



The Impact of Affordable and Accessible Broadband on SSDI and SSI Participation

George Zuo and David Powell

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George Zuo
RAND Corporation

David Powell
RAND Corporation

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Michigan Retirement and Disability Research Center, University of Michigan, P.O. Box 1248.
Ann Arbor, MI 48104, mrdrc.isr.umich.edu, (734) 615-0422

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The Impact of Affordable and Accessible Broadband on SSDI and SSI Participation

Abstract

Online access to government services and benefits has become increasingly prevalent, but a substantial portion of low-income, disabled individuals live without a home broadband connection. We study how the launch of a large-scale broadband subsidy program affected participation in the Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) programs. Using difference-in-differences leveraging geographic variation in the broadband subsidy program, we find that SSDI and SSI participation rates significantly increased in areas where the program became available. Effects were driven by areas with fewer physical Social Security Administration offices. Mechanisms appear tied to the convenience of the online application portal, and not to indirect benefits of home broadband such as improved information gathering.

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High-speed internet has transformed nearly every facet of modern daily life. Despite this, approximately 20% of households in 2019 lived without a high-speed home broadband connection, a figure that increases to 32% among individuals with a disability and 48% among individuals with a disability and income beneath the federal poverty limit.¹ Nearly one-quarter of unconnected individuals with disabilities cite cost as the primary reason for why they live without home broadband.²

Barriers to home broadband adoption may have important implications for Social Security Administration (SSA) programs such as Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) — programs that have become critical lifelines for millions of people with disabilities. The in-person application process can be a stressful and drawn-out experience, deterring many from essential income that they are entitled to (Grandison, Lynch, and Tran 2022). Long wait times, inconsistent translator/interpreter availability, cumbersome documentation requirements, and staffing shortages frequently force individuals to visit in-person offices multiple times. The physical act of traveling to an SSA office can also deter potential applicants, particularly for those in nonurban areas as well as those with mobility issues or chronic illnesses. Some potential applicants may also feel stigmatized applying for disability benefits in-person. Applying online from the comfort of one's home can mitigate many of these

¹ Authors' calculation from the 2021 American Community Survey 1-Year Estimates.

² From the 2019 Current Population Computer and Internet Use Supplement, the top reasons for why individuals did not have internet were: 1) because of lack of need/interest (53%), 2) they could not afford the cost (23%), and 3) a lack of a computing device (3.8%). Only 3% cited geographic lack of broadband networks.

deterrents, allowing applicants to apply, gather documentation, and consult family or advisors without the pressure of real-time constraints and face-to-face interactions.

This paper estimates how subsidizing broadband for low-income households causally affects SSDI and SSI participation. We study the impact of a widespread broadband discount program known as Internet Essentials. Internet Essentials is operated by Comcast, one of the country's largest Internet Service Providers (ISPs). The program launched nationally in 2012 to low-income households living within Comcast's broadband service area who had children enrolled in the National School Lunch Program.³ In 2016 and 2019, the program expanded its eligibility, eventually covering low-income households receiving virtually any form of federal assistance. The launch of Internet Essentials occurred shortly after the digitization of the SSA application process. In 2009, the SSA deployed its online application system (known as "iClaim") for SSDI applications. iClaim could not be used to file SSI applications until 2017, when it was eventually made available to a modest subset of first-time SSI applicants.

We first use difference-in-differences to estimate the causal impact of Internet Essentials on SSDI receipt. Our approach exploits the geographic availability of Internet Essentials being tied to locations where Comcast provided internet service. After restricting the sample to nonworking, low-income adults with disabilities, we find that Internet Essentials significantly increased SSDI receipt by 1.7 percentage points (a 5.7% increase among this population). We find that SSDI receipt was not trending differently by Comcast availability prior to the introduction of Internet Essentials.

³ The program was piloted in DC and Chicago late in 2011.

We also conduct a placebo test analyzing whether effects exist for other national ISPs and document no corresponding effect for non-Comcast ISPs. The effect of Internet Essentials availability also appears greater in areas with one or fewer SSA offices, suggesting that the program had a larger effect on SSDI participation in places where it was more difficult to physically reach an SSA office.

We then estimate the causal impact of Internet Essentials on SSI receipt, noting that the SSI online application did not become available until 2017. We use a revised difference-in-differences approach to estimate causal impacts separately in 1) the period directly following the launch of Internet Essentials, but preceding the SSI online application, and 2) the period following the online application's deployment. The online application process was only made available to never-married citizens. After restricting to this subset of low-income individuals, we found no effect of Internet Essentials in the post-period prior to the SSI online portal, and a marginally significant effect of 1.9 percentage points (5.3% for our population) in the period after the portal's launch. This effect size increases to a significant 3.2 percentage points (8.6%) in places with low access to SSA field offices. We find no effect in areas with greater access to SSA field offices, as well as for individuals who were ever married and therefore ineligible to apply online. Together these results suggest that the effect of affordable broadband increased SSI participation primarily through the availability of the online application, and not through indirect benefits of home broadband adoption such as increasing access to information, advice, and digital resources.

The influence of affordable broadband on access to government programs remains largely unexplored. Butrica and Schwabish (2022) document positive

correlations between county-level DI award rates with broadband adoption rates. Foote, Grosz, and Rennane (2019) find that the launch of the online platform iClaim in 2009 could explain 15% of the increase in SSDI applications between 2008 and 2011. More broadly, there is interest in understanding the role of hassle and stigma costs in explaining take-up of social insurance (Ebenstein and Stange 2010; Celhay, Meyer, and Mittag 2022; Moffitt 1983). Large literatures often focus on the importance of social insurance benefits in improving consumption smoothing and reducing poverty (Chetty 2008; East and Kuka 2015; Meyer and Wu 2018). However, improving access and reducing hurdles to applying for benefits could potentially have meaningful and cost-effective impacts on these same metrics without altering the benefit schedule.

