Applications, Denials, and Appeals for Social Security Disability Insurance

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Abstract

This project explores the process by which older workers apply for, and are awarded, Social Security Disability Insurance (DI) benefits. Our focus is on how and whether DI serves as a path out of the labor market at older ages. This research is important to the extent that proposals to raise the early retirement age under Social Security alter the opportunity set available to older workers. Identifying the characteristics of older workers who apply for DI under current rules, those who are rejected after application, and those who then go on to appeal, can provide policymakers with insight regarding the potential well-being of the "at risk" population if the early retirement age were to rise. We use data from the Health and Retirement Study to compare older workers prior to application, and use these characteristics to predict future DI application and award patterns. The findings indicate that older people initially in poor health and with low economic status are more likely to apply for DI thereafter, as compared to those reporting no health problems and with more assets. Nevertheless few factors distinguish statistically between applicants awarded versus denied benefits, and between those who appeal rejected applications versus those who do not.

JEL Codes: J26 Retirement and Retirement Policies; H55 Social Security and Public Pensions; I12 Disability.

Author's Acknowledgment

This paper examines whether and how older workers use Social Security Disability Insurance (DI) as a path out of the labor market. This is important to the extent that proposals to raise the age of early eligibility for Social Security retirement benefits might alter the opportunity set available to older workers. Indeed, it is possible that raising the early retirement age might induce some older people to apply for DI benefits in lieu of waiting to receive delayed Social Security retirement payments. Previous research examined the potential influence of reductions in Social Security early retirement benefits on retirement outcomes (Mitchell and Phillips, 2000). Those results suggested that, while most early beneficiaries would delay benefit claiming, some would attempt to claim DI benefits. A shortcoming of the prior analysis is that it set equal the likelihood of future application and award across respondents. In this paper, therefore, we extend the literature by identifying the characteristics of older workers who do and do not apply for DI, and among those who are rejected, factors that differentiate those who appeal. Not only do our results inform research on benefit take-up patterns, but they also offer policymakers insight on relationships between the probability of applying for DI and older workers' long-term well-being.

Previous disability studies tend to agree that the process by which workers move onto disability rolls is influenced by the size of and availability of DI benefits.[1] Most useful among them are studies that rely on respondent survey data linked with administrative records on covered earnings, since this linkage is critical in determining who is actually eligible for DI benefits in the event of a health problem.[2] For example, Hu, et al. (2002) and Benitez-Silva et al. (1999) obtain Social Security administrative data to match with survey records[3]. In principle, it is critical to use longitudinal data in examining this problem, since using contemporaneous or retrospective surveys to determine why someone applied for DI runs a serious risk of endogeneity. Two analyses that use individuals' "before" characteristics to examine subsequent application and award are Daly (1998) and Rupp and Davies (2002). Daly uses longitudinal PSID data to condition on award status, and she examine the characteristics of SSI and DI recipients up to five years prior to award. She finds that recipients report having health limitations that begin several years prior to award, and furthermore, a large proportion of future recipients receive public transfers for several years prior to DI/SSI award.[4] Rupp and Davies use SIPP data linked with administrative records, and explore the influence of initial characteristics on SSI/DI program participation over the next 2 to 14 years. They conclude that self-reported health and disability are strong predictors of future program participation.

While these studies evaluate how baseline characteristics are correlated to eventual program participation, they do not examine the process by which older workers move through the DI application, appeal, and award process. Hence in this research we pose and answer four key questions:

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[1] There remains some controversy about the size of the response; see Parsons (1980); Haveman and Wolfe (1984); Bound (1989); Kreider (1999); Song et al. (2002). For excellent surveys of empirical studies reporting behavioral responses to DI benefits, see Rupp and Stapleton (1998) and Bound and Burkhauser (1999).

[2] Mitchell and Phillips (2001) show that older workers are far from all insured for DI.

[3] Hu, et al. (2002) matched SSA adminstrative records of disability determinations to SIPP data. Despite lacking disability determination data, Benitez-Silva et al. (1999) closely replicate the Hu, et al. results using HRS data matched to SSA administrative earnings data.

[4] Burkhauser et al. (2001/2002) uses HRS data matched to administrative records to show that the median time to application from the onset of a work limiting disability for men is seven years (though the greatest "risk" of application occurs in the year following onset).

1. How do demographic, social, and health characteristics of older workers influence application for DI in later life?
2. Among the older population that applies for disability insurance, what distinguishes those who are awarded DI versus those who are rejected?
3. What factors are associated with successful versus unsuccessful appeals among the initially denied applicant population?
4. How sensitive are our results to alternative sample and estimation specifications?

In what follows, Section I outlines the rules for receiving cash benefits for disability under the DI system and describes the disability determination process. Section II reports characteristics of the analysis sample we evaluate drawn from the Health and Retirement Study (HRS) linked with administrative records on covered earnings. In Section III we use a multivariate model to illustrate how applicants to the DI program differ from nonapplicants. Section IV focuses on initial awards, while Section V explores the appeal process. Section VI examines sensitivity to alternative modeling approaches, and a brief conclusion appears in Section VII.

I. The Social Security Disability Insurance Program

Prior to 1954, the US Social Security program had no disability insurance; in that year, Amendments provided for a cash benefit to be paid to disabled persons. The DI program has been amended several times subsequently, including changes to extend Medicare coverage for individuals collecting benefits for 24 consecutive months and attempts to improve work incentives for disability beneficiaries.

Today the process of applying for and receiving benefits from the DI program has three steps, involving the determination of insured status, determination of medical eligibility, and provision of benefit.

Insured Status for DI

To be eligible to receive DI, program applicants must pass a set of prior work test requirements. These work requirements are summarized in a measure called "Quarters of Coverage" (QCs). A worker earns a QC based on payroll contributions and can attain a maximum of four annually. Though called "quarters" of coverage, workers may accumulate all four in a single calendar quarter, if their payroll contributions exceed the annual earnings requirement for four QCs.[5] Currently, all of the following QC requirements must be met for a worker to be DI insured:[6]

- A worker over age 30 must have earned 20 QCs during the last 40 calendar quarters ending in disability. Workers 30 and under must have total quarters equal to half the calendar quarters from age 21 to the time of disability;
- The worker must have 1 QC for each year from age 22 to the age of disability;
- The worker must have at least 6 QCs.

Note that the first condition requires "recent work." A result of this recency condition is that individuals can move into and out of DI eligibility over their lifetimes, depending on their work patterns. The pattern of DI insured status for HRS workers over time appears in Figure 1,

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[5] For example, the payroll contribution required to attain a QC in 2000 was $780. If a worker's payroll contributions exceed $3,120 in one calendar quarter, they would acquire all four QC in that quarter.
[6] Insured status for Social Security retirement benefits and DI benefits differ. As a result, some workers may be insured for retirement benefits but not for DI benefits. (Levine, Mitchell and Phillips (2000) and Mitchell and Phillips (2001) have a detailed analysis of insured status for alternative Social Security purposes.)

and it shows that most older workers are insured for DI, but many are not DI insured as they approach retirement.

Figure 1 here

Medical Eligibility: The Disability Determination Process.

The Social Security definition of disability can be characterized by three factors:

- The applicant must have a medically determinable impairment;
- The impairment must be expected to last at least 12 months or result in death;
- The applicant must be unable to engage in "substantial gainful activity" due to impairment, considering age, education and work experience.

