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## The effect of the Americans with Disabilities Act on economic well-being of men with disabilities

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### Abstract

This paper estimates the effect of the Americans with Disabilities Act (ADA) on the economic well-being of working-age (20–62) men with disabilities by fitting a fixed-effects model to the U.S. Survey of Income and Program Participation (SIPP) panel data. This paper constructs a new and alternative measure of disability utilizing rich information on limitations to functional activities (FA), activities of daily living (ADL), and instrumental activities of daily living (IADL). The new *objective* measure of disability identifies a larger group of people as being disabled than conventional self-reported measure. Probability of employment for disabled men fell 5.8% compared to *nondisabled* men significantly at the 5% level. Log-real-wages of men with disabilities fell 5.3% relative to men without disabilities significantly at the 10% level.

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**Keywords:** Americans with Disabilities Act; Disability policy; Measurement of disability; Fixed-effects panel regression; Economic well-being

### 1. Introduction

The Americans with Disabilities Act (ADA) of 1990 requires employers to offer reasonable accommodation to qualified disabled workers, and bans discrimination against people with disabilities in all employment practices including hiring, firing, wage rates, and training. Advocates of the Act argue that, under the ADA, employment and thus economic well-being of disabled

men has improved significantly. We test the claim by estimating the effects of the ADA on various employment (e.g., work/no work, full-time work/not, and hours-of-work), dollar-valued well-being (e.g., wages, earnings, and total personal income), and economic inequality measures (e.g., poverty, and *T/E*-ratios) of working-age (20–62) disabled men.

Previous studies, e.g., Acemoglu and Angrist [1] and DeLeire [2], report that the ADA has not produced an anticipated growth in employment of people with disabilities. Acemoglu and Angrist [1] find that weeks worked by younger disabled men of ages 21–39 fell by 1.8 weeks in 1993, and declined more in 1995. For an older group of men with disabilities of age 40–58,

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weeks-of-work again fell by 1.8 weeks in 1993 but slightly less in 1995. DeLeire [2] estimates the probability of employment for men with disabilities fell by 7.2% in the post-ADA (1990–95) period relative to their *nondisabled* counterparts. Acemoglu and Angrist [1] and DeLeire [2] are both cross-sectional studies but they use different data sets, the March Current Population Survey (CPS) and the Survey of Income and Program Participation (SIPP), respectively.

This paper has two purposes: the first is to estimate precise effects of the ADA by fitting a fixed-effects model to panel data. The fixed-effects estimation strategy is adopted because it allows one to take into account the effect of unmeasured factors such as disability-related characteristics that are not recorded in a data set. Previous cross-sectional studies are vulnerable to *selection* bias due to the unmeasured elements. We find that the employment probability of disabled males fell by 5.8% relative to their *nondisabled* counterparts over time interval running from just prior to the enactment of the ADA in July of 1990 to mid-1992. The log-real-wages of men with disabilities fell significantly by 5.2% compared to *nondisabled* men at the 10% level. Economic dependence of disabled males on means-tested government cash transfers and other sources of transferred income rose significantly by 7.4% compared to able-bodied males at the 5% level.

The second goal of this study is to address long-standing *measurement* issues arising from the field of *disability policy*. We construct a new and alternative measure of disability utilizing information on functional limitations, activities of daily living (ADL), and instrumental activities of daily living (IADL) in the Survey of Income and Program Participation (SIPP). The new *objective* measure identifies a larger group of people as being disabled compared to conventional, self-reported measure of disability. Using the alternative measure, we find that probability of employment for men with disabilities fell by 5.8% compared to men without disabilities, and this result is statistically significant at the 5% level. The log-real-wages of men with disabilities fell by 5.3% compared to their *nondisabled* counterparts at the 10% level.

### 1.1. Americans with Disabilities Act of 1990

The Americans with Disabilities Act (ADA) of 1990, which was passed by the U.S. Congress in July

1990, is designed to protect and promote the rights of people with disabilities. With the recognition that **disabled persons are entitled to civil rights protections** such as those already provided to individuals who are discriminated against on the basis of race, color, sex, national origin, age, and religion, this Act provides disabled persons with legislation to enforce their civil rights [3]. The ADA has five sections.<sup>1</sup> Among them, especially relevant to employment is Title I, which prohibits discrimination against any qualified persons with disabilities in all aspects of employment. The covered practices of employment include job application procedures, hiring, firing, compensation, advancement, and other terms and conditions of employment (section 102 of the Act). It also requires employers with 15 or more employees to provide "reasonable accommodations"<sup>2</sup> to covered individuals.<sup>3</sup> If a disabled person is qualified, that is, he or she meets the requirements of the position and is able to perform the "essential functions"<sup>4</sup> of the position, with or without

<sup>1</sup> The ADA provides equal opportunity for all persons in the areas of employment (Title I); public services (Title II); public accommodations (Title III); telecommunications (Title IV). Title V of the ADA prohibits anyone from coercing, threatening or retaliating against either the disabled, or persons attempting to help disabled people in asserting their rights under the ADA.

