.

CRA Probit Analysis, 1994.

CRA conducted an updated version of the Crandall analysis for 64 nationally distributed pay and basic services.¹⁴⁷ For each service, we compared the behavior of majority-owned TCI systems to otherwise identical systems that were not

As a result, vertically integrated operators always carry their own services while unintegrated operators sometimes carry the integrated services and sometimes carry their rivals.

¹⁴⁷ The results of this study were described in greater detail in a separate appendix.

vertically integrated with any service. We then calculated the number of TCI subscribers that were either "advantaged" or "foreclosed" by TCI's behavior. That is, we calculated the addition to, or reduction in, the number of TCI subscribers with access to the service as compared to the number that we estimate would have been carried by an unintegrated system.

Of the nineteen affiliated services examined, thirteen are "favored" by TCI. However, excluding Encore, the average extent of the affiliation advantage was about 5% of the services' subscriber base. This was not substantially larger than the average advantage of 4% provided to twenty-five unaffiliated services. Put differently, Encore was the only service for which TCI's "favoritism" is much more substantial than for unaffiliated services.

Moreover, TCI carried more than a third of its affiliated services less often than unintegrated systems. Indeed, the typical percentage of TCI subscribers foreclosed from these affiliated services is about 8.5 percent, an average that is higher than that for the unaffiliated foreclosed services.

While TCI provided a carriage "advantage" to 25 unaffiliated services, it also carried another 21 unaffiliated services less frequently than unintegrated systems. The net amount of foreclosure across all unaffiliated services was about 4 million subscriber transactions¹⁴⁸ spread across these 46 services,¹⁴⁹ or about 87

¹⁴⁸ A subscriber transaction is defined as one subscriber having access to one service. Thus, a subscriber with access to 10 basic services would be "counted" as having 10 subscriber transactions.

¹⁴⁹ This is the difference between the total number of foreclosed subscribers and the total number of advantaged subscribers.

thousand subscribers per service. This net foreclosure rate accounted for less than one-half of 1% of all subscriber transactions.

Chipty, T., "Vertical Integration, Market Foreclosure, and Consumer Welfare: An Empirical Investigation" [There are a number of versions of this paper.]

The first version of this paper addressed the effects of vertical integration between cable television systems and cable program services on the program services offered by cable systems, the prices of basic and pay cable service, and the welfare of subscribers using data for 2,079 cable systems from the 1991 *Television and Cable Factbook*.¹⁵⁰

Chipty estimated that cable systems "integrated with pay channels suppliers offer 54% fewer pay channels than do unintegrated firms." (p. 9)¹⁵¹ She also estimated that "operators affiliated to pay movie channels are 5% less likely to offer basic movie channels than are unaffiliated operators, where this difference was statistically significant. Affiliation to a pay sports channels [sic] also has a negative, though not significant, effect on the probability of offering a basic sports channel.... Downstream firms who are integrated with basic movie suppliers are 24% more likely to offer a movie channel in their basic package than are unintegrated downstream firms" (p. 11).

Chipty also claimed to show that integrated systems offer fewer basic services than their unintegrated counterparts, a result she ascribed to the desire of integrated systems to foreclose rivals to their affiliated program services. However, the dependent variable in her statistical analysis was not the number of basic

¹⁵⁰ The handwritten date on our copy of this version is 5/4/95.

¹⁵¹ It should be noted that these operators are also integrated with basic services. A different variable accounted for the effect of vertical integration only with basic services.

services offered but, “duplication,” the ratio of the number of services offered to the number of different service types offered.¹⁵² Thus, she found that duplication is lower for vertically integrated systems and concluded that fewer services are offered holding constant the number of different types of services offered. Put differently, if integrated systems offer more services, but also offer proportionately more types of services than do unintegrated systems, Chipty would conclude that the integrated systems offer fewer services, and thus are engaged in foreclosure. [That is the result in equation (3) where the number of basic services is related to vertical integration “controlling for type.”]

To put the difficulty with Chipty’s approach most clearly, suppose that an integrated and an unintegrated system both carry the same services, that the ratio of the number of services offered to the number of service types offered exceeds one, and the integrated system adds a type of service that neither system had previously been carrying. In these circumstances, the Chipty would conclude that the integrated system is engaging in foreclosure because the ratio of the number of services offered to the number of service types is lower for the integrated system. Moreover, the author would reach the same conclusion even if the service added by the integrated system were one with which it is not affiliated. This is because her dependent variable counts services carried without regard to whether or not they are integrated with the system. [Chipty remarks on the “low power” of her test, but identifies a different problem from the one discussed here.] The conclusion that foreclosure has occurred is, of course, completely unwarranted in this case. In fact,

¹⁵² Services were assigned to one of 21 different types.

at least with respect to basic services, the Chipty provides no evidence of any foreclosure, and, indeed, could not do so given the nature of her tests.

The author also reported descriptive statistics that indicated that the average number of basic services offered by integrated systems was significantly larger than the average offered by unintegrated systems. Since she found that duplication by vertically integrated systems is lower, this must mean that integrated systems offer more different types of basic services. And this, of course, is consistent with her finding that the offerings of integrated systems are more valuable to subscribers despite their higher prices. [Another way to make the same point is that a comparison that “controls for type” is not appropriate if one wants to compare the offerings of integrated and unintegrated systems.]

