
Disability Benefit Applications and the Economy

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This article discusses the causes of the growth in applications for disability insurance benefits, which rose from 720,000 in 1968 to a peak of 1.3 million in 1974 and—although declining slightly since then—are still reaching 1.2 million per year. Several regression models are analyzed. Among the significant economic variables found were the unemployment rate and the rate at which disability insurance replaces predisability spendable earnings. Significant demographic variables included the size of the insured population and the proportion of the insured population aged 45 and over. The introduction of the supplemental security income program in 1974 created a tremendous bulge in applications for the year. Simulating the period 1970–78, under the assumption that the unemployment rate and the replacement rate remained constant at the 1969 levels, indicates that more than 200,000 applications each year reflected increases in these rates. Thus, 19 percent of the applications received during 1970–78 may have resulted from changes in the economic choices facing disabled persons.

The number of beneficiaries and total expenditures under the Social Security Administration's disability insurance program have grown significantly since 1966, when the last major liberalization of the definition of disability took place. During the period 1966–78 the number of persons receiving disabled-worker benefits increased by 160 percent, rising from 1.9 million to 4.9 million. In 1966, all types of disability benefits amounted to \$1.8 billion. By 1978 this figure had increased sixfold to \$12.5 billion.

The growth in the disability insurance program has manifested itself in a number of ways: Increases in benefit payments and the number of beneficiaries on the rolls; a rise in the number and rate of disability applications; a significant increase in the number of persons requesting reconsideration and hearings and with their disability allowed as a result; and a reduction in the number and proportion of benefits being terminated as a result of recovery, return to work, or rehabilitation.

Background

Much of the recent growth in disability insurance benefits can be traced to the statutory increases in benefit levels and

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maximum taxable earnings and is shared by the old-age and survivors insurance (OASI) program.

Benefit levels rose by about 15 percent in January 1970, 10 percent in January 1971, 20 percent in September 1972, and 11 percent in June 1974. Beginning in 1975, benefits are raised automatically if the consumer price index has risen 3 percent or more in the base period. This provision has led to annual June increases as follows: 1975, 8 percent; 1976, 6.4 percent; 1977, 5.9 percent; 1978, 6.5 percent; and 1979, 9.9 percent. Maximum taxable earnings went from \$7,800 to \$9,000 in 1974, to \$10,800 in 1973, and to \$13,200 in 1974. After 1974 the amount was subject to automatic provisions applicable when benefits increase. The 1975 level was \$14,100; it became \$15,300 in 1976, \$16,500 in 1977, and \$17,700 in 1978. The 1977 amendments set the 1979 figure at \$22,900.

While OASI benefit payments grew by 2.5 times over the period 1969–78, disability insurance benefits quintupled—that is, rose twice as rapidly. The number of disabled workers receiving benefits went from 1.4 million in December 1969 to 2.9 million in December 1978. This doubling took place during a period in which the number of people insured for disability increased slightly more than one-fourth—from 71.2 million to 90.6 million (table 1).

New disabled-worker awards rose from 345,000 in 1969 to 592,000 in 1975, an increase of 70 percent, and then decreased. In 1978 there were 457,000 such awards. This upsurge in awards can result from three causes: (1) more applications being filed, (2) a higher proportion of applica-

Table 1.—Growth in the disability insurance program

Year	Number of insured workers (in millions) ¹	Applications		Disabled-worker benefits in current-payment status	
		Number received (in thousands)	Rate per 1,000 insured workers	Number (in thousands)	Rate per 1,000 insured workers
1962	51.5	437.0	8	740.9	14
1963	52.3	459.8	9	827.0	16
1964	53.3	473.1	9	894.2	17
1965	55.0	529.3	10	988.1	18
1966	55.7	544.5	10	1,097.2	20
1967	56.9	573.2	10	1,193.1	21
1968	70.1	719.8	10	1,295.3	18
1969	72.4	725.2	10	1,394.3	19
1970	74.5	869.8	12	1,492.9	20
1971	76.1	924.0	12	1,647.7	22
1972	77.8	947.5	12	1,832.9	24
1973	80.4	1,067.5	13	2,016.6	25
1974	83.3	1,331.2	16	2,236.9	27
1975	85.3	1,284.3	15	2,488.8	29
1976	² 87.0	1,233.3	14	2,670.2	31
1977	² 88.8	1,235.3	14	2,834.4	32
1978	³ 90.6	1,184.7	13	2,879.8	32