Whether a worker is determined to be disabled, under the Social Security definition, is established by the Disability Determination Services (DDS), which are federally-funded but state-operated agencies.

A five-step process determines an applicant's medical eligibility for benefits under the SSA disability definition. First, an insured applicant may not engage in substantial gainful activity (SGA), defined as earning $700 or more per month.[7] If an applicant earns below the SGA, the second step is the determination of severity for the applicant's medical condition. The application is rejected if the condition is determined not severe enough to limit the applicant's capacity to perform work. If the condition is determined sufficiently severe, the application then moves to step three, where the DDS examines SSA listings of disabling medical conditions. If the applicant's impairment is judged to last at least 12 months and it either meets or exceeds the SSA listing, the applicant is awarded benefits. If the impairment does not meet the listings but is judged to last at least 12 months, the application moves to step four, an examination of the applicant's residual functional capacity. If the impairment would not prevent the applicant from performing his old job, his application is rejected. If it is determined that he cannot perform his old job with his current impairment, step five determines whether the applicant can participate in other occupations with this impairment given the applicants education, age, and work experience. If the applicant can perform work in the economy, he is denied benefits. If he cannot, he is awarded benefits.

Appeals.

If an applicant is denied benefits, he may appeal the DDS decision. This appeal process has several stages, like the disability determination process. The rejected applicant may request reconsideration by the DDS (up to 60 days after being denied). The DDS, using a different set of staff from those who made the initial determination, reconsiders the application. If the appellant's claim is again rejected by the DDS, he may request a hearing before an administrative law judge (ALJ, again if requested within 60 days of receiving the denied reconsideration). Should the ALJ deny the appeal, an appellant can request review by an Appeals Council.[8] Both the Appeals Council and the ALJ operate within the Social Security Administrations Office of Hearings and Appeals. Should both the ALJ and the Appeals Council deny the claim, the last avenue for appeal is in U.S. Circuit Court of Appeals (if filed within 60 days).

Benefit Determination.

When an insured DI applicant is awarded DI benefits, the SSA calculates the applicant's average indexed monthly earnings (AIME) and applies it to a benefit formula to determine his

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[7] SGA for blind applicants is higher ($1,170 in 2000).

[8] Even if the appellant does not request review by the Appeals Council, it is possible that the Council could move independently to review the claim; see SSA (2000).

primary insurance amount (PIA). The AIME is the applicant's average indexed covered earnings from age 22 to the year of disability (less the lowest 5 years of earnings).[9] The PIA formula is a nonlinear transformation of AIME with two bend-points: AIME to the first bend point pays $0.90 per dollar; above the first bend-point and up to the second bend-point the formula pays $0.32 per dollar; and above that it pays $0.15 per dollar. Figure 2 provides an example using 1992 bend points.[10] Recipients receive inflation-protected DI benefits until death or they attain the normal retirement age, or have their benefits terminated due to recovery.[11]

II. Characteristics of the Analysis Sample

To explore further the factors predictive of application for DI benefits along with reapplication and appeal of denied applicants, we use a sample drawn from the Health and Retirement Study (HRS). This is a national panel study of individuals age 51 to 61 in 1992 and their spouses (regardless of age). Baseline respondents were subsequently reinterviewed at two-year intervals (1992, 1994, 1996, 1998, and 2000) and we draw on responses from all available interviews. Since the HRS is a large and complex data file, the empirical analysis employs a "user-friendly" file known as the "Rand-HRS," which includes age-eligibles from the 1992 baseline interview along with an extensive subset of HRS variables.[12] Spouses who are not age-eligible only appear as spouse on the record of an age-eligible respondent. Under restricted conditions, the HRS can also be matched to Social Security administrative files on covered earnings and projected benefits.

The analysis sample used in the empirical analysis below was drawn from age-eligible HRS respondents according to the following criteria:[13]

- *They had not applied for nor received DI/SSI at baseline.*
  Since our focus is the possible use of DI as a path to early retirement, the analysis sample was constructed to include only respondents who had not previously applied for nor awarded DI; about 11% of the sample had done so at baseline.[14]
- *They had a matched Social Security covered earnings record.*

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[9] The earnings from the last two years ending in disability are not indexed. Also, disability beneficiaries under age 47 have between one and four dropout years as opposed to five. See SSA (2000) for more details.

[10] An analysis of historical redistribution under the DI program (Leimer, 1998) shows "evidence of substantial redistribution under the DI program across cohorts and across race and gender groups within cohorts and over time."

[11] When a DI recipient reaches the normal retirement age under Social Security, his benefits are automatically relabeled as "retirement" benefits for accounting purposes only; this does not influence benefits paid. Continuing Disability Reviews (CDR) are supposed to occur from 6 months to 7 years after award, and they provide an opportunity to re-evaluate the condition of the recipient to determine whether benefits should be terminated due to recovery (SSA, 2000). Hennessey and Dykacz (1989) find that 11% of DI beneficiaries recover, 36% are terminated at death, and 53% are relabeled as retirement benefits when recipients attain the normal retirement age.

[12] Most of the variables used in this analysis are included in the Rand-HRS file, but a few additional variables were created from public-use HRS data (http://www.umich.edu/~hrswww/data/index.html; this website also provides codebooks and guidelines for matching HRS data to SSA administrative records for earnings and benefits). The RAND-HRS was developed by the RAND Corporation with support from the Social Security Administration and the National Institutes on Aging. An overview of the HRS appears in Juster and Suzman (1995). Information regarding the Earnings and Benefits data can be found in Mitchell, Olson, and Steinmeier (2000).

[13] These selection criteria are not mutually exclusive; e.g. some respondents without a Social Security earnings history also do not appear in multiple HRS waves.

[14] Early waves of the HRS survey combined SSI and DI benefits when asking respondents about application and award. However, DI requires that applicants be insured, in contrast to SSI. By conditioning on insured status, we should eliminate SSI-only applications.

Computing workers' insured status for Social Security benefits and average indexed monthly earnings (AIME) requires they have a matched SSA earnings record. About one quarter of age-eligible respondents did not have a matched SSA record.[15]

- *They were insured for DI at baseline.*

Some 30% of the sample was not DI insured at baseline.

- *They appeared in at least two waves of the HRS.*

To follow DI application procedures, respondents had to be interviewed in 1992, the baseline wave. At least one additional interview was required to observe a potential transition. About 5% of the respondents appeared in only one HRS wave.

The empirical analysis proceeds in steps. First we outline characteristics of the HRS sample, focusing on baseline characteristics. Next, we estimate a Probit model comparing respondents who applied for DI with those who did not. Our null hypothesis is that, among DI-insured workers, older workers in poor health with low income were those who subsequently applied for DI, while those who did not were more likely to be healthier and better-off. We also investigate who was granted DI benefits and how these respondents compare, in terms of socioeconomic and health characteristics, with those who were rejected after application. Finally, we investigate whether the results from this analysis are sensitive to the way in which sample attrition is handled.

Baseline Characteristics

The HRS sample includes 4,583 age-eligible respondents insured for DI in 1992, the first wave of the survey. Sample socioeconomic, health, and wealth characteristics are reported in Table 1. The first four sets of variables in Table 1 (Panels A-D) are measured at baseline, while variables describing respondents' subsequent application and award experiences (Panel E) are measured during subsequent waves (1994-2000). (The Appendix defines variables and provides information on missing data imputations.)