Hassle costs do seem to matter for applying for disability benefits. Deshpande and Li (2019) document large reductions in disability recipients following SSA field office closures, and highlight increased congestion at neighboring offices as the primary driver underlying these effects. Previous studies have addressed the relevance of internet accessibility in various sectors such as work (Zuo 2021; Dettling 2017; Hjort and Poulsen 2019), education (Malamud et al. 2019; Dettling, Goodman, and Smith 2018), health (Suziedelyte 2012; Wouter et al. 2016), and more. The causal link between affordable broadband and access to government programs and services remains virtually undocumented.

This research has become particularly relevant following the COVID-19 pandemic, when physical SSA offices closed to the public and applications for SSDI and SSI were largely processed over the phone and online. While SSA offices have since re-opened, staffing shortages have led to strains in services provided in person

(Friedman 2022). Late in the COVID-19 pandemic, a temporary program known as the Emergency Broadband Benefit (EBB) was launched to provide discounts of up to \$50 per month on broadband service for eligible low-income households. The program was eventually replaced by the permanent Affordable Connectivity Plan (ACP), a long-term program funded by the Infrastructure Investment and Jobs Act (IIJA) which provides a discount of up to \$30 per month on broadband service and allows individuals to use their SSI status to automatically qualify. ACP adoption has been gradual but promising: The number of enrolled households has more than doubled in less than two years, with roughly 6 million households qualifying based on SSI status.^{4,5} As broadband access expands, disability benefit applications may increase despite no changes in SSDI/SSI benefits. Yet, we have little evidence about the potential impacts of this expansion on social insurance programs.

From a policy perspective of connecting people with disabilities online, 53% of disabled individuals without a home broadband connection in 2019 cited lack of interest and need, whereas 28% cited cost, and just 3% cited geographic availability.⁶ The funding priorities of the IIJA contrast with these needs: \$42.5 billion of funds were allocated toward building broadband networks in underserved places, \$14.2 billion was used to fund the Affordable Connectivity Plan, and \$2.8 billion was spent to enhance community-level digital equity and inclusion. In addition to increasing online

⁴ See: <https://www.usac.org/about/affordable-connectivity-program/acp-enrollment-and-claims-tracker/additional-acp-data/>

⁵ By comparison, roughly 8 million individuals receive SSI annually.

⁶ Calculations from the 2019 Current Population Survey's Computer and Internet Use Supplement.

connectivity, the limited availability of the SSI online application continues to affect individuals in need of SSI benefits, particularly those with limited access to SSA field offices. Further research on ways to address community-level reluctance and confidence in technology could provide promising ways to further increase SSDI and SSI participation alongside increasing the ease of online access for SSI and SSDI, particularly in light of the recent progress that the U.S. has made toward increasing broadband affordability.

I. Background

Internet Essentials and the digital divide

Zuo (2021) summarizes the origins of the Internet Essentials program. From its national launch in 2012 through the beginning of the COVID-19 pandemic, the program connected more than 8 million low-income individuals to home broadband at a monthly cost of \$9.95 (Comcast Corporation 2020). At launch, the program provided 15 megabits per second download speeds, waives all relevant fees and equipment rentals, provides a low-cost option for individuals to purchase a computer for \$150, and offers complementary digital training resources that can be accessed online, in print, and in person.

At launch, eligibility for Internet Essentials was originally limited to households with children eligible for free- and reduced-price lunches at schools (i.e., children with families earning less than 185% of the federal poverty limit). The eligibility criteria were expanded in 2016 to include individuals receiving public housing assistance and low-income veterans, and again in 2019 to include low-income families receiving virtually

any form of federal assistance. Comcast restricted eligibility to individuals who have not had a Comcast subscription within the past 90 days, and who did not have outstanding debt owed to Comcast. Comcast also reserves the right to reverify eligibility on an annual basis.

Until 2016, Internet Essentials was the only low-income broadband program provided by any major ISP. AT&T and Spectrum both launched similar programs in 2016, though neither company has publicly released any information on the extent of program take-up.⁷ In 2016, the federal government also expanded its subsidized phone service program (“Lifeline”) to cover broadband internet, with little success (Holsworth 2016). Internet Essentials therefore remained the predominant low-income broadband program in the U.S. leading up to the COVID -19 pandemic.

In May 2021, the Emergency Broadband Benefit was launched by the Federal Communications Commission (FCC) program and offered a temporary discount of up to \$50 per month toward broadband service for low-income households during the COVID-19 pandemic.⁸ The program ended in December 2021 and was replaced by the Affordable Connectivity Benefit, which maintained similar eligibility requirements but reduced the subsidy to \$30 per month. Individuals eligible for Internet Essentials can combine the two programs, effectively allowing households to purchase a home broadband subscription at no cost.

⁷ Internet Essentials claims that its low-income customer base substantially exceeds all other similar programs combined [IE-ExecSummary-6-19-20.pdf \(comcast.com\)](#).

⁸ The program provided a number of ways to qualify, including having a household income below 135% of the FPL; participating in assistance programs such as SNAP, Medicaid, National School Lunch Program, Federal Pell Grant; or experiencing a substantial loss of income due to job loss.

Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI)

The Social Security Disability Insurance (SSDI) program provides income support for individuals unable to work due to a disabling condition. The benefits received through SSDI are directly tied to the recipient's lifetime average earnings that were subject to Social Security taxes, rather than the severity of the disability or income level. Benefits under the SSDI program can range widely depending on the recipient's earnings history, typically between \$800 and \$1,800 per month. To qualify for SSDI, individuals must be unable to engage in any substantial gainful activity due to a medically determinable physical or mental impairment expected to last at least one year or result in death. Applicants must also have accrued enough work credits in Social Security-covered employment — typically 40 credits, of which at least 20 must have been earned in the last 10 years ending with the year the disability began. SSDI benefits continue for as long as the recipient remains disabled, which is verified through periodic Continuing Disability Reviews. The frequency of these reviews can range from every six months to every seven years, depending on the likelihood that the recipient's medical condition will improve. Once an SSDI recipient reaches full retirement age, their benefits automatically convert to retirement benefits.

Supplemental Security Income (SSI) is a federal assistance program designed to provide financial support to populations who face the most vulnerabilities. Unlike SSDI which bases eligibility on prior work history, SSI eligibility is determined primarily by income and resource constraints. SSI targets three distinct populations: blind or disabled children (roughly one in six of recipients), blind or disabled nonelderly adults (roughly 60% of recipients), and individuals 65 or older regardless of disability status

(roughly one in four of recipients) (Duggan, Kearney, and Rennane 2015). Means-testing eligibility for SSI is determined by both income (both earned and unearned) as well as assets. Assets (e.g., bank accounts, stocks, etc.) cannot exceed \$2,000 for individuals and \$3,000 for couples, though certain specific assets, such as an individual's home and car, are excluded from this determination. In terms of income, an individual's *countable income* decreases an eligible adult's benefit amount dollar for dollar.⁹ Once a non-elderly individual qualifies for SSI, the benefits continue as long as the individual remains eligible through periodic Continuing Disability Reviews.

Online applications for SSDI began in 2009 (Foote, Grosz, and Rennane 2019) through an online portal called iClaim. Prior to iClaim, individuals usually filed their SSDI applications in person at a local field office, though it was also possible to apply by phone. iClaim enabled applicants to apply from home and outside of business hours, while also allowing individuals to view the application in advance and learn about program requirements before deciding to apply. Figure 1 shows that the launch of iClaim coincided with a large spike in the proportion of SSDI applications that were filed online. iClaim only expanded to SSI in 2017 and was only available to never-married citizens between the ages of 18 and 65 who were first-time applicants for SSI or disability benefits.¹⁰

⁹ Countable income is a sum of unearned income and half of earned income. There are also a number of exclusions subtracted from total income before countable income is calculated, including the first \$20 of income per month and the first \$65 of earned income per month (Duggan, Kearney, and Rennane 2015).

¹⁰ See: <https://blog.ssa.gov/supplemental-security-income-applications-now-online/>

II. Data

To measure SSDI and SSI participation, we use American Community Survey one-year estimates obtained via the Integrated Public Use Microdata Series (“IPUMS”) (Ruggles et al. 2023). Each year, the ACS asks respondents to report the amount of income that they receive through “Social Security or Railroad Retirement.”¹¹ To ensure that we do not conflate SSDI with retirement income, we restrict the sample to individuals 61 or younger to account for the possibility of claiming Social Security retirement income as early as age 62. A separate question asks respondents to report the amount of income that they receive through “Supplemental Security Income (SSI).” The American Community Survey also includes a rich set of demographic and socioeconomic covariates, as well as data on employment and labor force participation status, citizenship, and number of times married.

The American Community Survey also provides multiple markers for disability status. These markers include:

- **Hearing difficulty:** Respondents are asked whether they experience significant hearing loss even when using a hearing aid.
- **Vision difficulty:** This marker identifies individuals who have trouble seeing, even when wearing glasses or contact lenses.
- **Cognitive difficulty:** This category captures individuals who experience challenges with concentrating, remembering, or making decisions due to a physical, mental, or emotional condition.

¹¹ We note that a separate question asks individuals to report “retirement income, pensions, survivor, or disability pensions,” but explicitly states not to include Social Security.

- **Ambulatory difficulty:** This refers to individuals who have serious difficulty walking or climbing stairs.
- **Self-care difficulty:** This marker identifies those who have difficulty bathing or dressing themselves.
- **Independent living difficulty:** This category includes individuals who find it challenging to perform errands alone, such as visiting a doctor's office or shopping, due to a physical, mental, or emotional condition.

In our analysis, we define an individual as having a disability if he or she reports any of the markers above. While these disability markers do not directly translate to medical eligibility for SSDI and SSI, roughly half of ACS respondents on SSDI report one of these disabilities, and 70% of individuals on SSI report one of these disabilities. These measures “produce an unbiased picture of the population with disabilities” (Altman, Madans, and Weeks 2017). While the ACS disability questions have changed over time, these measures were consistently collected during our time period.¹² We study the population reporting at least one of these markers to target an appropriate sample.

The primary geographic unit that we use is the census Public Use Microdata Area (PUMA), the lowest level of geography identified for all respondents in the ACS. PUMAs are redrawn with each decennial census, meaning that a location in a given PUMA in 2008 could be in a different PUMA in 2012. To account for this, the Integrated Public Use Microdata Series (IPUMS) algorithmically optimizes the aggregation of

¹² For further details, see: <https://www.census.gov/topics/health/disability/guidance/data-collection-ac.html>.

PUMAs into “consistent” PUMAs, which can be compared across time. We focus on consistent PUMAs (which we refer to simply as PUMAs from this point onward) as the primary geographic unit for our analysis.

To calculate Comcast coverage rates, we rely on data from Zuo (2021) who calculates the percentage of each PUMA’s population living in a census block where Comcast provided broadband internet service. These data were derived by combined data from the National Telecommunications and Information Administration and the Federal Communications Commission. The data are fixed to 2012 to avoid potentially endogenous expansion of Comcast networks following the launch of Internet Essentials. Figure 2 plots the geographic distribution of Comcast availability across PUMAs and shows that Comcast appears to have footholds in all major regions across the country, though service appears to be most reliably concentrated along the Northeast Corridor. Figure 2 also presents the corresponding histogram of PUMA-level Comcast availability, which appears bimodal; approximately half of PUMAs do not have any Comcast coverage, whereas a third of PUMAs have greater than 75% coverage. Table 1 compares a variety of covariates across the same two groupings of PUMAs.