¹ As of January 1 of following year.² Based on preliminary data.³ Projection by the Office of the Actuary, Social Security Administration.

tions being allowed initially, and (3) more benefit allowances generated at the reconsideration and hearing levels. Studies show that the initial allowance rate has not increased. Available data reveal that most of the growth has resulted from the growth in initial applications and that the remainder is traceable to allowances at the secondary and tertiary levels of consideration—through reconsiderations and hearings.

Applications for disabled-worker benefits received in district offices show a strong upward trend for the entire period. A large increase in 1968 (26 percent) was associated with the liberalization of the insured-status requirements for younger persons.¹ The 1969–74 period was one of rapid growth (77 percent) with the biggest yearly gain (25 percent) in 1974 doubtless linked to the beginning of the supplemental security income (SSI) program (title XVI of the Social Security Act). The medical requirements for participation in the disability portion of the SSI program are the same as those for disability insurance, and the federalization of aid to the permanently and totally disabled caused a very sharp increase in applications in 1974, particularly during the first quarter of the year. The number of applications in 1975 was 4 percent below the 1974 level, in 1976 it declined another 4 percent, in 1977 it was unchanged, and in 1978 went down another 4 percent. Chart 1 shows the growth in applications and in the number of disabled workers receiving benefits.

As early as 1972 the rapid growth of the disability insurance program evoked the concern of the Board of Trustees

¹ Instead of the regular requirement of 20 quarters of covered employment in the preceding 10 years, workers disabled before age 31 need coverage in only half the quarters between attainment of age 21 and the onset of disability; workers disabled before age 24 need coverage in half the quarters in the 3 years ending with the quarter in which disablement occurs. In both cases, a minimum of 6 quarters of coverage is required.

of the Federal OASDI Trust Fund who recommended a “future increased allocation to the disability insurance trust fund.”² Subsequent legislation increased the payroll contribution rate earmarked for the disability insurance trust fund from 0.55 percent for employers and employees to 0.575 percent in 1974 and had scheduled increases to 0.6 percent in 1978, 0.65 percent in 1981 with further increases in 1986 and 2011. The Social Security Amendments of 1977 accelerated the pace to 7.75 percent in 1978, 7.50 percent in 1979, and 8.25 percent in 1981 with further increases scheduled for 1985 and 1990.

This article updates a model discussed in an earlier paper that showed, using regression analysis on quarterly data for the period 1962–73, a significant relationship between labor-market conditions and the volume of disability insurance applications.³ As suggested by the “discouraged worker” hypothesis, changes in the unemployment rate were shown to explain part of the observed variation in both the number of disability insurance applicants and the proportion of the insured population applying for benefits.

Causes of Growth In A Social Insurance Program

With the passage of time it is anticipated that the number of persons receiving benefits under a given social insurance program will tend to grow. Several reasons for this phenomenon exist.⁴

Growth of the Insured Population

The insured population can increase in two ways. One is through natural growth—that is, higher birth rates in some previous period will be reflected at present in increasing numbers being eligible for benefits. It can also grow through legislative fiat: Congress can change the requirements for being insured by reducing the number of quarters required for coverage.

The increases in the insured population will lead to increases in the number of applicants and the number of beneficiaries, even if it is assumed that the system has reached equilibrium and that only a fixed proportion receive benefits. For the disability program, as noted below, it cannot be assumed that such equilibrium has been attained.

