

Reconciling Findings on the Employment Effect of Disability Insurance

John Bound, Stephan Lindner and Timothy Waidmann



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John Bound

University of Michigan and National Bureau of Economic Research

Stephan Lindner

University of Michigan

Timothy Waidmann

Urban Institute

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Michigan Retirement Research Center

University of Michigan

P.O. Box 1248

Ann Arbor, MI 48104

<http://www.mrrc.isr.umich.edu/>

(734) 615-0422

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Julia Donovan Darrow, Ann Arbor; Laurence B. Deitch, Bingham Farms; Denise Ilitch, Bingham Farms; Olivia P. Maynard, Goodrich; Andrea Fischer Newman, Ann Arbor; Andrew C. Richner, Grosse Pointe Park; S. Martin Taylor, Gross Pointe Farms; Katherine E. White, Ann Arbor; Mary Sue Coleman, ex officio

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Abstract

Over the last 25 years the Social Security Disability Insurance Program (DI) has grown dramatically. During the same period of time employment rates for men with work limitations showed substantial declines in both absolute and relative terms. While the timing of these trends suggests that the expansion of DI was a major contributor to employment decline and raises questions about the targeting of disability benefits, studies using denied applicants suggest a more modest role for DI expansion. In order to reconcile these findings, we decompose total employment changes into population and employment changes for three categories: DI beneficiaries, denied applicants and non-applicants. Our results show that during the early 1990s, the growth in DI can fully explain the employment decline for men only under an extreme assumption about the employment potential of beneficiaries. For the period after the mid-1990s, we find little role for the DI program in explaining the continuing employment decline for men with work limitations.

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1. Introduction

Over the last 25 years the Social Security Disability Insurance Program (DI) has grown dramatically. In 1985 2.2 percent of individuals between the ages of 25 and 64 were receiving DI benefits. By 2008 this fraction had more than doubled to 4.6 percent. A significant share of this growth can be account for by the growing work force attachment of women. However, even among men, DI participation grew rapidly over the period, rising from 3.1 to 4.8 percent of 25-64 year old men. Congressional reforms that, importantly, made it substantially easier for those suffering from severe pain or depression to obtain benefits together with increases in the effective after tax replacement rate plausibly contributed significantly to both these increases and the downward shift in the age distribution of awards (Rupp & Stapleton, 1995; Autor & Duggan, 2006). With rapidly expanding rolls together with the shift in the age distribution of awards, there has been a natural concern that many of those being awarded DI benefits may be quite capable of work. The fear was partially fueled by the fact that, during the 1990s and 2000s, while employment rates for working-aged men remained constant, as Figure 1 shows, the employment rates for men with work limitations fell (Burkhauser, Daly, Houtenville, & Nargis, 2002).¹

Several recent influential studies using aggregate data have suggested that the recent growth in the DI program may account for much, if not all of the employment decline of men with work limitations. At both the national and the state level, Bound and Waidmann (2002) regress the fraction of men out of work with health impairments on the fraction receiving DI, and Autor and Duggan (2003) estimate similar cross-state regressions for the period 1978 to 1998 for high-school drop-outs, who represent a disparate share of those on DI. In both studies, the increase in DI participation appears to have had a major negative effect on employment of men with the highest probability of applying for and receiving DI benefits. In contrast to these analyzes, studies that have used rejected disability insurance applicants to measure the labor market potential of beneficiaries have found that rejected applicants have low earnings and employment rates. Bound (1989) analyzes two samples of denied applicants from the 1970s. Arguing that rejected applicants should be more capable of work than are actual beneficiaries, he argues that their employment rate can be thought of as an upper bound estimate of how much beneficiaries would work had they not applied for DI. He finds an employment rate for denied male applicants of no more than 50 per cent. These results have been replicated for the same age category of men (45 years and older) by von Wachter et al. (2009), who use administrative records spanning the period 1978 to 2004. Chen and van der Klaauw (2008) find similar results using data from the Survey of Income and Program Participation (SIPP) covering the 1990s. They exploit a discontinuity in the determination process to estimate the disincentive effect for a subgroup of applicants whose determination is based on vocational factors.² They estimate that the employment rate of these DI beneficiaries would have been only 20 percent higher had they not received benefits. These results have

¹ Correspondingly, while employment rates for women increased during the same time, employment rates for women with a work limitation remained constant.

² Initial Application for disability insurance follows a five-stage procedure. Vocational factors are considered at the fifth stage for those applicants who have not qualified for disability insurance based on severe impairments. See Hu, et al. (2001) for a description of the application process.

generally been interpreted as evidence that the increased availability and generosity of DI benefits could have had at most a moderate effect on the employment rates of people with work limitations.

These two approaches to estimating the disemployment effects of DI are, at best, estimating different parameters. Rejected applicant studies purport to estimate bounds on the effect of DI on the employment of those on DI. In program evaluation literature this would be referred to as the average treatment effect on the treated (ATET). In contrast, the aggregate studies purport to be estimating the effect of implicit and explicit policy shifts during the 1980s on employment rates. This could be thought of as a local average treatment effect (LATE). It seems plausible that DI would have larger disemployment effects on marginal applicants than on infra-marginal applicants. Still, the gap between estimates based on the aggregate and the denied applicants studies is so large, it seems doubtful that a difference between marginal and average applicants could fully explain the discrepancies between these two methods.

Each approach involves making assumptions that are open to some question. On the one side, Bound and Waidmann (2002) and Autor and Duggan (2003) observe only ecological correlations. It is possible, though, that men with work limitations found it increasingly difficult to work during the time period, while the DI program drew from a population with relatively low employment rates. If this were the case, the approach used by these studies would overstate the effect of the increase in the availability of DI benefits on the employment of men. On the other side, Bound (1989), Chen and van der Klaauw (2008), and von Wachter et al. (2009) provide accurate estimates of the counterfactual employment rate of beneficiaries only if the application process itself does not substantially reduce employment for denied applicants. Furthermore, Bound's and Chen and van der Klaauw's results pertain to men 45 years or older.³

We overcome limitations of these two approaches by identifying an additional control population (non-applicants) through administrative records, and by assessing the expansion of the DI system jointly with employment rates for different application and age groups. Our results clarify that the employment decline during the early 1990s can only be explained by the concurrent DI expansion if the marginal beneficiaries would have worked at rates comparable to non-applicants, were they not receiving benefits. This seems doubtful. In addition, we extend the analysis past the period of rapid expansion of the DI program. Employment rates for men with work limitations continued to decline in the late 1990s and early 2000, despite a slowdown in the rate of growth of DI. This fact alone would seem to suggest important other factors at work.

Section 2 briefly discusses main features of the DI program as well as major policy changes over the last decades. In section 3, we develop and discuss the decomposition. Section 4 provides a description of the main data sources used for this study. It is followed by results (section 5) and concluding remarks (section 6).

³ Chen and van der Klaauw (2008) exploit discontinuities for ages 45, 50, and 55. Therefore, by construction, they estimate the average treatment effect for these age groups only.

2. Background

The federal government provides cash and medical benefits to the disabled through two programs, the Social Security Disability Insurance (DI) program, which was enacted in 1956, and the Supplemental Security Income (SSI) program, enacted in 1974. For both programs, successful application requires the

(...) inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or which has lasted, or can be expected to last, for a continuous period of at least 12 months.⁴

During the 1960s and 1970s, the DI program was made available to a wider range of people. In 1960, individuals under the age of 50 were made eligible for DI, and in 1965, the definition of disability was liberalized to allow those without permanent disabilities to qualify. In 1972, the waiting period required before an applicant for DI could start receiving benefits was reduced from six to five months and benefit levels increased. By the mid-1970s typical after-tax replacement rates reached 60 percent. In addition, the introduction of the Supplemental Security Income program (SSI) effectively eliminated the work history requirement for those without either significant assets or other sources of income. With the increase in both the availability and generosity of the program, it is no surprise that DI rolls grew rapidly during the 1960s and 1970s, reaching 2.9 million (3 percent of the working-age population) by 1980. Total benefits paid out exceeded \$15 billion, or 20 percent of benefits paid out for retirement. During the 1970s, concern grew that the Social Security Administration was losing control over the system and that many DI beneficiaries might not actually be eligible under the law. The Social Security Administration responded both by trying to refine the regulations guiding decisions, and by negotiating agreements with various states. The consequences were quite dramatic. Award rates fell from 48.8 to 33.3 percent between 1975 and 1980, with this fall concentrated among states that had been more lenient in their decision making. Then in 1980 Congress passed legislation designed to tighten administrative control over the disability determination process in a number of ways. The 1980 law changed both the frequency and the nature of medical eligibility reviews for disability beneficiaries, and it had a discernible impact on administrative practice. The number of new awards continued to drop from 40 to 29 percent of all insured workers between 1980 and 1982. At the same time, there was a five-fold increase in the number of terminations. In two years' time, 25 percent of beneficiaries had their cases reviewed and more than 40 percent of those reviewed had their benefits terminated. These stricter practices led to questions about due process. Many who had their benefits terminated during this period won reinstatement on appeal, and concern grew that many of those who did not appeal their terminations were, in fact, eligible for benefits.

Widespread criticism led Congress to reverse course in 1984. These amendments had a profound effect on the standards used to evaluate DI eligibility. First, the burden of proof was shifted onto the Social Security Administration to demonstrate that the health of beneficiaries under review had

⁴ See Title II of the Social Security Act, Section 223. [42U.S.C. 423], (d) (1) (A) (http://www.socialsecurity.gov/OP_Home/ssact/title02/0223.htm.)

improved sufficiently to allow them to return to work. Second, a moratorium was imposed on reevaluations of the most troublesome cases --- those that involved mental impairments or pain --- until more appropriate guidelines could be developed. Third, benefits were continued for those whose terminations were under appeal. Fourth, more weight was given to source evidence (evidence provided by the claimant's own physician) by requiring that it be considered first, prior to the results of an SSA consultative examination. Fifth, consideration had to be given to the combined effect of all of an individual's impairments, regardless of whether any single impairment was severe enough to qualify the individual for benefits. Finally, and perhaps most important, the Social Security Administration substantially revised its treatment of mental illness, reducing the weight given to diagnostic or medical factors and emphasizing the ability of an individual to function in work or work-like settings. Further liberalization in eligibility criteria were implemented in 1988 and then again in 1991 when the Social Security Administration issued new rulings on pain that gave controlling weight to source evidence when such opinions were supported by medical evidence and were not inconsistent with other evidence in the case record. In addition, court opinions throughout the 1980s and early 1990s tended to reinforce SSA shift in favor of source opinions (Social Security Advisory Board 2001).