Finally, we use SSA data on field office locations as of 2019 which we geocoded and linked to the PUMA level, allowing us to count the number of field offices available in each PUMA. Our analysis data set therefore links each respondent in the ACS to the availability of Comcast networks in their PUMA of residence as well as the number of SSA field offices available.

III. Empirical strategy

Given the differences in when the online application portals for SSDI and SSI launched, we use two separate strategies for estimating how Internet Essentials impacted participation rates for each program.

Estimating the impacts of affordable home broadband on SSDI participation

Our baseline approach for estimating the impact of SSDI uses difference-in-differences to exploit geographic variation in the availability of Internet Essentials following its launch in 2012. The program was available for any eligible low-income household living in a location where Comcast provided internet service. Our baseline specification uses local Comcast availability at the PUMA level as the treatment variable in the following estimating equation:

$$SSDI_{ipt} = \alpha + \rho(Comcast_p \times Post_t) + X'_{ipt}\beta + \gamma_p + \lambda_t + \epsilon_{ipt} \quad (1)$$

where $SSDI_{ipt}$ is an indicator for whether an individual i in PUMA p and year t received SSDI, $Comcast_p$ is the percentage of PUMA p 's population with Comcast access, $Post_t$ is an indicator for whether year t occurs after Internet Essential's launch in 2012, X_{ipt} is a vector of individual-level covariates (gender, age, age-squared, Black, Hispanic, years of education, marital status, and number of children), and γ_p and λ_t are PUMA- and year-specific fixed effects. Standard errors are clustered at the PUMA level.¹³

¹³ We note that Zuo (2021) uses triple differences to compare the *gap* in employment between eligible and ineligible individuals across differing levels of Comcast availability before and after 2012. The sample time frame in this paper only extends to 2015, prior to Internet Essentials eligibility expansions, which occurred in 2016 and 2019. Given that we analyze outcomes through 2019, the shifting eligibility standards over time do not allow us to reliably use the same triple differences approach in this setting.

The coefficient of interest ρ represents the effect of PUMA-wide coverage of Internet Essentials on SSDI participation rates. The identifying assumption is that the trajectory of SSDI participation rates would have remained parallel across PUMAs with different rates of Comcast availability in the absence of Internet Essentials, conditional on covariates X_{ipt} . In Figure 3, we plot SSDI participation rates (residualized with respect to X_{ipt}) for “high-Comcast” PUMAs (simplified to include the subset of PUMAs with $Comcast_p$ of at least 0.5) versus those with no Comcast availability at all. In the three years leading up to the launch of Internet Essentials, the trend of SSDI participation follows similar trajectories for both groups, providing some evidence supporting the possibility that counterfactual SSDI trends would have remained parallel in the absence of Internet Essentials.

Given the launch of iClaim in 2009 and the potential confounding impact of the Great Recession in 2007 and 2008, our sample time frame begins in 2009. We analyze SSDI participation rates through 2019, the year prior to the COVID-19 pandemic. We also restrict the sample to individuals between the ages of 30 and 61, first to increase the likelihood that individuals have accrued sufficient work history to be eligible for SSDI, and second to minimize the likelihood of conflating SSDI income in the ACS with Social Security retirement income.

We also focus our attention on individuals who were likely to have been jointly eligible for both SSDI and Internet Essentials, though the ACS data do not allow us to directly observe this. For SSDI eligibility, we restrict the sample to individuals with a disability and who are either unemployed or not in the labor force. For Internet Essentials eligibility, we restrict our sample to low-income households with combined

income less than 200% of the federal poverty limit, near the cutoff for reduced-price lunch eligibility and a threshold likely to include households that qualified for Internet Essentials through the program's eligibility expansions in 2016 and 2019.

Estimating Causal impacts for SSI participation

For SSI, the key challenge is that iClaim did not support online SSI applications until 2017, years after Internet Essentials had already launched. However, Internet Essentials could still have indirectly increased SSI participation prior to 2017 by improving access to information about the SSI application process and connecting individuals to resources and advisors to facilitate the application process. The delayed online launch of the SSI application process therefore provides an opportunity to examine whether the impact of affordable broadband on program participation is driven by access to the online portal or rather the broader advantages of broadband access (irrespective of the portal itself).

Given this, our empirical approach modifies the differences-in-differences approach in Equation (1) to separately estimate the effect of Internet Essentials availability in two periods: the period from 2012 to 2016 in which Internet Essentials was available and the period from 2017 to 2019 after the SSI online application became available:

$$SSI_{ipt} = \alpha + \rho_1(Comcast_p \times Yr2012_{16t}) + \rho_2(Comcast_p \times Yr2017_{19t}) + X'_{ipt}\beta + \gamma_p + \lambda_t + \epsilon_{ipt} \quad (2)$$

where $Yr2012_{16}$ represents the period following the launch of Internet Essentials but before iClaim opened to SSI applications, and $Yr2017_{19}$ represents the period following the iClaim launch through the end of the sample period. The approach otherwise mirrors that of Equation (1).

Our sample restrictions differ for SSI compared to the previous analysis for SSDI. Specifically, we limit the sample not just to individuals who would be eligible for SSI, but specifically to those who potentially would have been eligible for iClaim: low-income U.S. citizens between the ages of 18 and 65 with a disability and who have never been married. In practice, an individual would need to make roughly \$1,500 per month (\$18,000 annually) to fully phase out the SSI benefit (Duggan, Kearney, and Rennane 2015). Given this, we restrict our sample to individuals earning less than \$10,000 annually to focus on applicants who would potentially receive a meaningful SSI benefit. Roughly 36% of these individuals in this subsample of individuals ultimately received SSI benefits.