<sup>2</sup> A reasonable accommodation is any modification or adjustment to the work environment that will enable a qualified disabled individual to perform the essential job functions [3]. The section 101 of the Act states that the reasonable accommodations include (i) making existing facilities used by employees readily accessible to or usable by individuals with disabilities, and (ii) job restructuring, part-time or modified work schedules, reassignment to a vacant position, acquisition or modification of equipment or devices, appropriate adjustment or modifications of examinations, training materials or policies, the provision of qualified readers or interpreters, and other similar accommodations for disabled individuals.

<sup>3</sup> The covered individuals include (i) persons who have an association with an individual known to have a disability, such as a relative, and (ii) persons who have been coerced or subjected to retaliation because they helped a person assert his/her rights under the ADA as well as (iii) persons with disabilities [3].

<sup>4</sup> The section 102 of the Act states that the essential functions are the basic tasks that an employee must be able to perform. This term would be used so that individuals with disabilities must not be deemed unqualified because they are unable to perform incidental or inconsequential tasks related to the position. Before announcing a job opening, an employer is required to carefully examine each job description and determine which functions or tasks are essential to performance of the job. Anyone who is able to perform the essential functions of the job must not be discriminated against.

"reasonable accommodations", he or she must not be unfairly treated in all employment practices.

The Americans with Disabilities Act (ADA) states that an individual is considered disabled "if he or she is substantially impaired<sup>5</sup> with respect to a major life activity, or he or she has a record of such an impairment, or is regarded as having an impairment (Glossary of the ADA)". This definition of disability is thought to be broader than the widely accepted measure suggested by Nagi [4,5]<sup>6</sup> in the sense that it encompasses the larger body of people with disabilities who do not receive disability-related cash transfers and are successfully integrated into society and work.

The enforcement of the ADA provisions is left to the Equal Employment Opportunity Commission (EEOC) and the courts. Disabled employees or job applicants who believe they have been discriminated against can file a charge with the EEOC, which will investigate and in some cases try to resolve the charge or sue [1].

## 1.2. Previous studies

There are two systematic empirical works examining the employment and wage effect of the ADA. Acemoglu and Angrist [1] focused on weeks worked and average weekly wages using the March Current Population Survey (CPS). They found that, after enactment of the ADA, employment of working-age (21–58) disabled men was reduced significantly relative to their nondisabled counterparts. Weeks worked by disabled men aged 21–39 were stable until 1992, but fell by 1.8 weeks in 1993, and declined by an additional week relative to their nondisabled counterparts in 1995. For men of the 40–58 age group, the number of weeks worked by the disabled fell by 1.8 weeks relative to the nondisabled in 1993 but this effect was halved when a linear trend was added.

<sup>5</sup> Covered physical or mental disabilities may include visual, speech or hearing impairments, orthopedic conditions, epilepsy, cerebral palsy, muscular dystrophy, multiple sclerosis, cancer, heart disease, diabetes, mental retardation, emotional illness, certain learning disabilities, AIDS/HIV disease, tuberculosis, past drug addiction, and alcoholism [3].

<sup>6</sup> Nagi [4,5] describes disability processes as three levels: the existence of pathology, an impairment, and *disability* which is defined as an 'inability or limitation in performing roles and tasks that are socially expected in market work'. How much this self-assessed Nagi measure would be consistent with the ADA-definition of disability is a central theme of the later Section 3.

However, the wage effect of the ADA was weak. Log-real-weekly-wages of men aged 21–39 slightly fell relative to the nondisabled counterparts in 1994, but not in other years. The adverse effect disappeared in a model with trends. The wage estimates for older men (aged 40–58) were not robust to the inclusion of trends.

DeLeire [2] uses data from the 1986 to 1993 panels of the Survey of Income and Program Participation (SIPP). The sample includes men aged 18–64. In the DeLeire (2000)-sample, individuals are repeatedly observed across all waves belonging to the same panel. There were a total of 331,147 observations representing 56,507 individuals in his sample.

DeLeire [2] uses a difference-in-difference (DD) method: first, coefficient estimates are obtained by fitting a probit model to the SIPP sample with correlation-corrected standard errors across repeated observations on individuals. Second, repeated differentiation among four conditional predicted probabilities of employment, i.e., before and after, then disabled and nondisabled, produced the difference-in-difference (DD) estimates. Wage estimates were also produced within the DD framework by pooled OLS regression analysis.<sup>7</sup> The aim of DeLeire's study was to answer the following questions: Did the ADA increase the relative employment and wages of disabled people? How did the ADA affect different groups of disabled people?

According to DeLeire [2], the relative employment of men with disabilities started to drop in the year of 1990 and continued to decrease until the year of 1995. The ADA led to a decrease of 7.2% points on average in relative employment of men with disabilities. The wages of disabled men did not change with the passage of the ADA.

