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“RELEVANCE” AND “PRICE” AS DETERMINANTS OF INTERNET NON-ADOPTION: A REVIEW OF THE EVIDENCE

Abstract: Explaining non-adoption for Internet service has led to a debate about whether non-adopters place a low value on Internet use or whether the price of connectivity is too high. Survey evidence consistently points to a lack of interest as more important than price, but a new report by the National Digital Inclusion Alliance (“*NDIA Report*”) claims that recent survey evidence points to price as the dominant cause. As detailed in this BULLETIN, the conclusion is impermissible. The surveys relied upon in the *NDIA Report* no longer permit respondents to indicate a lack of interest as the reason for not using the Internet at home, despite this reason being the most frequent response provided in earlier editions of these same surveys. A more thorough analysis of the surveys relied upon by the *NDIA Report* reveals that non-price factors dominate price as the determining factor for not using the Internet at home. Still, as price is a legitimate factor of adoption, if surveys are to be truly useful for policymaking, then they must abandon the current question seeking explanations for non-adoption and gather data that permit an estimate of price sensitivity.

I. Background

Policymakers see Internet service as critical to modern life, a view given new credence by a global pandemic closing schools and much of the economy. Yet, about 15% of Americans do not use the Internet at home.¹ Why? The largest survey on Internet use—the Computer and

¹ Statistic calculated from the 2017 Computer and Internet Use Supplement of the Current Population Survey (available at: <https://www2.census.gov/programs-surveys/cps/techdocs/cpsnov17.pdf>). See, e.g., M. Anderson, A.

(Footnote Continued....)

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Internet Use Supplement of the Current Population Survey (“CPS”) – reports the most common reason given for a lack of a home connection is “Don’t Need or Not Interested.”² Likewise, the 2009 and 2013 surveys by the Pew Research Center find the primary reasons for non-adoption in the home is a “lack of interest” or “low relevance.”³ So, while there are many reasons for not using the Internet at home, a lack of interest is widely held as the primary cause.

A smaller share of survey respondents explains their lack of Internet use on the service being “too expensive.” Some broadband policymakers, researchers and advocates would prefer this less common response to rank first among reasons for non-adoption.⁴ Presumably these groups were pleased with the recent report published by the National Digital Inclusion Alliance (“NDIA Report”) concluding that the price of service “is the principal reason people do not subscribe to broadband.”⁵ The *NDIA Report*, authored by John Horrigan, has since been mentioned by both Commissioner Geoffrey Starks and Commissioner Jessica Rosenworcel of the Federal Communications Commission (“FCC”) and recently echoed by Tom Wheeler, the agency’s former Chairman, for the premise that price is the most important barrier to adoption.⁶

Perrin, J. Jiang and M. Kumar, *10% of Americans Don’t Use the Internet. Who are They?*, Pew Research Center (April 22, 2019) (available at: <https://www.pewresearch.org/fact-tank/2019/04/22/some-americans-dont-use-the-internet-who-are-they>).

² https://cps.ipums.org/cps/compint_sample_notes.shtml; <https://www.ntia.doc.gov/data/digital-nation-data-explorer#sel=noNeedInterestMainReason&disp=map>.

³ *Id.*; K. Zickuhr, *Who’s Not Online and Why*, Pew Research Center (September 25, 2013) (available at: <https://www.pewresearch.org/internet/2013/09/25/whos-not-online-and-why>).

⁴ See, e.g., *In the Matter of Rural Digital Opportunity Fund; Connect America Fund*, FCC 20-5, REPORT AND ORDER, __ FCC Rcd. __ (rel. February 7, 2020), Statement of Commissioner Jessica Rosenworcel, Approving In Part, Dissenting In Part (“we need to recognize that price is a barrier for many people.”) (available at: <https://docs.fcc.gov/public/attachments/FCC-20-5A5.pdf>); *In the Matter of Establishing the Digital Opportunity Data Collection, Modernizing the FCC Form 477 Data Program*, FCC 19-79, REPORT AND ORDER AND SECOND FURTHER NOTICE OF PROPOSED RULEMAKING, __ FCC Rcd. __ (rel. August 6, 2019), Statement of Commissioner Jessica Rosenworcel, Approving In Part, Dissenting In Part (“[I]f we want a truly accurate picture of broadband service across the country we are setting ourselves up for problems by not even asking how price and affordability plays a role. Here’s the thing: it plays a big one.”) (available at: <https://docs.fcc.gov/public/attachments/FCC-19-79A5.pdf>); K. Bode, *Many Americans Can’t Afford Broadband, But the FCC Doesn’t Care*, MOTHERBOARD (February 13, 2020) (available at: https://www.vice.com/en_us/article/k7e3vw/42-million-americans-cant-afford-broadband-but-the-fcc-doesnt-care);

