

'Net Equity: A Report on Income and Internet Access

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THE international information infrastructure now known as the Internet had its origins in technologies and procedures developed by the United States government. However, U.S. policy, as articulated by the Clinton administration, calls for the private sector to continue the development of the Internet while the public sector limits its role to spurring competition among telecommunications companies. A White House document entitled "The Framework for Global Electronic Commerce" outlines this policy. "The Internet," it states, "should develop as a market-driven arena not a regulated industry. Even where collective action is necessary, governments should encourage industry self-regulation and private sector leadership where possible."

This hands-off approach is unusual in the realm of telecommunications services. Telephone service, for instance, is regarded as a necessity. Because of this, the Federal Communications Commission (FCC) establishes subsidies paid by businesses and urban customers for rural customers in an effort to extend service to as many people as possible. In contrast, the Internet has operated in an environment mostly free of government regulation. (The FCC does have a Universal Service Program, but it is concerned mostly with Internet connections in schools and libraries, whereas universal telephone service means basic phone service to every residence.)

At the same time, the medium is widely acknowledged to be indispensable for individuals in an economy based on exchanging and

processing information. Even at a rudimentary level, the benefits identified by the federal government as stemming from a National Information Infrastructure give a hint of the breathtaking scope of the potential impact of the Internet:

Development of the NII [National Information Infrastructure] can help unleash an information revolution that will change forever the way people live, work, and interact with each other. With this technology:

- People will be able to live almost anywhere they want, without foregoing opportunities for useful and fulfilling employment, by “telecommuting” to their offices through an electronic highway.
- The best schools, teachers, and courses will become available to all students, without regard to geography, distance, resources, or disability.
- Services that improve America’s health care system and respond to other important social needs will be available on line.

NIST

Equity Concerns

These two characteristics of the Internet—its acknowledged indispensability in the information age and its development in a laissez-faire environment—have resulted in concerns about equity. It is not at all clear that the economics of efficient, high-speed multimedia networks will allow ubiquitous, “universal” deployment.¹ The concerns may be justified. In this early stage of the game, a plan by Bell Atlantic to rewire the state of New Jersey has come under fire for “singling out suburban areas for preferential treatment.”

Egan

Peterson

Equity concerns center around the availability of access and its pricing. Analysis of the physical infrastructure by Mitchell Moss and Anthony Townsend of New York University’s Taub Urban Research Center has already shown that “less urbanized areas, economically distressed cities, and interior regions lag the nation in Internet development.” A recent study has also uncovered a racial divide on the Internet. Donna Hoffman and Thomas P. Novak of Vanderbilt University found that “whites are more likely to have ever used the web (26 percent vs. 22 percent), and the gap between whites and

African-Americans becomes proportionately larger the more recently the respondent stated they had last used the web.”

Other concerns center on pricing issues. The current pricing model is about \$20 a month for basic Internet access—e-mail, web-browsing, and usenet groups. (Before this, of course, is the cost of the computer or set-up box necessary for Internet access.) It is far from clear that this emerging pricing structure will accommodate the mass market—or even that it is intended to. Private companies that run the Internet have not been pushed to accommodate universal service in the way that telephone-service companies were. There are also indications that the price for access could rise further as the telecommunications infrastructure is upgraded to utilize the latest fiber optic technology. According to some estimates, given the regulatory climate, current pricing schemes are not enough to develop broadband services to the home on a mass scale.

Egan

The Research Project

Relying on data obtained from one of the largest Internet Service Providers in the United States, this paper aims to examine the structure of the subscriber base formed under the current pricing policies of Internet providers. It aims to understand the level of “access” and how it varies in different communities with different demographic characteristics. It is a first step towards determining whether this so-called indispensable medium has the potential to reach everyone in the current unregulated, “hands-off” environment.

The research in this paper relies on data obtained from a national Internet Service Provider (ISP) in late 1997. An ISP is the consumer’s gateway to the Internet. Residential customers use regular phone lines on the Public Switched Telephone Network (PSTN) to connect to the ISP; the ISP provides them with access to the web through data transmission lines. From a consumer’s point of view, an ISP is analogous to the telephone company, except that instead of providing voice connections to others, an ISP provides access to the World Wide Web, e-mail, and other Internet-related services.