Of concern about DeLeire's study is that there is an important and difficult estimation issue involved in calculating reliable DD estimates of the effect of the ADA on any kind of dependent variables. The *unmeasured* characteristics of people with disabilities greatly differ from those without disabilities in disability research. For example, while we may have the same proportion

<sup>7</sup> A coefficient estimate indicates overall effect of the post-ADA period on outcomes of men with and without disabilities. Then, in particular he distinguishes the effect of the ADA on the disabled relative to the nondisabled.

of college graduates in the two samples, people with and without disabilities, it is likely that the graduates who are disabled are more highly motivated, or more bright, than the *nondisabled* graduates. Because it is more difficult for disabled people as a group to succeed in higher education, the ones who do succeed are likely to have "special unmeasured characteristics". Such unmeasured characteristics of the population with disabilities are important in disability research designed to measure the disability-employment nexus because they lead to *selection* bias when they are omitted from models but are associated with the labor market outcomes.

This paper attempts to solve this problem by using a fixed-effects model fit to a panel data set. The longitudinal framework adopted in this paper accounts for the effect of the unmeasured factors which are not captured by a pooled regression estimator. The fixed-effects estimation can solve the omitted variable problem by purging the variance due to (unmeasured) individual effects that contaminate a pooled estimator [6].

The remaining part of this paper is organized as follows: Section 2 presents a fixed-effects model fit to the panel data designed to estimate the effect of the ADA on employment (i.e., work/no work, hours worked, full-time or part time work) and dollar-valued well-being measures (i.e., wages, earnings, and total personal income) of men with disabilities relative to men without disabilities. Section 3 discusses a measurement issue in this project. We attempt a fixed-effects panel regression analysis using a newly constructed *objective* measure of disability. Study results will be presented, discussed, and concluded in Sections 4 and 5.

## 2. Method

### 2.1. Data and sample

Waves 1 and 8 core files of the Survey of Income and Program Participation (SIPP) 1990 Panel are used the analysis. The SIPP is a series of longitudinal overlapped panels covering between 32 months (1990, 1991 SIPP) and 48 months (1996 SIPP). It can be used to support cross-sectional analyses of large groups as well as longitudinal studies. It collects monthly data with an *oversample* of low-income groups. The core questionnaire is administered every 4 months. It includes

demographic characteristics, household composition, monthly data on work, sources of income, and program participation.

Topical modules of the SIPP supplement the core files. *Work disability history* and *employment history* files are often used for the study of disability and employment. For our analysis, we used *functional limitation* topical models from the SIPP 1990 panel in this project. They contain rich information on physical limitation, activities of daily living (ADL), and instrumental activities of daily living (IADL). The *functional limitation* sections of the Waves 3 and 6 topical module files in the SIPP 1990 panel were merged with corresponding core files, respectively.

The sample in use for the analysis was restricted to working-age (20–62) men with and without disabilities who were born between 1930 and 1969. The reference period of Wave 1 of the SIPP 1990 runs from October 1989 to April 1990, which is prior to the enactment of the ADA (July 1990). Wave 8 of the SIPP 1990 refers to the period from February 1992 to August 1992, which is about one-and-a-half year after the passage of the law.

### 2.2. Selectivity bias and model specification

"*Selection* concerns the presence of some characteristic of the treatment (or control) group that is both associated with receipt of the treatment and the outcome so as to lead to a false attribution of causality regarding treatment and outcomes [7]". Nonrandom assignment of subjects into the treatment group (as opposed to the comparison group) may break unbiasedness of regression coefficients prominently due to the presence of *selection* bias.

The group of men with disabilities is not randomly selected. Some disability-related, individual-specific characteristics among men with disabilities are likely to affect their labor and economic outcomes. Multivariate regression analysis using pooled data, without controlling for such unmeasured, individual-specific characteristics, often leads to biased estimates. Consider a "true" model across two periods ( $t = 1, 2$ ):

$$Y_{it} = X_{it}\alpha + \beta D_{it} + \gamma \tau_t + \delta(D_{it}\tau_t) \\ + Z_i\sigma + \varepsilon_{it}, \quad t = 1, 2 \quad (1)$$

$$\varepsilon_{it} = \alpha_i + \eta_{it} \quad (2)$$

In Eq. (1),  $i$  denotes individuals and  $t$  years;  $Y_{it}$  represents an economic outcome variable;  $D_{it}$  indicates disability (0 or 1).  $\tau_t$  is a post-ADA indicator which is equal to zero for the period from October 1989 to April 1990, which corresponds to "before" the enactment of the ADA, and equal to one for the period from February 1992 to August 1992, which is "after" the passage of the law.

$X_{it}$  is a demographic vector that varies across time and individuals (e.g., age, marital status, education, and unemployment rates, etc.).  $Z_i$  represents demographic observables that vary across individuals but for each individual are constant over time. The error structure for the disturbance term of individual  $i$  in the period  $t$  is specified in (2), where we assume that  $\eta_{it}$  is uncorrelated with  $X_{it}$ . The first term of this decomposition,  $\alpha_i$ , is an individual specific effect. In this formulation, the unknown quantity is composed of two parts: the first part varies across individuals or unit but is constant across time. This part may or may not be correlated with the explanatory variables. The second part varies unsystematically (or independently) across time and individuals.