⁵ J.B. Horrigan, *Measuring the Gap: What’s the Right Approach to Exploring Why Some Americans Do Not Subscriber to Broadband?*, National Digital Inclusion Alliance (February 2020) at p. 10 (available at: https://www.digitalinclusion.org/wp-content/uploads/2020/02/Horrigan_Measuring-the-Gap-v1.1.pdf).

⁶ See Tweet by Commissioner Jessica Rosenworcel (February 12, 2020 at 10:00 am) (“This study finds that in the United States ‘cost is the chief reason for not having broadband.”) (available at:

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The claim made in the *NDIA Report*, if true, is important in that it might lead to some policy changes related to improving broadband adoption. So, in this BULLETIN, I review the *NDIA Report*, the survey evidence upon which it relied, and other surveys on broadband adoption to appraise its conclusion that price “is the principal reason people do not subscribe to broadband.” I conclude (unequivocally) that the *NDIA Report’s* claim is untenable: the *NDIA Report* bases its conclusion on survey questions modified over time to exclude the most common responses (e.g., no interest, low relevance) and thereby inflating the relevance of price as a determining factor. A more thorough analysis of the surveys relied upon in the *NDIA Report*, as conducted herein, confirms that price is dominated by non-price factors as the cause of non-adoption.

This BULLETIN is outlined as follows. First, I take a slight diversion from survey analysis to explain why the “main reason no Internet at home” survey question cannot alone distinguish between “relevance” or “price” as the cause of non-adoption (as is common). When a respondent says, “it’s too expensive,” what they mean is that “the price exceeds my willingness to pay.” Alternately, when a respondent says, “it’s not worth it,” what they presumably mean is again that, “the price exceeds my willingness to pay.” These sorts of responses seem to indicate the same underlying condition and thus say nothing about whether price is “high” in some absolute sense. Second, and in support of the theoretical argument, I exploit an additional question in the latest CPS (year 2017) to demonstrate that responses appearing to speak to relevance *or* price always speak to relevance *and* price. Augmenting the typical questions about non-adoption with a question about price, the analysis suggests that price is not the primary reason for non-adoption (even for those who say the service is “too expensive”), since relatively few respondents indicate a lower price would induce Internet use at home.

Third, I look closely at the *NDIA Report* and discover that the surveys relied upon by its author have been modified over time to inflate the importance of price as a cause of non-adoption. While the *NDIA Report* expresses a preference for close-ended questions (that is, the respondent is limited to a select list of responses), the *NDIA Report* fails to acknowledge that the close-ended questions on which it relies no longer permit responses regarding “relevance.” Since the “relevance” responses were the most common explanations in earlier surveys, the decision to drop them is puzzling, to say the least, and arguably agenda-driven. In any case, it

<https://twitter.com/JRosenworcel/status/1227608437246263299>); G. Starks, *To Fight Coronavirus, Millions More Americans Need Internet Access: Here’s What the Federal Government Must Do To Help*, NEW YORK TIMES (March 19, 2020) (available at: <https://www.nytimes.com/2020/03/19/opinion/internet-broadband-coronavirus.html>); T. Wheeler, *Why The Internet Didn’t Break*, Brookings (April 2, 2020) (available at: <https://www.brookings.edu/blog/techtank/2020/04/02/why-the-internet-didnt-break>).

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is impossible to conclude that price is more important than relevance when relevance is not a response, though that is exactly what the *NDIA Report* does.

Finally, I offer a recommendation on improving surveys on Internet adoption. If the effect of price on adoption is a concern, and it appears to be so, then future surveys on Internet adoption should ask questions that permit the estimation of an own-price elasticity of demand, thereby permitting policy analysts to determine the responsiveness of consumers to pricing policies, such as direct subsidies, and compare price-related policies to other interventions including expanded availability. With simple but improved questions, we would be able to better explain the lack of universal connectivity and what policy responses may work best.