Table 1 here

Panel A in Table 1 summarizes demographic information about the sample, and shows that the HRS respondent was initially 55 years old and had 13 years of education at baseline, with around half the sample being female and most (76%) married. Panel B describes respondent health characteristics using health measures regularly used in the retirement and disability literature. The average respondent was overweight, with a Body Mass Index (BMI) measuring 27.[16] Around 10 percent of the respondents reported having a health problem that limited the type or amount of work they could perform. The next eight variables represent doctor-diagnosed conditions as reported by respondents, and the "condition summary" reflects the total number of health conditions reported. High blood pressure and arthritis were reported by roughly 1 in 3 respondents, and the sample average of total conditions was 0.9 or about 1 per respondent.

The next Panel of variables summarizes respondents' economic status, measured here by lifetime earnings and wealth. The sample average AIME is $1,633. It will be recalled that the AIME implies higher benefits for sample members, all of who met the work experience requirements to be insured for benefits. Also given is a comprehensive set of household wealth measures including the net value of the primary residence, other non-housing wealth, and

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[15] Haider and Solon (2000) suggest that respondents that did not provide consent forms (and hence are omitted from our sample) are more likely to be non-white and have substantial assets than those who did.

[16] The National Institute of Medicine defines overweight as having a BMI of 25-29.9, with higher BMIs indicating obesity; http://www.nhlbisupport.com/bmi/

employer-provided pension wealth. The average of total non-Social Security wealth in the sample was $333,000. Labor force characteristics are also reported, where it can be seen that around 9 of 10 respondents reported working for pay at baseline, and 1 in 10 worked a second job. Over one-quarter of the sample reported that their longest job tenure occurred in a blue-collar occupation. Average tenure in the reported occupation was about 18 years.

The final Panel of Table 1 indicates HRS sample members' patterns of DI application and award patterns over the eight-year period after the baseline survey. It is of interest that out of this relatively healthy group of respondents, some 8 percent applied for DI by the year 2000. Initial award rates for the entire sample were 4 percent, while in the subsample that applied for DI, half (51 percent) were awarded benefits. This award rate is somewhat higher than the overall 45 percent rate reported by SSA derived from administrative award rates,[17] a difference that is not surprising in view of the older age composition of the HRS sample relative to the population as a whole. That is, it is understandable that older applicants who reach the later stages of the disability determination process have a higher likelihood of award than younger applicants.

In the HRS sample, of those who applied for DI but were rejected, about half re-applied or appealed. This rate is lower than that obtained from SSA administrative data of about 63 perent, for the population as a whole.[18] Of those who re-applied or appealed, 44 percent were subsequently awarded benefits, a lower rate than reported in SSA administrative data (of 69 percent); this is understandable inasmuch as more older applicants in the HRS sample were initially awarded DI benefits, fewer were likely to appeal. Further, since HRS respondents were close to being age-eligible for Social Security retirement benefits at baseline, it is possible that some might elect early retirement benefits rather than going through the DI appeals process.

Taking into account the entire process, over the eight-year period, 8 percent of the older respondents applied for DI by the year 2000, and 60 percent of these applicants were awarded benefits.[19]

III. Applications to the Social Security Disability Program

A description of insured applicants and non-applicants to the DI program is provided in Table 2. The first two columns of statistics represent averages for applicants and non-applicants, respectively, while the final column tests for statistically significant differences in means for the two groups. Asterisks indicate significance of differences between group means, and the number of asterisks coincides with the level of significance.
Table 2 here

The data shows that future DI applicants unambiguously had very different demographic, health, wealth, and work characteristics than did people who did not apply for DI over the subsequent survey waves. Focusing first on demographics (Panel A), applicants had less education, were less likely to be married, and more likely to be black, compared to non-applicants. Less educated respondents may have had fewer labor market options relative to more educated respondents in the event of a work-preventing disability. Turning to the health variables (Panel B), applicants reported significantly worse health in almost every category. For example, more than 1 in 4 respondents who applied for DI reported a work-limiting disability at

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[17] Unpublished data for 1999 and 2000 based on annual workload provided by the SSA Office of Disability; statistics separating SSI and DI unavailable prior to 1999.

[18] Unpublished data based on annual workload provided by the SSA Office of Disability from 1999 (64%) and 2000 (61%); separate SSI and DI totals unavailable prior to 1999.

[19] This is only 8 percent below SSA administrative records for the population as a whole (unpublished data from the SSA Office of Disability based on annual workload, 1999-2000).

baseline, compared to fewer than 1 in 10 non-applicants. Applicants also reported a higher incidence of medical conditions in 1992 compared to non-applicants. The economic and labor force variables (Panels C and D) indicate that people who later applied to DI were also poorer than non-applicants and had worse labor market prospects. Applicants had lower AIMEs ($1,400 versus $1,653) and less than half the total non-Social Security wealth than applicants: applicants have one third the non-housing/non-pension wealth ($45,400 versos $136,000). Applicants were also less likely to be working for pay at baseline, and were more likely to be blue-collar workers. Therefore Table 2 suggests that applicants were clearly poorer and less healthy than non-applicants, even before the DI application process began.

      To determine whether these relationships are robust to controls for other factors, we use a multivariate Probit analysis to describe the factors that differentiate applicants from nonapplicants. As we have argued above, some previous studies of DI applications use contemporaneous, or retrospective, explanatory variables to explain applications for DI benefits. A potential shortcoming of such an approach is that variables such as current health and earnings are endogenous to the DI application decision. To mitigate this problem, baseline HRS data can be used to predict subsequent DI applications and awards. Results are given in Table 3 for three alternative models of DI application.[20]

Table 3 here

      It will be recalled that the DI benefit is a non-linear function of the AIME (see Figure 1). For this reason, the regressions use AIME splines to control for the non-linearity of the benefit formula.[21] We hypothesize that a worker with a higher earnings replacement rate from DI benefits will be more likely to apply, all else equal, than a worker with lower earnings replacement. The first column of Table 3 reports results for DI application patterns using only with wealth and AIME, and it shows that high-earners are significantly less likely to apply for DI than are insured workers in the other earnings categories. Respondents with relatively high levels of wealth are also less likely to apply for DI than are respondents with less non-Social Security wealth. The second column of Table 3 adds baseline health variables to the regression, and the findings show that the vector of health characteristics is positive and significant. Further, controlling for health does not affect earlier findings: AIME and wealth remain significant and negative. In column three we add demographic variables to the equation, where the results show that older respondents are less likely to apply for DI than younger. This confirms our hypothesis that older workers are more likely to wait for early retirement benefits as compared to younger workers. The results also show other factors are significant including education and occupation; more educated and white collar workers are less likely to apply, probably because they face less disability risk on the jobs and because physically disabling conditions may be less deleterious to their ability to work. The inclusion of the demographic variables to the model does not alter the sign and significance of health and wealth variables, but it does reduce the magnitude and significance of the AIME variables which is logical since education and occupation are related to workers lifetime earnings.

      In summary, these results imply that among the DI-insured HRS older population, those most likely to apply for DI were poor workers with health problems. Furthermore, the statistical

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[20] The dependent variable equals one if we observe an application by an insured worker from 1993 (Wave 2) to 2000 (Wave 5), and zero otherwise. For background on the Probit model, see Greene (1997), p.871.