3. Empirical Methodology

We decompose the overall change in employment rates for those experiencing a work limitation into changes within and between application categories. Consider the following decomposition of the employment rate of men with some health impairment at a time $t = 1$:

$$E_1 = W_{b,1} \cdot E_{b,1} + W_{d,1} \cdot E_{d,1} + W_{n,1} \cdot E_{n,1} ,$$

where the b , d , and n subscripts index beneficiary, denied applicant and non-applicants, respectively, and E 's represent first the overall employment rate of those with work limitations, and then the employment rates of those on DI, those who applied for DI benefits but were rejected and, finally, those who never applied for benefits. In this decomposition we ignore men who are currently applying for DI and former beneficiaries whose benefits were terminated. Both groups are small and do not change the empirical results. The W 's represent the fractions of the population, among those identifying themselves with work limitations, in each group. The employment rate for $t = 2$ can be decomposed in the same fashion:

$$E_2 = W_{b,2} \cdot E_{b,2} + W_{d,2} \cdot E_{d,2} + W_{n,2} \cdot E_{n,2} ,$$

Taking the difference between the two time periods and denoting changes by Δ yields:

$$\Delta E = \Delta W_b \cdot \overline{E_b} + \Delta W_d \cdot \overline{E_d} + \Delta W_n \cdot \overline{E_n} + \overline{W_b} \cdot \Delta E_b + \overline{W_d} \cdot \Delta E_d + \overline{W_n} \cdot \Delta E_n , \quad (1)$$

where upper bars indicate averages taken over two periods. We can rewrite equation (1) using the fact that $\Delta W_n = -(\Delta W_b + \Delta W_d)$.

$$\Delta E = \Delta W_b \cdot (\overline{E_b} - \overline{E_n}) + \Delta W_d \cdot (\overline{E_d} - \overline{E_n}) + \Delta W_n \cdot \overline{E_n} + \overline{W_b} \cdot \Delta E_b + \overline{W_d} \cdot \Delta E_d + \overline{W_n} \cdot \Delta E_n . \quad (2)$$

Equation (2) is simply an accounting identity. However, if we assume that newly induced DI applicants would have had employment rates similar to those of non-applicants, had they not applied for DI, then the first two terms have an economic interpretation. The first term $\Delta W_b \cdot (\bar{E}_b - \bar{E}_n)$ in the decomposition measures the effect that the growth in the fraction of men on DI contributes to the decline in the employment of those with work limitations, while the second term measures the effect that the growth in the fraction of men who are denied applicants has on the employment decline. The last three terms represent the within group employment declines, which presumably reflect factors affecting the employment of the disabled that are unrelated to program growth. It is not clear the extent to which any of these components are related to the increased availability of DI benefits. In particular, the last of these three components reflects employment changes amongst those who never applied for DI benefits. It seems safe to assume that this component does not reflect any behavioral effect of the program.⁵

If the increased availability of the disability insurance program during the 1990s has mainly involved men who would previously have been working, then equation (2) accurately measures the employment effect of the disability insurance program during this time. It seems more plausible, however, that this form of decomposition overstates the role of the DI growth, since it assumes that denied applicants and beneficiaries would have the same employment rate as non-applicants if they had not applied.

An alternative decomposition involves substituting out ΔW_d instead of ΔW_n in equation (1). We obtain then

$$\Delta E = \Delta W_b \cdot (\bar{E}_b - \bar{E}_d) + \Delta W_n \cdot (\bar{E}_n - \bar{E}_d) + \bar{W}_b \cdot \Delta E_b + \bar{W}_d \cdot \Delta E_d + \bar{W}_n \cdot \Delta E_n. \quad (3)$$

In this case, the expansion of the DI program is weighted by the difference $\bar{E}_b - \bar{E}_d$ instead of $\bar{E}_b - \bar{E}_n$. The leading term of this decomposition reflects the effect of the expansion of DI on employment if marginal beneficiaries would have had employment rates similar to denied applicants, had they not been receiving benefits, and if the application for DI itself does not reduce the employment of denied applicants.

These two decompositions help us interpret previous studies on the employment effect of DI. The approach by Bound and Waidmann (2002) and Autor and Duggan (2003) may be stated as estimating a type of the following specification:

$$\Delta E = \beta \Delta W_b + \varepsilon \quad (4)$$

If there is no correlation between ΔW_b and other factors that affect the employment decline of men with work limitations then the OLS estimate $\hat{\beta}$ consistently estimates the employment effect of DI

⁵ With the expansion of DI, the size of the population of non-applicants will shrink. Presumably this should mean the remaining non-applicants are more capable of work. Thus, these compositional shifts should work in the direction of making this last term positive. To the extent that this term is negative, it would seem to clearly point to factors unrelated to the increased availability of DI contributing to the decline in the employment of the men with work limitations.

expansion. However, if factors other than the increased availability of DI benefits contributed to the employment decline, as seems entirely plausible, then ε and W_b in equation (4) will be negatively correlated, and the magnitude of $\hat{\beta}$ will be biased upwards. Autor and Duggan (2003) address this issue by using instrumental variables. They exploit changes in DI generosity due to shifts in the wage distribution. A more obvious issue is that their IV estimates are very imprecise (the 95 percent confidence interval for men after 1984 includes the possibility that the growth of DI had no effect on employment decline).

In contrast, studies that base inference on the behavior of denied applications such as Bound (1989), Chen and van der Klaauw (2008) and von Wachter et al. (2009) interpret the first term of (3) as an upper bound estimate of the effect of DI expansion on employment. This use of denied applicants as a control group presupposes that the simple act of applying for DI benefits has no effect on employment. How plausible this presumption is open to question (see the interchange between Parsons (1991) and Bound (1991) for a discussion of this issue). If applying for DI benefits had a negative effect on the employment of denied applicants, using the employment rate of denied applicants could understate the average treatment effect of receiving disability insurance for beneficiaries. In addition, in this case, any growth in the fraction of men who are denied benefits would contribute to the employment decline of men.

4. Data and sample selection

Estimating the decompositions requires information about fractions of non-applicants, denied applicants, and beneficiaries, as well as their respective employment rates. We use the Survey of Income and Program Participation (SIPP), a nationally representative sample of individuals 15 years of age and older in the civilian non-institutionalized population. Respondents are interviewed once every four months, for two to four years. When sampling a new SIPP panel, the Census Bureau randomly groups people into four rotation groups. Starting with the first rotation group, each subsequent rotation group is interviewed one month after the previous one. When interviewed, respondents are asked to provide information about the preceding four months, which are also called reference months.

While the SIPP asks respondents about their employment situation and work limitations, it does not contain information regarding applications and application outcomes for DI. Several administrative files were used in order to identify beneficiaries, denied applicants, and non-applicants. These files were matched to SIPP records using respondent's Social Security Number (SSN). Since people who disclose their SSN systematically differ from people who do not, we reweight the original population weights provided by Census (Raghuathan, 2004) before selecting those respondents who disclosed their SSN. The administrative records are not available for SIPP panels 1986 to 1989. Therefore, our analysis is restricted to the SIPP panel 1984 and SIPP panels 1990s and later.

We restricted our sample to men ages 25 and 61 who report a work limitation. We eliminate men younger than 25 because very few such individuals apply for DI and those older than 61 because they would be eligible for Social Security Retirement benefits. We limit ourselves to men who identify

themselves as suffering from some kind of work limitation because men who experience no such limitations are very unlikely to either apply for DI benefits or have them awarded.

Maag and Wittenburg (2003) have identified several problems with panels prior to 1996, interviewer prompting likely led to over-reporting of work limitations for all waves except the first one. Therefore, we only use the first wave for these panels. For the 1996 and 2001 panels, we disregard the first waves due to apparent problems following questionnaire redesign.⁶ We exclude men who have been in the army, and men who have applied or are currently applying for SSI but not for DI.⁷ With these restrictions, the fraction of men identified as having a work limitation remains approximately constant through the years we examine (see Table 1). For an exact decomposition, we also disregard current applicants and men who had received DI, but whose benefits had been terminated. Both groups are relatively small, and a more extensive decomposition which includes these two groups does not change the results.⁸ Finally, we select the fourth reference month for each wave,⁹ and use the last weeks' employment status, which corresponds to the standard CPS employment measure. Details on administrative records and the sample selection are contained in appendix A.

Four waves are used for the decomposition. These are SIPP panel 1990, wave 1, SIPP panel 1996, wave 2, SIPP panel 2001, wave 5, and SIPP panel 2004, wave 1. The fourth reference month of the first wave of the SIPP 1990 covers January through April 1990, just before the recession of 1990/1991 and the expansion of the DI program started.¹⁰ For the 1996 SIPP panel, the fourth reference month of the second wave covers July through October 1996, which corresponds to a time where the major expansion of the early 1990s had subsided. The 2001 SIPP was conducted around and after the recession of 2001, which occurred between March and November 2001. Since DI participation growth tends to lag the unemployment rate (Rupp & Stapleton, 1995), we choose wave 5 of the 2001 panel, which corresponds to May through August of 2002. We also use the first wave of the 2004 SIPP, which covers January through April 2004, because the full effect of the recession on employment and DI participation might only appear after the 2001 panel was conducted.¹¹ Besides these four waves, we will use all of the selected waves to discuss some of the findings of the decomposition.

⁶ See Appendix A for a discussion of these problems.

⁷ People can apply for DI and SSI for the blind and disabled simultaneously if they fulfill the respective eligibility criteria. These dual applicant or beneficiaries are not disregarded.

⁸ For the sample prior to disregarding current applicants and men who had received disability insurance, the fraction of current applicants is generally between 2.5 and 5.5 percent for the waves considered, and does not show any trend. The fraction of men whose benefits have been terminated increases from about 1 percent to 3 percent between the 1990 and 2004 panel, which is consistent with a decrease of terminations due to death and retirement, and an increase of terminations due to medical disqualifications since the late 1980s (Autor & Duggan, 2006).

⁹ This is the month preceding the interview month and therefore likely to be the least affected by recall bias regarding past employment status.

¹⁰ Following the NBER business cycle dates, the recession of 1990/1991 started in July 1990.