*Selection* of men with outcome-related attributes into a disability group suggests that  $\text{Corr}(D_{it}, \alpha_i) \neq 0$ . In this case,  $\hat{\beta}$  and  $\hat{\delta}$ , estimated by least squares from a model in which  $\alpha_i$  is a part of the error structure in (2), are biased estimates of  $\beta$  and  $\delta$ .

A standard solution to this problem is "within" or fixed-effects estimation of the model. That is obtained by applying a difference operator between the two time points (i.e., before and after the passage of the law) in (1):

$$\Delta Y = \alpha \Delta X_{it} + \beta \Delta D_{it} + \gamma \Delta \tau_t + \delta \Delta(D\tau) + \Delta \eta \quad (3)$$

where  $\Delta$  is a difference operator. We note that the time-invariant terms  $Z_i$  and  $\alpha_i$  drop out after application of the difference operator. The key feature of this model is that a necessary orthogonality condition now holds on the transformed (i.e., differenced) data. Specifically, with the vector of remaining explanatory variables in (3) denoted as  $W$ ,  $E[\Delta W' \Delta \eta]$  holds.<sup>8</sup> The fixed-effects

estimator is now unbiased even with individual-specific omitted variables out of the regression equation [6].

### 2.3. Dependent and control variables

Employment outcomes include both *extensive* and *intensive* margins: work/no work, hours worked, full-time or part-time work. Dollar-valued outcomes include hourly real wages, personal real earnings, and total personal real income over the reference 4-month period. The individual hourly wages are obtained by dividing individual 4-month earnings by hours worked over the period. Total personal income is equal to the summation of personal earnings, property income, and the receipt of cash transfers. All dollar values are converted into 1982–84 dollars.

Other dependent variables are *T/E-ratios* and poverty status. *T/E-ratios* are devised to measure economic dependence/independence of people with and without disabilities. *T-ratio* is defined as the percentage of means-tested cash transfer<sup>9</sup> and other sources of transferred income<sup>10</sup> out of the person's total income. *E-ratio* is defined as the percentage of personal earnings out of the person's total income. *T/E-ratios* are expected to indicate a portion of income coming from means-tested and other sources of transferred income (*T-ratios*) and its own work (*E-ratios*) out of individual total income. The high value of *E-ratio* implies that an individual is more likely to rely on earnings to make their living. Conversely, a high value of *T-ratio* indicates that an individual relies more on cash transfers. Poverty status is judged by comparing 4-month total family incomes with 4-month official poverty thresholds.<sup>11</sup>

Control variables include demographic variables (e.g., age, education, race, urban/rural, and marital status) and family-related characteristics (e.g., number of

<sup>9</sup> The means-tested cash transfer includes: Federal SSI, State SSI, Veteran's Compensation Payments, Aid to Families with Dependent Children, General Assistance, Other Welfare.

<sup>10</sup> Other sources of transferred income includes: Social Security, Railroad Retirement, Worker's Compensation, employer or union temporary sickness payments, income from a private sickness, accident or disability insurance policy purchased by own, State Unemployment Compensation, Child Support Payments, U.S. military retirement pay, state government pension, local government pension, etc.

<sup>11</sup> The 4-month poverty threshold was obtained by dividing the annual poverty threshold contained in the SIPP by 3.

<sup>8</sup> The consequence of this observation is that running an ordinary linear regression over the transformed data will yield unbiased coefficient estimates to the regressors in  $W$  [6].

own children under 18 in a family). Over the period under study, the business cycle was observed at peak in 1989 and then declined continuously until touching bottom in 1994. Monthly unemployment rates are included to capture the cyclical trend.

### 3. Measurement of disability

The majority of researchers rely on the self-reported disability measure to identify the population with disabilities. However, some researchers worry about the presence of systematic *measurement errors* in using a self-reported measure. The *justification* hypothesis supports their claim. The *justification* hypothesis is that estimated health effects using the self-reported measure is likely to be mis-estimated when individuals use health as a *justification* for leaving the labor force early or reducing the labor supply. According to this hypothesis, people who dislike their work tend to exaggerate their health problem while those who enjoy their work downplay their health problems and work longer [8].

In the literature, many empirical results support the reliability of the self-reported measure. Stern [9] finds that the self-reported measure is a stable and strong measure of disability. Bound [10] compared an objective measure of health status with the self-reported measure. His result suggests that there is no clear basis for referring one type of measure over the other.<sup>12</sup> Dwyer and Mitchell [8] explored alternative measures of health status, e.g., activities of daily living (ADL), instrumental activities of daily living (IADL), and functional limitations (FL), to identify the effect of mental and physical capacity for work on older men's retirement.<sup>13</sup> They found that the self-reported health measure is not endogenously determined with labor supply, and it does not appear to be correlated with compensation variables in the retirement equations. In their study, the evidence supporting the *justification* hypothesis was weak.