II. Economic Framework

People subscribe to broadband when its perceived value (or willingness to pay), which I label v , exceeds its price, labeled p . For adopters, it must be the case that $v \geq p$, and for all non-adopters it must be true that $v < p$. The problem with determining the cause of non-adoption is immediately apparent: when a question is asked to non-adopters, it is always true that the question is asked to persons for which $v < p$. The general set of survey questions regarding non-use cannot, therefore, to obtain information on p without reference to v , or to obtain information on v without reference to p . The two are linked.

Consider, for instance, the possible responses on non-adoption recorded in the CPS. Non-adopters are permitted to say that they do not have broadband because it is “not worth the cost.” This is self-evident: for all non-adopters we know that $v < p$, which is to say the service is *not worth the cost*. Or, respondents may reply they “don’t need it,” which certainly may imply that the value is low but does not preclude the purchase of the service at some lower price. Likewise, a response of “can’t afford it” or “too expensive” does not imply price is high, but only that price exceeds the willingness-to-pay. In fact, in the CPS, about 17% of persons with incomes above \$100,000 say they “can’t afford it.”

For the standard set of questions asked in surveys, irrespective of the particular language used, the responses cannot tell us directly whether v is low or p is high, whether v is high but p is higher, or whether p is low but v is lower. We only know that v is less than p ($v < p$), and this condition holds, by definition, for every non-adopter. Responses to such questions cannot, therefore, tell us whether p is higher than some unspecified ideal price because the assessment of p is always in relation to v . A respondent that values home Internet use at \$5 per month believes a price of \$6 per month is “too expensive,” but \$6 is a very low price by any meaningful standard.

As discussed in more detail later, future surveys should abandon such naive and fruitless lines of questioning and use questions better rooted in economic theory so that some useful information may be gleaned from responses. This information tells us how non-adopters

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respond to price and, possibly, how they respond to demand-side educational programs. Knowing the marginal payoffs from influencing v and influencing p permits policymakers to better focus their efforts. Before getting to that issue, let's use the CPS to look a little closer at the responses of non-adopters regarding their decision not to obtain a home connection.

III. The CPS Survey

The CPS's Computer and Internet Use Supplement includes a set of questions inquiring about why a household does not use the Internet at home.⁷ In the 2017 Supplement I use here, the survey asks respondents that do not have Internet service at home the following question: *What are the reasons why (you/members of your household) do not use the Internet at home?* Several responses are possible. Respondents are permitted to offer multiple reasons for non-adoption.⁸ In fact, over 18% of respondents that "can't afford it" also say they "don't need it." The survey also asks: *Of the reasons you just listed for not going online at home, which (do you/does your household) consider to be the most important?*

Table 1. Reasons for Non-Adoption at Home

Response	% Responses	% Most Important
Don't Need It or Not Interested	53.1	51.9
Can't Afford It (or "Too Expensive")	26.0	21.8
Not Worth the Cost	5.6	3.2
Can Use it Elsewhere	4.6	3.3
Not available in area	3.0	2.6
No Computer	6.9	4.5
Privacy/Security Concerns	2.8	1.5
Personal Safety Concerns	1.3	0.6
Moving	0.1	0.8
Some Other Reason	11.1	9.9

Response rates to these questions are summarized in Table 1 with a sample size of 8,497.⁹ It is worth noting that the NTIA's Digital Nation Data Explorer, an online interface that provides

⁷ Survey documentation is available at: <https://www2.census.gov/programs-surveys/cps/techdocs/cpsnov17.pdf>.

⁸ While the *NDIA Report* states that these responses are mutually-exclusive, they are in fact not. *NDIA Report*, *supra* n. 5 at p. 5 ("respondents give only a single reason to interviewers.").

⁹ The statistics are weighted by pwsswt.

descriptive statistics from the CPS data, replaces “can’t afford it” with the term “too expensive,” which is a non-trivial and arguably invalid substitution for the actual language of the survey.¹⁰ By far, the most common response is “don’t need it or not interested,” with the second most frequent response being “can’t afford it.” The same is true for the “most important” reason. The remaining responses are infrequent, except perhaps for “other.” Several of these responses are reasonably linked to “relevance” or “interest,” including privacy, security, and safety concerns, use in other places, and “not worth the cost.”