Change in Eligibility

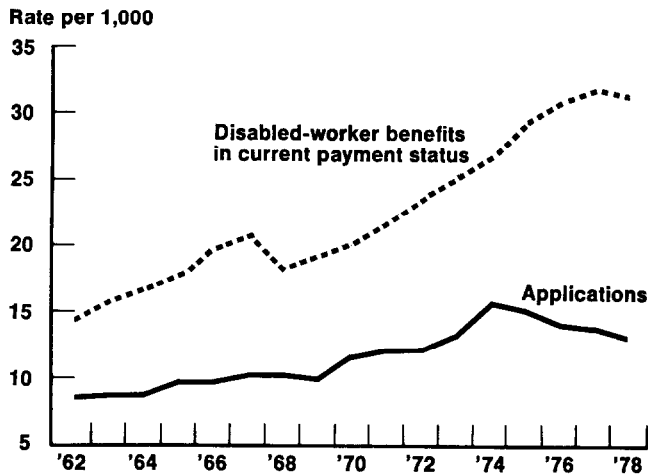
Even with a given insured population, the proportion who apply and are awarded benefits might increase if the eligibil-

² 1972 Annual Report of the Board of Trustees of the Federal Old Age and Survivors Insurance and Disability Insurance Trust Fund, page 32.

³ Mordechai E. Lando, “The Effect of Unemployment on Application for Disability Insurance.” 1974 Business and Economic Statistics Section, Proceedings of the American Statistical Association.

⁴ Some of the discussion in this section was presented in the earlier paper cited in footnote 3.

Chart 1.—Growth in the disability insurance program, 1962-78



ity requirements were relaxed. Such changes have occurred in the disability program when persons under age 50 were granted benefits and when the disability definition was changed from a condition of indefinite duration to one that would continue for at least 1 year. A similar change occurred in 1972 when Congress reduced the waiting period for disability from 6 months to 5 months. These changes may increase the proportion of the insured population who seek and are granted benefits.

Changes in Public Perception or Awareness of Program

In the private sector a producer introducing a new good or service has a strong incentive to use aggressive marketing and advertising techniques to make the public aware of the product. Despite all these efforts, numerous studies have shown that a significant proportion of the population remains oblivious. In the public sector it is frequently argued that the opposite incentive prevails—an agency will probably win greater approval from its funders if it spends less money and thus even fewer people will know about the program.

Although tremendous efforts are made by the Social Security Administration to inform the public concerning the various social insurance programs it administers, a learning-curve process that causes a significant lag in public awareness of the program is to be taken into account. A 1963 survey of persons filing late for disability benefits disclosed that 39 percent had not known the program existed. Another 30 percent knew of the program but had originally thought they were ineligible.⁵ These statistics understate the proportion in the total population since they exclude those who never filed because of ignorance. As more beneficiaries receive these payments and as their fami-

⁵ Barbara Levenson and Aaron Krute, "Delayed Filing for Disability Benefits Under the Social Security Act," *Social Security Bulletin*, October 1964, table 9.

lies and friends learn of the program, it can be expected that the number applying will grow.

Another index of the lack of knowledge of the program can be gleaned from the 1972 Survey of Disabled and Nondisabled Adults. When the nondisabled population aged 20-64 were questioned, 80 percent reported that they were aware of the old-age insurance segment of the social security program and 62 percent were aware of survivor insurance. Only 46 percent, however, were aware of the disability insurance part of the program. Even among persons who classified themselves as having a work disability, only 52 percent were aware of the disability program and one-fourth said they were unaware of any government program to aid the disabled. When the focus was just on disabled men—who are more likely to be insured for disability than women are—it was found that only 55 percent were aware of the program and about 20 percent were unaware of any government programs to aid the disabled.⁶

In the 7 years since the 1972 Survey, one can assume that knowledge of the program has become more widespread as a result of the introduction of the SSI program under the Social Security Amendments of 1972. This program replaces Federal grants to States for old-age assistance, aid to the blind, and aid to the permanently and totally disabled. As a result of this change, many persons came in contact with the Social Security Administration and then learned about the additional benefits available to them under OASDI. Thus, the greatest surge in disability insurance applications came during 1974—the first full year of the new program's operation.

The attitude of the public toward the program may also affect the proportion applying. Many persons eligible for a welfare payment do not apply because a stigma is attached to it. Some observers have claimed that the tremendous growth in the number of welfare recipients during the second half of the sixties has reflected the efforts of groups that urged consideration of the rights of welfare recipients. These groups performed two functions: informing the needy of their eligibility for welfare and, in addition and perhaps more important, helping create an aura of welfare as a right rather than a dole. Many who previously would have found living on welfare payments an unacceptable choice were led to change both their perception and their behavior. In a similar fashion, it is claimed that many who previously were reluctant to apply for public assistance when these programs were State-administered because of the "welfare taint" applied for SSI payments after the assistance programs were federalized.

