HOUSEHOLD PRODUCTION AND CONSUMPTION OF NEWS-INFORMATION SERVICES:

AN EMPIRICAL STUDY

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INTRODUCTION

The Beckerian theory of consumer behavior rests on two simple but profound ideas: first, time is a critical input in the production *and* consumption of goods; second, households combine time and market goods to produce more "ultimate" commodities as objects of utility-maximization. A theory of implicit or full price has developed that models the motivations and actual behavior of consumers and households in consumption [Becker, 1965; Becker and Michael, 1973] and a variety of activities [Becker, 1981] has developed from these two critical notions. Time, as a non-augmentable resource, increases in opportunity cost or value as wages and the labor force participation rate rise. In recent decades, rising wages and decreasing time in home production have enhanced full prices for household production that is time intensive. The directions and character of food production and consumption, entertainment, health services and leisure activities in the household are clearly products of these relative prices and constraints. The appearance of fast foods, microwave ovens, VCRs, exercise machines for the home and other time-saving technologies for the household all may be explained within the Beckerian nexus.

A number of theoretical extensions of these ideas have emerged [DeVany, 1976; Gronau, 1977], many of the more important ones developed by Becker himself [Becker and Murphy, 1988]. But very few empirical studies have examined directly the effects of rising time costs on the shape and direction of household production and commodity consumption.[1] The purpose of the paper is to supplement this literature by focusing on one particular area of household "commodities" consumption — news-information services. Our study does not test Becker's theory in the formal sense. However, we find inspiration in the identification of "news acquisition" as a "commodity" where newspapers, along with other information services are but one market input [Stigler and Becker, 1977].[2] Here we consider the demand for one input as a function of the changing value of household time.[3] We contend that newspaper consumption represents a relatively time-intensive method of producing news-information services relative to cable and television news. We argue, further,

that the decline in per capita newspaper circulation and the rise in the availability of cable and news programs, in part, are attributable to the increase in the labor force participation and the increase in wages — which proxies an increase in the opportunity cost of time.

HOUSEHOLD PRODUCTION AND CONSUMPTION OF NEWS-INFORMATION SERVICES

Newspaper circulation per capita fell by 26 percent between 1955 and 1989. Bankruptcies, mergers and union problems among newspapers were common. The circulation reduction may be explained as a decrease in the demand for news and information in general. The decline is partly attributable to the change in the economic environment of the household and to the subsequent development of time-saving substitute news sources such as television and cable news services, magazines and so on. News service consumption from newspapers virtually eliminates all other activities and, we argue, is more time intensive than other news market inputs. Radio or TV news — with primary reliance on visuals — permits joint production of meals, driving, ironing, exercising and other activities with news consumption. Other things equal, it is a less time-intensive means of acquiring news.[4]

Time is a constraint in choices between market work, household production and leisure. As the percent of the population in the labor force rises, time available for home production decreases. The value of time for non-workers is not known, but that of workers may be measured in a number of ways. We assume it to be greater than for non-workers,[5] and measure it by the labor force participation rate adjusted by the wage rate. Even with a relatively constant wage rate, an increase in the labor force participation rate will increase time cost of activities devoted to household production and leisure. As the labor force participation rate rises, the amount of non-market time becomes more scarce.

Importantly, the labor force participation rate increased by 11.3 percent and the wage rate increased by 81 percent between 1955 and 1989, producing an increase in the value of time. Since news consumption is a product of both market-purchased goods (newspapers, television, magazines, etc.) and household time, households will choose the lowest cost method of "producing" and consuming news in response to changing relative full prices.

The rising labor force participation of women since 1970 is especially important in interpreting trends in household production and consumption, arguably increasing the opportunity cost of newspaper readership by *women* relative to men. Anecdotal evidence supports the proposition that there has been a 20-year slide in female readership of newspapers. Cox reports that "from 1970 to 1990, female newspaper readership fell 18%, vs. a 12.5% decline among men" [1992, 8B].

