



The willingness to pay for broadband of non-adopters in the U.S.: Estimates from a multi-state survey [☆]



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ABSTRACT

We use data from a large-scale survey of non-adopting households to provide estimates of their willingness to pay for broadband. A large fraction – approximately 2/3 – of the reporting households indicated that they would not consider subscribing to broadband at any price. For the remaining households who indicated that they would consider subscribing, we find strong evidence in the data of over-reporting at high values of the willingness to pay for broadband. We correct for reporting bias using a semi-parametric procedure. Our estimate of the price elasticity of demand for broadband using the bias-corrected willingness to pay values is equal to -0.62 , markedly different from the estimate of -0.95 obtained with the values reported by the survey respondents. Our estimates indicate that, on average, to achieve a 10% increase in subscribership, a price reduction of about 15% is needed. In addition, we estimate the impact of several household characteristics on the likelihood of broadband adoption.

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1. Introduction

Since the late-2000s, several countries have created programs aiming to achieve universal broadband service.¹ In the United States, the Telecommunications Act of 1996 mandated that the Federal Communications

Commission (FCC) promote Americans' access to advanced telecommunications services at a reasonable price.² Prior to the reform of the Universal Service programs adopted by the FCC in 2011 and 2012, efforts were aimed primarily at telephone communications. The transformed Connect America Fund, created in 2011, visibly shifted the focus of the Universal Service programs from telephone to broadband communications. Furthermore, the reforms of the Lifeline program adopted by the FCC in January 2012 include an express goal of ensuring broadband availability for all low-income Americans.

[☆] The opinions expressed in this paper are those of the authors and do not necessarily represent the views of Connected Nation, the Federal Communications Commission, or the United States Government.

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¹ Switzerland has included broadband in its Universal Service mandate since in 2007. Shortly thereafter, Finland and Taiwan also initiated universal broadband service programs.

² In particular, Congress set out a universal service principle that consumers in rural and high cost areas should have access to advanced telecommunications and information services at rates reasonably comparable to those charged for similar services in urban areas.

Despite significant progress in achieving higher adoption rates,³ roughly 28% of American households still don't subscribe to high-speed Internet. Because affordability remains one of the main barriers to broadband adoption, evaluating the difference between broadband price and the non-adopters' willingness to pay will aid policy makers in considering the best means through which the broadband affordability gap may be narrowed.

In this paper we take a significant step toward achieving a better understanding of the determinants of broadband adoption by estimating the size and composition of the willingness to pay for broadband. We use a new and comprehensive data set containing detailed information about the willingness to pay for broadband of some 15,000 non-adopting households surveyed by Connected Nation Inc. in 2011.⁴ This survey was funded by the State Broadband Initiative (SBI) federal grant program, managed by the National Telecommunications and Information Administration at the Department of Commerce.

While our understanding of the determinants of broadband adopters' willingness to pay for broadband has been advancing steadily (see e.g., [Varian, 2002](#); [Goolsbee, 2001](#); [Savage and Waldman, 2005](#)), we know surprisingly little about the *non-adopters'* demand for broadband services. In this paper, we use the only recent, large-scale survey of U.S. non-adopters available to provide concrete information that can be readily used in the design of broadband adoption initiatives.

Expanding the access to high-speed Internet communications for millions of Americans in rural and urban areas can be achieved, at least in part, through a system of discounts on broadband service for qualifying low-income consumers. These discounts are similar to the discounts employed for more than two decades for the Lifeline and Link-Up programs. Just as these programs have helped millions of low-income Americans to gain access to – or retain – basic phone service, a broadband Lifeline program could help millions of qualifying low-income Americans to gain access to broadband communications. Our estimates provide information to policy makers who seek to evaluate the discount levels at which the benefits of providing broadband access to all Americans are balanced against the costs to society of providing these discounts.

The Connected Nation surveys asked respondents to state their willingness to pay for broadband. [Hausman \(2012\)](#) identified three main problems with contingent preferences – and, by extension, with stated preferences – that might arise in connection with the survey data that we use. In particular, (1) stated preferences might be upwardly-biased as a result of hypothetical bias; (2) contrary to economic theory, stated preferences tend to be affected by the phrasing of the survey question in terms

of willingness-to-pay or willingness-to-accept; and (3) “embedding” and “scope” effects may cause value to be demonstrably arbitrary because willingness-to-pay varies significantly depending on whether the good is assessed on its own or as a package. While these concerns arise saliently in surveys of the values of public goods, we recognize their importance in our context and seek to explicitly correct for potential biased reporting of willingness to pay in our analysis.⁵

We have additional reasons to strongly suspect that some of the surveyed households' reported willingness to pay for broadband was affected by reporting bias. For example, we found that about 6% of the households with annual incomes lower than \$15,000 reported a willingness to pay for broadband greater than \$100/month. This indicates to us that, consistent with similar evidence concerning self-reported data (see e.g., [Diamond and Hausman, 1994](#); [Klein and Sherman, 1997](#); [Meyer and Sullivan, 2008](#); [Hausman, 2012](#)), the responses to the Connected Nation survey questions eliciting the households' willingness to pay for broadband are affected by systematic reporting bias. To estimate the non-adopters' “true” underlying willingness to pay for broadband we use the *Orbit* semi-parametric procedure devised by [Klein and Sherman \(1997\)](#). We find strong evidence of significant over-reporting at high values of the willingness to pay, and some evidence of modest under-reporting at intermediate values of the willingness to pay.

Another apparent shortcoming of the data that we use is the lack of specificity about what the reporting households consider to be “broadband,” i.e., the characteristics of the broadband connection that the survey respondents have in mind when they report their willingness to pay. While a technical definition of broadband was not supplied to all respondents, if respondents asked for a definition (very few did), they were told “commonly known as high-speed Internet, we define broadband in this survey as an Internet connection with speeds of 768 kilobits or higher per second in at least one direction.”

As broadband characteristics improve (e.g., higher up- or down-link speeds, lower latencies, higher reliability of service) it is expected that the service becomes more valuable to subscribers. We believe that these characteristics are of reduced importance for the non-subscribers' decisions to adopt broadband. This is in part because the additional cost of bandwidth-hungry applications like Netflix might make them unattractive to the households that adopt broadband at this relatively late stage, in part because the non-adopters tend to be less informed on average about the characteristics that could make a broadband connection more valuable,⁶ and in part because the delay between innovations in communication policies and the implementation of these policies might understate the

³ According to a recent report by the United States National Telecommunications Information Administration (NTIA) and the United States Economics and Statistics Administration (ESA), as of October 2012, 72.4 percent of American households have high-speed Internet at home, an increase of 3.8 percentage points from July 2011 (see [NTIA and ESA, 2013](#)).

⁴ See [Joshi et al. \(2012\)](#) for details.

⁵ [Goolsbee \(2006\)](#) also uses stated preference data to estimate consumers' broadband reservation prices. By comparing the aggregate stated preference results with actual market data, Goolsbee finds that the stated and revealed preference values are in fact consistent.

⁶ See e.g., [Horrihan and Satterwhite \(2010\)](#), who suggest that 80% of consumers do not know what speed they purchased from their ISP.

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