A. *Decomposing the Price Effect*

For the reasons discussed above, the responses listed in Table 1 reflect the respondent’s interpretation of the condition $v < p$. Decomposing the condition requires additional information, which fortunately is available. The CPS also asks for a “yes/no” response to the question: *Would (you/your household) buy home Internet service if it were offered at a lower price?* When the answer is “no,” then it difficult to conclude that price is a motivating factor. That said, while perhaps useful in some ways, this is not the best question since the respondent is not directed to consider a \$2 price cut or a \$20 price cut. The respondent is left to decide the size of the price cut and this choice is certain to vary by respondent; in turn, this variation is certain to impact interpretation.

Admitting to the caveat, the question may still be useful for deciphering, even if crudely, how relevance and price are embedded in all the responses. If, for instance, “can’t afford it” means broadband is “too expensive,” then it is reasonable to expect that most persons responding “can’t afford it” would also say that they would subscribe to home Internet service if the price was lower. And, if “don’t need it” had nothing to do with price but spoke only to value, then we should expect most of those responding in this way would not be persuaded to get home Internet service at a lower price. Persons worried about “safety” and “privacy” may not be influenced by a price reduction at all, but that is for the data to say.

To decompose the responses, I adjust the sample in the following ways. First, I exclude respondents that say the Internet is “not available” since that fact is determinative. Second, I exclude persons that are moving since this is an exogenous factor unrelated to value or price. Third, I limit my attention initially to four responses that best seem to reflect the influence of interest and price: (a) don’t need it; (b) can’t afford it; (c) not worth it; and (d) use elsewhere. (I will return to the other responses later.) Fourth, since I am computing descriptive statistics, the

¹⁰ <https://www.ntia.doc.gov/data/digital-nation-data-explorer#sel=noNeedInterestMainReason&disp=map>. The *NDIA Report* adopts this alternative terminology, but I retain the original.

sample is weighted to reflect the population. There are 8,145 non-adopters in the sample representing 23.8 million Americans.

Buy at a Lower Price?	Don't Need	Can't Afford	Not Worth It	Use Elsewhere
No	85%	47%	59%	44%
Yes	15%	53%	41%	56%
Sample Total	4,474	2,195	460	386
Pop. (mil)	13.1	6.41	1.34	1.13

Table 2 summarizes the key responses by whether the respondent indicates that a lower price would induce adoption. These statistics are interesting. First, some respondents indicating they “don’t need it” or are “not interested” are, in fact, interested in home Internet use at home if the price was lower. Of the 4,474 respondents that are “not interested,” 15% would buy it at a lower price. So, “not interested” is certainly not independent of price. The price effect is larger for those that say they “can’t afford it,” as might be expected. Still, only about half (53%) of those saying they “can’t afford it” would buy it at a lower price. Clearly, “can’t afford it” is not the same as the price being high by some objective measure. Of the “not worth it” crowd, about 41% are influenced by a lower price, and 56% of those that “use it elsewhere” would use the Internet at home at a lower price.

These responses include a rich mix of willingness-to-pay and price, as economic theory would suggest. Across these four responses, 70% of non-adopters are not influenced by a lower price; the remaining 30% are. Across all non-users and all responses listed in Table 1, the same 30% of respondents indicate a willingness to “buy at a lower price.” If a lower price leads to adoption of only 30% of non-uses, then plainly “price” is not the most important factor—it is less than half as important as non-price factors in this large sample.

B. Income and Race Differences

We might expect income to influence the response to a lower price. I divide the sample into four income groups: (a) Below \$25,000; (b) \$25,000 to \$49,999; (c) \$50,000 to \$99,999; and (d) \$100,000 or more. Results are summarized in Table 3; I have limited the response to “Yes” for expositional purposes.