Another obvious and important aspect of the news-services market is the emergence of broadcast television and cable as "news" substitutes for newspapers. While television news services have a longer history, perhaps the most important

development has been the phenomenal growth of cable technology. In 1984 cable rates, first regulated in 1972 through municipal franchising, were deregulated. Technology and the number of channels mushroomed prior to re-regulation of cable rates in 1992.[6] While cable companies compete in an extremely broad market (motion pictures, over-the-air broadcasts, satellite programming, sporting events, home videos), they are clear competitors in newspaper, news magazine, and other information markets. The emergence of CNN news, CNN Headline news, CNBC financial news and other services presents viable competition for the traditional forms of news services. It is likely, moreover, that the full (quality adjusted) price of cable television has fallen over time, especially since the early 1980s. (This is important in interpreting the empirical results reported later in this paper.) Further, an important problem is the definition of a product. Although news found on television or cable is not as in-depth as in newspapers and news magazines, consumers may have considered a far lower quality product to be a close substitute. While newspaper consumption has declined relative to other news sources, the overall quantity of news services demanded may well have increased over the period analyzed.

To make an obvious point, news and information services provided as *either* newspaper or cable "market" goods are joint products. It has long been understood that the news part of a newspaper is a "loss leader" and that lowered transactions costs is the rationale for combining news reporting with advertising [Telser, 1966]. Over time, moreover, the ratio of news to advertising content in the joint product has fallen [Ferguson, 1963] and continues to decline.[7] Likewise, cable is a multiproduct industry, in which news and information provisions is but one of a multitude of services. These factors, plus others, make an empirical test more difficult but, we believe, not impossible.

A THEORY OF HOUSEHOLD NEWS CONSUMPTION

A simple formal model of household news production and consumption may be developed to test our proposition. The household consumption of news requires two basic inputs: market purchased goods (newspapers, magazines, radios, televisions, cable TV, etc.) and household time. Let individuals receive utility from consuming commodities, in this case news from various sources, N_i.

$$U = U(N_1, N_2,\ldots,N_n).$$

News consumed in each household is produced with a combination of market purchased inputs, x_i and time T_i, or

$$N_i = f_i(x_i, T_i).$$

Let the production functions take the following form:

$$T_i = t_i N_i$$
$$x_i = b_i N_i$$

where t_i is the amount of time per N_i or the time spent per news item and b_i is the amount of market-purchased input per news item.

The money income constraint is

$$\Sigma p_i x_i = V + wT_w$$

where p_i is the price of an input, V is nonlabor income, w is the wage, and T_w is time spent in the labor force. The time constraint is

$$T = T_w + \Sigma T_i$$

where T is total time available and ΣT_i is time spent producing news in the home. Substituting for T_w, we obtain the following single constraint

$$\Sigma p_i x_i + \Sigma T_i w = V + wT.$$

Substituting the production functions into the above equation yields

$$\Sigma(p_i b_i + t_i w)N_i = V + wT.$$

The term $(p_i b_i + t_i w)$ represents the full price of each news item. The term $p_i b_i$ is the amount of money spent on goods used to produce one news item from one particular source, and $t_i w$ is the time cost of one news item from source i. News may be expensive or inexpensive, depending on the values of p_i, b_i, t_i and w. Whether news is goods intensive or labor intensive depends on the relative values of b and t. The larger is b, the greater is the amount of market purchased inputs required to produce a unit of news. Likewise, the greater is t, the more time intensive is the production of news.

In the presence of rising wages, the cost of consuming news from any source rises. However, the relative price of time-intensive news rises more than goods-intensive news. Consequently, we predict that as wages and the number of people per household in the labor force increase, less labor-intensive news will be consumed.

HOUSEHOLD NEWS CONSUMPTION: EMPIRICAL TEST

The theory that the demand for newspapers falls relative to other news sources as the value of household time increases may be tested using the theoretical model presented in the last section. Specifically, we examine the determinants of newspaper circulation per capita using time series data for the years where U.S. data was readily available: 1955, 1960, 1965, 1970, and 1975 through 1989.

We assume that the quantity of newspapers per capita is a function of the price of newspapers, household income, the value of time in the household, and the price and availability of substitutes for newspapers. The basic form of the model for testing per capita circulation is the following:

$$CIR/P = f(CMPLF, PNEWS, PCABLE, PMAG, MET, Y)$$

where *CMPLF* is an index that represents the value of time in the home and is equal to compensation per hour times the labor force participation rate.[8] This index (one of several possible) is our proxy for the opportunity cost and availability of time in the household. *PNEWS* is a price index of newspapers and is equal to the average price of selected newspapers throughout the U. S. in the available years.[9] While we do not explicitly test supply-side considerations, *PNEWS* reflects cost increases such as labor union awards. (An alternative formulation would use a simultaneous supply-demand model with explicit supply determinants.) *PCABLE* is the average price of cable television. *PMAG* is the real average price of news magazines,[10] and *MET* the percent of the population living in metropolitan areas, and *Y* median household income.