In a recent work, Rust et al. [11] found that the self-reported measure is not systematically different from

the objective measure. Their results support the claim that respondents do not tend to make false reports on health/disabling status in an anonymous survey data like the Health and Retirement Survey (HRS) they used in the study.

However, some researchers have found evidence supporting the *justification* hypothesis: Anderson and Burkhauser [12] used early mortality to proxy health problems, and found that the objective measure had a smaller effect on labor supply than did self-reported measure. Bazzoli [13] compared the retirees' self-reported health before and after retirement. She found that the same individuals reported poorer health after retirement than they did earlier.

The recent approach to dealing with this *measurement* issue is to use both self-reported and objective disability measures for comparison purposes.<sup>14</sup> The SIPP topical model file includes both types of measures, i.e., the binary self-reported measure and a set of dichotomous indicators of the presence of the functional limitations (FL), limitations to activities of daily living (ADL), limitations to instrumental activities of daily living (IADL). Moreover, the SIPP data contains information on the main causes of disability.<sup>15</sup>

We constructed a new binary variable indicating disability status by using information contained in the set of binary variables indicating presence of FL/ADL/IADL as well as some more specific conditions (e.g., a learning disability; mental retardation or another developmental disability; Alzheimer's disease; and some other types of mental or emotional conditions). For the identification of men with disabilities, we follow the criteria suggested by McNeil and John [15]. People 15 years old and over are identified as being disabled if they:

- (1) Used a wheelchair or were a long term user of a cane, crutches, or a walker.
- (2) Had difficulty performing one or more functional activities (e.g., seeing, hearing, speaking, using stairs, walking, and lifting/carrying).
- (3) Had difficulty with one or more activities of daily living (ADL) (e.g. getting around inside the home,

<sup>12</sup> The Retirement History Survey (RHS) and the National Longitudinal Survey of Older Men were used as the sources of data for this study.

<sup>13</sup> The first wave of the Health and Retirement Survey (HRS), focusing on men of age 51–65 in 1992, were used for this empirical analysis.

<sup>14</sup> See [8,14].

<sup>15</sup> The control card of the SIPP questionnaire provides 30 symptoms, where each interviewee identified as being disabled chooses one as the main cause of their limitation.

- getting in or out of bed or a chair, bathing, dressing, eating, and toileting).
- (4) Had difficulty with one or more instrumental activities of daily living (IADL) (e.g., going outside the home, keeping track of money and bills, preparing meals, doing light housework, and using the telephone).
- (5) Had one or more of pre-existing disability conditions such as learning disability, mental retardation, developmental disability, Alzheimer's disease, or some other type of mental/emotional conditions.

- (6) Were receiving federal benefits based on the inability to work.

#### 4. Results and discussion

Table 1 shows the summary statistics of the sample. *Objective* measure of disability identifies a larger group of men as being disabled than the self-reported measure of disability. About 11.89% of the sample was identified as being disabled, which is larger

Table 1  
Sample statistics: working-age (20–62) men

Percent disabled	Self-reported measure 10.10%		Objective measure 11.89%	
	Disabled	Nondisabled	Disabled	Nondisabled
<b>Labor market outcome</b>				
Percent employed	58	91	65	91
Four-month hours-of-work	406	686	469	683
Percent employed full time	49.56	85.20	57.55	84.85
Percent employed part time	8.04	6.08	6.39	6.27
Hourly wage (U.S. \$)	7.94	9.74	8.37	9.73
<b>Economic well-being</b>				
Four-month total personal income (U.S. \$)	4377.50	7017.23	5011.91	6985.31
Four-month personal earnings	3167.06	6574.48	3937.42	6539.83
T-ratios	0.41	0.07	0.35	0.07
E-ratios	0.55	0.89	0.60	0.89
Poverty	0.17	0.07	0.16	0.07
<b>Age</b>				
Percent of cohort 1930s	29.49	14.11	29.10	13.85
Percent of cohort 1940s	26.22	22.65	27.88	22.35
Percent of cohort 1950s	24.60	31.53	24.42	31.70
Percent of cohort 1960s	19.68	31.70	18.60	32.09
<b>Education</b>				
Percent with less than HS education	31.56	14.79	30.78	14.56
Percent with high school (HS) graduate	34.55	33.16	33.82	33.23
Percent any college education	33.88	52.05	35.40	52.21
<b>Race</b>				
White	0.82	0.86	0.85	0.86
Nonwhite	0.18	0.14	0.15	0.14
<b>Marital status</b>				
Married	0.56	0.64	0.61	0.64
Nonmarried	0.44	0.36	0.38	0.36
<b>Metropolitan status</b>				
Urban	0.74	0.78	0.71	0.79
Residual	0.26	0.22	0.29	0.21
<b>No. of kids</b>				
No. of own kids in the family of age under 18	0.61	0.82	0.66	0.82
<i>N</i>	28167	28167	28167	28167
<i>n</i>	16286	16286	16286	16286

Source: Waves 1 and 8 of the U.S. Survey of Income and Program Participation (SIPP) 1990 panel. Note: Sample was restricted to working-age (20–62) men born in 1930–1969.