[21] The spline coefficients show the marginal effect of having an AIME that falls in one of the three regions delineated by the PIA bend points. So, the first coefficient, "AIME up to $387," shows the marginal effect of having an AIME in that region of the PIA formula on the probability of applying for DI. For more on splines, see STATA (2001) p. 336.

significance of these models indicates that baseline data on older individuals are useful in predicting future disability applications.

IV. A Model of DI Benefit Awards

We next turn to the subset of DI applicants, in an attempt to identify factors that differentiate between those applicants awarded benefits initially, versus those who were denied. The dependent variable in this next exercise therefore equals one if the insured applicant's first attempt at award was successful and zero otherwise. We hypothesize that awardees will be less healthy and will have characteristics that suggest limited labor market alternatives in the presence of a disability (i.e., low education, low lifetime earnings, blue collar occupation, etc.).

Table 4 compares characteristics of insured DI applicants initially awarded benefits – about half the applicant sample – and those who were rejected.[22] Compared to earlier results, we see very few significant differences between these two groups. A greater share of black applicants was denied benefits than awarded (17% versus 10%), and those awarded benefits initially were also somewhat wealthier than denied applicants. Specifically, the AIME, housing wealth, and total non-Social Security wealth of denied applicants was significantly less than for those initially awarded benefits. Other factors are not significantly different, including health characteristics at baseline. These results provide some support for earlier studies that argued that rejected DI applicants are similar to applicants awarded benefits under the program (Bound, 1989, 1991).[23]

Table 4 here

We again use a multivariate Probit approach to evaluate whether the findings are robust to controls for other factors; see Table 5. The first column controls only AIME and non-Social Security wealth. Some patterns are similar to those reported in Table 4: for instance, initial award probability is positively correlated with higher non-Social Security wealth. Those with the lowest AIME are no more or less likely to receive an initial award, but workers having earnings between the two PIA bend-points are more likely to be awarded on first application; those with earnings above the second bend-point are less likely to receive benefits. In other words, lifetime earnings appear nonlinearly related to award probabilities. Adding health variables does not much enhance model significance nor are most baseline health measures influential in identifying who is initially awarded DI. Adding demographics also does little. IN other words, there are few statistical differences between DI applicants who are awarded benefits versus denied benefits, on initial application. This lack of statistical significance may be the result of several factors. First, the sample of DI applicants is a small one, reducing the explanatory power of the estimates. Second, it is possible that there truly is little difference in baseline characteristics across accepted and denied applicants.

Table 5 here

V. A Model of DI Appeals

We previously focused on initial award because some applicants initially denied eventually were awarded benefits after appeal. Further, administrative records from SSA (known as "workload data") imply that the award rate for appeals cases differs from the initial

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[22] Sixteen applicants were still waiting for an award determination in our sample. While these respondents were included in our application equations, they do not appear in the award analysis.

[23] Nevertheless, this does not rule out the possibility that DI creates labor supply disincentives; see Parsons (1980, 1991).

award rate. For example, the initial award rate was 44 percent and the overall appeal award rate 69 percent in 1999.[24] We therefore hypothesize that those with more to gain from a successful DI application would be more likely to appeal an initial denial; these would probably be people with lower AIMEs and possibly lower wealth. Similarly, the likelihood of a successful appeal may be correlated with poor health and limited work options.

The empirical analysis focuses only on DI applicants who report being rejected by the DI program, to evaluate differences between those who appeal and those who do not. Tables 6 and 7 show the comparison of sample means and the multivariate analyses, respectively. The results indicate that, in this sample, there are no significant differences between the demographic and health/economic baseline characteristics of those who appeal and those who do not. Means from Table 6 reveal differences in two of the health variables, but there is only weak bivariate support for the health hypothesis: differences are significant at only the 10% level. Moreover, in the bivariate tabulation, none of the economic variables is significantly different between those who appeal and those who do not. The multivariate results in Table 7 indicate no significant coefficient estimates for any of the specifications.

Tables 6, 7 here

Given these results, it is not surprising that our analyses of secondary awards also indicate little difference between those who successfully appeal versus those who are denied (see Tables 8 and 9). The only result of note is that those who successfully appealed have somewhat higher non-Social Security wealth than those whose appeals were denied. Finally, Table 10 compares the characteristics of those initially awarded benefits to those who were awarded through appeal or re-application. Only on factor is statistically significant: more black applicants appear to be approved for DI via appeals than via initial award. (This result is robust to controls for other characteristics in the multivariate Probit; results not shown).

Tables 8, 9, and 10 here

In sum, the lack of many significant differences in the appeal analysis suggests that baseline data cannot distinguish which DI applicants appealed after being rejected, or which had a successful appeal, when rejected. The lack of significant may in part be attributed to small sample sizes.

VI. Sensitivity to Alternative Modeling Approaches

In this section, we discuss whether results are sensitive to alternative econometric and sample selection decisions. Specifically, we:

- Test whether including an unbalanced panel affects results;
- Test whether joint estimation of the various stages of the DI process affects results;
- Test whether results are sensitive to modeling only "final award," as opposed to separately modeling initial and later award.

Unbalanced versus Balanced Panels.

Thus far our empirical analysis has included all HRS respondents who respond to at least 2 waves of the survey. This leaves open the possibility that respondents who left the panel after 2 waves were somehow "different" from those who stayed in the survey longer, and these unobservable factors might influence results. To determine whether this was so, we replicated our analysis on a subset of respondents that met all of the previously discussed criteria and in addition appeared in all HRS waves. This resulted in a sample size of 3,615 respondents, versus the earlier 4,583 analysis sample. Results from that analysis (not shown) prove qualitatively

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[24] Unpublished numbers from the SSA Office of Disability based on annual workload.

identical to those reported above. Similar factors influenced the application for DI model, but baseline characteristics did not do a good job of distinguishing which DI applicants appealed after being rejected, or which had successful appeals once rejected.

Joint Estimation of DI

Multivariate analyses undertaken to this point has evaluated independent equations of DI application and award, to determine the explanatory power of baseline factors. Yet it is possible that unobserved relationships between various stages of the application process might be correlated and hence influence results in ways that cannot be detected with equation-by-equation estimation.

To determine whether relaxing this assumption changes coefficient estimates, we also estimated bivariate Probit models of application/initial award, initial award/appeal, and appeal/secondary award. Estimates of the correlation coefficient across equations generated in these models were not precisely estimated and the magnitudes were sensitive to model specification. While our results imply that there is no selection bias, the estimates were so sensitive to model specification that the "test" should be judged inconclusive at best. Earlier work by Kreider (1999) argued for a positive and significant correlation between disturbances in his DI application and award equations. However, that study used retrospective data from the 1978 Survey of Disability and Work, while our results use a forward-looking time frame. As we have shown, HRS baseline data do effectively identify future application but do not effectively identify the award of DI benefits.

Modeling "Final Award"

Thus far the analysis has disaggregated the DI process into steps – initial application, initial award, appeal, and secondary award – because of our desire to determine whether baseline characteristics differentiate older persons awarded or denied DI benefits at different stages of the process. Yet the analysis reveals very few statistically significant differences between people eventually awarded DI, even if they arrive there via different paths. Consequently in Table 11 we report multivariate estimates of a Probit model of "final" or eventual DI award, defined as award at either the initial or some subsequent stage. It is interesting but probably not surprising that the estimated coefficients in Table 11 are virtually identical to those on initial award in Table 5. We also jointly estimated a bivariate Probit for application/final award. As before, the bivariate model yielded insignificant correlations between equation disturbances and results were sensitive to model specifications (results not shown).