ISPs can be divided into those that operate on a national scale, such as AT&T Worldnet, America Online, Earthlink, MCI Internet, Microsoft Network, etc., to ones that operate regionally (e.g., Interport in the New York area). Most Internet service providers, including the one studied in this report, charge about \$20 a month for unlimited access to the full range of Internet services.

Method

We were able to obtain data on the number of subscribers in 20 Designated Market Areas (DMAs) of one of the largest national ISPs. DMAs are a creation of the advertising industry. They were invented by the television audience measurement company, Nielsen, Inc., to measure the reach of television signals. DMAs are different enough from the U.S. Census Bureau's Metropolitan Statistical Areas (MSAs) so that demographics available from the Bureau could not be used in this analysis. For instance, the adult population (18 and older) of the Los Angeles DMA is 11.3 million; the Los Angeles MSA's adult population is slightly less, about 10.6 million. Because of this difference, we relied on media market sources that keep track of statistics by DMA. One of these sources is the *SRDS Lifestyle Market Analyst*, an annual volume published by SRDS, Inc., a provider of media rates and data for the advertising industry.

The data from the Internet Service Provider were used to measure the "access density" for the top 20 DMAs in the United States. Access density, for the purpose of this paper, is defined in two ways in different parts of the following analysis (because of the limitations of the available demographics): subscribers per household and/or subscribers per adult in the DMA. These numbers are then plotted against variables that track the racial, income, gender, and age characteristics of the various DMAs (e.g., median annual income per household).

We present our analysis with several caveats:

Partial Coverage. A single ISP does not provide a complete picture of the wired world. The only way to get around this is to either collect data from every ISP and aggregate them or to survey households specifically about demographic issues and Internet access. The former is nearly impossible—because the information is proprietary and competitive and most companies will not part with it. However, the ISP we have chosen provides a good estimate of the overall Internet population. While we cannot identify the company, we can describe it as a large, well-funded, national ISP. In fact, a sizable fraction of the on-line population are this company's customers. The company has conducted several nationwide marketing campaigns on television and magazines and is well-known.

Lack of Randomization. The data are not random samples, i.e., we received data on the top 20 DMAs of one particular ISP (ranked by the number of subscribers). Hence, we cannot assume that the findings can be generalized to the on-line population at large. How-

ever, they give us a sense, within the limits of the sample, of how access density varies when demographic factors fluctuate.

Ecological Fallacy. The “subscriber density” variable used in the analysis applies to the entire market area. We cannot use the variable to draw *individual-level* conclusions of causality. Therefore, if we find a relationship between the median income of a market area and the subscriber density in that area, it should not be interpreted to mean that a causal relationship exists between an individual’s income and his or her propensity to subscribe to the Internet. That may be so, but it would need to be verified by studying a random sample of *individuals*, not areas. This is a study about the socio-economic characteristics of areas and the relationship of these areas to being “wired.”

Sample Size. The small sample size compelled us to limit our analysis to several runs of bivariate regressions. The data are to be interpreted as giving a “flavor” of a relationship rather than pinpointing actual coefficients. Unless otherwise specified, a significance of 90 percent ($\alpha=0.10$) was used to reject/accept hypotheses. That is, there is a one-in-ten chance that we are wrong in any of the following claims.

Summary of Data

The data show that penetration of this ISP in its top 20 DMAs (where it has the largest absolute number of subscribers in the United States) ranges from a low of 7 percent of households to a high of about 14 percent of households. DMAs with high penetration were San Francisco, Washington, New York, and Boston. At the low end of the top 20 DMAs were Houston, Tampa, and Cleveland. Since the overall penetration rate of U.S. households is usually estimated at around 15 percent, it is clear that this ISP accounts for a significant number of these Internet connections. On average, 10 percent of the households within the DMAs we studied subscribed to our subject ISP.