¹¹ Results from the 2004 SIPP should be treated with caution, since the percentage of men with work limitation is noticeably higher as compared to previous panels. If the population with a work limitation in the 2004 panel is more healthy as compared to the population with a work limitation in previous panels, then both the overall

5. Results

Table 2 presents population fractions of men by applicant status, i.e. non-applicant, beneficiary, and denied applicant. At the beginning of 1990, slightly more than two thirds of men 25 to 61 years old with a reported work limitation are non-applicants, 19 percent are beneficiaries, and 13.9 percent denied applicants. Older men are more likely to receive DI benefits, whereas the fraction of the population who were denied applicants was similar across age groups. By 1996, the picture had changed quite dramatically. The fraction of non-applicants had decreased by 10 percentage points to 56.9 percent. That decrease had been matched by a corresponding increase in the fraction of beneficiaries to 29.2 percent. The fraction of denied applicants had remained stable during that time.¹² When comparing population fractions among age categories, one can see that the increase in beneficiaries was mostly concentrated among men 25 to 44 years old: the percentage of beneficiaries 44 years or younger almost doubled during that time. However, in absolute terms, the increase was highest for men age 55 years and older, those participation increased from 29.7 percent to 42.6 percent. By 2002, the fraction of non-applicants had decreased even further, but only slightly to 53.4 percent. The fraction of beneficiaries had increased by another 4.2 percentage points, while the fraction of denied applicants had decreased slightly. Comparing the 1996 panel to the 2004 panel, we observe a further decline of the fraction of non-applicants to 51.8 percent, a 3.4 percentage increase in the fraction of beneficiaries, and a 1.8 percentage increase in the fraction of denied applicants.

Table 3 shows corresponding employment rates. The employment rate of non-applicants was 61.1 percent in 1990, whereas denied applicants had an employment rate of 34.1 percent. Beneficiaries had an average employment rate of 5.7 percent.¹³ Across age groups, men 25 to 44 years have similar employment rates as men 45 to 54, but their employment rates of non-applicants and denied applicants are much lower than those of men 45 to 54. In contrast, the employment rate of beneficiaries age 25-44 was 14 percent, whereas it is less than 3 percent for beneficiaries age 45 or older. For non-applicants and beneficiaries, this pattern remains remarkably stable across most years and panels. These results imply that the difference in the employment rate of non-applicants versus beneficiaries is not necessarily larger for younger men as compared to older men.¹⁴

Table 4 presents the results using the first decomposition (equation 2). For the 1990-1996 comparison, the decomposition suggests an estimated employment decline attributable to the increased availability of DI benefits that exceeds the overall employment decline if men 25 to 61 are considered. However, separate decompositions by age groups reveal that employment rates declined during that time period only for men who were 25 to 54 years old. For them, DI growth can explain the

employment change and the role of DI growth would be understated. The overall bias for the decomposition is therefore unclear.

¹² It appears that an increase in the application success probability since the mid-1980s has mainly contributed to a stable fraction of denied applicants.

¹³ As mentioned in section 2, beneficiaries are not prohibited from working fully, but may work to some extent, as long as their earnings do not exceed a certain threshold, called the “Substantial Gainful Activity” amount.

¹⁴ For instance, in 1990, the difference is 46.5 percent for men 25-44 years old, but 66.9 percent for men 44-54 years old and 51.1 percent 55-61 years old.

entire decline in employment. The contribution of the DI expansion looks quite different using the second decomposition (equation 3). Table 5 presents corresponding results. This decomposition suggests that for men 25 to 54 years old, the growth in DI can now only explain about half of the overall employment decline.

Decompositions for 1996 and the 2001 and 2004 panel show a much larger overall employment decline, which exceeded 10 percentage points for men 25 to 44 years old. No matter which decomposition is used, these dramatic employment changes were not nearly matched by a corresponding expansion of the DI program. For men 25 to 61 years old, the growth in DI for the 1996-2001 comparison can only explain between 8 and 20 percent of the overall employment decline, depending on which decomposition is used. Over the period 1996-2004, the DI program can explain between 30 percent and 50 percent of the overall employment decline. Even more startling are the decompositions for the three different age groups. Especially for men 25 to 44 years old, the portion of the employment decline which is attributable to the expansion of the DI program is at most 20 percent. Further sensitivity analyzes for the SIPP which support this finding are explained in appendix B.

While the SIPP data we have been working with have the distinct advantage of being matchable to data that allows us to identify those who have applied for DI benefits, there are a number of things about the data that raise concerns about the comparability of the data over time. As we have discussed, the nature of the questions that allow us to identify how the population with disabilities has changed over time. In addition, the fraction of SIPP respondents matchable to the administrative data that allow us to identify DI applicants has declined over the years. For this reason, we turn to the CPS. Since 1989 the public release of the March Current Population Survey (CPS) has included data identify those with a work limitation. Over time, this question identifies a roughly constant fraction of working aged men that suffers from some kind of limitation that affects capacity for work (see Figure 3). The CPS data has not been matched to administrative data, and so cannot, in the data, determine who has applied for DI or SSI benefits. At the same time, it is possible to identify those who are receiving Social Security benefits. For those under the age of 62 virtually all workers who receive Social Security benefits are receiving DI benefits. Figure 4 shows DI participation by age categories. It can be seen that the fraction of male DI beneficiaries who are 25-44 years old remained constant between 1995 and 2007, or even decreased slightly. Corresponding employment trends by age groups from the CPS, as shown in Figure 5, reveal that employment rates declined the most among younger men between 1995 and 2008. These patterns suggest that something other than the increased availability of DI benefits played an important role in the employment declines of those identified as suffering from a work limitation. Finally, Figure 6 shows trends in employment for those in the CPS who identify themselves as limited, but do not identify themselves as receiving Social Security or SSI benefits. The CPS shows striking employment declines in this group. Since the fraction of denied applicants remained constant during that time period, this employment decline can be interpreted as occurring primarily among those who never applied for DI.

6. Conclusion

This study has attempted to reconcile divergent findings concerning the employment effect of the DI program. Using a decomposition strategy, we find that it is unlikely that the growth in the fraction of DI

beneficiaries during the early 1990s can fully explain the employment decline. This result is substantiated by the steady employment decline during the mid-1990s to mid-2000s, with no corresponding strong increase in the fraction of beneficiaries. It therefore seems to be likely that other factors than the DI program have contributed to employment decline from 1990 to 2004. This is precisely the context in which the methods used by Bound and Waidmann (2002) and Autor and Duggan (2003) are likely to seriously exaggerate the causal role played by DI in explaining the decline in the employment of men with work limitations.

Since they were enacted, some analysts and policy makers have feared that the DI reforms of the mid and late 1980s allowed a large number of work-capable men onto the rolls, leading to the dramatic decline in labor force participation among men with health-related work limitations. However, our analysis suggests that other factors were behind that decline in participation, and that the growth in DI rolls experienced in the 1990s was made up of men who would not have been working regardless of the DI expansion.

If the DI expansion does not explain the drop in employment among men with work limitations, we are still left with the question of what does explain that trend. While answering this question is beyond the scope of this paper, we can shed some light on directions for future research. For example, SIPP and CPS data can be used to examine sources of household income for men with work limitations who are neither working nor receiving disability benefits. For the families of these men, the earnings of other household members represents an important source of income as do benefits from various social insurance programs such as veterans and workers compensation benefits. There is no reason to suspect that such things as workers compensation has become more available or more generous over the period in question, and, indeed, the SIPP and CPS data show, if anything, the reverse to be true. Beyond this, the fraction of men with limitations who are married with spouse present has fallen, making it harder for these men to rely on spousal earnings. All in all, we see no evidence that the move out of the workforce is due to any increase in the availability of alternative sources of income. At the same time, we find evidence that the earnings potential of this group has declined. With a substantial and growing fraction of these men out of work, estimating their earnings potential is problematic, but if we assume that those who are not working would have earned below median earnings had they worked, we can consistently calculate the 75th percentile of the potential hourly earnings distribution for these men. Under this assumption, we find that this dropped by roughly one third between the early 1990s and late 2000s, suggesting that a shift in the demand for the labor of men in this population may be behind their employment decline.

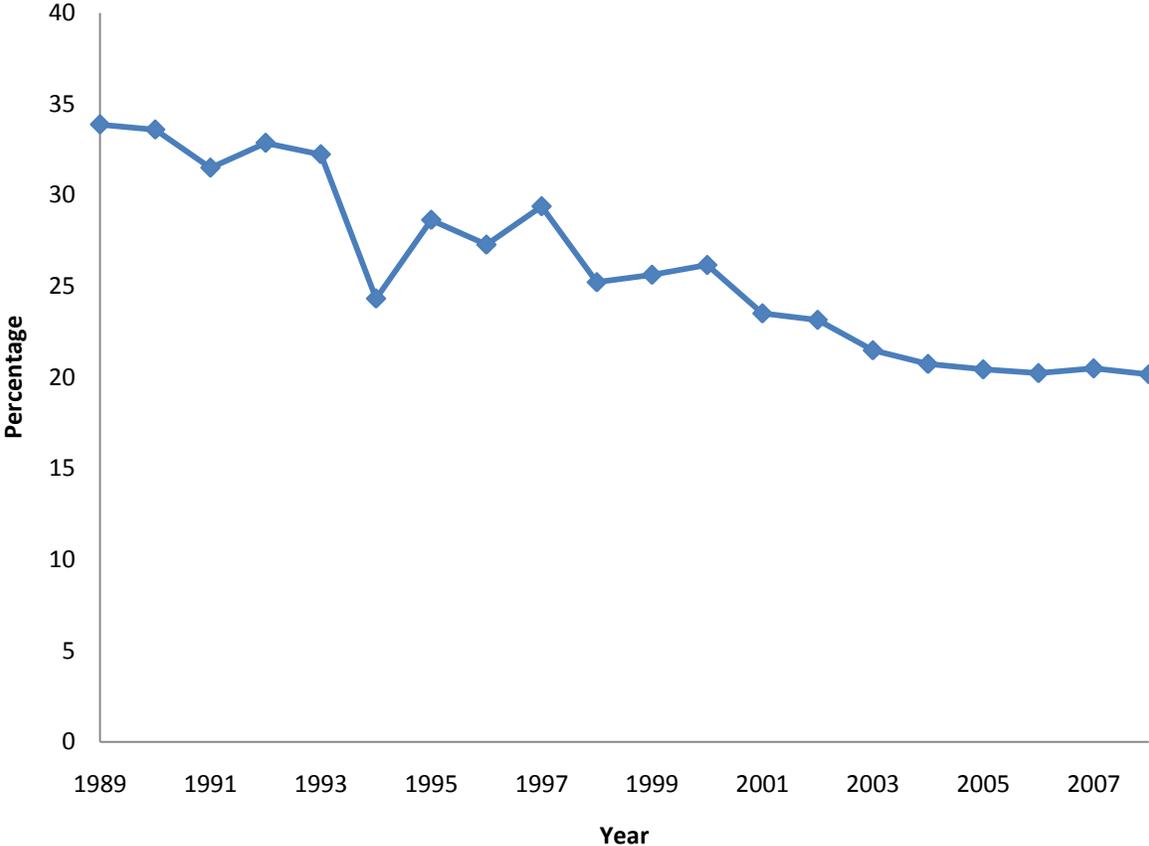
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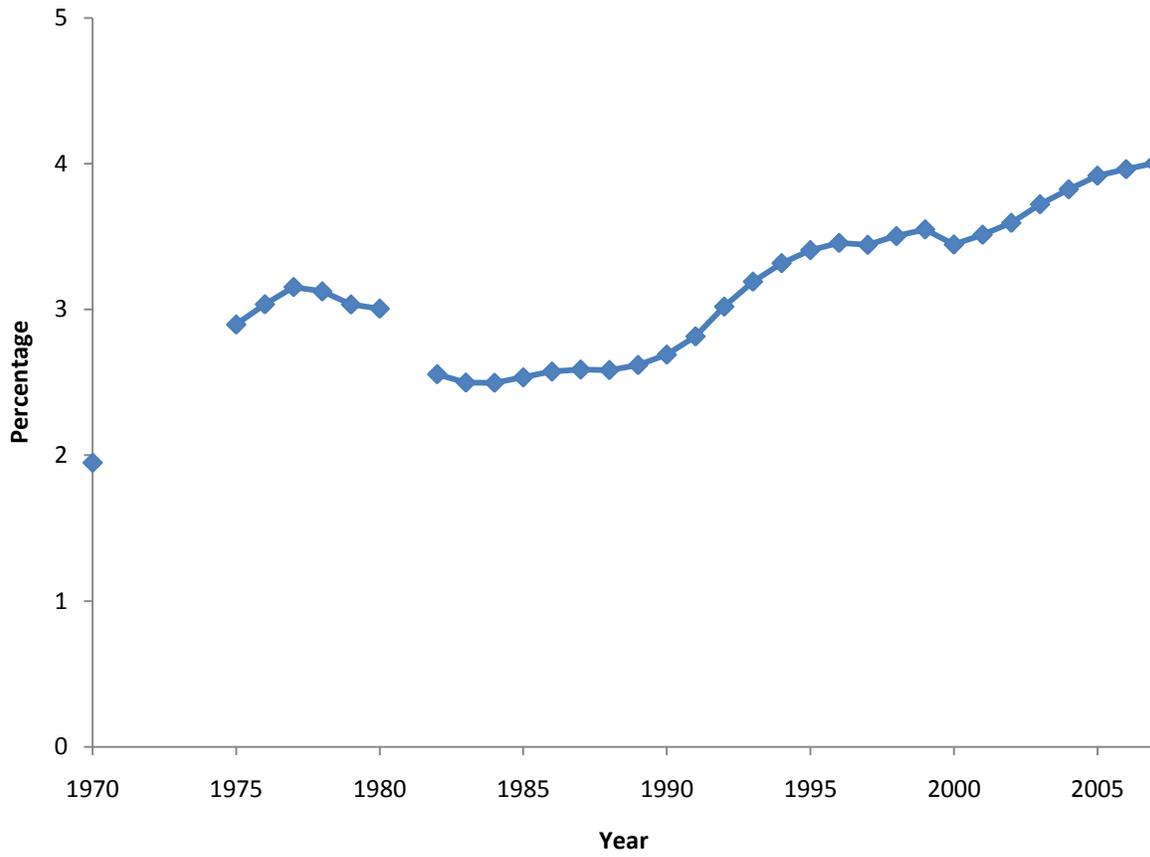
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Figure 1: Employment rates for men, age 25-61, who indicate a work limitation, 1989-2007