IV. Results

Figure 3 plots the evolution of SSDI receipt over time between high- and low-Comcast areas after residualizing SSDI participation with respect to covariates X_{ipt} . The graph appears to depict three distinct phases. Prior to Internet Essentials, high-Comcast areas had consistently lower SSDI participation rates, and the two groups trended quite similarly. From 2012 to 2017, the gap between the two series effectively disappears while continuing to trend closely together. In 2018 and 2019, the gap suddenly changes to favor high-Comcast areas, and both series experience similar declines in SSDI participation in 2019, a decline which was corroborated by official SSA statistics and did not have any straightforward explanation (Ruffing 2020). While the change between 2011 and 2012 could potentially be attributed to Internet Essentials, the reason driving the sudden shift between 2017 and 2018 is more difficult to pinpoint. One possibility is the expansion of Internet Essentials in both 2016 and 2019, though the timing of the

shift does not cleanly coincide with either expansion. Another possibility is the launch of iClaim for SSI applications in 2017, allowing individuals to apply online for both SSI and SSDI simultaneously, though the online application was only available for a modest subset of individuals.

Table 2 presents regression estimates for the impact of Internet Essentials availability on SSDI participation. Our baseline estimate in column (1) indicates that the availability of Internet Essentials significantly increased the probability of SSDI participation by 1.6 percentage points (a 5.1% increase). Relatedly, Foote, Grosz, and Rennane (2019) find that counties with one standard deviation greater internet connectivity experienced a 1.8% increase in SSDI applications following the launch of iClaim in 2009, accounting for approximately 7.5% of the overall increase in SSDI applications over the study time frame. Our estimates suggest that SSDI participation can be further increased through providing access to affordable home broadband to low-income households, particularly since low-income households are far more likely to forgo a home broadband connection due to price.

In Column (2), we test the robustness of this result to the inclusion of division-specific time trends to account for potential confounding regional trends in SSDI take up, particularly since Comcast availability in Figure 2 appears geographically clustered on the West Coast, the Northeast Corridor, and the South. In Column (3), we similarly include a time trend varying based on a PUMA-specific indicator for urbanicity.¹⁴ Both

¹⁴ There are numerous ways to classify whether a PUMA is urban, and we begin by following the direction of Ratcliffe et al. (2016). Census blocks are classified as urban if population density within the block exceeds 1,000 people per square mile. A census block that touches an urban block and has a population density over 500 people per square mile is considered

estimates remain significant, though the magnitudes both decrease to 1.1 percentage points. In Column (4), we test the robustness of the results to lowering the income restriction threshold from 200% of the federal poverty limit to 100% of the poverty limit. The estimate remains significant and virtually unchanged in magnitude for this subset of lower-income individuals.

Additionally, we analyze how the estimates differ when run separately for PUMAs with high versus low access to physical SSA offices. To do so, we split PUMAs into those with one or no SSA field office, and those with two or more field offices. This effectively splits the sample in half as shown by observation counts in Columns (5) and (6). We find that the point estimate increases to a highly significant 2.0 percentage points in Column (5). The point estimate is a nonsignificant 0.9 percentage points in Column (6), suggesting that the effects of Internet Essentials on SSDI participation tends to be concentrated in PUMAs where physical access to SSA offices is comparatively limited. Deshpande and Li (2019) find that field office closings reduce nearby disability applications by 10% and recipients by 16%. Our estimates suggest that subsidizing home broadband access likely provides disadvantaged individuals who face limited SSA field office access with an important channel for applying for SSDI benefits and may be able to meaningfully counteract the effects of SSA office closures when they occur.

We also conduct a placebo check assessing whether significant effects exist for other large ISPs. To do so, we re-run regression (1) on the subset of PUMAs where

part of an “urban cluster.” We define an urban PUMA as one where 95% of its population lives in an urban cluster.

Comcast was not present, substituting $Comcast_p$ for the corresponding local penetration of three other large-scale ISPs: Charter (now merged with Time Warner Cable), AT&T, and Verizon. Table 3 presents these estimates and shows that the effect sizes are smaller and insignificant for these other ISPs. At baseline, non-Comcast PUMAs also exhibit nearly identical SSDI participation rates.

Table 4 provides regression estimates for SSI participation. The first row of estimates represents the effect of Internet Essentials availability from 2012 to 2016, whereas the second row of estimates captures the effect of Internet Essentials availability from 2017 to 2019. In the first column, we focus on the entire sample of low-income, disabled, never-married citizens. The effect from 2012 to 2016 is essentially zero, and the effect from 2017 to 2019 is approximately 2 percentage points (a 5.6% increase) — though significant only at the 10% threshold. In Columns (2) and (3), we split the sample to individuals living in areas with high versus low physical SSA office availability. The estimates in these regressions suggest that the effect in Column (1) is entirely driven by individuals living in areas with one or no SSA field office, where the effect size in the latter post-period is a significant 3.2 percentage points (8.6%). Internet Essentials availability had effectively no impact — in either period — in areas where SSA offices were more commonplace. As a placebo check, Column (4) shows the effect of Internet Essentials availability in PUMAs with one or fewer field offices, but specifically among individuals who had been married at least once. The large and significant estimates from Column (2) effectively vanish, even in areas with limited physical SSA presence.