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Table 3. Buy at a Lower Price (by Income)				
Buy at a Lower Price?	Don't Need	Can't Afford	Not Worth It	Use Elsewhere
<i>All Incomes</i>				
Yes	15%	53%	41%	56%
<i>Below \$25,000</i>				
Yes	14%	51%	33%	68%
<i>\$25,000 – 49,999</i>				
Yes	13%	48%	34%	47%
<i>\$50,000-99,999</i>				
Yes	18%	59%	48%	53%
<i>\$100,000 or more</i>				
Yes	16%	55%	46%	59%

Table 3 shows little variation in the response to price by income for the “don’t need” and “can’t afford” responses. Larger differences are found for “not worth it,” but the price response is slightly larger at higher incomes. The “use elsewhere” response has a larger effect for the lowest income group but again note that the effect is somewhat larger for the higher income group.¹¹ In all, there is very little in Table 3 to suggest income influences the response to a lower price in a consistent or meaningful way.

¹¹ The “buy at a lower price” response is comparable across the income groups: (a) 32.5%; (b) 27.2%; (c) 30.5%; and (d) 34.0%.

Table 4. Buy at a Lower Price (by Race)

Buy at a Lower Price?	Don't Need	Can't Afford	Not Worth It	Use Elsewhere
<i>All Persons</i>				
Yes	15%	53%	41%	56%
<i>White</i>				
Yes	13%	52%	46%	59%
<i>Black</i>				
Yes	20%	55%	34%	59%
<i>Hispanic</i>				
Yes	14%	54%	45%	45%

As shown in Table 4, I find little difference across three race groupings: (a) White; (b) Black; and (c) Hispanic. The “don’t need” response includes a larger price effect for Blacks than the other races, but there is less price response for those saying it’s “not worth it.” Hispanics have a relatively small price effect for “use elsewhere.” The “can’t afford” response, which is often labeled as the “too expensive” effect, is comparable across races in terms of the influence of price. The overall “buy at a lower price” response is slightly larger for Blacks: (a) Whites 28.7%; (b) Blacks 35.8%; and (c) Hispanics 31.2%. For the three race groups, non-price factors appear to be the most important determinants of non-adoption in the home.

C. Other Responses

Table 5 summarizes the response to a lower price for the other responses. The results are comparable across all four responses, with about one-third of respondents indicating they would buy at a lower price.

Table 5. Buy at a Lower Price?

Buy at a Lower Price?	No			
	Computer	Privacy	Safety	Other
No	68%	67%	64%	64%
Yes	32%	33%	36%	36%
Sample Total	580	240	111	943
Pop. (mil)	1.70	0.70	0.33	2.76

I find these results a bit surprising. Internet use and computers are strong complements, so for those without a computer, I suppose a lower price for service might affect decisions more strongly than is indicated by the data. Also, why price influences those concerned about privacy and safety is unclear. Little can be said about the catch-all response of “other.” Still, the

results suggest that all these responses represent of mix of willingness-to-pay and price, as expected, but it appears non-price factors are dominate.

IV. A Review of the NDIA Report

The *NDIA Report's* conclusion that price is the most important determinant of non-adoption relies on two survey sources other than the CPS: (1) Pew Surveys from 2015 and 2019 and (2) the California Emerging Technology Fund (“CETF”) surveys from 2017 and 2019.¹² In part, the *NDIA Report* claims the CPS data is less probative because it does not permit multiple answers. Yet, as Table 1 (and the survey documentation) show, the CPS does permit multiple answers. The *NDIA Report's* preference for the Pew and CETF surveys is inexplicable, since the close-ended questions in recent versions of those surveys cannot distinguish between “relevance” and “price” since the respondents are not permitted to choose a “relevance” response. Excluding “relevance” responses is a recent development, however. Older versions of both the Pew and CETF surveys that permit “relevance” and “price” responses consistently find “relevance” to be far more important than “price” as the cause of non-adoption.

A. The Pew Surveys: 2009-2019

For the Pew surveys, the *NDIA Report* relies only on the 2015 and 2019 versions, neither of which includes a response of the “no interest” sort in a close-ended question about home Internet adoption. This limited list of reasons is a marked departure from Pew’s earlier surveys that permit several “low interest” responses (as detailed below). Why Pew did not include relevance-type responses in its latest surveys, especially since they were the most common responses in earlier surveys, is a puzzling and arguably agenda driven change to its surveys.