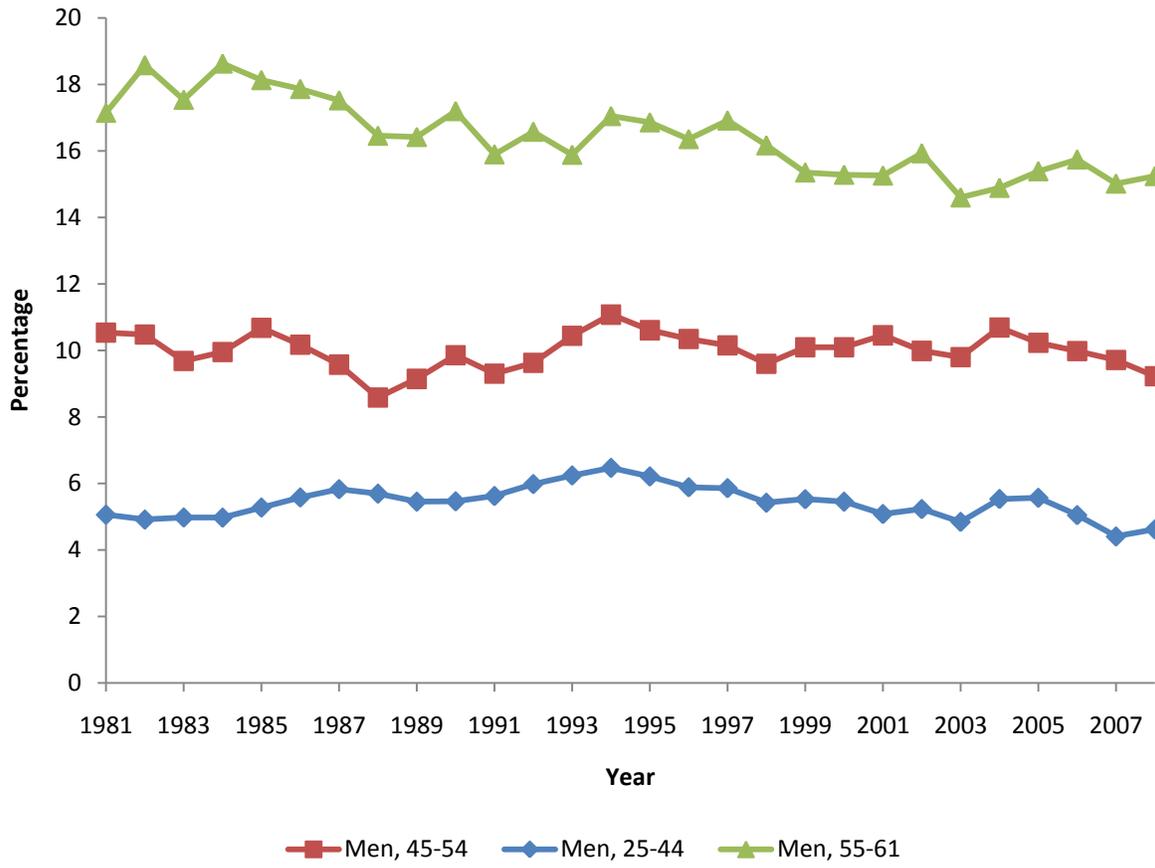
Source: CPS March Supplement

Figure 2: DI participation for men, age 25-61, 1970-2007



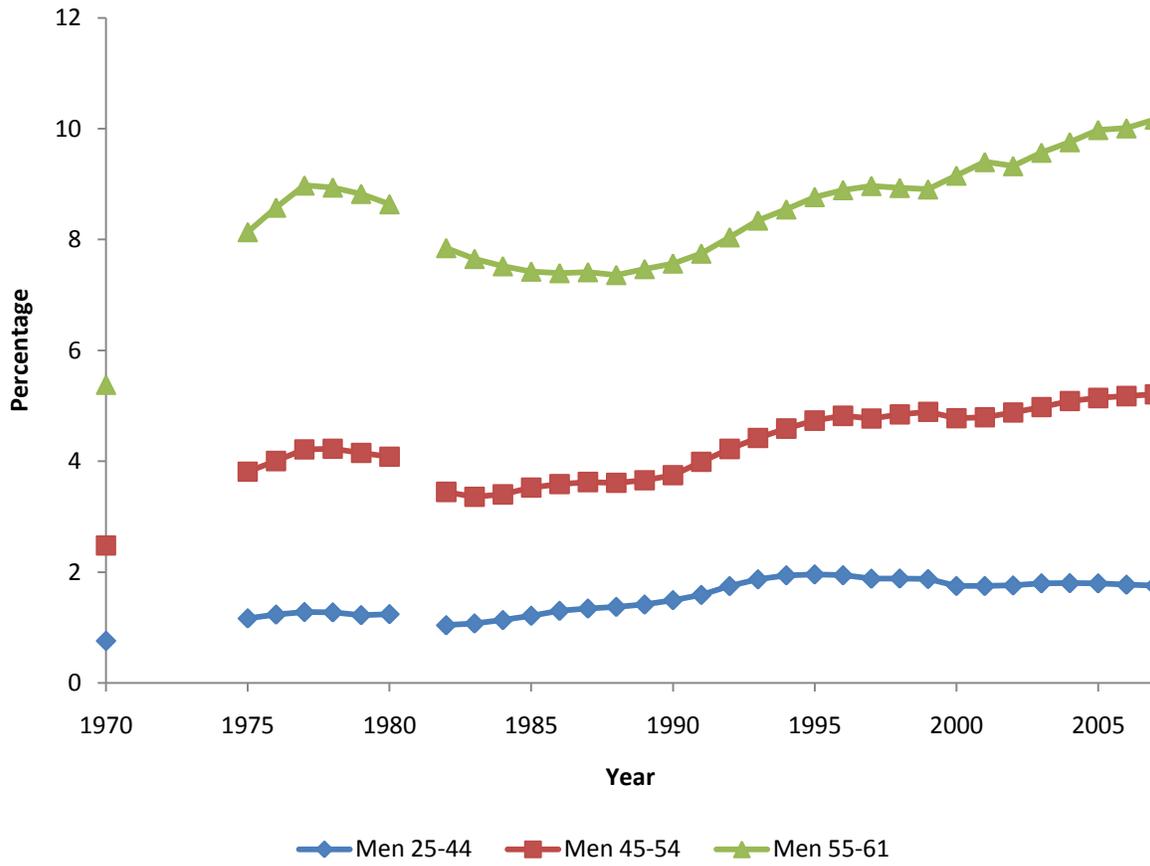
Source: SSA Statistical Supplement

Figure 3: Percentage of men, age 25-61, who indicate a work limitation, 1981-2008