Table 11 here

VII. Conclusions

Those who would examine models of retirement behavior should account for the probability that some older workers may use disability insurance as a pathway into retirement. This paper seeks to model how the DI path is used, by relying on data collected at one point in time to predict the future likelihood of applying for DI benefits. We investigate the process of application, denial, appeal, and award of DI benefits for a sample of people in their 50s, and then follows them for eight years to judge eventual benefit outcomes.

Our results show that demographic, social, and health characteristics are strongly associated with the probability of DI application in later life among the older population insured for disability insurance. Specifically, HRS respondents who were initially poor, reported health conditions, and had fewer years of education, were more likely to apply for DI thereafter. These results suggest that measures of "lifetime" characteristics like lifetime earnings and education are

good predictors of future applications to the DI program. By contrast, few factors seem to further differentiate individuals beyond the application phase. Among initial applicants, middle AIME earners were more likely to be awarded DI benefits, while high AIME respondents were less likely to receive initial awards. For re-applications and appeals, higher non-Social Security wealth was positively correlated with secondary award. Relying simply on baseline characteristics, we find that respondents who were initially rejected did not differ from those who appealed versus those who did not. Overall, few factors distinguished across subsets of the applicant pool. These results are robust to a range of sensitivity analyses. Finally, collapsing initial and secondary DI awards into a single "award" category yields results very similar to the initial award results.

Our interest in examining the potential of a DI pathway into retirement extends previous analysis on retirement and Social Security benefit take-up patterns. Specifically, the findings are relevant to the question of whether people seeking to claim Social Security retirement benefits at some future date might alternatively consider applying for DI, and if so, whether they could reasonably predict their likelihood of future award, given what they currently know about themselves. Our results that some lifetime characteristics are, in fact, correlated with future application, but not the probability of future award given application. Future research will incorporate these results into more elaborate models of Social Security benefit take-up patterns.

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Table 1: Socioeconomic, Health, and Wealth Characteristics of the Analysis Sample

Variable Name	Mean	SD
A. Demographic		
Education (Years)	12.70	2.76
Age (Years)	55.39	3.22
Black	0.08	0.27
Hispanic	0.04	0.20
Female	0.46	0.50
Currently Married	0.76	0.43
B. Health		
Health Limits Work	0.09	0.29
Body Mass Index (BMI)	26.90	4.64
High Blood Pressure	0.31	0.46
Diabetes	0.06	0.25
Cancer	0.04	0.20
Lung Disease	0.04	0.20
Heart Problems	0.08	0.27
Stroke	0.01	0.11
Psychological Problems	0.05	0.22
Arthritis	0.31	0.46
Condition Summary	0.90	0.95
C. Economic		
AIME	$1,633	888
PV Pension Wealth	$134,711	222,098
Net Housing Wealth	$68,994	100,912
Non-Housing Wealth	$129,311	388,606
Total Non-SS Wealth	$333,016	488,871
D. Labor Force		
Working in 1992	0.88	0.33
Working 2nd job in 1992	0.12	0.33
Long Occ "Blue Collar"	0.28	0.45
Tenure in Long Occ	17.92	9.70
E. DI Experience		
Apply for DI	0.08	0.27
Initially Awarded DI	0.04	0.19
Initially Awarded|Apply	0.51	0.50
Re-Apply or Appeal	0.02	0.13
Re-App/Appeal| Reject	0.47	0.50
Secondary Award	0.01	0.08
Sec Award| Re-app/App	0.44	0.50
Overall Award	0.05	0.21
Overall Award|Apply	0.60	0.49
Observations	4,583	

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Table 2: Socioeconomic, Health, and Wealth Characteristics of DI Applicants and Nonapplicants

Variable Name	Applicants (N=380)	Non-Applicants (N=4,203)	Significant Difference
A. Demographic			
Education (Years)	11.57	12.79	***
Age (Years)	54.99	55.42	***
Black	0.13	0.07	***
Hispanic	0.05	0.04	
Female	0.46	0.46	
Currently Married	0.68	0.77	***
B. Health			
Health Limits Work	0.26	0.08	***
Body Mass Index (BMI)	28.27	26.79	***
High Blood Pressure	0.40	0.30	***
Diabetes	0.16	0.06	***
Cancer	0.05	0.04	
Lung Disease	0.10	0.04	***
Heart Problems	0.15	0.07	***
Stroke	0.02	0.01	*
Psychological Problems	0.11	0.04	***
Arthritis	0.47	0.29	***
Condition Summary	1.47	0.86	***
C. Economic			
AIME	$1,400	$1,653	***
PV Pension Wealth	$83,241	$139,041	***
Net Housing Wealth	$39,681	$71,460	***
Non-Housing Wealth	$45,396	$136,370	***
Total Non-SS Wealth	$168,319	$346,870	***
D. Labor Force			
Working in 1992	0.82	0.88	***
Working 2nd job in 1992	0.08	0.13	***
Long Occ "Blue Collar"	0.44	0.27	***
Tenure in Long Occ	15.84	18.10	***

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Significance Levels:
*	10%
**	5%
***	1%

Table 3: Probit Estimates of DI Application for DI Insured Respondents

Variable	Application for DI		
	AIME	AIME & Health	Full Model
Spline of AIME/1000:			
AIME up to $387	0.038	0.097	0.087
	(0.11)	(0.09)	(0.09)
AIME up to $2,333	-0.005	-0.004	-0.014*
	(0.01)	(0.01)	(0.01)
AIME over $2,333	-0.065**	-0.055**	-0.042*
	(0.03)	(0.03)	(0.03)
Log Non-SS Wealth	-0.009***	-0.007***	-0.005***
	(0.00)	(0.00)	(0.00)
Health Limits Work		0.093***	0.085***
		(0.02)	(0.02)
Body Mass Index		0.002***	0.002**
		(0.00)	(0.00)
Health Conditions		0.027***	0.027***
		(0.00)	(0.00)
Age			-0.004***
			(0.00)
Education (years)			-0.004***
			(0.00)
Black			0.013
			(0.01)
Hispanic			-0.022*
			(0.01)
Female			-0.016
			(0.01)
Married			-0.007
			(0.01)
Blue Collar			0.034***
			(0.01)
Wald Test Statistic	89.5***	247.6***	295.6***
Log Likelihood	-1,201.8	-1,120.7	-1,089.4
Observations	4583	4583	4583

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Robust standard errors in parentheses.