Table 2  
Counts of the disabled: self-reported and *objective* measure

Self-reported	Objective		Total
	0	1	
0	23655	1667	25322 (89.90%)
1	1162	1683	2845 (10.10%)
Total	24817 (88.11%)	3350 (11.89%)	28167 (100%)

Source: Data are from Waves 1 and 8 of the SIPP 1990 panel. Note: Out of the sample, the number of disabled men was counted by either self-reported or *objective* measure of disability.

than the disability group identified by a self-reported measure.

Table 2 tabulates the number of the disabled for the entire available sample, as identified by the self-reported or *objective* measure of disability. The table indicates that for most of the observations, the disability identified by the self-reported disability measure is equivalent to that measured by the *objective* measure of disability. The probability that both measures are identical was 89.96%. However, about 4.12% of the sample individuals declare they are disabled on the basis of self-reporting but found to be not under the *objective* measure. In addition, about 5.92% of the U.S. working-age (20–62) males are found to have one or more limitation(s) to functional activities, activities of daily living (ADL), or instrumental activities of daily living (IADL), even though they self-reported that they are not disabled.

Table 3 reports the empirical results as to the effects of the ADA on the economic well-being of men with disabilities relative to their *nondisabled* counterparts. The *objective* measure of disability was used in this estimation, incorporated with the fixed-effects model fit to panel sample of the Survey of Income and Program Participation (SIPP). Columns (1)–(8) show that men with disabilities suffered a significant fall in most of the employment measures relative to their *nondisabled* counterparts. Relative employment (i.e., work/no work) of men with disabilities fell by 5.8%; relative full-time job employment of men with disabilities fell by 7.1%; 4-month hours-of-work of men with disabilities fell by 60.48 h relative to their *nondisabled* counterparts. We find that most of the adverse effects of the ADA on the employment of men with disabilities were concentrated on their full-time job employment (i.e., 5.8% fall in work/no work versus 7.1% fall in full-time job employment). In columns (6) and (8), the

seemingly perverse, negative signs on the unemployment rates appear to be due to the use of a limited sample that contains relatively small number of observations recorded over only two time points.

Column (9) shows that relative log-real-wages of men with disabilities fell significantly by 5.2% (or 5.1%) when controlling for demographic characteristics (column (10)) relative to their *nondisabled* counterparts at the 10% level.

Columns (11)–(14) show that log-real-earnings and log-real total personal income significantly fell by about 12.4 and 13.6% for men with disabilities relative to their *nondisabled* counterparts at the 5% level.

Column (15) show that *T*-ratios, the percentage of government means-tested and other sources of cash transferred income out of the total personal income, of men with disabilities rose by 7.4% relative to *nondisabled* counterparts, significantly at the 5% level. This estimate was robust to the inclusion of trends (column (16)). Column (17) shows that the *E*-ratios, the percentage of personal earnings out of the total personal income, of men with disabilities fell significantly by 6.4% relative to *nondisabled* counterparts at the 5% level. Again, this coefficient estimate was robust to the inclusion of trends (column (18)). From these two estimation results, we find that the economic dependence of men with disabilities on the means-tested government cash transfers and other sources of transferred income rose significantly over the period.

Columns (19)–(20) report that the effect of the ADA on the individual-level poverty status of working-age (20–62) men with disabilities is not statistically significant.

Finally, Table 4 compares two sets of coefficient estimates obtained either with self-reported or *objective* measure of disability. We find that the effects of the ADA on two dollar-valued well-being measures