In Pew’s 2009 and 2013 Surveys, respondents were permitted to provide a reason (in an open-ended format) for not using the Internet. Grouped response rates are summarized in Table 6.¹³ Relevance is by far the most common response, with “too expensive” being a distant third or fourth.

¹² J.B. Horrigan and M. Duggan, *Home Broadband 2015*, Pew Research Center (2015) (available at: <https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2015/12/Broadband-adoption-full.pdf>); M. Anderson, *Mobile Technology and Home Broadband 2019*, Pew Research Center (2019) (available at: https://www.pewresearch.org/internet/wp-content/uploads/sites/9/2019/06/PI_2019.06.13_Mobile-Technology-and-Home-Broadband_FINAL2.pdf); *Annual Survey*, California Emerging Technology Fund (2017, 2019) (available at: <http://www.cetfund.org/progress/annualsurvey>).

¹³ Data from the Pew surveys were downloaded from: https://www.pewresearch.org/internet/?post_type=dataset. Author’s calculations used weighted data. See also, J.B. Horrigan, *Home Broadband 2009*, Pew Research Center (2015) (available at:

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Table 6. Main Reason No Internet at Home

Response	2009 % Responses	2013 % Responses
Relevance	62.1	71.3
Too Expensive	10.5	5.7
No Computer	5.2	15.2
Availability	16.4	6.4
Don't Know/Refused	5.9	1.5
Observations	566	284

In Pew's 2015 and 2019 Surveys, the open-ended question for the *main reason for not using the Internet at home* was replaced with a close-ended design.¹⁴ Responses were limited to: (1) service is too expensive; (2) smartphone does everything they need; (3) access Internet outside the home; and (4) cost of computer is too expensive. Despite responses related to "relevance" being the most common response in the 2009 and 2013 surveys, Pew did not include any responses related to relevance in its close-ended question. Whether intentional or otherwise, the changes in the Pew surveys have the effect of masking the "relevance" response for non-adoption, thereby inflating the relevance of "price." The included responses and their shares for the 2015 and 2019 surveys are summarized in Table 7.¹⁵ Comparing Tables 6 and 7, we see that the lack of "relevance" responses leads to higher shares of "too expensive," "other," and "don't know/refused" responses. Even so, in 2019, "too expensive" is not the most common response (unless combined with "computer too expensive").

<https://www.pewresearch.org/internet/2009/06/17/barriers-to-broadband-adoption>); K. Zickuhr and A. Smith, *Home Broadband 2013*, Pew Research Center (2013) (available at: <https://www.pewresearch.org/internet/2013/08/26/home-broadband-2013-2>).

¹⁴ Pew continued to permit open-ended responses (allowing relevance responses) to why respondents did not have a smartphone.

¹⁵ Values are taken from the topline documents provided by Pew.

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Table 7. Main Reason No Internet at Home

Response	2015 % Responses	2019 % Responses
Too Expensive	33	21
Smartphone is Enough	12	23
Can Use It Elsewhere	10	11
Computer Too Expensive	10	6
Not Available	5	7
Other	16	13
Don't Know/Refused	15	18
Observations	605	357

Based on the 2015 and 2019 Surveys, the *NDIA Report* concludes,

There is clearly a relationship between research design and results. NTIA's open-ended approach finds that "don't need/not interest" is the reason behind non-adoption, while Pew, CETF, and others find, using a close-ended approach, that cost (either monthly fee or device affordability) is most prominent.¹⁶

Indeed, research design does matter, but not in the way the *NDIA Report* supposes. When a research design excludes "relevance" as a response to a close-ended question, the survey cannot possibly speak to the relative importance of "relevance" and "price."

Like the CPS, the Pew surveys ask a separate question that is informative though unmentioned in the *NDIA Report*. All the Pew surveys (listed above) asked non-users whether they were interested in becoming users (a Yes/No response). Descriptive statistics are provided in Table 8. Across all four surveys, most respondents that did not use the Internet at home (70% or more) were not interested in becoming users. Also, in the 2019 Survey, 67% of respondents that had used the Internet at home in past but no longer do so (i.e., experienced users) said they were not interested in using an Internet service at home.

¹⁶ *NDIA Report*, *supra* n. 5 at p. 7.

Table 8. Interested in Internet Use at Home?