Significance Levels:
*	10%
**	5%
***	1%

Table 4: Socioeconomic, Health, and Wealth Characteristics of Initial Awardees and Rejectees

Variable Name	Initially Awarded (N=185)	Initially Rejected (N=179)	Significant Difference
A. Demographic			
Education (Years)	11.75	11.26	*
Age (Years)	54.90	55.14	
Black	0.10	0.17	**
Hispanic	0.05	0.05	
Female	0.44	0.48	
Currently Married	0.70	0.64	
B. Health			
Health Limits Work	0.27	0.26	
Body Mass Index (BMI)	28.51	28.16	
High Blood Pressure	0.41	0.39	
Diabetes	0.13	0.18	
Cancer	0.07	0.04	
Lung Disease	0.09	0.11	
Heart Problems	0.14	0.14	
Stroke	0.01	0.03	
Psychological Problems	0.09	0.12	
Arthritis	0.47	0.49	
Condition Summary	1.42	1.50	
C. Economic			
AIME	$1,499	$1,293	***
PV Pension Wealth	$91,423	$74,286	
Net Housing Wealth	$46,179	$32,841	***
Non-Housing Wealth	$56,710	$33,114	
Total Non-SS Wealth	$194,313	$140,241	**
D. Labor Force			
Working in 1992	0.84	0.80	
Working 2nd job in 1992	0.06	0.10	
Long Occ "Blue Collar"	0.46	0.44	
Tenure in Long Occ	16.11	15.29	

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS.
All other variables measured at
baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Significance Levels:

*	10%
**	5%
***	1%

Table 5: Probit and Bivariate Probit Estimates of Initial Award

Variable	Initial Award		
	AIME	AIME & Health	Full Model
Spline of AIME/1000:			
AIME up to $387	-0.349	-0.364	-0.267
	(0.70)	(0.71)	(0.72)
AIME up to $2,333	0.132**	0.135**	0.170**
	(0.05)	(0.05)	(0.07)
AIME over $2,333	-0.352*	-0.355*	-0.344
	(0.21)	(0.21)	(0.21)
Log Non-SS Wealth	0.014*	0.013	0.009
	(0.01)	(0.01)	(0.01)
Health Limits Work		0.021	0.023
		(0.07)	(0.07)
Body Mass Index		0.003	0.002
		(0.01)	(0.01)
Health Conditions		-0.019	-0.02
		(0.03)	(0.03)
Age			-0.008
			(0.01)
Education (years)			0.008
			(0.01)
Black			-0.086
			(0.07)
Hispanic			0.032
			(0.12)
Female			0.085
			(0.08)
Married			0.005
			(0.07)
Blue Collar			0.003
			(0.07)
Wald Test Statistic	12.29**	13.19*	17.48
Log Likelihood	-244.57	-244.13	-241.87
Observations	364	364	364

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Robust standard errors in parentheses

Significance Levels:
*	10%
**	5%
***	1%

Table 6: Socioeconomic, Health, and Wealth Characteristics of Initially Rejected DI Applicants who Re-Apply or Appeal

Variable Name	Re-Apply or Appeal (N=88)	Do Not Re-Apply or Appeal (N=91)	Significant Difference
A. Demographic			
Education (Years)	11.31	11.22	
Age (Years)	54.98	55.29	
Black	0.19	0.16	
Hispanic	0.03	0.06	
Female	0.48	0.48	
Currently Married	0.65	0.64	
B. Health			
Health Limits Work	0.32	0.21	*
Body Mass Index (BMI)	28.40	27.94	
High Blood Pressure	0.43	0.35	
Diabetes	0.17	0.19	
Cancer	0.05	0.03	
Lung Disease	0.11	0.10	
Heart Problems	0.19	0.10	*
Stroke	0.04	0.03	
Psychological Problems	0.11	0.12	
Arthritis	0.46	0.51	
Condition Summary	1.56	1.45	
C. Economic			
AIME	$1,383	$1,212	
PV Pension Wealth	$71,539	$76,770	
Net Housing Wealth	$35,280	$30,636	
Non-Housing Wealth	$35,851	$30,639	
Total Non-SS Wealth	$142,670	$138,045	
D. Labor Force			
Working in 1992	0.80	0.81	
Working 2nd job in 1992	0.10	0.09	
Long Occ "Blue Collar"	0.44	0.44	
Tenure in Long Occ	15.74	14.88	

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Significance Levels:
*	10%
**	5%
***	1%

Table 7: Probit and Bivariate Probit Estimates for Appeal/Re-Apply

Variable	Appeal or Re-apply		
	AIME	AIME & Health	Full Model
Spline of AIME/1000:			
AIME up to $387	0.058	0.174	0.208
	(0.94)	(1.01)	(1.06)
AIME up to $2,333	0.059	0.065	0.168
	(0.08)	(0.08)	(0.10)
AIME over $2,333	0.103	0.102	0.055
	(0.29)	(0.29)	(0.30)
Log Non-SS Wealth	-0.002	-0.004	-0.005
	(0.01)	(0.01)	(0.01)
Health Limits Work		0.147	0.146
		(0.09)	(0.10)
Body Mass Index		0.003	-0.002
		(0.01)	(0.01)
Health Conditions		0.009	0.013
		(0.04)	(0.04)
Age			-0.016
			(0.02)
Education (years)			-0.004
			(0.02)
Black			0.100
			(0.10)
Hispanic			-0.099
			(0.18)
Female			0.162
			(0.12)
Married			0.023
			(0.10)
Blue Collar			-0.003
			(0.09)
Wald Test Statistic	1.54	4.68	8.53
Log Likelihood	-122.9	-121.1	-119.2
Observations	179	179	179

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Robust standard errors in parentheses

Significance Levels:
*	10%
**	5%
***	1%

Table 8: Socioeconomic, Health, and Wealth Characteristics of Rejected Applicants who Re-Apply or Appeal: Secondary Awardees and Rejectees

Variable Name	Secondary Award (N=43)	Secondary Rejection (N=45)	Significant Difference
A. Demographic			
Education (Years)	11.39	11.24	
Age (Years)	54.49	55.35	
Black	0.23	0.16	
Hispanic	0.02	0.05	
Female	0.49	0.47	
Currently Married	0.73	0.59	
B. Health			
Health Limits Work	0.32	0.32	
Body Mass Index (BMI)	28.77	28.11	
High Blood Pressure	0.47	0.40	
Diabetes	0.15	0.18	
Cancer	0.02	0.08	
Lung Disease	0.13	0.09	
Heart Problems	0.23	0.16	
Stroke	0.02	0.06	
Psychological Problems	0.17	0.07	*
Arthritis	0.53	0.42	
Condition Summary	1.70	1.45	
C. Economic			
AIME	$1,306	$1,443	
PV Pension Wealth	$66,283	$75,599	
Net Housing Wealth	$46,673	$26,479	*
Non-Housing Wealth	$38,819	$33,559	
Total Non-SS Wealth	$151,775	$135,637	
D. Labor Force			
Working in 1992	0.85	0.75	
Working 2nd job in 1992	0.07	0.13	
Long Occ "Blue Collar"	0.50	0.40	
Tenure in Long Occ	15.87	15.63	

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Significance Levels:
*	10%
**	5%
***	1%

Table 9: Probit and Bivariate Probit Estimates of Secondary Award

Variable	Secondary Award		
	AIME	AIME & Health	Full Model
Spline of AIME/1000:			
AIME up to $387	-1.19	-0.973	-1.361
	(1.48)	(1.56)	(1.59)
AIME up to $2,333	-0.031	-0.072	-0.032
	(0.10)	(0.11)	(0.18)
AIME over $2,333	-0.406	-0.292	-0.405
	(0.34)	(0.35)	(0.35)
Log Non-SS Wealth	0.039**	0.044**	0.041*
	(0.02)	(0.02)	(0.02)
Health Limits Work		-0.073	-0.063
		(0.12)	(0.13)
Body Mass Index		0.000	-0.007
		(0.01)	(0.01)
Health Conditions		0.069	0.104*
		(0.05)	(0.06)
Age			-0.031
			(0.02)
Education (years)			-0.015
			(0.03)
Black			0.158
			(0.15)
Hispanic			-0.330**
			(0.14)
Female			0.144
			(0.22)
Married			0.176
			(0.14)
Blue Collar			0.184
			(0.14)
Wald Test Statistic	6.44	7.36	14.01
Log Likelihood	-56.7	-55.8	-51.7
Observations	88	88	88