Table 3  
Impact of the ADA on economic well-being of disabled men

	Work		Full time		Hours-of-work	
	(1)	(2)	(3)	(4)	(5)	(6)
Obj.-disabled	0.016 (0.010)	0.015 (0.010)	0.021 (0.012)	0.020 (0.012)	21.72* (9.780)	19.93* (9.772)
Post-ADA	-0.021* (0.003)	-0.009 (0.045)	-0.010* (0.004)	-0.083 (0.056)	-23.22* (3.083)	-271.2* (44.671)
Obj.-disabled × post-ADA	-0.058* (0.010)	-0.058* (0.010)	-0.071* (0.012)	-0.070* (0.012)	-60.48* (9.836)	-59.25* (9.829)
Age	-	0.001 (0.002)	-	-0.001 (0.003)	-	0.713 (2.494)
Education	-	-	-	-	-	-3.974 (23.064)
College	-	-0.010 (0.023)	-	0.021 (0.029)	-	-12.743 (20.038)
HS graduate	-	-0.001 (0.020)	-	0.025 (0.025)	-	-
Race	-	-	-	0.209* (0.083)	-	68.178 (65.593)
White	-	0.111 (0.066)	-	-	-	-
Marital status	-	-	-	0.023 (0.013)	-	28.262 (10.538)
Married	-	0.011 (0.011)	-	-	-	-
Metropolitan status	-	-	-	0.056* (0.023)	-	45.283* (18.129)
Urban	-	0.040* (0.018)	-	-	-	-
No. of kids	-	-	-	-	-	-
No. of kids in family of age ≤ 18	-	0.002 (0.005)	-	0.002 (0.006)	-	2.681 (4.656)
Unemployment	-	-	-	-	-	-
Rates, 4-month	-	-0.006 (0.019)	-	0.031 (0.024)	-	104.56* (18.80)
N	28167	28167	28167	28167	28167	28167
n	16286	16286	16286	16286	16286	16286
Log-hours	Log-real-wages					
	(7)	(8)	(9)	(10)	(11)	(12)
Obj.-disabled	0.022 (0.018)	0.019 (0.018)	0.006 (0.025)	0.005 (0.025)	0.030 (0.028)	0.024 (0.028)
Post-ADA	-0.001 (0.005)	-0.437* (0.073)	0.014* (0.007)	0.174* (0.102)	0.015* (0.008)	-0.217* (0.114)
Obj.-disabled × post-ADA	-0.079* (0.020)	-0.077* (0.020)	-0.052* (0.028)	-0.051* (0.028)	-0.124* (0.031)	-0.120* (0.031)
Age	-	0.001 (0.004)	-	0.004 (0.006)	-	0.005 (0.006)
Education	-	-	-	-	-	-
College	-	-0.043 (0.040)	-	0.080 (0.049)	-	0.026 (0.063)
HS graduate	-	-0.036 (0.035)	-	0.059 (0.056)	-	0.059 (0.055)
Race	-	-	-	-	-	-
White	-	0.008 (0.123)	-	-0.041 (0.170)	-	-0.032 (0.189)
Marital status	-	-	-	-	-	-
Married	-	0.046* (0.017)	-	0.089* (0.024)	-	0.134* (0.026)
Metropolitan status	-	-	-	-0.038 (0.042)	-	-0.021 (0.047)
Urban	-	0.004 (0.030)	-	-	-	-
No. of kids	-	-	-	-	-	-
No. of kids in family of age ≤ 18	-	0.001 (0.008)	-	-0.004 (0.011)	-	-0.001 (0.012)
Unemployment	-	-	-	-	-	-
Rates, 4-month	-	0.184* (0.031)	-	-0.072* (0.043)	-	0.092* (0.048)
N	24751	24751	24322	24322	24339	24339
n	14790	14790	14652	14652	14663	14663

Table 3 (Continued)

	Log-real-total personal income			T-ratios			E-ratios			Poverty		
	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)				
Obj.-disabled	0.065 (0.036)	0.060 (0.036)	-0.010 (0.013)	-0.003 (0.011)	-0.004 (0.011)	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)	0.008 (0.009)
Post-ADA	0.008 (0.011)	-0.318 (0.164)	0.023* (0.004)	0.014 (0.058)	-0.020* (0.003)	-0.058 (0.050)	0.002 (0.003)	0.100* (0.042)	0.002 (0.003)	0.002 (0.003)	0.100* (0.042)	0.002 (0.003)
Obj.-disabled × post-ADA	-0.136* (0.037)	-0.131* (0.037)	0.074* (0.013)	0.073* (0.013)	-0.064* (0.011)	-0.063* (0.011)	0.007 (0.009)	0.007 (0.009)	0.007 (0.009)	0.007 (0.009)	0.007 (0.009)	0.007 (0.009)
Age	-	0.007 (0.009)	-	0.001 (0.003)	-	-0.001 (0.003)	-	-	-	-	-0.001 (0.002)	-
Education	-	-	-	-	-	-	-	-	-	-	-	-
College	-	0.140 (0.085)	-	-0.002 (0.030)	-	0.010 (0.026)	-	0.009 (0.021)	-	-	-	-
HS graduate	-	0.117 (0.07)	-	-0.007 (0.026)	-	0.069 (0.073)	-	-0.025 (0.019)	-	-	-	-
Race	-	0.002 (0.240)	-	-0.116 (0.084)	-	0.069 (0.073)	-	0.101** (0.061)	-	-	-	-
White	-	0.146 (0.038)	-	-0.016 (0.013)	-	0.030* (0.012)	-	-0.027* (0.010)	-	-	-	-
Marital	-	-	-	-	-	-	-	-	-	-	-	-
Married	-	-	-	-	-	-	-	-	-	-	-	-
Metropolitan	-	-	-	-	-	-	-	-	-	-	-	-
Urban	-	-0.015 (0.067)	-	-0.024 (0.023)	-	0.028 (0.020)	-	-0.017 (0.017)	-	-	-	-
No. of kids	-	0.005 (0.017)	-	-0.008 (0.006)	-	-0.001 (0.005)	-	0.019* (0.004)	-	-	-	-
No. of kids of age ≤ 18	-	0.130** (0.069)	-	0.003 (0.024)	-	0.017 (0.021)	-	-0.041* (0.017)	-	-	-	-
Unemployment rates	-	27158	27158	27158	27158	27158	27158	28167	28167	28167	28167	28167
N	27158	27158	27158	27158	27158	27158	27158	28167	28167	28167	28167	28167
n	15881	15881	15881	15881	15881	15881	15881	16286	16286	16286	16286	16286

Source: Data are from Waves 1 and 8 of the SIPP 1990 panel. Note: Fixed-effects panel regression analysis is performed over working-age (20–62) men. Objective measure of disability is incorporated. Robust standard errors are reported in parentheses. Asterisks \* and \*\* indicate statistical significance at 5% and 10% level, respectively.