At least two issues relate to the definitions of vertical integration that are used in this and subsequent versions of the paper. The variable BASINT was 1 if a cable system is affiliated with at least one basic service, but not with any premium services, and zero otherwise. The variable PAYINT was 1 if a cable system is integrated with a premium service, whether or not it was integrated with a basic service, and zero otherwise. Thus, systems that were integrated with both basic and premium services, e.g., Viacom systems that are integrated with both MTV and Nickelodeon, among other basic services, as well as Showtime and The Movie Channel, were apparently excluded when a comparison is made between unintegrated systems and systems that were integrated with basic services. For these systems, the specification used in the paper does not permit one to

distinguish between the effect on carriage behavior of owning basic services and the effect of owning premium services.¹⁵³

In a subsequent version of the paper, Chipty added results for the effect of vertical integration on the number of basic services offered to those for program duplication and the number of pay services.¹⁵⁴ She found that: (a) "... operators who own basic services offer significantly fewer basic services," (b) "operators who own basic services also offer significantly less duplication;" (c) "operators who own premium services offer significantly fewer premium services;" (d) operators who own premium movie services are 9% less likely to offer at least one basic movie service; and (e) "operators who own premium sports services are 21% less likely to offer at least one basic sports service."(p. 11)

The results regarding duplication are, of course, subject to the same criticism discussed above. Moreover, although the paper could have assessed the foreclosure effects directly by testing, for example, whether a cable operator that is integrated with a news service actually carries fewer news services than one that is not, in fact it did not actually carry out this test.¹⁵⁵

¹⁵³ Curiously, this distinction was taken into account in constructing the consumer surplus estimates where basic 1 systems were integrated with basic services, but not with premium services, and basic 2 systems apparently included both basic 1 systems and systems that are integrated with both basic and premium services.

¹⁵⁴ The handwritten date on our copy of this version is 12/27/95.

¹⁵⁵ In an earlier working paper, Chipty, "Vertical Integration and its Effects on Unintegrated Rivals: Evidence from the Cable Television Industry," September 8, 1993, the author actually carried out the direct test and found a significant relationship only for the music and home shopping channel program categories. She apparently found no significant effect of vertical integration in all other program categories, which together accounted for 93% of the program services in her sample. Chipty attributed these results to the fact that "the evidence for the duplication hypothesis deteriorates as the category definition deteriorates" and, indeed, she refers to the vast majority of categories for which she tested the hypothesis as "not as well defined." (p. 22)

It should also be observed that the magnitude of the "foreclosure" effect identified by Chipty for music and home shopping services in the earlier paper is extremely small. She found that for music

Chipty also presented results on the effects of vertical integration on consumer welfare. She found that "Point estimates of surplus in premium systems are higher than estimates in basic systems, which are higher than estimates of surplus in unintegrated systems. All three-point estimates were statistically different from zero but not statistically different from each other. Hence, results suggest that vertical integration does not harm, and may actually benefit consumers." (p. 16)

Chipty produced another revised version of this paper.¹⁵⁶ The paper now reports that: "...premium operators, defined as those operators integrated with premium services, offer significantly fewer basic services...and fewer premium services. These findings suggest that vertical integration with premium services results in the exclusion of rival services - both basic and premium. Estimates of the effects of vertical integration with basic services are not as precise, though some evidence suggests that basic integration has a positive effect on the number of basic services and a negative effect on the number of premium services." (pp. 2-3) In particular, "...the average premium operator in the sample should offer 3.8 fewer basic services and 1.9 fewer premium services.....the average basic operator should offer 1.5 more basic services and 0.2 fewer premium services."

Thus, in contrast to the results in the previous version of the paper, Chipty now finds that cable systems that are vertically integrated with basic program services, but not with premium services, carry more basic program services than

services, systems affiliated with one or more of the services carry about .2 fewer services than other systems. Put differently, 20% of the affiliate MSOs' systems carried one fewer music service than did other systems. For home shopping services, the corresponding carriage reduction was about .11 services.

¹⁵⁶ The handwritten date on our copy of this version is 11/21/96.

those that are unaffiliated with any program service. Systems that are affiliated with owners of premium services, who also own basic services, carry fewer basic services than either unintegrated systems or systems integrated with basic-only owners.

The paper also provides results for the effect of vertical integration on the carriage of services in two particular program categories: home shopping and movies. With regard to home shopping services, Chipty finds that “TCI and Comcast [the then-owners of QVC] are about 25% less likely to carry HSN [the rival home shopping service], about 30% more likely to carry QVC, and about 4% less likely to carry both QVC and HSN than are comparable operators serving comparable markets.” The primary effect of vertical integration, therefore, appears to be a substitution of the vertically integrated home shopping service for its rival, with only a small overall reduction in the number of home shopping services offered.