The expected impact of *CMPLF* is negative; that is, as compensation per hour and the number of persons per household in the labor force rise, the household value of time rises and the demand for time-intensive newspapers decreases. The expected impact of *PNEWS* is negative, meaning that the quantity demanded falls as the price of newspapers increases. The expected effect of *PCABLE* is positive — as the price of cable television rises the demand for newspapers should rise. There were, however, major increases in the quality of cable television over this period, particularly in the area of news programs as noted in the previous section. The expected value of *PMAG* is positive since newspapers and news magazines are substitutes. The variable *MET* represents the percent of the population residing in metropolitan areas and roughly coincides with the percent of the population that has access to broadcast and cable television. In the early part of the sample *both* over-the-air and network broadcasts and cable TV were much less commonly available in rural rather than in metropolitan areas. (Network broadcasts always have been more available in metro-major-market areas.) If this is the case, then *MET* will be negatively related to per capita circulation. The impact of *Y*, median household income, on circulation depends upon whether newspapers are normal or inferior goods.

With these parameters in mind, the following model was regressed:

$$CIR/p = B_0 + B_1 CMPLF + B_2 PNEWS + B_3 PCABLE + B_4 PMAG + B_5 MET + B_6 Y + e.$$

The regression results are reported in Table 1. All of the variables save two are significant at the 10 percent level or above and three are significant at 2.5 percent. The significant and negative impact of *CMPLF* is the major point of interest. Increases in compensation per hour weighted by the labor force participation rate

TABLE 1
Impact of the Determinants of Newspaper Circulation
Dependent variable: CIR/p

Independent Variable	Parameter estimate	*t*-value
Intercept	0.634	12.80
CMPLF	-0.171E-02	-2.43[a]
PNEWS	-0.170E-02	-2.33[a]
PCABLE	-0.110E-02	-1.58[b]
PMAG	0.409E-02	0.52
MET	-0.319E-02	-4.65[a]
Y	0.1023E-05	0.91

Adjusted $R^2 = 0.9836$
Degrees of Freedom = 18

[a] Indicates significance at the 2.5 percent level or better.
[b] Indicates significance at the 10 percent level.

(our proxy for the opportunity cost of household time) had a detrimental impact on newspaper circulation over the years 1955 through 1989, appearing to confirm the Beckerian view of news service consumption.

While the price of newspapers has the predicted impact, the price of cable television does not. The anomalous regression results suggest that newspaper demand falls as cable prices rise. There is, as we have suggested, reason to believe that the quality of cable television news services (and over-the-air news broadcasting transmitted over cable) has risen dramatically over the test years, especially over the past decade. If this is correct, the price of cable and the quality of services offered are highly correlated. Such a correlation would help explain the unexpected sign and significance of *PCABLE* in the regression. The price of news magazines had the expected sign, but proved to be insignificant.

The percent of the population living in metropolitan areas had the predicted impact and is significant at the 1 percent level. As a larger percent of the population moved into areas that offered cable and broadcast television, newspaper circulation fell. The parameter estimate of the impact of *Y* suggests that the demand for newspapers increases as household income rises, but the estimate is not statistically significant.[11]

CONCLUSIONS AND CAVEATS

Our results present fairly consistent support for the view that the shape and direction of the demand for consumption of news services depends less on time-intensive newspapers and more on other market inputs (cable and TV news). Additionally, these phenomena seem strong enough to be captured at a relatively

high degree of aggregation and, in the spirit of Occam's razor, with a model that is quite simple.

A number of caveats and suggestions for further research are in order. Ideally, joint production should be considered, as well as explicit supply considerations. We did not, for example, attempt to gauge the impact of changing costs (e.g., paper, ink, labor costs) on per capita newspaper circulation, although, some of these costs are captured in *PNEWS*. Our focus has been on the consumption of newspapers as a function of demand-side variables.

Our model suggests that quality changes in news (and in other informational and entertainment services) are demand driven by time constraints. This indicates that technology, products, and product quality in the newspaper and television areas are all powered by a common factor. Technologically, for example, there was no reason why 24-hour news channels could not be supplied in the 1950s. Lower time costs did not direct demand in those directions at that time, although we now find *two* 24-hour cable news networks, at least one overnight network news broadcast, and a proliferation of network news "magazines."