Survey Year	% Yes	% No
2009	11	86
2013	25	70
2015	25	70
2019	18	80

In Table 9, the share of persons responding they were “not interested” or “interested” in using the Internet at home that also said Internet service was “too expensive” are summarized. When given the opportunity to provide reasons other than price for not using the Internet at home (the 2009 and 2013 surveys), the share of respondents saying they were “not interested” in using the Internet at home was less than 10%. When “relevance” responses were excluded (the 2015 and 2019 surveys), the share rose to about one quarter of respondents; even so, non-price factors remained dominant. Even for respondents that were “interested” in using the Internet at home only about 15% say that Internet service is “too expensive,” indicating that other reasons are far more important than price.

Table 9. Price as the Reason for No Interest

Survey Year	% Not Interested & Too Expensive	% Interested & Too Expensive
2009	8.2	16
2013	6.5	15
2015	30	15
2019	20	11

These results point to a few conclusions. First, and most importantly, absent responses on “relevance,” using the latest Pew surveys to conclude that price is more important than relevance is impermissible. In the past, when various forms of “relevance” questions were permitted, these “relevance” responses dominated “price” as the reason for non-adoption. Excluding “relevance” responses has the expected effect of either inflating price as a reason (by the $w < p$ condition) or inflating the “don’t know” responses. Second, for those not interested in the Internet at home, the majority do view service price as the reason. Third, for those interested in the Internet at home, price is also not the dominant reason for not having Internet service. Fourth, the change in research design, whether intentional or not, appears to inflate the “too expensive” response in a close-ended question. It is this change in research design, on only that change, that leads to the *NDIA Report’s* primary conclusion.

B. *The CETF Surveys: 2017, 2019*

The same distortionary change to the Pew surveys is likewise found in the CETF surveys. The 2017 CETF survey permits nine responses but mingles the cost of service with computer ownership: (1) too expensive; (2) no computer or smartphone; (3) too difficult to set up and learn; (4) privacy and safety concerns; and (5) connect from another place; (6) not interested; (7) too busy; (8) not available; and (9) don't know or refused to say.¹⁷ I combine 'not interested', 'too busy', and 'too difficult' into a broad "relevance" category comparable to Table 1.¹⁸ (I leave privacy/security separate, but these responses likewise speak to interest.) Tabulations are summarized in Table 10 based on a sample size of 112. Relevance is the most common response with "too expensive" being second.

Response	2017 % Responses	2019 % Responses
Not Interested/Too Busy/Too Difficult	43.6	...
Too Expensive	31.6	28.8
No Computer/Smartphone	2.4	8.2
Online Privacy/Security Concerns/Not Comfortable	12.0	12.6
Can Use It Elsewhere	5.6	12.4
Not Available in Area	3.9	5.7
Don't Know/Refused	0.9	40.5
Observations	112	116

Inexplicably, the 2019 CETF survey alters the possible responses to include only six options: (1) too expensive; (2) no computer or smartphone; (3) connect at another place; (4) not available at home; (5) not comfortable with a computer or going online; (6) don't know or refused to say. Despite summing to the largest response category in the 2017 survey, all three responses on "relevance" were dropped in the 2019 survey. Excluding the most popular responses from the 2019 CETF survey is mystifying, though it has predictable consequences. (I note that a deeper analysis of the CETF is precluded since, despite multiple requests, the raw data was not provided.)

¹⁷ *Broadband Internet Connectivity and the "Digital Divide" in California-2017*, CALIFORNIA EMERGING TECHNOLOGY FUND (June 27, 2017) (available at: http://www.cetfund.org/files/002_CETF_2017_002_IGS_Poll_CA_Digital_Divide.pdf).

¹⁸ The individual shares are: (1) not relevant (21.6%); too busy (10.4%); and too difficult (11.6%).

Tabulations from the 2019 survey are also summarized in Table 10. The “too expensive” response is close to the 2017 level (in fact, a bit lower) but the “don’t know” response has risen from nearly zero in 2017 to 40.5% of the responses in 2019. A large increase in the “can use it elsewhere” response is also observed. This dramatic increase in the “don’t know” and “use it elsewhere” responses appear to reflect the absence of the “relevance” responses (43.6% in 2017) in a close-ended question. In fact, “too expensive” is the second most popular answer, falling far behind “don’t know” as a response (which was less than 1% in 2017).