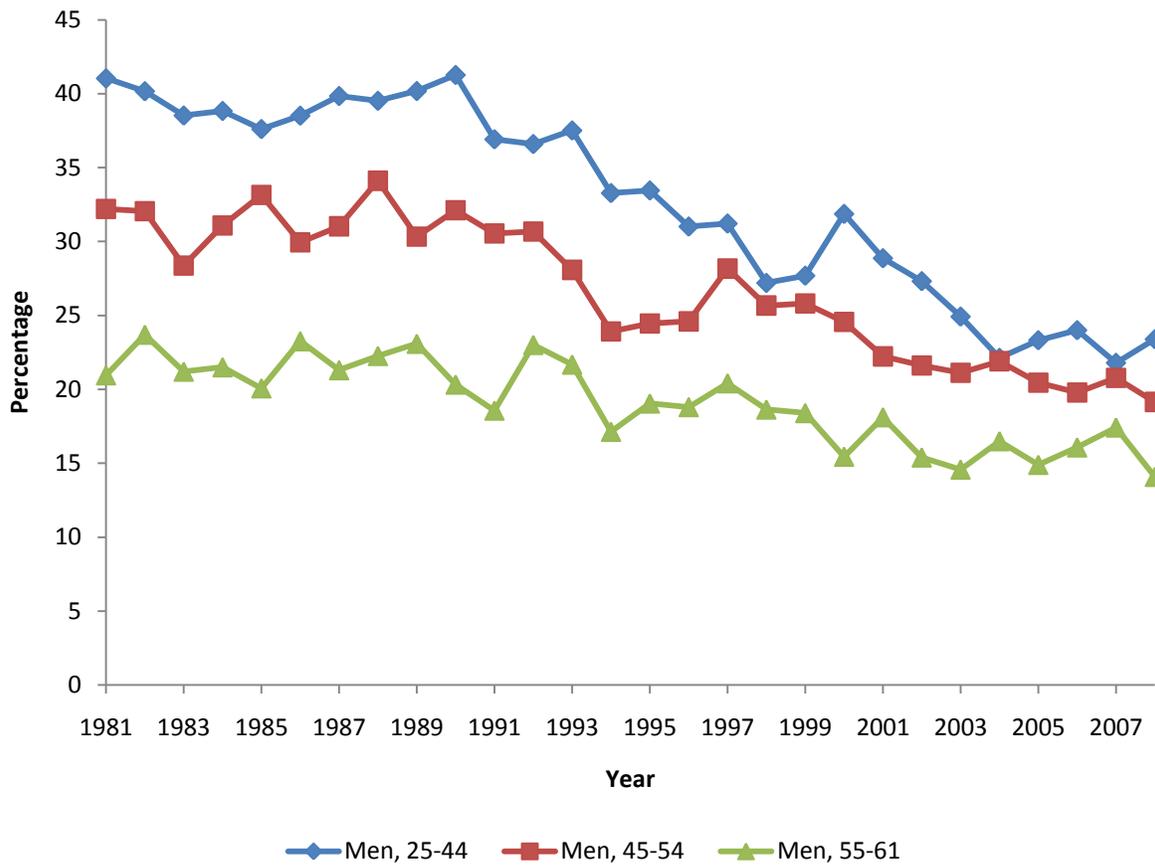
Source: CPS March Supplement

Figure 4: DI Participation for Men, age 25-61, 1970-2007



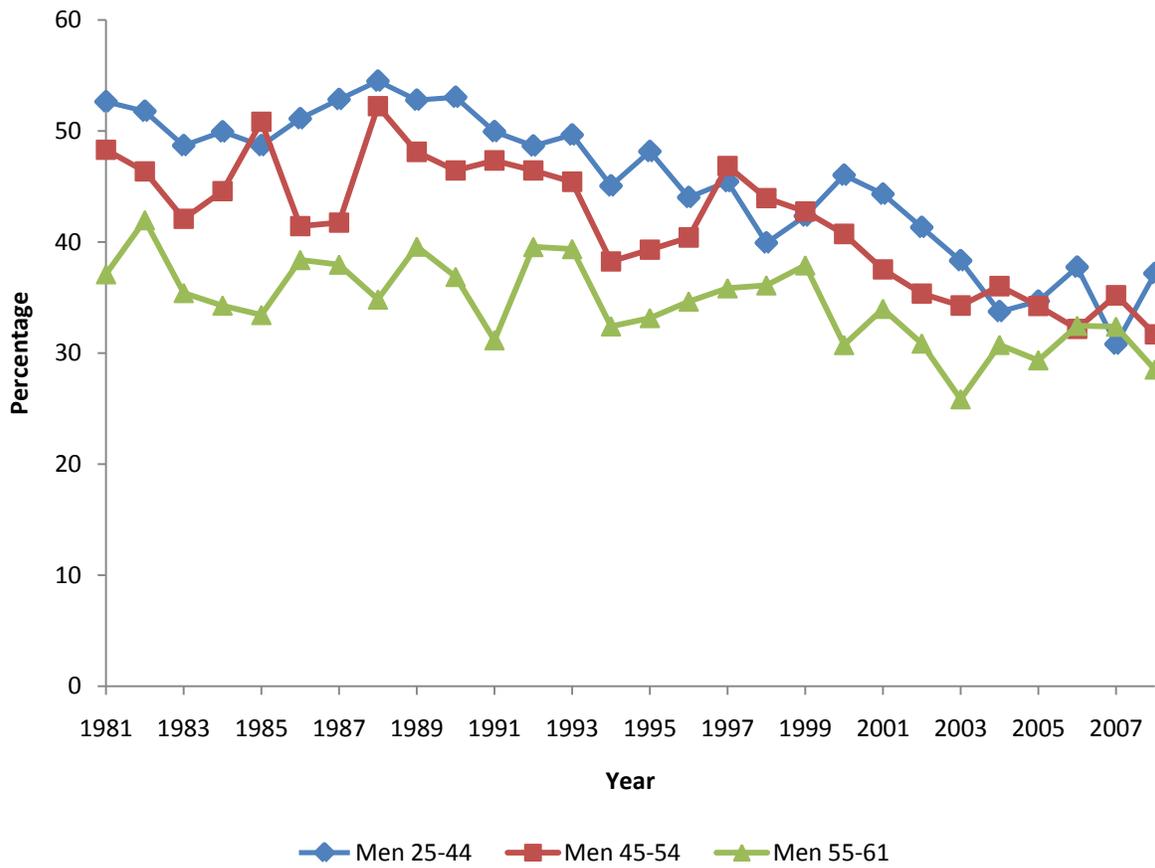
Source: SSA Statistical Supplement and Census

Figure 5: Employment rates for men, age 25-61, who indicate a work limitation, 1981-2008



Source: CPS March Supplement

Figure 6: Employment rates of men, age 25-61, who do not receive Social Security, 1981-2008



Source: CPS March Supplement

Table 1: Percentage of Men with Work Limitations

	Men, 25-61	Men, 25-44	Men, 45-54	Men, 55-61
SIPP 1990, Wave 1	9.96	6.82	12.52	23.23
SIPP 1996, Wave 2	10.93	8.05	13.5	21.54
SIPP 2001, Wave 5	10.38	6.99	12.3	19.8
SIPP 2004, Wave 1	11.3	7.2	13.49	21.34

Note - Original person-month weights provided by Census have been used.

Table 2: Population Fractions

	Non-Applicants		Denied Applicants		Beneficiaries	
	Percentage	N	Percentage	N	Percentage	N
SIPP 1990, Wave 1						
Men	67.1	720	13.9	139	19.0	214
Men, 25-44	75.4	368	12.9	63	11.8	58
Men, 45-54	63.9	178	16.4	38	19.8	62
Men, 55-61	57.0	174	13.3	38	29.7	94
SIPP 1996, Wave 2						
Men	56.9	904	13.8	224	29.2	475
Men, 25-44	64.9	456	13.3	99	21.8	158
Men, 45-54	54.3	286	15.0	74	30.7	157
Men, 55-61	44.0	162	13.5	51	42.6	160
SIPP 2001, Wave 5						
Men	53.4	436	13.2	110	33.4	273
Men, 25-44	61.1	186	15.8	46	23.1	71
Men, 45-54	49.9	147	13.7	40	36.4	98
Men, 55-61	46.2	103	8.8	24	45.1	104
SIPP 2004, Wave 1						
Men	51.8	1000	15.6	293	32.6	615
Men, 25-44	58.5	408	17.3	120	24.2	158
Men, 45-54	51.6	343	15.9	101	32.6	214
Men, 55-61	42.4	249	12.9	72	44.7	243

Note - Corrected person-month weights have been used (see appendix A).

Table 3: Employment Rates

	Total	Non-Applicants	Denied Applicants	Beneficiaries
SIPP 1990, Wave 1				
Men, 25-61	46.8	61.1	34.1	5.7
Men, 25-44	52.2	60.5	38.1	14.0
Men, 45-54	53.2	69.8	49.1	2.9
Men, 55-61	32.4	53.2	11.2	2.1
SIPP 1996, Wave 2				
Men, 25-61	43.7	63.9	30.8	10.6
Men, 25-44	47.4	60.7	38.5	13.3
Men, 45-54	45.9	72.3	25.4	9.4
Men, 55-61	33.3	60.2	22.8	8.8
SIPP 2001, Wave 5				
Men, 25-61	33.6	51.2	27.4	7.8
Men, 25-44	36.4	47.9	31.2	9.7
Men, 45-54	33.9	54.1	27.9	8.5
Men, 55-61	28.8	53.9	16.1	5.6
SIPP 2004, Wave 1				
Men, 25-61	36.4	58.6	25.4	6.3
Men, 25-44	35.9	51.3	21.7	8.9
Men, 45-54	41.6	65.9	34.8	6.6
Men, 55-61	31.0	62.9	19.3	4.2

Note - Corrected person-month weights have been used (see appendix A).

Table 4: Decompositions

	ΔE	$\Delta W_b(\bar{E}_b - \bar{E}_n)$	$\Delta W_d(\bar{E}_d - \bar{E}_n)$	$\bar{W}_n \Delta E_n$	$\bar{W}_b \Delta E_b$	$\bar{W}_d \Delta E_d$
1990-1996						
Men, 25-61	-3.06	-5.54	0.02	1.75	1.19	-0.47
Men, 25-44	-4.79	-4.72	-0.09	0.09	-0.12	0.05
Men, 45-54	-7.26	-7.06	0.45	1.45	1.63	-3.72
Men, 55-61	0.84	-6.57	-0.08	3.52	2.42	1.55
1996-2001						
Men, 25-61	-10.16	-2.00	0.17	-6.99	-0.88	-0.46
Men, 25-44	-10.96	-0.53	-0.50	-8.04	-0.82	-1.07
Men, 45-54	-12.03	-3.10	0.47	-9.48	-0.29	0.36
Men, 55-61	-4.48	-1.24	1.76	-2.82	-1.43	-0.75
1996-2004						
Men, 25-61	-7.33	-1.80	-0.58	-2.87	-1.31	-0.78
Men, 25-44	-11.46	-1.07	-1.03	-5.78	-1.02	-2.57
Men, 45-54	-4.29	-1.16	-0.33	-3.39	-0.88	1.46
Men, 55-61	-2.27	-1.19	0.23	1.18	-2.03	-0.46

Note - Corrected person-month weights have been used (see appendix A).