These estimates suggest that any positive impacts from Internet Essentials on SSI participation were likely driven by iClaim, and not any secondary benefits from broadband adoption (e.g., finding information, connecting with advisors/resources, etc.). We first highlight the limited effect of Internet Essentials in the years prior to iClaim's launch in 2017. However, we note that the difference in the two periods could potentially be driven by changes in Internet Essentials eligibility over time. Until 2016, only a small portion of low-income individuals with disabilities were eligible for Internet Essentials, which required having a child eligible for the National School Lunch Program. Only 14% of individuals in our SSI analysis sample had a school-aged child. Starting in 2016, Internet Essentials became available to anyone who received federal housing assistance, including housing vouchers and public housing, substantially increasing the number of individuals who could receive subsidized broadband. Given this caveat, our other findings still reinforce the notion that iClaim drives these results. Low-income, disabled individuals who were married (making them ineligible for iClaim) experienced no impact at all and would have been similarly affected by the 2016 Internet Essentials eligibility expansion. Never-married individuals living in places with greater access to physical SSA offices also experienced no impact, further pointing to the online portal as the primary driver.

V. Conclusion

In a world where goods and services are increasingly accessed through online platforms, home broadband inequities create barriers for individuals with disabilities to receive needed economic lifelines. This paper fills a critical gap in the literature by examining the causal relationship between affordable broadband and access to SSDI

and SSI. While previous studies have touched upon the importance of internet accessibility in various sectors like work, education, and health, the causal link between affordable broadband and access to government programs remains sparsely documented. This research has become particularly timely given the recent COVID-19 pandemic, which accelerated the shift to online platforms for essential services.

Our findings reveal significant impacts of subsidizing broadband on SSDI and SSI access. Using difference-in-differences, we find that the Internet Essentials program increased SSDI receipt by 1.7 percentage points (5.7%), a result robust to various sensitivity tests. The effect was notably larger in areas with limited physical access to SSA field offices, underscoring the role of broadband in mitigating geographical disparities in SSA access. Effects on SSI were slightly more nuanced. While Internet Essentials availability appeared to have little impact prior to SSI's online launch in 2017, effect sizes were larger and significant after the online portal opened, particularly in areas with low physical SSA office availability where SSI receipt rates increased by 3.2 percentage points (8.6%). Our results suggest that the impact of subsidizing was likely driven by access to SSI's online application, and not through indirect benefits of home broadband such as enhanced access to information and resources.

Our findings highlight the importance of affordable broadband as a tool for increasing access to essential income support programs, particularly for those with disabilities. Our findings also strongly suggest that the relative importance of affordable broadband is likely shaped by the local availability of SSA field offices. Finally, our results underscore the potential for affordable broadband to serve as a lever for increasing the effectiveness and reach of other public services, beyond SSDI and SSI.

Given SSA's ongoing staffing challenges and the increasing digitization of public services, efforts to increase the ease and availability of the online application process are worth consideration alongside ongoing federal and state and efforts to expand equitable broadband access across the country.

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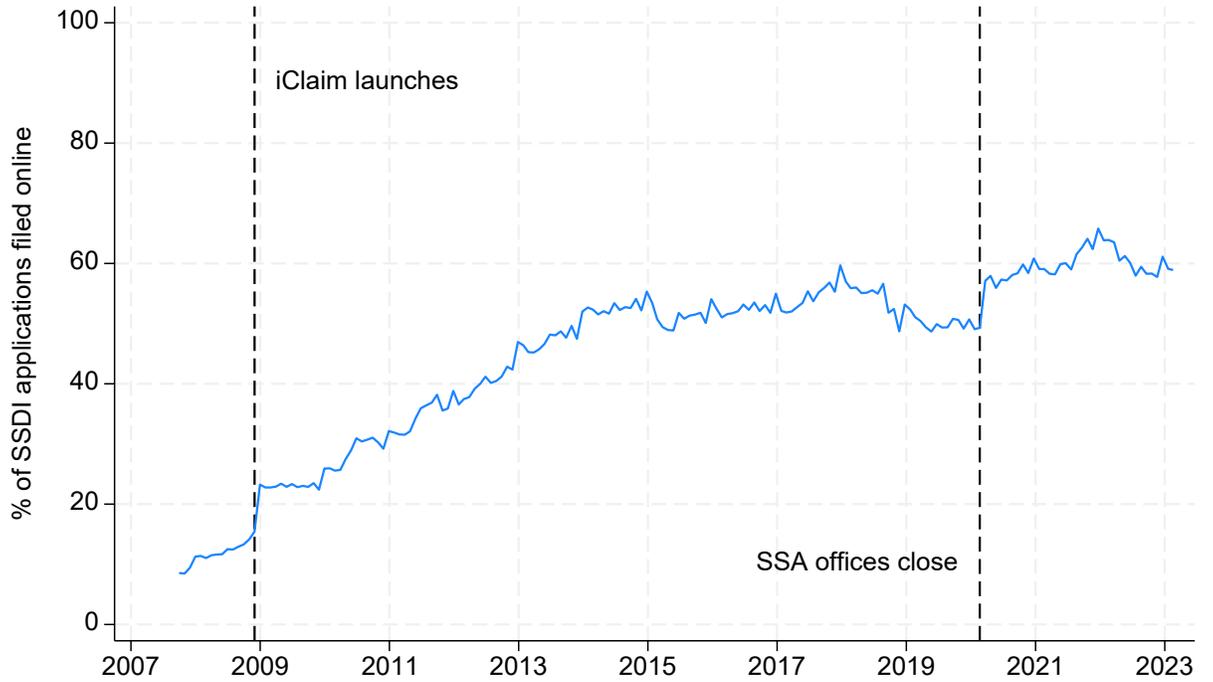
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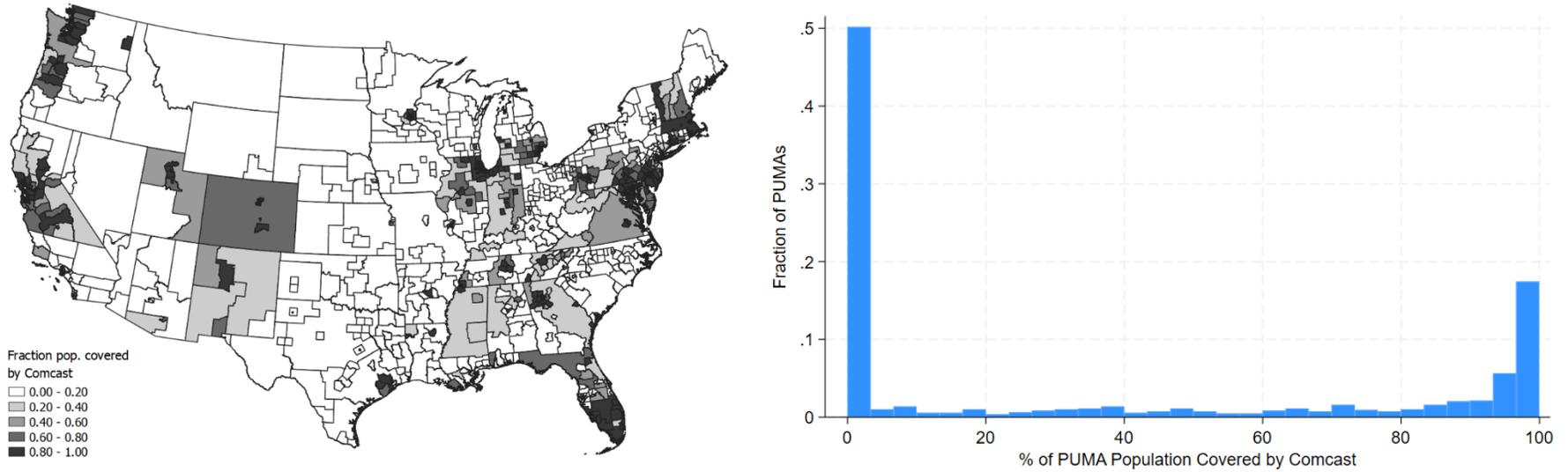
Figures and tables