Increases in Relative Value of Social Insurance Benefit

To receive social insurance benefits the beneficiary must reduce his participation in the labor force. The decision as to

⁶ Unpublished tables from the 1972 Survey of Disabled and Nondisabled Adults.

whether to remain in the labor market or get out in favor of social insurance will depend on the relative returns that can be realized in these two alternatives. Thus, if the Congress were to increase social insurance benefits significantly one would expect to find more dropouts from the labor force. In the same fashion, if social insurance benefits remain constant but wages drop, one can expect more withdrawals from the labor force.

The average benefit awarded to disabled-worker beneficiaries has been increasing during the entire life of the program. A recent study shows that median family benefits for newly entitled workers doubled from \$141 in 1969 to \$282 in 1975.⁷ These benefits were compared with earnings in the year before the onset of disability, and it was found that earnings replacement rates rose from 51 percent to 59 percent during this period. One-fourth of those entitled in 1969 had replacement rates of at least 80 percent of their previous earnings, but by 1975 this proportion had increased to 31 percent. In fact, one-fourth of the newly entitled received more in benefits than they earned while working.

Another change has occurred that significantly raises the value of the disabled-worker award. The 1972 amendments extended Medicare benefits to disabled beneficiaries entitled to benefits for at least 24 consecutive months. The value of this benefit can be estimated from data gathered in the 1972 Survey. The median estimated amount of medical care charges in 1971 for severely disabled persons was \$376, and the mean was \$1,056.⁸ With hospital charges only included, the median was \$1,238 and the mean \$1,713 for the 18 percent of the severely disabled with such bills.⁹ These costs have increased significantly since 1971 with the continuing high rate of inflation in the medical care component of the Consumer Price Index of the Bureau of Labor Statistics.

When these relative returns are considered, what is important is not only the wage rate the worker can reasonably expect but also his probability of getting a job. If wage rates remain constant but unemployment increases, the worker's expected wage will decrease. An increase in applicants and beneficiaries may follow. It should be emphasized that this effect of labor-market conditions need not be symmetrical—that is, when unemployment declines the numbers of persons reentering the labor force and leaving the social insurance rolls need not equal the numbers who went on the rolls originally. As with many other economic phenomena, a ratchet effect may result, and more people are pushed on the rolls by a deteriorating labor market than are pulled off by improving labor-market conditions. Thus the original increase in unemployment may lead to a per-

manent upward shift in the numbers and proportion of beneficiaries.

This ratchet effect will be exacerbated by the presence of the Medicare benefit. It is highly probable that a potential applicant significantly discounts a benefit that has a 29-month waiting period (5 months to get on the rolls and 24 months on the rolls). Coverage of the beneficiary by Medicare, however, will tend to have a significant disincentive effect and discourage workers from leaving the rolls.

Decline in Number Leaving Program

The main focus of this article is to test several models that purport to predict changes in the level of disability application and hence the number of awards that arise from these applications. The main interest is in the flow into the disability insurance system, but, just as the flow into the system has been increasing, another phenomenon has been observed: a smaller proportion of beneficiaries are leaving the rolls. Thus, not only are more persons entering the system, but a higher proportion of the increased stock remains in the system. Some of the causes cited above to explain the growth in the number of applications can also explain the decline in benefit terminations. As unemployment rises, those currently on the rolls and now able to seek employment will discover that jobs are few and far between and so will remain on the rolls longer.

Similar lines of reasoning prevail for increases in the relative value of the benefit and the extension of Medicare benefits. Concern over the disincentive effect of the loss of Medicare on a beneficiary who has not medically recovered but might be able to work was reflected in 1977 proposals for changes in the disability program.¹⁰ One proposal would have continued Medicare benefits for such workers for 24 months after they have left the rolls because of return to work. In addition, if such an ex-beneficiary returned to the rolls, the 24-month Medicare waiting period would not have to be repeated.

Under proposals currently being considered the extension would be lengthened to 36 months. The waiting period would be waived for workers returning to the rolls within 5 years and within 7 years for disabled widow(ers) and adults disabled since childhood.