Table 5: Alternative Decompositions

	ΔE	$\Delta W_b(\bar{E}_b - \bar{E}_d)$	$\Delta W_n(\bar{E}_n - \bar{E}_d)$	$\bar{W}_n \Delta E_n$	$\bar{W}_b \Delta E_b$	$\bar{W}_d \Delta E_d$
1990-1996						
Men, 25-61	-3.06	-2.48	-3.04	1.75	1.19	-0.47
Men, 25-44	-4.79	-2.47	-2.34	0.09	-0.12	0.05
Men, 45-54	-7.26	-3.39	-3.22	1.45	1.63	-3.72
Men, 55-61	0.84	-1.49	-5.16	3.52	2.42	1.55
1996-2001						
Men, 25-61	-10.16	-0.83	-1.00	-6.99	-0.88	-0.46
Men, 25-44	-10.96	-0.30	-0.73	-8.04	-0.82	-1.07
Men, 45-54	-12.03	-1.02	-1.61	-9.48	-0.29	0.36
Men, 55-61	-4.48	-0.31	0.83	-2.82	-1.43	-0.75
1996-2004						
Men, 25-61	-7.33	-0.69	-1.69	-2.87	-1.31	-0.78
Men, 25-44	-11.46	-0.46	-1.64	-5.78	-1.02	-2.57
Men, 45-54	-4.29	-0.44	-1.05	-3.39	-0.88	1.46
Men, 55-61	-2.27	-0.31	-0.65	1.18	-2.03	-0.46

Note - Corrected person-month weights have been used (see appendix A).

Appendix

A. Data Selection

Administrative records: Applications are identified through so-called 831 files. When a person applies for DI, an 831 file is opened. It subsequently documents all application stages up to the reconsideration stage.¹⁵ We use 831 files from 1978 onwards, which is the earliest year they are currently available. This restriction is likely to understate the number of denied applicants slightly, especially for the earlier years of the analysis.

While 831 records provide accurate information on application dates and outcomes of initial application and reconsideration, they do not record appeal decisions. However, an increasing fraction of initially denied applications have been appealed. For instance, in 2002, about one-third of all applications were decided through the appeal process. Of these, more than three quarters were successful, as opposed to only 37 percent successful initial applications (Szymendera, 2006). These successful appeals would be misclassified as denial by 831 records.

In order to improve on the accuracy of the application information of the 831 files, we augment them with the Master Beneficiary Records (MBR). The MBR contain complete application information including appeals, but only for the latest disability application. MBR records are matched to 831 files using dates of application. Furthermore, we use the Payment History Update System (PHUS) to identify successful appeals which have been erased from the MBR. The PHUS records monthly information on benefits received from 1984 onwards. They are matched to 831 files and MBR records using benefit begin dates.¹⁶

Work limitation: The SIPP contains a standard work limitation question: “Does [person] have a physical, mental, or other health condition which limits the kind or amount of work [person] can do?” Before the 1996 panel, people were asked this question during the first wave, and then only for some subsequent waves which contained health and disability modules. In these modules, people who had indicated a work limitation in a previous wave were reminded of his or her affirmative response before the question was asked again.¹⁷ With the 1996 redesign, the work limitation question was included in all core surveys, and people were not reminded of their previous response. Maag and Wittenburg (2003) show that before the 1996 redesign, the prevalence rate of work limitation increased within each panel over subsequent waves, whereas such a trend is not visible for the 1996 panel. They hypothesize that those who indicated having a work limitation in a previous wave are more likely to respond positively to the

¹⁵ If denied benefits at the initial determination process, applicants can ask for reconsideration. If still denied benefits, they can further appeal the decision to an Administrative Law Judge and an Appeal Board. See Benitez-Silva, et al. (1999) for a detailed analysis of the appeal process.

¹⁶ In practice, dates of filing might differ for same applications in these files. Therefore, we matched records which were filed within 50 days. PHUS records are matched to 831 or MBR records if the benefit begin date is within 100 days of the date an application decision has been reached.

¹⁷ Specifically, they are asked: “We have recorded that [person]’s health limits the kind or amount of work [person] can do. Is that correct?”

question if they were reminded about their earlier response. Figure A1 replicates their findings using SIPP panels 1984 to 2004 for men age 25 to 61. As can be seen, the prevalence rates generally increase within each wave before the 1996 redesign. In contrast, the 1996, 2001, and 2004 SIPP panels do not exhibit such a trend.

As a consequence of this reporting bias, it is plausible that people with work limitations are relatively more healthy for later waves than for earlier ones. Consequently, employment rates of people with work limitation are likely to be upward biased for later waves of these panels. Figure A2 demonstrates the effect of the recall bias on employment rates. As the fraction of men indicating a work limitation increases for SIPP panels 1984-1993, so does their employment rate. In contrast, employment rates remain stable across waves for later panels.

In order to circumvent the recall bias with respect to the work limitation question on estimates of employment changes, we restrict our analysis to the first wave prior to the 1996 redesign. Figure A3 shows trends in the prevalence rates of men with work limitations, using wave one, two, and four of SIPP panels between 1984 and 2004. It illustrates that the prevalence rate remains fairly stable between 1984 and 2004 when only same waves are considered. Figure A4 depicts corresponding employment trends for men with work limitations. The decline in the employment rate is similar to the CPS based trend of Figure 1, although it seems to have started earlier.

We also disregard the first wave of the 1996 panel, since numerous changes implemented in the 1996 SIPP redesign are likely to have affected data reporting for the first wave (Maag & Wittenburg, 2003). As shown in Figure A1, the work limitation prevalence rate is somewhat higher for the first wave of the 1996 SIPP panel than in subsequent waves. This anomaly also appears for the 2001 SIPP panel. We suspect that similar implementation issues affected that wave, and disregard it as well. Concerning the 2004 SIPP panel, we consider the first seven waves only, because administrative records are currently available until the end of 2005.

SSN disclosure: Table A1 reports the percentage of men, 25 to 61 years old, who did and who did not disclose their SSN for selected waves of panels 1984 to 2004.¹⁸ The percentage of men who disclose their SSN declines from 92% for the SIPP 1990 to 85% for the SIPP 1996, and further to 76% for the SIPP 2004, wave 1. Moreover, the percentage is only 62% for the SIPP 2001, wave 1, and declines to just above 60% for subsequent waves of that panel. For that panel, the low percentage of disclosures was apparently caused by Census' asking about respondents' SSN through telephone interviews.

The decreasing SSN disclosure percentage poses two problems. First, since those who do not report their SSN are subsequently disregarded, a lower disclosure percentage reduces the final sample size.¹⁹ Second, and more seriously, if men who disclose their SSN systematically differ from men who do not,

¹⁸ For these tabulations, we select men as described in section 4, except selection based on their SSN. Therefore, table 6 presents accurate percentages for the sample used for the decomposition prior to selection based on SSN disclosure.

¹⁹ Leaving men who do not disclose their SSN in the sample is not an option since they would be classified as non-applicants, even though some of them are beneficiaries or denied applicants.

than selection based on SSN disclosure can bias the results from the decomposition. Table A2 shows demographic and economic characteristics for selected waves of those who disclosed and those who did not disclose their SSN, respectively. Men who disclosed their SSN are more likely to be better educated, married and employed than those who did not disclose their SSN. They also tend to be more likely to report a work limitation in the 1990 SIPP panel, but they are less likely to do so for the 2001 and 2004 panel. For a given panel, these differences in observable characteristics suggest that we would overstate the employment rate among all application groups, and understate the fractions of beneficiaries and denied applicants, since these population groups are less likely to be higher educated, married, and employed. Moreover, since the percentage of men who disclose their SSN decreases over subsequent panels, we would expect these biases to become more severe for later panels. Consequently, we would obtain estimates for the increase in DI enrollment and for the decline in employment rates which are too low. In order to correct for these biases, we reweight the original population weights provided by Census to account for non-random selection by SSN disclosure status (see for instance Raganathan, 2004). For that, we estimate weighted logit models of SSN disclosure for each panel separately. We use the person-month weights provided by Census and include the same variables as in Table A2, except for flexible age dummies.²⁰ We then divide the original weights by the predicted values in order to obtain corrected weights. This procedure eliminates the biases which result from selection on SSN if this selection, conditional on the observable characteristics, is random.²¹

B. Further sensitivity analyzes for the SIPP

In order to substantiate our finding that the DI program can explain little of the employment decline in the SIPP since the mid-1990s, we combine each 1996 wave (except for the first) with a 2001 or 2004 wave (except of the first 2001 wave), carry out the first decomposition, and aggregate the results into two sources of employment changes: the employment effect due to changes in DI beneficiaries and denied applicants (the first two terms in equation 2), and changes in employment rates of non-applicants, beneficiaries, and denied applicants (the last three terms of equation 2). This procedure produces 88 decompositions for the 1996-2001 comparison, and 77 for the 1996-2004 comparison. For the 1996-2001 comparison, all 88 employment changes are negative and so are the total employment effects of the DI program. For the 1996-2004 comparison, the two changes have the same sign for 66 out of 77 cases, but in eleven cases, the employment change is positive while the effect of the DI growth is negative. However, as argued earlier, the results for the 2004 panel are likely to be confounded by much stronger changes in the percentage of men indicating a work limitation (see footnote 11). For