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Robust standard errors in parentheses

Significance Levels:
*	10%
**	5%
***	1%

Table 10: Socioeconomic, Health, and Wealth Characteristics of Rejected Applicants who Re-Apply or Appeal: Secondary Awardees and Rejectees

Variable Name	Initial Award (N=185)	Secondary Award (N=43)	Significant Difference
A. Demographic			
Education (Years)	11.75	11.39	
Age (Years)	54.90	54.49	
Black	0.10	0.23	**
Hispanic	0.05	0.02	
Female	0.44	0.49	
Currently Married	0.70	0.73	
B. Health			
Health Limits Work	0.27	0.32	
Body Mass Index (BMI)	28.51	28.77	
High Blood Pressure	0.41	0.47	
Diabetes	0.13	0.15	
Cancer	0.07	0.02	
Lung Disease	0.09	0.13	
Heart Problems	0.14	0.23	
Stroke	0.01	0.02	
Psychological Problems	0.09	0.17	
Arthritis	0.47	0.53	
Condition Summary	1.42	1.70	
C. Economic			
AIME	$1,499	$1,306	
PV Pension Wealth	$91,423	$66,283	
Net Housing Wealth	$46,179	$46,673	
Non-Housing Wealth	$56,710	$38,819	
Total Non-SS Wealth	$194,313	$151,775	
D. Labor Force			
Working in 1992	0.84	0.85	
Working 2nd job in 1992	0.06	0.07	
Long Occ "Blue Collar"	0.46	0.50	
Tenure in Long Occ	16.11	15.87	

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

Significance Levels:
*	10%
**	5%
***	1%

Table 11: Probit and Bivariate Probit for Final Award

Variable	Final Award		
	AIME	AIME & Health	Full Model
Spline of AIME/1000:			
AIME up to $387	-0.418	-0.337	-0.299
	(0.69)	(0.69)	(0.71)
AIME up to $2,333	0.111**	0.113**	0.156**
	(0.05)	(0.05)	(0.07)
AIME over $2,333	-0.359*	-0.367*	-0.369*
	(0.21)	(0.21)	(0.21)
Log Non-SS Wealth	0.018**	0.017**	0.013
	(0.01)	(0.01)	(0.01)
Health Limits Work		0.035	0.037
		(0.06)	(0.06)
Body Mass Index		0.004	0.001
		(0.01)	(0.01)
Health Conditions		0.000	0.003
		(0.03)	(0.03)
Age			-0.015
			(0.01)
Education (years)			0.007
			(0.01)
Black			0.013
			(0.07)
Hispanic			-0.025
			(0.12)
Female			0.098
			(0.08)
Married			0.044
			(0.07)
Blue Collar			0.037
			(0.07)
Wald Test Statistic	13.27***	14.10**	19.18
Log Likelihood	-232.713	-232.23	-229.571
Observations	364	364	364

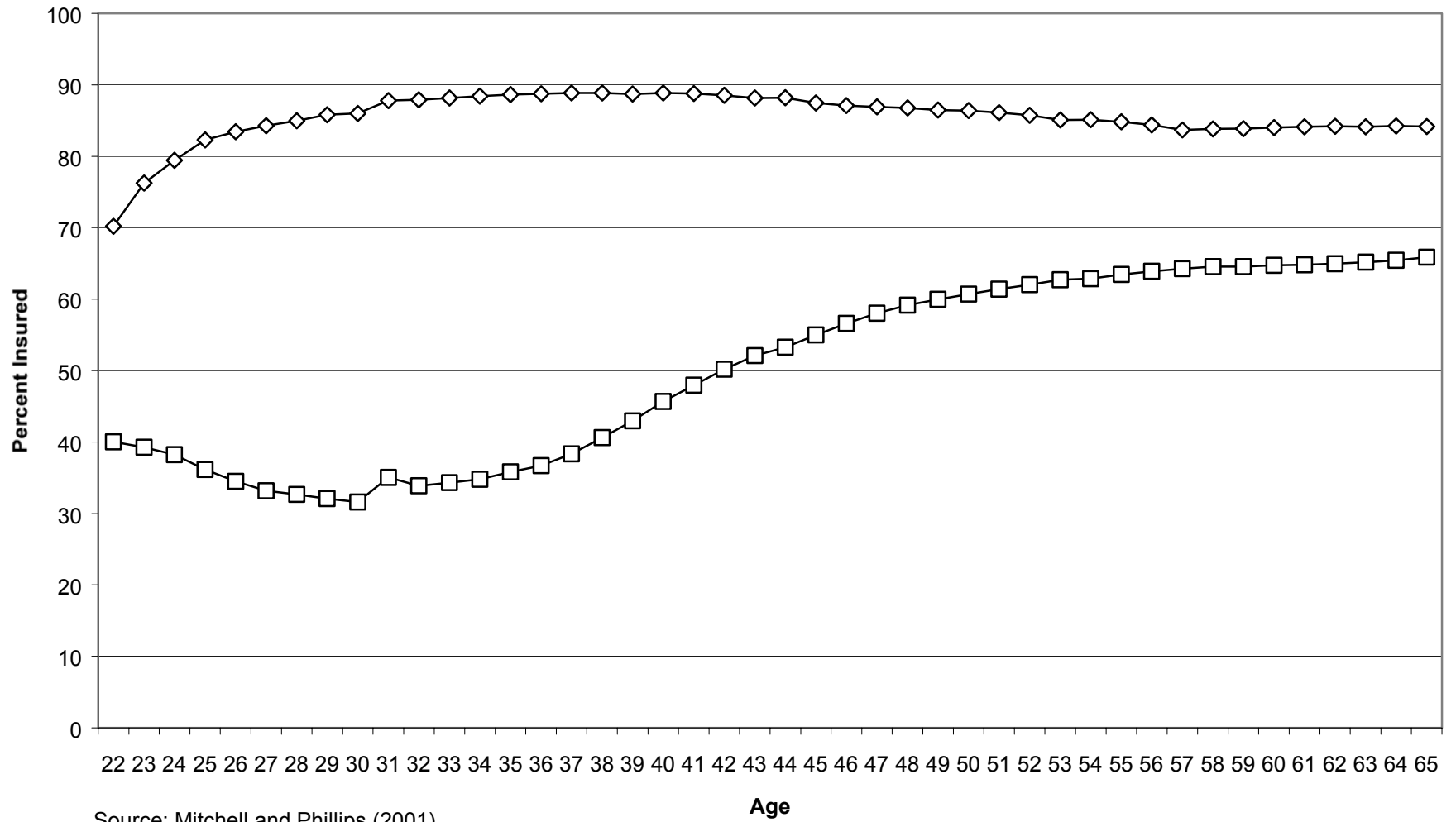Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992. See variable definitions Appendix Table 1.