The two major reasons for disability-benefit termination are attainment of age 65 (49 percent in 1976) and death (39 percent in 1976). Of course, the former, although it reduces the disability rolls, is simply an accounting shift to the retired-worker beneficiary rolls. Termination for recovery, either medical recovery or return to work, accounted for only 10 percent of terminations in 1976. Legislation in the 1960's that granted benefits to persons below age 50 and the liberalization of the insured-status requirement for persons below age 30 have affected terminations. Granting of

⁷ L. Scott Muller and Mordechai E. Lando, **Replacement of Earnings of the Disabled Under Social Security: Levels and Trends, 1969-75** (Research Report No. 53), Office of Research and Statistics, Social Security Administration, forthcoming.

⁸ Donald T. Ferron, **Medical Care Charges for the Disabled and Nondisabled** (Report No. 7), 1972 Disability Survey, table 2.

⁹ *Ibid.*, table 3.

¹⁰ Subcommittee on Social Security of the Committee on Ways and Means, U. S. House of Representatives, H. R. 8076, **Disability Insurance Amendments of 1977** (95th Cong., 1st sess.), July 12, 1977.

benefits to younger persons would decrease the proportion on the rolls who attain age 65 in any given year.

In addition, as younger people come on the rolls generally for different types of disabilities—and as a result of the change in the disability definition from a condition leading to death to one expected to last at least a year, the proportion of beneficiaries who die each year has decreased. The death rate for men beneficiaries declined by 15 percent and that for women beneficiaries by 17 percent between 1966 and 1971.¹¹ A more recent study shows that the gross termination rate because of death has declined from 80 per 1,000 on the rolls in 1966–69 to 50 per 1,000 in 1977 or by more than one-fourth.¹² Gross rates for terminations because of recovery peaked at 32 per 1,000 disabled-worker beneficiaries in 1966. By 1977 this rate had fallen by 47 percent and stood at 22 per 1,000.

The Model

Earlier Model

The model reported to the American Statistical Association meetings in 1974 was fitted for the period 1962–73.¹³ It did not do well in predicting the SSI-induced surge in applications in 1974 but did accurately predict applications in 1975. Since 1975 it has been overpredicting the number of applications, by about 8 percent in 1976–77 and by 15 percent in 1978.

The model lacked two important variables: (1) A measure of the value of the disability insurance benefit in relation to what the worker could earn in the marketplace and (2) an index of the change in public awareness of the program. The reason for undertaking the research that led to this article was an attempt to find proxies for the variables that were omitted from the first model and a desire to fit the model over a longer period of time.¹⁴

Variables Used in Analysis

The following is a list of the variables used in the regressions. Except for DWA and PROP, all the variables are independent variables.

(1) DWA—the number of applications received by district offices quarterly. This is a dependent variable.

¹¹ Charles M. Croner and Lawrence D. Haber, *Declining Mortality Among Disabled-Worker Beneficiaries* (Research and Statistics Note No. 13), Office of Research and Statistics, Social Security Administration, 1974.

¹² *Experiences of Disabled Worker Benefits Under OASDI, 1972–76* (Actuarial Study No. 75), Office of the Actuary, Social Security Administration, 1978, table 5.

¹³ Mordechai E. Lando, *op. cit.*

¹⁴ See *Modeling Applications for Disability Insurance*, *op. cit.*, for a longer discussion of the predictive power of the old model and for a short discussion of models by John C. Hambor (Unemployment and Disability, Staff Paper No. 20, Office of Research and Statistics, Social Security Administration, 1975), and Lawrence C. Thompson and Paul Van de Water (The Short Run Behavior of the Social Security Trust Funds, Technical Analysis Paper No. 8, Department of Health, Education, and Welfare, December 1975).

(2) INSURE—the number of workers insured for disability, estimated as of the first of each year from the Continuous Work History Sample. The estimates have been interpolated to produce a quarterly series. This variable measures the contribution to the growth of the program that results from the growth of the insured population caused both by natural increase and by legislation.

(3) U_1 —the seasonally adjusted quarterly unemployment rate for married men—lagged one period. This variable was used to measure the effect of changes in the demand for labor.