Other contemporary quality changes also reflect, in part, changing relative prices of market and non-market time as shown in this paper. Newspapers and news magazines have become more "visual" as have entertainment sources. Most large sale books (and all best sellers) are made available on tape as they are released in hardback, and may be "read" while driving, walking, jogging or tending other tasks. Abbreviated news now appears on-line on computers; the *Prodigy* service is an example. New technology is responsible for many of these competitive developments but such technology also has been made possible from increased demand for time-saving market goods in these areas.

Disaggregated studies (given appropriate data) would provide enhanced statistical evidence of the relevance of time based opportunity cost for the shape and direction of household "commodities" consumption. Confirmation with specific market data, including specific wage and newspaper circulation rates in a particular locale, would be particularly interesting. Moreover, with appropriate data, more and less time-intensive forms of goods such as newspapers may be subjected to an analysis similar to ours. It appears that consumption of news from slicker, less time-intensive sources such as *USA Today* would crowd out in-depth (more time-intensive) sources such as the *Wall Street Journal* or the *Christian Science Monitor*. The changing age and income distribution of the news-buying population and other demographic factors also may be related to the opportunity cost of time in finer and more sophisticated tests. Indeed, a whole range of household commodities may be analyzed from these perspectives. Using simple aggregate data, however, the tests reported in this paper are fully consistent with both Becker's model and the traditional model of household consumption behavior.

NOTES

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1. One exception is an analysis of the directions of household production and consumption of food. Utilizing a model of relative time costs to the household we show (empirically) that the ratio of restaurant to total meal consumption and the ratio of fast food to restaurant meals are positively related to household opportunity costs [Ekelund and Watson, 1991]. A further empirical "prediction" of the model is that the consumption of *ethnic* fast food will rise relative to total fast food in general.
2. Indeed our results conform to the standard theory of consumer behavior as well. In the standard view leisure is defined as non-market time so a rise in market wages also increases the "price" of non-market time. Economizing behavior would follow the increase in the (implicit) price of non-market activity: non-market time and newspaper consumption are complementary goods.
3. While the demand for newspapers has been analyzed before, these demands have not been related to household consumption of news-information inputs or to the opportunity cost of time. An interesting recent paper relates newspaper demand to ideology. In a profit-maximizing framework with fitted values for the liberal-conservative ideology at the state level, Goff and Tollison [1990] show that news-demander preferences drive the so-called liberal bias in the media.
4. For simplicity we skirt the rather obvious quality differences assuming that such quality changes through time are demand driven and a function of the value of time. Newspapers are characterized by non-visual but in-depth transfers of information. Reliance on visuals and "sound bites" are hallmarks of TV news.
5. This is a fairly safe assumption given that labor supply decisions are made in the home. Generally, the household members who are able to obtain relatively higher wages are the ones most likely to enter the market, while those who face relatively lower wages are more likely to specialize in home production.
6. Total spending (more than doubling between 1984 and 1990 [U. S. General Accounting Office, *National Survey of CATV Rates and Services*, 1990]) by both basic cable networks (such as CNN, TBS, and CNBC) and premium networks (such as Disney, HBO, and Showtime) on programming was stimulated by price deregulation.
7. McChesney [1987] has tested an interesting aspect of the demand for news. He uses event analysis to determine whether the Watergate scandal had any impact on demand for particular newspapers (the *Washington Post* and the *Wall Street Journal*) and finds that it has none.
8. All data except *PNEWS* is from the *Statistical Abstract of the United States* [1955-89].
9. *PNEWS* is an average of the annual prices of the *Wall Street Journal*, *New York Times*, *Los Angeles Times*, *New Orleans Times Picayune*, *Chicago Tribune*, and *Kansas City Times-Star* as reported in Editor and Publisher's *International Year Book* [1955-89].
10. *PMAG* is the average price of *Time* and *Newsweek* corrected for inflation.
11. Income, in this and similar formulations, may also proxy other variables such as the "level of educational attainment" or median age of consumers. Goff and Tollison [1990, 17], without relating variables to the opportunity cost of time, find both of these measures to be positively related to per capita newspaper circulation using data in several tests. Of these, however, only median age was significant.

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