Figure 1: Online SSDI applications over time, 2007 to 2023



Note: This figure plots the proportion of SSDI applications filed online between October 2007 and March 2023. Data were retrieved from SSA Open Data.

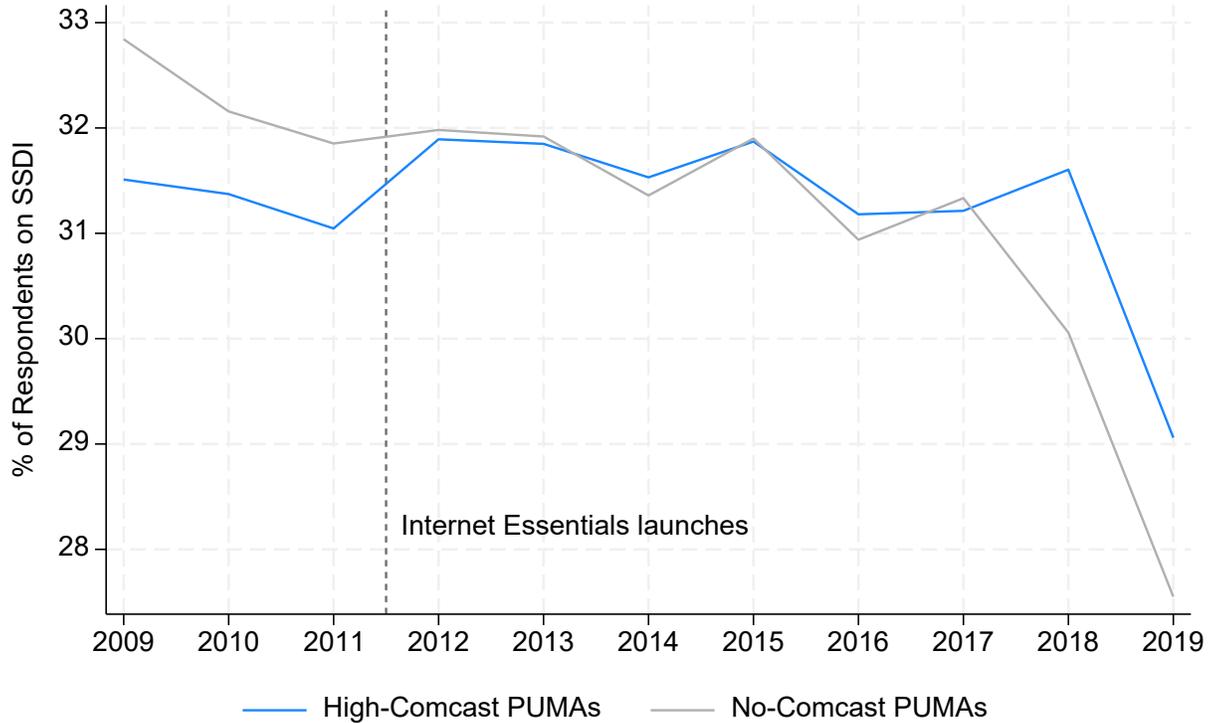
Figure 2: Distribution of Comcast broadband service area



Note: The map and histogram above present the distribution of Comcast coverage rates aggregated at the IPUMS consistent PUMA level. The data used to construct these figures are collected at the census block level in 2012 via the State Broadband Initiative, run by the National Telecommunications and Information Administration.