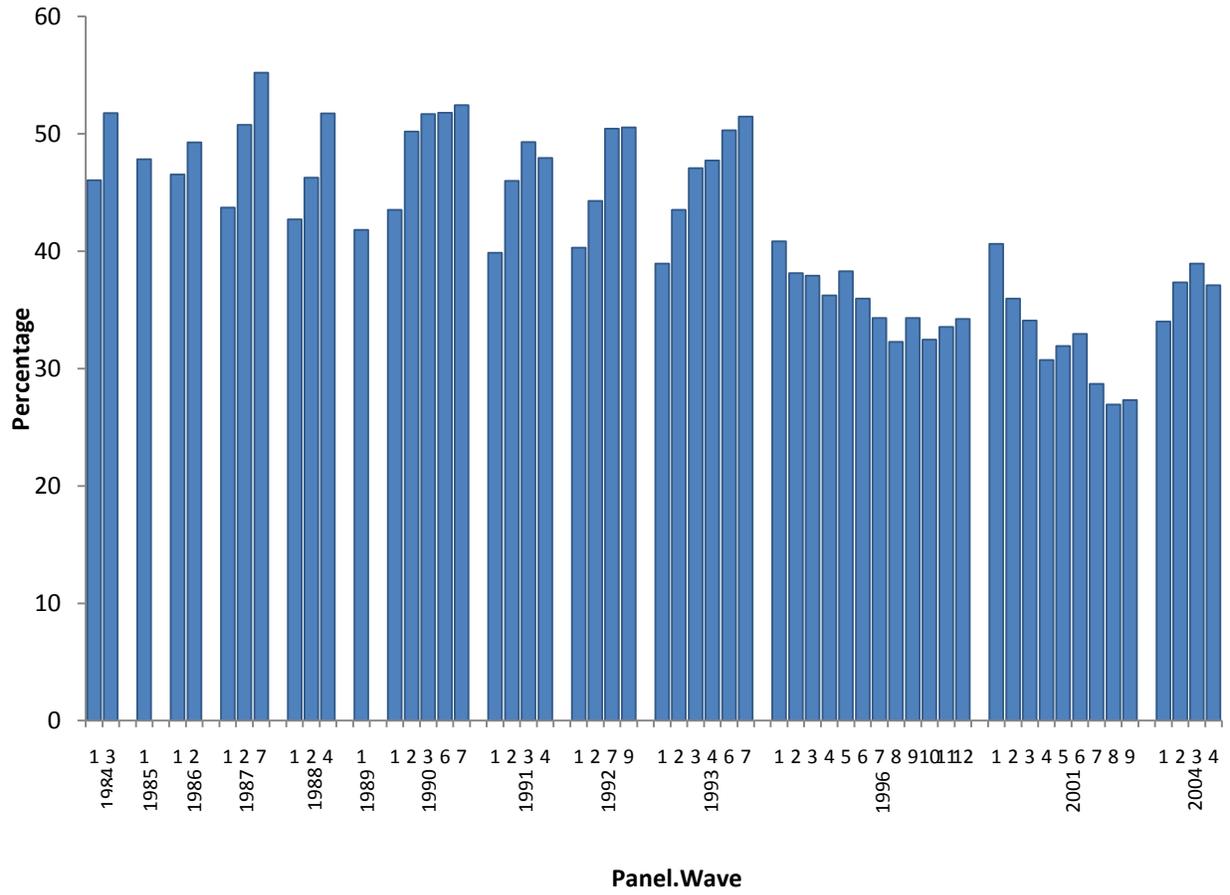
²⁰ We use the following age categories: 25-29 years, 30-34 years, 35-39 years, 40-44 years, 45-49 years, 50-54 years, and 55-61 years.

²¹ In order to verify our supposition regarding the bias due to SSN disclosure, we compared population fractions, employment rates, and decompositions using the original person-month weights and the corrected person-month weights. The correction does increase the fraction of DI recipients and denied applicants, as well as decrease the employment rates for all applicant groups. Furthermore, these changes tend to be more severe for panels with a lower disclosure percentage. For the decomposition, we find that using the corrected weights slightly reduces the role of the expansion of the DI program in explaining the observed employment declines.

those cases for which both differences are negative, the total employment effect never explains more than 50 percent of the overall employment decline.

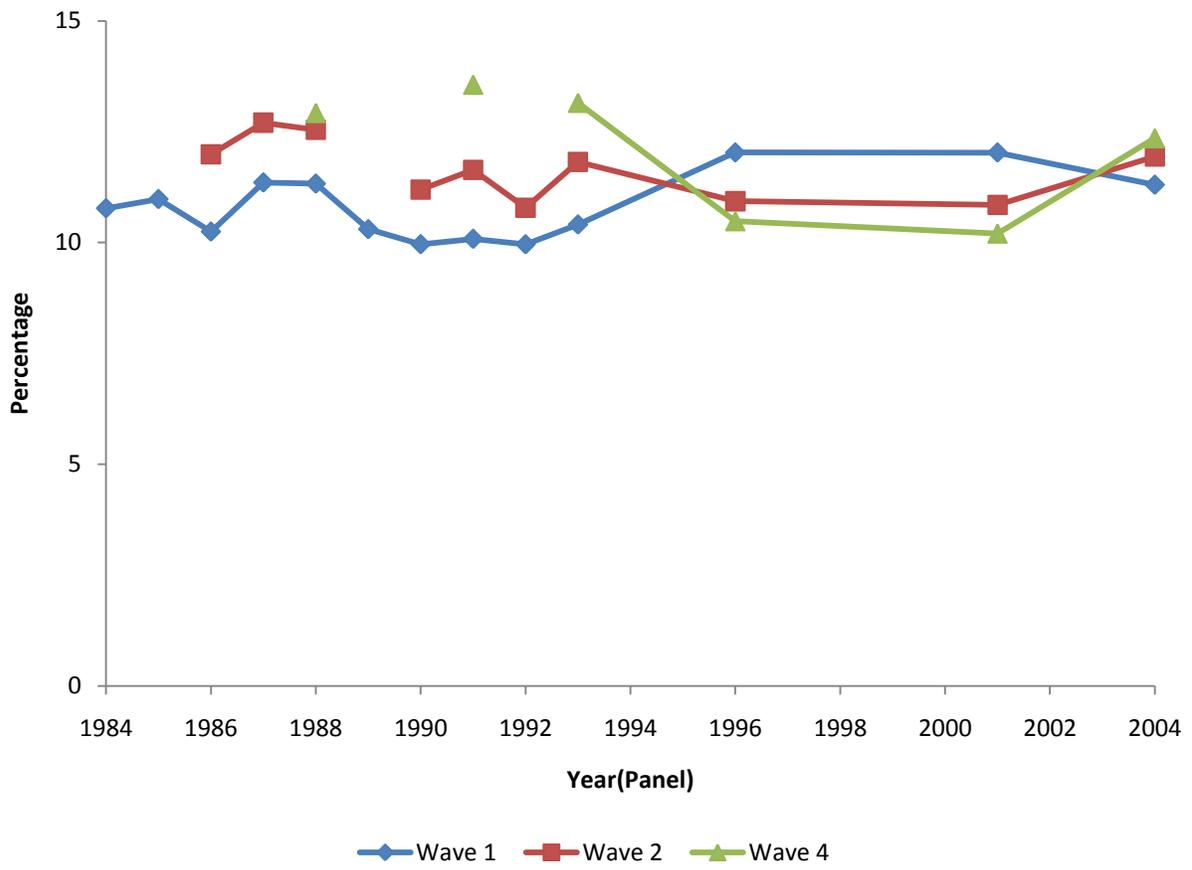
As a second way to validate the above result, we investigate the employment rate of non-applicants. If the growth in the DI program since the mid-1990s cannot explain much of the decline of the employment rate of men with work limitations, then we would expect a decrease in the employment rate of non-applicants during that time. However, using trends of employment rates from the SIPP may be misleading, since the percentage of men who report a work limitation decreased over subsequent waves for the 1996 and 2001 wave. Whether this change in self-reported work limitations is a point of concern depends on why the percentage of men who report work limitations declined. Figure A5 shows the percentage of men with work limitations for two categories, namely whether the respondent had participated in all waves of a panel or whether the respondent did not. The fractions of men with work limitations are generally higher for those who did not participate in all waves as compared to those who did, and this fraction also declines over subsequent waves. Hence, it appears that men with more serious health problems are more likely to drop out of a panel. In contrast, those who remained in a panel for all waves have a relatively stable probability of work limitation in both the 1996 and the 2001 panels. The decline of the fraction of men with work limitations over subsequent waves would therefore, if at all, understate the real employment decline of non-applicants, since those who drop out of the panel are likely to be more severely impaired and less likely to be employed. Figure A6 presents trends in employment of non-applicants by participation. The employment rate increased somewhat until the fifth wave of the 1996 panel, corresponding to the first quarter of 1997, but then decreases until wave 12, which corresponds to the last quarter of 1999. A further decline can be observed for the 2001 panel.

Figure A2: Employment rates of men, age 25-61, with work limitation, by SIPP wave and panel



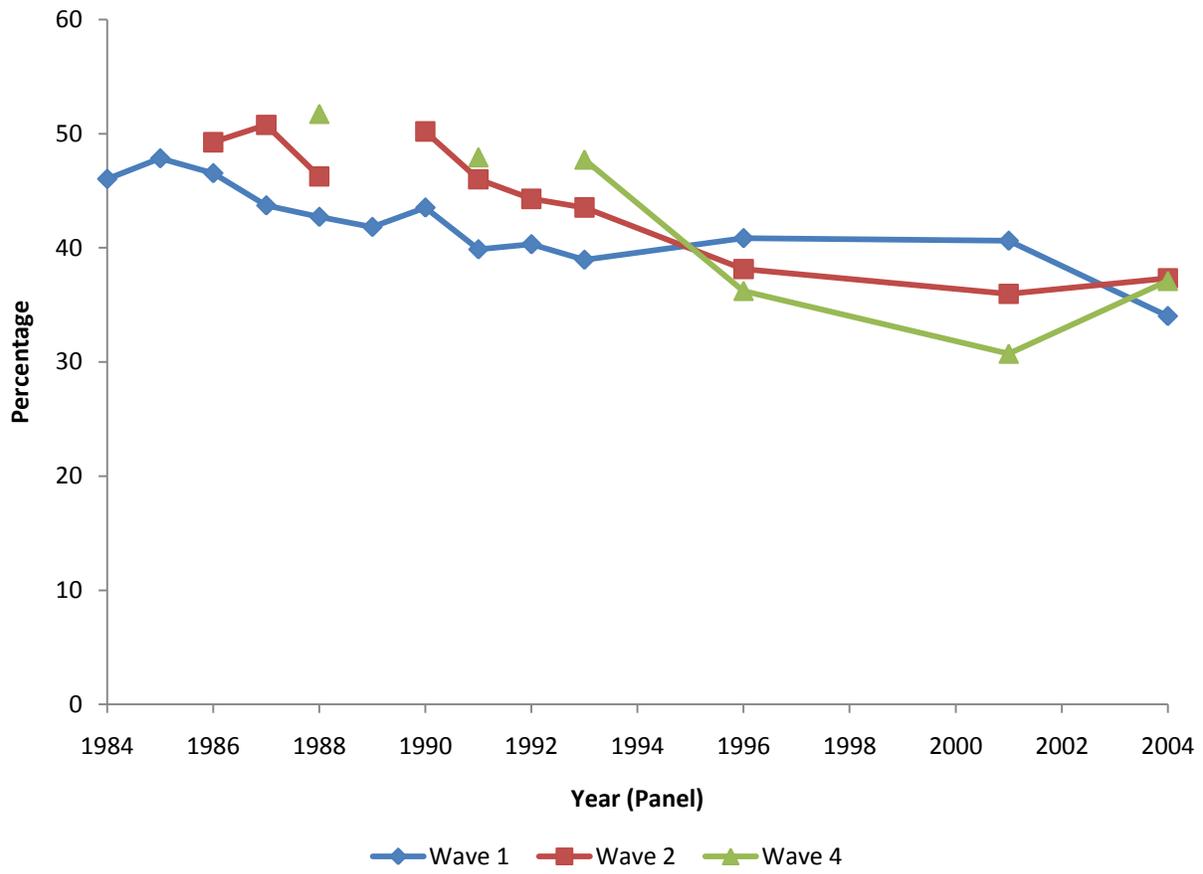
Source: SIPP panels, 1984-2004. Original person-month weights provided by Census have been used.