(4) RIP—a variable to measure the ratchet effect discussed earlier. It is defined as $U - U_1$ —the difference between the unemployment rate in the current quarter and the unemployment rate in the previous quarter. If the unemployment rate is decreasing, this variable is assigned a value of zero.

(5) PROP—the number of applications per 100,000 insured population. $PROP = DWA / INSURE$. This is a dependent variable.

(6) Q_1, Q_2, Q_3 —seasonal dummies.

(7) SSI—variable to pick up effects of SSI program during 1974. Values are the relative proportion of annual SSI applications filed in each quarter of 1974.

(8) RBW—a quarterly variable to approximate the relative value of the disability insurance cash benefit. A quarterly series was constructed of the value of new awards made to disabled workers. This series was divided by the Bureau of Labor Statistics data for spendable average earnings for a worker with three dependents.¹⁵ The resultant variable is an estimate of the ratio of the value of the benefit to net earnings from employment. As chart 2 shows, this variable has increased from about .30 in 1969 to approximately .40 in 1978.

An unsuccessful attempt was made to measure the growth in public awareness of the disability insurance program by adapting an epidemic model to measure the spread of knowledge.¹⁶ Although the epidemic model variable did not work, some feel for changes in public awareness of the program can be found. It is frequently claimed that the disability insurance program has as yet not achieved maturity—that is, a substantial proportion of the severely disabled are not receiving benefits. Thus, in 1972 it was found that only 37 percent of the self-identified severely disabled men who were disabled more than 6 months and 9 percent of such women were disabled-worker beneficiaries. With the focus narrowed to persons disabled more than 6 months and unable to work at all, it appears that 54 percent

¹⁵ Spendable earnings are gross earnings minus the social security contribution and Federal income taxes; based on data from unpublished tables from the Bureau of Labor Statistics.

¹⁶ D. Maki and M. Thompson, *Mathematical Models and Applications*, Prentice Hall, 1973.

Chart 2.—Ratio of disabled-worker average monthly award to average spendable earnings, quarterly, 1964-78



of the men and 86 percent of the women are not receiving benefits.

A significant portion of those severely disabled and not receiving benefits were not insured for disability since they did not meet the labor-market-attachment test of 20 quarters of covered employment out of the last 10 years before application. Nevertheless, 47 percent of the severely disabled nonbeneficiary men and 21 percent of the women were insured for disability.

Despite the fact that the proportions were low for severely disabled men and women who were receiving disabled-worker benefits in 1972, these figures represent a dramatic improvement over the figures gathered in the 1966

Survey of the Disabled. In that year, only 24 percent of the severely disabled men and 5 percent of the women were receiving disabled-worker benefits.¹⁷ This growth in the proportion receiving benefits is a significant index of growing awareness of the program by the public. Nevertheless, the fact that the proportions receiving benefits have remained low indicates that the program is moving in the direction of maturity but has not yet achieved it.

¹⁷ Lawrence D. Haber, "Disability, Work and Income Maintenance: Prevalence of Disability 1966," *Social Security Bulletin*, May 1968, table 4. The 1966 Survey was a sample of the population aged 18-64, and the 1972 Survey sampled the population aged 20-64. The liberalization of the insured-status requirement for younger workers took place between these two surveys.

Table 2.—Regression results relating to number of quarterly applications received by district offices

[Figures in parenthesis are *t* statistics]

Independent variable	1964-75	1964-77	1964-78
U ₁	7,417 (2.25)	7,976 (2.42)	11,052 (3.17)
RIP	16,414 (2.08)	19,705 (2.61)	22,339 (2.96)
INSURE	331.4 (7.64)	329.2 (7.47)	331.6 (6.56)
RBW	537,634 (4.04)	470,642 (3.79)	375,383 (3.02)
SSI	207,147 (7.02)	218,270 (7.50)	224,429 (7.50)
Q ₁	17,532 (5.54)	18,263 (6.27)	17,862 (6.72)
Q ₂	17,284 (4.99)	19,070 (5.96)	19,867 (6.74)
Q ₃	15,611 (5.14)	17,800 (6.35)	18,453 (7.20)
rho .....	.51 (3.38)	.53 (3.61)	.65 (5.27)
Constant	-221,752 (-10.51)	-204,473 (-11.43)	-186,992 (-9.16)
R ² .....	.98	.98	.98
SE/ \bar{Y} (normalized standard error) .....	.045	.043	.042