Figure 3. Visualizing difference-in-differences and the impact of Internet

Essentials on SSDI



Note: This figure plots differences in residualized SSDI participation rates across two series which split respondents based on whether they live in a high-Comcast PUMA ($\geq 50\%$ Comcast coverage) or a no-Comcast PUMA (0% Comcast coverage). SSDI participation is residualized with respect to gender, age and its square, race (Black and Hispanic), marital status, years of education, and number of children. All calculations are weighted by person-level ACS weights. Data come from the 2009–2019 one-year ACS estimates merged with the 2012 NTIA broadband map.

Table 1: PUMA-level summary statistics, by Comcast coverage rates

	High Comcast		Low Comcast	
	Mean	SD	Mean	SD
Population	6006	9367	8729	13786
Male	0.43	0.11	0.45	0.09
Age	48.78	1.72	48.72	1.69
% Black	0.30	0.26	0.20	0.20
% Hispanic	0.15	0.16	0.12	0.19
% Married	0.21	0.09	0.27	0.10
Years of Education	11.53	0.82	11.32	0.76
# Children	0.63	0.28	0.62	0.23
Total Earnings (\$)	452	524	449	414
% Federal Poverty Limit Labor Force Participation	73.37	10.43	75.45	8.66
SSDI	0.14	0.07	0.11	0.07
SSI	0.27	0.10	0.31	0.10
Any Internet	0.35	0.12	0.33	0.10
Broadband Internet	0.52	0.14	0.51	0.12
Number of CPUMAs	332		743	
Number of respondents	2,621,708		7,496,981	

Note: This table provides summary statistics aggregated to the IPUMS-consistent PUMA level. “High Comcast” refers to any PUMA where Comcast coverage rates equal or exceed 50%. “Low Comcast” refers to PUMAs where coverage is less than 50%. All calculations are weighed by PUMA-level populations (except for the population outcome), which are calculated by adding individual-level person weights for each PUMA. The sample used to construct these summary statistics includes all noninstitutionalized respondents 18 and older in the ACS. Internet data is only available in the ACS beginning in 2013.

Table 2: The Impact of Internet Essentials availability on SSDI participation

	Baseline	Robustness Checks			Field Office Heterogeneity	
	(1)	(2)	(3)	(4)	(5)	(6)
Comcast x Post	0.016*** (0.006)	0.011** (0.005)	0.011** (0.006)	0.015** (0.006)	0.020*** (0.007)	0.009 (0.009)
N	599,305	599,305	599,305	346,348	284,732	314,573
Baseline Mean	0.316	0.316	0.316	0.244	0.311	0.322
Trend	None	Division	Urbanicity	None	None	None
Income Limit	200% FPL	200% FPL	200% FPL	100% FPL	200% FPL	200% FPL
Sites	Any	Any	Any	Any	<=1 site	>1 site

Note: This table shows the effects of PUMA-wide availability of Internet Essentials, estimated using differences-in-differences via equation (1). The outcome, SSDI participation, is a binary indicator and the coefficients in this table can consequently be interpreted as probabilities. “Comcast” refers to the percentage of a PUMA’s population living within Comcast’s broadband service territory. “Post” refers to whether the individual responded to the ACS in 2012 or later. The sample has been restricted to low-income individuals between the ages of 30 and 61 who were not working and reported at least one disability in the ACS. “Baseline mean” represents the percentage of individuals who reported having SSDI income in 2011 (the year prior to the launch of Internet Essentials) and is weighted using person-level weights. All regressions contain controls for gender, age and its square, race (Black and Hispanic), marital status, years of education, and number of children. All regressions are weighted by ACS person-level weights; standard errors are clustered at the PUMA level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Table 3: Effects of exposure to non-Comcast ISPs (placebo test)

	Baseline	Placebos		
	Comcast	Charter	AT&T	Verizon
	(1)	(2)	(3)	(4)
Comcast x Post	0.016*** (0.006)			
Charter x Post		0.011 (0.010)		
AT&T x Post			-0.001 (0.008)	
Verizon x Post				0.009 (0.008)
N	599,305	253,205	253,205	253,205
Baseline Mean	0.316	0.311	0.311	0.311

Note: This table presents results from a placebo test replacing Comcast coverage rates in Equation (1) with coverage rates of the next largest ISPs: Charter/Time Warner, AT&T, and Verizon. Placebo regressions are run using the subset of PUMAs where Comcast is absent. Regressions are weighted by ACS person-level sample weights, and standard errors are clustered at the PUMA level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 4: The impact of Internet Essentials and iClaim on SSI participation

	Baseline	Site Heterogeneity		Online Ineligible
	(1)	(2)	(3)	(4)
Comcast x 2012-2016	0.001 (0.009)	0.015 (0.012)	-0.015 (0.014)	0.002 (0.006)
Comcast x 2017-	0.019* (0.011)	0.032** (0.014)	0.004 (0.017)	0.001 (0.008)
N	156,458	78,278	78,180	254,849
Baseline Mean	0.359	0.372	0.345	0.277
Ever Married?	No	No	No	Yes
SSA Offices	Any	<= 1 site	>1 site	<= 1 site

Note: This table shows the effects of PUMA-wide availability of Internet Essentials on SSI participation, estimated using differences-in-differences via Equation (2). “Comcast” refers to the percentage of a PUMA’s population living within Comcast’s broadband service territory. Indicators for specific year ranges are interacted with this variable. The sample has been restricted to low-income, never-married citizens who reported at least one disability in the ACS. “Baseline mean” represents the percentage of individuals who reported having SSDI income in 2011 (the year prior to the launch of Internet Essentials) and is weighted using person-level weights. All regressions contain controls for gender, age and its square, race (Black and Hispanic), marital status, years of education, and number of children. All regressions are weighted by ACS person-level weights; standard errors are clustered at the PUMA level and are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.10.