Figure A3: Percentage of men, age 25-61, who indicate a work limitation (waves 1, 2, and 4 for various panels)



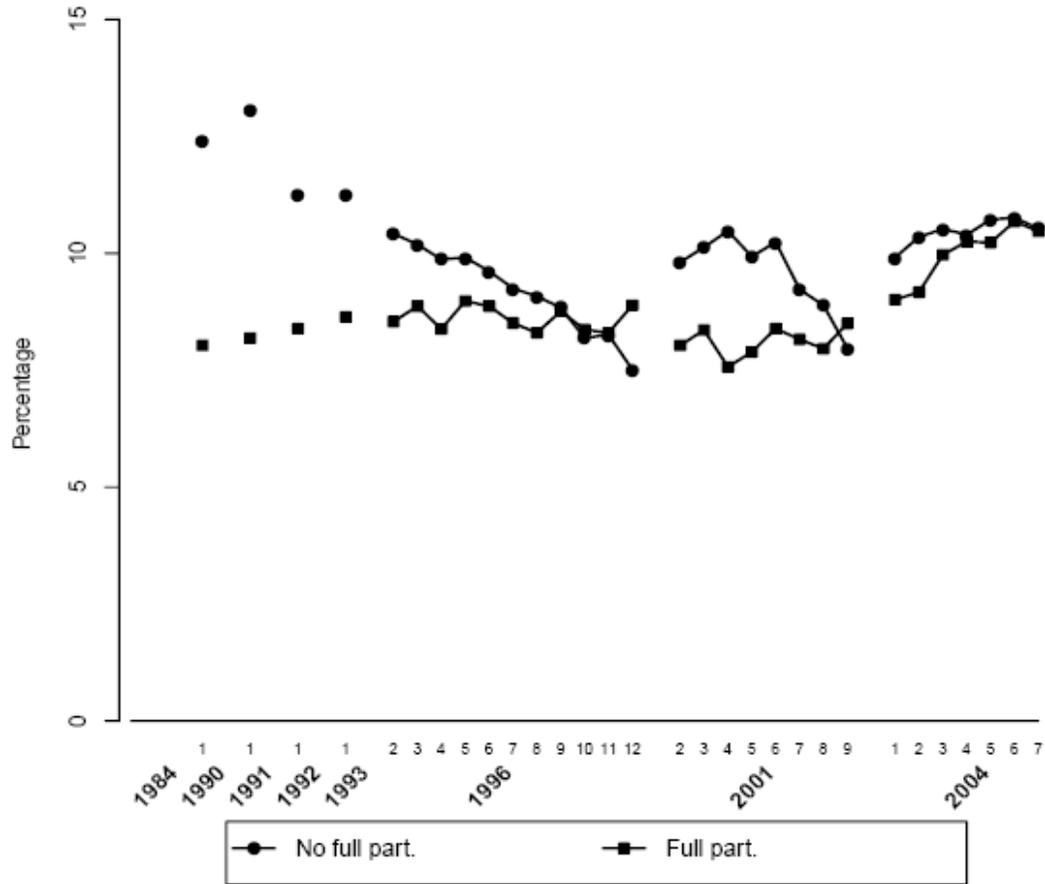
Source: SIPP panels 1984-2004. Original person-month weights provided by Census have been used.

Figure A4: Employment rates of men, age 25-61, with work limitation (waves 1, 2, and 4 for various panels)



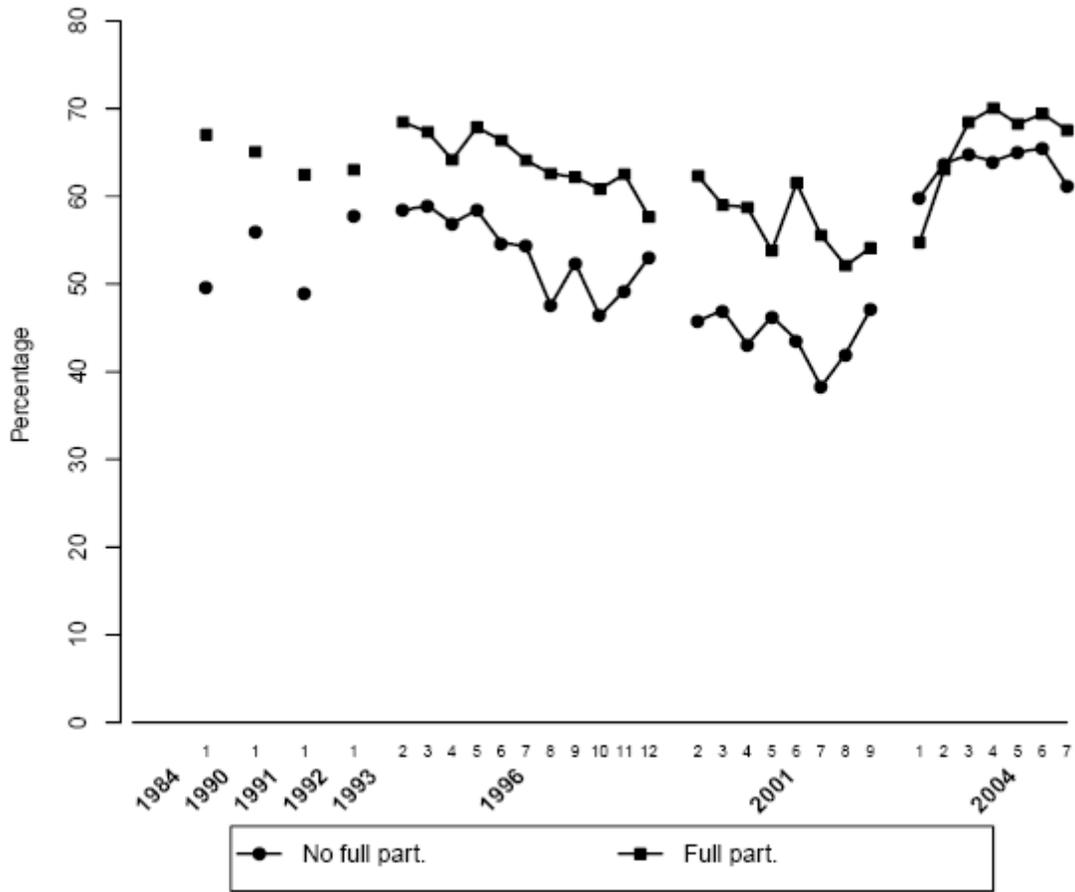
Source: SIPP panels 1984-2004. Original person-month weights provided by Census have been used.

Figure A5: Percentage of men, age 25-61, who indicate a work limitation (by participation status)



Source: SIPP panels 1984-2004 matched to administrative records. Corrected person-month weights have been used. (See appendix A for details)

Figure A6: Employment rates for non-applicant men, age 25-61, with work limitation (by participation status)



Source: SIPP panels 1984-2004 matched to administrative records. Corrected person-month weights have been used. (See appendix A for details)

Table A1: Disclosure of Social Security Numbers

Panel	Wave	SSN non-disclosure		SSN disclosure	
		Percentage	N	Percentage	N
1984	1	13.58	1578	86.42	10011
1990	1	7.9	1048	92.1	11590
1991	1	11.31	929	88.69	7562
1992	1	11.5	1236	88.5	10214
1993	1	12.26	1360	87.74	10239
1996	2	15.2	2971	84.8	16996
1996	3	15.08	2896	84.92	16535
1996	4	15.27	2837	84.73	15956
1996	5	15.17	2755	84.83	15383
1996	6	15.17	2649	84.83	14861
1996	7	15.24	2597	84.76	14396
1996	8	15.47	2625	84.53	14224
1996	9	15.47	2563	84.53	13971
1996	10	15.39	2517	84.61	13746
1996	11	15.49	2516	84.51	13600
1996	12	15.75	2578	84.25	13597
2001	2	37.86	6234	62.14	10280
2001	3	38.78	6178	61.22	9876
2001	4	38.64	6088	61.36	9685
2001	5	39.43	6122	60.57	9415
2001	6	39.51	6170	60.49	9343
2001	7	39.77	6138	60.23	9244
2001	8	39.94	6071	60.06	9046
2001	9	40.19	5940	59.81	8783
2004	1	23.65	5231	76.35	20021
2004	2	21.09	4374	78.91	19093
2004	3	20.19	4049	79.81	18428
2004	4	19.31	3813	80.69	18093
2004	5	18.23	3531	81.77	17840
2004	6	17.16	3281	82.84	17636
2004	7	16.06	3081	83.94	17471

Note - Data source is SIPP panels 1984-2004 matched to administrative records. Table entries are for men, 25-61 years old. We exclude from the sample: (i) men who have been in the military; (ii) men who have applied or are currently applying only for SSI; and (iii) men who are currently applying for DI/SSI or who were beneficiaries for DI. Details concerning sample selection see appendix A. Original person-month weights provided by Census have been used to compute percentages.

Table A2: Demographic Characteristics by SSN Disclosure

	1990, Wave 1			1996, Wave 2			2001, Wave 5			2004, Wave 1		
	no SSN	SSN	test stat. ¹	no SSN	SSN	test stat. ¹	no SSN	SSN	test stat. ¹	no SSN	SSN	test stat. ¹
Age	40.58	40.11	0.58	40.04	40.94	-2.85	41.43	42.36	-3.11	39.81	42.98	-9.33
HS graduates	82.56	83.83	1.07	83.09	88.87	79.10	88.05	90.04	14.93	79.63	91.92	658.93
Some college	41.78	47.22	11.16	33.61	40.57	50.80	39.90	43.27	17.12	36.42	51.14	359.34
Married	63.10	68.73	13.95	58.53	68.00	101.56	61.93	66.39	32.23	50.46	69.02	629.16
Work limited	7.04	9.38	5.91	9.41	9.43	0.00	9.29	8.33	4.01	12.68	8.93	65.90
Employed	84.89	87.01	3.50	84.09	88.33	42.01	82.57	86.67	48.72	77.96	86.81	253.77
Empl. if lim.	38.30	47.20	1.96	36.86	44.52	5.32	26.13	38.10	21.67	26.34	40.18	42.88

Note - Table entries are percentages except for the mean of age. Data source is SIPP panels 1984-2004 matched to administrative records. Table entries are for men, 25-61 years old. We exclude from the sample: (i) men who have been in the military; (ii) men who have applied or are currently applying only for SSI; and (iii) men who are currently applying for DI/SSI or who were beneficiaries for DI. Details concerning sample selection see appendix A. Original person-month weights provided by Census have been used to compute percentages and means.

¹ t-statistic (for mean differences) or chi-square (for proportions) is used.