Table 1 summarizes the result of a bivariate correlation analysis between subscriber density and the variables stipulated. (A bivariate correlation analysis looks at the relationship between two variables, not considering the effects of other variables. It is useful for unearthing general trends.) The first column shows characteristics of the DMAs we studied. The second column shows the relationship between each characteristic and subscriber density. The third column is a number corresponding to the strength of the relationship. (A “1” would imply a perfect positive relationship, and a “-1” would indicate a perfect negative relationship.)

TABLE 1
Summary of Correlation Analysis

<i>Characteristic</i>	<i>Relationship with the Density of Subscribers in a DMA</i>	<i>Correlation Coefficient</i>
<i>Income</i>		
Median household income in the DMA	Moderately positive	0.646 ***
Percent of households with annual income greater than \$100,000	Moderately positive	0.689 ***
Percent of households with annual income between \$75,000 and \$100,000	Moderately positive	0.604 ***
Percent of households with annual income between \$50,000 and \$75,000	Weak positive	0.400 *
Percent of households with annual income between \$30,000 and \$40,000	Moderately negative	-0.508 **
Percent of households with annual income between \$20,000 and \$30,000	Moderately negative	-0.553 **
Percent of households with annual income less than \$20,000	Moderately negative	-0.595***
<i>Other</i>		
Percent of households with single males aged 35-44	Moderately positive	0.497 **
Percent of households with single males aged 45-64	Moderately positive	0.601***
Percent of adults that are blue-collar workers	Moderately negative	-0.472 **
Percent of adults with some college education	Moderately positive	0.584 **

Notes: Subscriber density in the DMA was defined as subscribers per households for all but the last four items. For the last two, density was defined as subscribers per adult (i.e., over 18 years of age). Only variables that displayed a significant relationship (at the 90 percent level) are shown.

*** = Significant at alpha=0.01

** = Significant at alpha=0.05

* = Significant at alpha=0.1

Analysis

The results show that, in an early snapshot of the on-line world's evolution, one large ISP's subscriber base varies greatly in communities with different income characteristics. There is a moderate-to-strong positive correlation between median income and subscriber density i.e., the larger the median income, the higher the subscriber density. (See Figure 1.)

Analyzing further, the results show that concentrations of the rich (with incomes greater than \$100,000 per year) are strongly correlated with high subscriber densities; concentrations of poor households (with incomes less than \$20,000 per year) are related to lower subscriber densities. Figure 2 is a graphical representation of the changes in the correlation coefficient with variations in income levels.