Table 4  
Summarized estimates: comparison between self-reported and objective measures

	Work			Full time			Log-hours			Log-real-wages		
	Self-Rep.		Obj.	Self-Rep.		Obj.	Self-Rep.		Obj.	Self-Rep.		Obj.
	Post-ADA	-0.022* (0.003)	-0.021* (0.003)	-0.013* (0.004)	-0.010* (0.004)	-0.002 (0.005)	-0.001 (0.005)	-0.008 (0.020)	-0.079* (0.020)	0.008 (0.007)	0.008 (0.007)	0.014* (0.007)
Disabled × post-ADA	-0.048* (0.010)	-0.058* (0.010)	-0.045* (0.012)	-0.071* (0.012)	-0.084* (0.020)	-0.001 (0.005)	-0.001 (0.005)	-0.079* (0.020)	0.033 (0.029)	-0.052** (0.028)	-0.052** (0.028)	-0.052** (0.028)
N	28167	28167	28167	28167	28167	28167	28167	28167	24322	24322	24322	24322
n	16286	16286	16286	16286	16286	16286	16286	16286	14652	14652	14652	14652
Log-real-earnings			Log-real total persons-income			T-ratios			E-ratios			
Self-Rep.	Obj.	Self-Rep.	Obj.	Self-Rep.	Obj.	Self-Rep.	Obj.	Self-Rep.	Self-Rep.	Obj.	Self-Rep.	Obj.
Disabled	-0.048 (0.044)	0.030 (0.028)	-0.161* (0.052)	0.065 (0.036)	0.070* (0.018)	-0.010 (0.013)	-0.089* (0.016)	-0.089* (0.016)	-0.003 (0.011)	-0.003 (0.011)	-0.003 (0.011)	-0.003 (0.011)
Post-ADA	0.008 (0.007)	0.015** (0.008)	-0.006 (0.011)	0.008 (0.011)	0.026* (0.004)	0.023* (0.004)	-0.023* (0.004)	-0.023* (0.004)	-0.020* (0.003)	-0.020* (0.003)	-0.020* (0.003)	-0.020* (0.003)
Disabled × post-	-0.046 (0.032)	-0.124* (0.031)	-0.019 (0.037)	-0.136* (0.037)	0.054* (0.013)	0.074* (0.013)	0.074* (0.013)	0.074* (0.013)	-0.038* (0.011)	-0.038* (0.011)	-0.038* (0.011)	-0.038* (0.011)
ADA	N	24339	24339	17158	17158	17158	17158	17158	17158	17158	17158	17158
n	14663	14663	14663	15881	15881	15881	15881	15881	15881	15881	15881	15881

Source: Data from Waves 1 and 8 of the SIPP 1990 panel. Note: Fixed-effects panel regression analysis is performed over working-age (20–62) men. Self-reported or objective measure of disability incorporated. Robust standard errors are reported in parentheses. Asterisks \* and \*\* indicate statistical significance at 5% and 10% level, respectively.

(i.e., earnings and total personal income) of men with disabilities are larger and more statistically significant with *objective* measure than those with self-reported measure. The estimated effects of the ADA on dollar-valued well-being (i.e., wages, earnings, and total personal income) of men with disabilities are sensitive to the use of different type of disability measures, self-reported and *objective*. However, the estimated effects of the ADA on other variables (i.e., employment and *T/E*-ratios) were not sensitive to the use of either self-reported or *objective* measure.

## 5. Conclusions

Under *objective* measure of disability, larger group of people, about 11.89% of the sample of working-age (20–62) men, are identified as being disabled compared to 10.10% under self-reported measure. Compared to *nondisabled* counterparts, employment for disabled men fell significantly by 4.8 or 5.8% with self-reported or objective measure, respectively. Most of adverse effects of the ADA on employment of disabled men are found to concentrate on full-time job employment rather than part-time job (i.e., 5.8% fall in work/no work employment versus 7.1% fall in full-time job employment).

Relative log-real-wages of men with disabilities fell significantly by 5.2% at the 10% level. This result is in sharp contrast to wage estimates from using self-reported measure of disability (i.e., an insignificant increase by 3.3%).

Estimated effects of the ADA on dollar-valued well-being measures (i.e., wages, earnings, and total personal income) of men with disabilities are sensitive to the measurement of disability in use. The ADA effects on dollar-valued well-being measures of disabled men are found as larger and more statistically significant with objective measure than self-reported measure of disability. However, on other variables such as employment (e.g., work/no work, hours worked, full time or

part time work), economic dependence (*T/E*-ratios), and poverty, the ADA effects over disabled men relative to *nondisabled* counterparts are not very sensitive to the measurement issue.

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