C. Summary

When the Pew and CETF surveys permitted relevance responses, relevance was the most important determinant of the lack of Internet use at home. When later surveys excluded the most popular responses in a close-ended question, then (unsurprisingly) price became more important, though not always most important. I cannot imagine any compelling reason—but can think of a few strategic ones—to exclude the most popular responses from a survey design. As an analogy, consider an election survey. There are three candidates A, B, and C, which are ranked in popularity by 60%, 30%, and 10%. The redesign of the Pew and CETF surveys are akin to a survey asking respondents who they will vote for: Candidate B or C? Then, receiving a 30% response rate for candidate B and a 10% rate for Candidate C concluding that B is the most popular.

When a survey does not permit responses on “relevance,” it is impossible for the survey question to speak to the relative influence of relevance and price. Yet, that is exactly what the *NDIA Report* does. The study’s conclusion is untenable. Still, looking across multiple questions, factors other than price explain most of the non-adoption of Internet service at home. This should be neither a surprise nor viewed as a problem—some people just do not want the Internet at home and for good reasons.

V. Better Surveys

To allocate resources among varying programs, it is essential to understand their individual marginal impacts. If we wish to understand the effect of price cuts (perhaps by subsidy), then we need to know how price affects adoption. That is, we need to know the elasticity of demand (the percent change in quantity for a percent change in price). Surveys may be useful in this regard—certainly more useful than the questions they seek answers to today.

In fact, one survey included questions about subscribing at different prices and this survey produced a very informative academic publication. Cararea, McGovern, Noriega, and Schwarz (2015) use responses from a 2011 Connected Nation survey of 15,000 non-adopting

households about (among other things) the reasons for non-adoption.¹⁹ Included were two questions that permitted a richer analysis: (1) If you could subscribe to home broadband service at a price you considered acceptable, would you do so?; and (2) At what monthly price would you consider a home broadband subscription to be too expensive to consider? From these responses, the relationship of use to price could be estimated. The study reports an own-price elasticity of demand of 0.67, indicating that a sizable price cut of 15% would increase adoption only by 10%. This is useful information, though the inelastic response to price suggests that subsidies (or other types of price cuts) may be an ineffective or costly means to improve adoption.

Of course, the effectiveness of price reductions must be compared to alternative ways to increase adoption, assuming increased adoption is worth pursuing given the expense. A cost-benefit analysis of any adoption program should be carefully considered since such efforts are likely to draw funding from presumably effective programs like increased availability. It may be, though I suspect many will protest, that some households will remain non-adopters for the foreseeable future irrespective of price. Some households may simply not want the Internet in their homes, or else value spending on food and housing as more important than the Internet.

VI. Conclusion

Explaining non-adoption for Internet service has led to a debate about whether non-adopters place a low value on Internet use or whether the price of connectivity is too high. Survey evidence consistently pointed to non-price factors as more important than price; that is, until the surveys were changed to exclude non-price factors. The recent *NDIA Report* uses these modified surveys to conclude that price is the most important factor causing households not to use the Internet at home. The conclusion is impermissible, since these surveys no longer permit a “relevance” response, despite “relevance” being the most frequent response in these same organizations’ prior surveys. A more thorough analysis of the surveys used in the *NDIA Report*, and an appeal to the largest survey conducted by the U.S. Census Bureau, reveals that non-price factors dominate price as the determining factor for not using the Internet at home.

To increase their usefulness, surveys on Internet adoption should abandon the current question seeking explanations for non-adoption. The explanation is simple enough: the non-adopter’s willingness-to-pay is less than price, irrespective of how a respondent chooses to interpret that condition. If the effect of price on adoption is important, then the surveys should

¹⁹ O. Cararea, C. McGovern, R. Noriega, and J. Schwarz, *The Willingness to Pay for Broadband of Non-Adopters in the U.S.: Estimates from a Multi-State Survey*, 30 INFORMATION ECONOMICS AND POLICY 19-35 (2015) (draft available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2375867).

ask how specific prices or price changes affect adoption. Using these data, it is possible to estimate the elasticity of demand, and in turn, construct estimates of how effective subsidies (or other price interventions) might be.

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