FIGURE 1
Subscriber Density vs. Median Annual Household Income

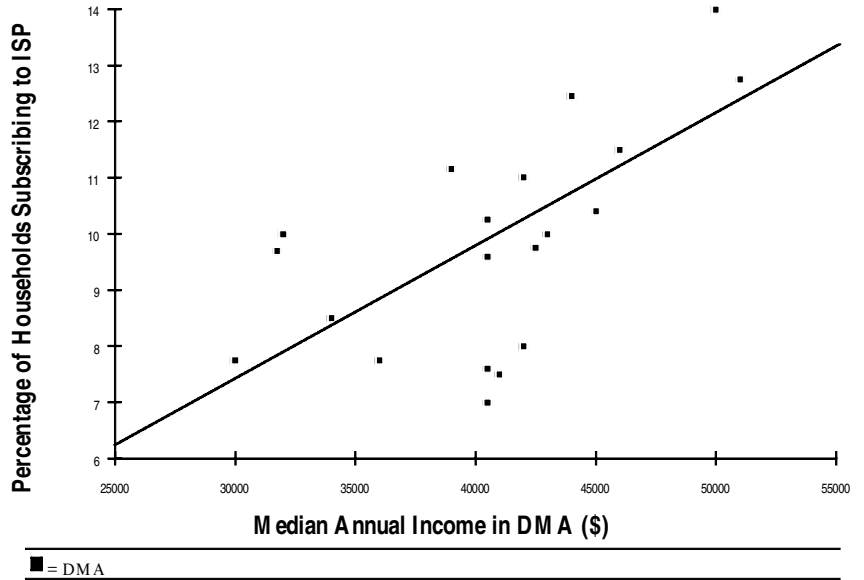
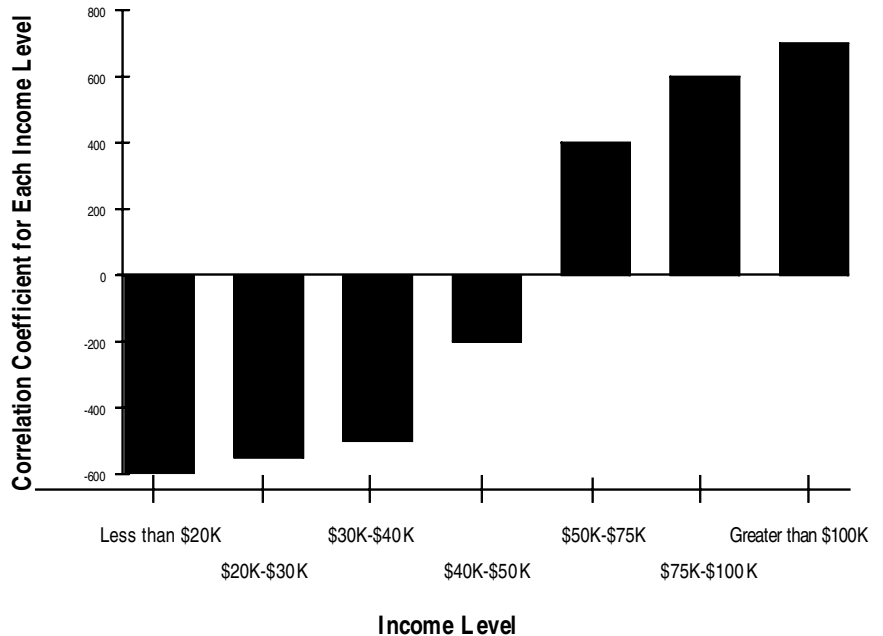


FIGURE 2
Correlation with Subscriber Density at Different Income Levels



Summary

The data, then, strongly suggest that subscriptions to this ISP are a normal economic good; that is, as income in a community rises, demand for it increases. (Because of the bivariate analysis, it cannot be interpreted as anything more than a suggestion of the trend.) At the same time that this income effect is seen, we also note that higher concentrations of those with college educations are positively correlated with subscriptions and lower concentrations are positively correlated with those in blue collar jobs. Given the size (and, probably, representativeness) of this ISP, this data could be regarded as a socially troubling start for the Internet.

Perhaps as interesting as those demographic characteristics that did show a significant correlation with subscriber density are two that *did not* show a significant relationship. One was the density of adult males or females at various age groups (considered separately) and the other was the concentration of students in the DMAs. The first probably shows a deficiency in using aggregate data (i.e., data over a DMA) for the level of analysis pertaining to individual age groups, while we believe the second reflects the fact that students are more likely to get access to the Internet at school and not from an ISP such as the one studied.

Conclusions

Because this research is a tentative, first step in examining an infant technology, it is hard to tell whether the trends we have uncovered will hold over time. What we can see, however, is that early on there are indications of a possible class distinction between those who have Internet access and those who do not. We do not know if this is the result of the pricing structure for access, the level of computer ownership, or some other factor or combination of factors. If this distinction is the result of the pricing structure, however, we may see an exacerbation of the trend if prices continue to reflect the costs of upgrading the telecommunications infrastructure. On the other hand, it is possible that the Internet will develop differently, and the costs of the telecommunications networks will be shifted to the content side. This could occur if connections and access devices were provided at little or no cost by ISPs whose revenues would be generated by advertising and subscription-based content.

What is clear from the trends noted in our research is that it is not now possible to speak of ubiquitous access to the Internet. Further-

more, if it is true that this medium is indispensable in an information economy, then society must examine whether universal access can be attained through free-market mechanisms.

Note

¹The cost structure of the multimedia networks is carefully guarded by the companies that own them. However, observers can get indications of these cost structures from industry analysts. This paper uses the estimates of Bruce Egan.

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