Chipty also claimed to find that “Operators who own basic movie services are weakly more likely, by about 2% to 3%, to offer basic movie services.” These results are, however, undermined by the fact that she has classified E! Entertainment Television as a “basic movie service.” (p. 3) E! is clearly not a movie service.¹⁵⁷ Thus, the results on the effect of the ownership of premium and basic movie services on the carriage of basic movie services would seem to be completely undercut. The misclassification of E! also affects the demand estimates,

¹⁵⁷ Cable Network Profiles describes E! as featuring “daily entertainment news reports, talk shows, original programs, and exclusive live coverage of major award shows and celebrity events.” *Television and Cable Factbook*, 1991 Edition [the source the author apparently used] describes E!’s

where the paper reports that “the premium penetration rate decreases as the number of basic movie services increases” (p. 19).

Finally, Chipty provided results on the effect of vertical integration on the prices charged by, and the number of subscribers to, cable systems (Tab 11, Table 6). She found that “...the results consistently show that basic operators charge less per basic service offered, and they achieve higher penetration rates. Also, they charge less for their premium services, and there is some evidence that they achieve higher premium penetration. These results suggest that basic integration may result in efficiency gains. The evidence for premium integration is that premium operators charge significantly less for the basic cable package and achieve weakly higher basic penetration rates. Thus, by offering fewer basic services at lower prices, premium operators lower the barrier to purchasing premium services. The results also show that premium operators charge significantly more per basic service and more for premium service. There is some evidence that they achieve higher premium penetration rates. Premium penetration rates may be higher, despite fewer premium service offerings and higher premium price, due to the smaller, less expensive basic package” (pp. 17-18).¹⁵⁸

programming as “previews of movies & original cable productions; celebrity interviews; premieres; entertainment news; behind-the-scenes specials.”

¹⁵⁸ The theory here appears to be that premium operators forego some basic-only subscribers by offering basic tiers that have a high price per service but more than make up for this by attracting more premium subscribers, some of whom take basic only, or primarily, because they want premium services. Evidence for this hypothesis would be lower combined basic-premium prices on systems owned by premium operators and a higher ratio of premium to basic subscribers on these systems.

Appendix E

CURRICULA VITAE OF AUTHORS

STANLEY M. BESEN

EDUCATION

City College of New York
B.B.A., Economics (1958)
Yale University
M.A., Economics (1960)
Ph.D., Economics (1964)

PROFESSIONAL EXPERIENCE

1992-present, Vice-President, Charles River Associates Incorporated

1980-1992 - Senior Economist, The Rand Corporation

1990-1991 - Visiting Professor of Law and Economics, Georgetown University Law Center

1988-1989 - Visiting Henley Professor of Law and Business, Columbia University

1985-1988 - Coeditor, Rand Journal of Economics

1978-1980 - Co-Director, Network Inquiry Special Staff, Federal Communications Commission

1971-1972 - Brookings Economic Policy Fellow, Office of Telecommunications Policy, Executive Office of the President

1965-1980 - Assistant Professor, Associate Professor, Professor of Economics, Allyn R. and Gladys M. Cline Professor of Economics and Finance, Rice University

1963-1965 - Economist, Institute for Defense Analyses

1962-1963 - Acting Assistant Professor of Economics, University of California, Santa Barbara

CONSULTANCIES

The Rand Corporation, 1972-1978

Office of Telecommunications Policy, Executive Office of the President, 1972-1977

Department of Defense, 1967

PROFESSIONAL ACTIVITIES/HONORS

Member, Editorial Board, Information Economics and Policy, 1992-present

Member, Editorial Board, Economics of Innovation and New Technology, 1989-present

Member, U.S. National Committee on Data for Science and Technology (CODATA), National Academy of Sciences/National Research Council, 1993-1996

Member, Office of Technology Assessment Advisory Panel on Communications Systems for an Information Age, 1986-1988

Member, Regional Telecommunications Planning Advisory Committee, City of Cincinnati, 1985

Member, Office of Technology Assessment Advisory Panel on Intellectual Property Rights in an Age of Electronics and Information, 1984-1985

Expert, World Intellectual Property Organization/UNESCO Meeting on Unauthorized Private Copying of Recordings, Broadcasts and Printed Matter, 1984

Who's Who in America, 1982-1983, 1984-1985, 1986-1987, 1988-1989, 1990-1991, 1992-1993, 1994, 1995, 1996, 1997, 1998, 1999

Member, Editorial Board, Southern Economic Journal, 1979-1981

Member, Task Force on National Telecommunications Policy Making, Aspen Institute Program on Communications and Society, 1977

Brookings Economic Policy Fellow, 1971-1972

Member, Technical Advisory Committee on Business Development, Model City Program, City of Houston, 1969-1971

Wilson University Fellow, 1959-1961

Overbrook Fellow, 1958-1959

Beta Gamma Sigma, 1958

PUBLICATIONS

Books

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"An Introduction to the Law and Economics of Intellectual Property," **Journal of Economic Perspectives**, 1991 (with L.J. Raskind). Translated and reprinted as "Introduzione agli Aspetti Legislativi ed Economici della Proprieta Intellettuale," in G. Goisis (editor), **Efficienza Produttiva: Alcuni Contributi Su Noti (E Meno Noti) Argomenti**, CEDAM, 1994.

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