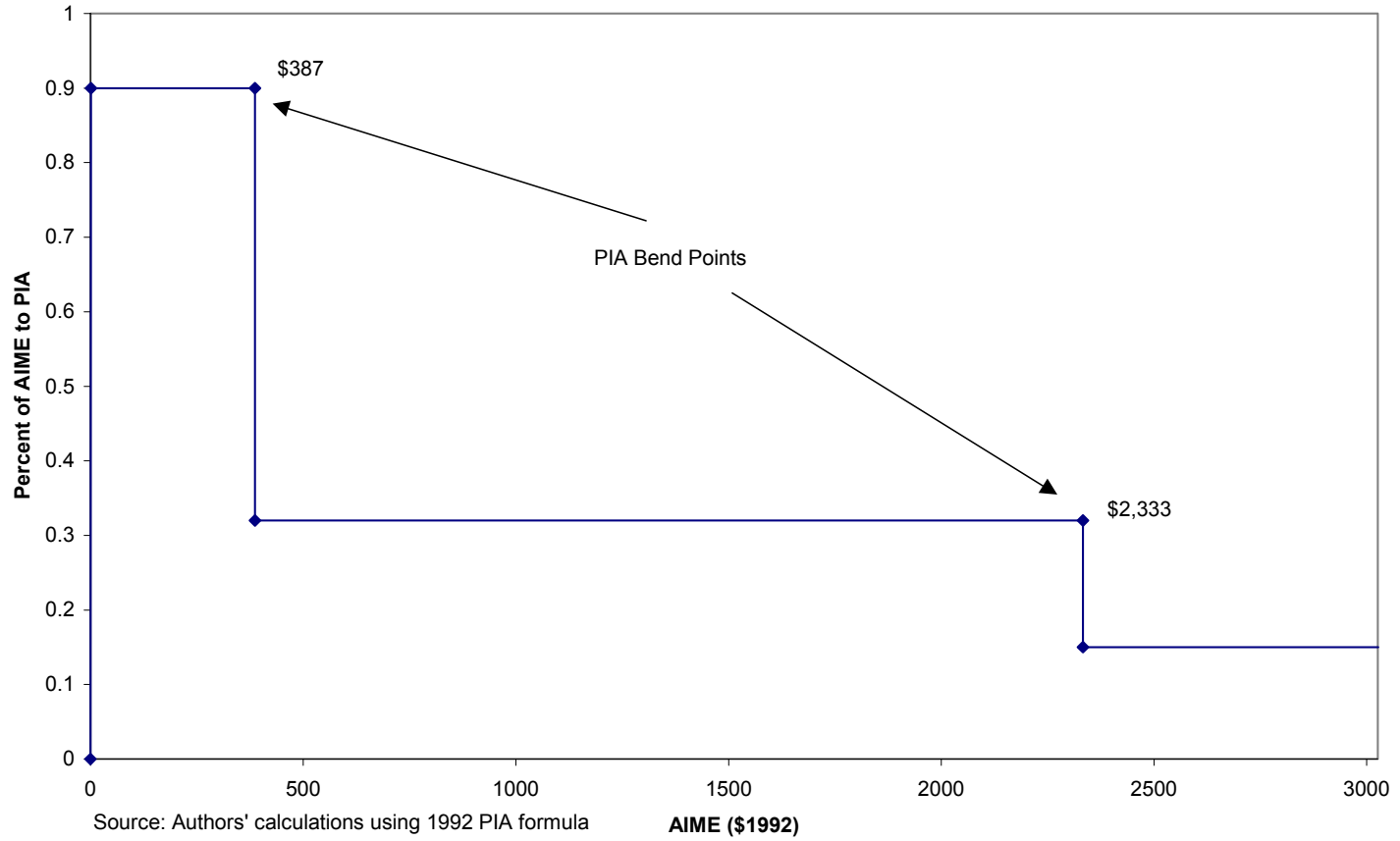Robust standard errors in parentheses

Significance Levels:
*	10%
**	5%
***	1%

Figure 1: DI Insured Status by Age and Sex

Source: Mitchell and Phillips (2001)

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Figure 2: Non-Linearities in the 1992 PIA Formula

Source: Authors' calculations using 1992 PIA formula   **AIME ($1992)**

Appendix Table 1: Variable Definitions

Variable Name	Definition
Education (Years)	Total years of education.
Age (Years)	Respondent age.
Black	Equals 1 if respondent reports themselves as black, 0 otherwise
Hispanic	Equals 1 if respondent reports themselves as Hispanic, 0 otherwise
Female	Equals 1 if respondent is female, 0 otherwise.
Currently Married	Equals 1 if respondent is married, 0 otherwise.
Health Limits Work	Equals 1 if respondent reports a health limiting disability, 0 otherwise.
Body Mass Index (BMI)	Respondent weight divided by the square of respondent height.
High Blood Pressure	Equals 1 if respondent told by a doctor that he had high blood pressure or hypertension, 0 otherwise.
Diabetes	Equals 1 if respondent told by a doctor that he had diabetes or high blood sugar, 0 otherwise.
Cancer	Equals 1 if respondent told by a doctor that he had cancer or a malignant tumor of any kind (except skin cancer), 0 otherwise.
Lung Disease	Equals 1 if respondent told by a doctor that he had chronic lung disease.
Heart Problems	Equals 1 if respondent told by a doctor that he had heart problems.
Stroke	Equals 1 if respondent told by a doctor that he had a stroke.
Psychological Problems	Equals 1 if respondent told by a doctor that he had emotional, nervous, or psychiatric problems, 0 otherwise.
Arthritis	Equals 1 if respondent told by a doctor that he had arthritis or rheumatism.
Condition Summary	A summary measure of all italicized doctor diagnosed conditions (0-8).
AIME	Average indexed monthly earnings from SSA administrative records.
PV Pension Wealth	Present discounted value of all employer pension wealth.
Net Housing Wealth	Net value of primary residence.
Non-Housing Wealth	Net value of all financial wealth excluding home and pension wealth.
Total Non-SS Wealth	The sum of pension, housing and non-housing wealth.
Working in 1992	Equals 1 if respondent worked for pay in 1992, 0 otherwise.
Working 2nd job in 1992	Equals 1 if respondent worked a second job for pay in 1992, 0 otherwise.
Long Occ "Blue Collar"	Occupation code for job with longest reported tenure is either Operator or Laborer, 0 otherwise.
Tenure in Long Occ	Number of years working on job with longest reported tenure.
Apply for DI	Equals 1 if the respondents reports an application after 1992, 0 otherwise.*
Initially Awarded DI	Equals 1 if the first application after 1992 is awarded, 0 otherwise.**
Re-Apply or Appeal	Equals 1 if initially rejected applicant re-applies or appeals, 0 otherwise.
Secondary Award	Equals 1 if an initially rejected applicant reapplies or appeals and is awarded benefits, 0 otherwise.**
Overall Award	Equals 1 if any application after 1992 ends in award, 0 otherwise.

Source: Authors' calculations using the RAND-HRS data file (see text).

Notes: Application and award data come from Wave 2 through Wave 5 of the HRS. All other variables measured at baseline (1992) and all dollars are $1992.

* Some application year data in the HRS is missing. We replace missing application years with the relevant interview year. ** Some award data is missing in the HRS. To impute missing award data, we investigate the respondent's income sources across waves of the data. If the respondent reports receiving SSDI income, we set the relevant award variable to 1, 0 otherwise.