Regression Results

Number of applications. Table 2 shows the regression results for the model fitted over three periods: 1964-75, 1964-77, and 1964-78. As with the earlier model, the presence of autocorrelation required the use of a first order autocorrelation correction *rho*. The model fitted through 1975 was used to predict 1976-78 and then compared with the actual program experience. The model consistently overpredicted with acceptable levels of error in 1976 and 1977—3.1 percent and 3.6 percent, respectively—but was off by 10.6 percent in 1978. As expected the model fitted through 1977 did a better job of predicting 1978 with an overprediction of 5.9 percent.

It is encouraging to find that all the variables in the model are statistically significant and especially cheering to find that the unemployment variable remains significant even after 5 years of experience have been added. In interpreting the 1964-78 regression results, it is found that an increase (decrease) in the unemployment rate for married men of one percentage point over the period of a year would increase (decrease) applications by approximately 44,000. Similarly, if the unemployment rate increases by one percentage point between 2 successive quarters, applications will show an additional increase of approximately 22,000. These two effects are additive; hence, a one-percentage-point increase between quarters leads to approximately 33,000 more applications. On the other hand, a one-percentage-point decrease in the unemployment rate between 2 successive quarters would reduce applications by only 11,000 for the quarter. An increase of 1 percent in the insured population will lead to an increase of 1.07 percent in applications, or 10,000 per year on the average. Lastly, as the replacement

rate rises by one percentage point, applications rise almost 15,000 annually.

Needless to say, other forms of the basic model were tried. In particular, two variables were added—(1) the proportion of women in the insured population and (2) the proportion of the insured population 45 and over (FINS).¹⁸ The first variable, which has been rising over time, was expected to have a negative coefficient. The variable lacked statistical significance, however, although it did have a negative coefficient. The second variable, which has been declining over time, was expected to have a positive coefficient. This expectation was borne out, and the variable FINS was significant. The model that included this variable, however, did not do as well in predicting the 1976-78 experience as the model reported in table 1.

Table 3 compares for 1964-78 the results of the model without and with the FINS variable. The unemployment rate, ratchet, and SSI variables are virtually unaffected. Major effects are seen in (1) the INSURE variable whose coefficient increases by four-fifths, (2) the coefficient of the replacement proxy, which decreases by two-fifths, and (3) the constant, which is three times its original size. As a result, a 1-percent change in the insured population now increases applications by almost 18,000 per year, and a one-percentage-point change in the replacement rate changes applications by only 9,000.

¹⁸ At the finishing stage of the research the authors became aware that a similar variable was used in a logarithmic model by Janice D. Halpern, "The Social Security Disability Program," *New England Economic Review*, May-June 1979.

Table 3.—Regression results relating to number of quarterly applications received with and without the FINS variable
[Figures in parenthesis are *t* statistics]

Independent variable	1964-68	
	Without FINS variable	With FINS variable
U ₁	11,052 (3.17)	11,444 (3.94)
RIP	22,339 (2.96)	22,470 (3.27)
INSURE	331.6 (6.56)	594.4 (6.13)
RBW	375,383 (3.02)	224,557 (1.92)
SSI	224,429 (7.50)	232,793 (8.05)
FINS		645,824 (2.86)
Q ₁	17,862 (6.72)	19,422 (7.21)
Q ₂	19,867 (6.74)	21,207 (7.20)
Q ₃	18,453 (7.20)	19,256 (7.51)
rho .....	.65 (5.27)	.54 (3.82)
Constant	-186,992 (-9.16)	-572,417 (-4.24)
R ² .....	.98	.99
SE/ \bar{Y} (normalized standard error) .....	.042	.040

Table 4.—Regression results relating to number of quarterly applications received per 100,000 insured population

[Figures in parenthesis are *t* statistics]

Independent variable	1964-75	1964-77	1964-78
U ₁	9.503 (1.68)	11.61 (2.11)	13.47 (2.46)
RIP	20.38 (1.90)	22.69 (2.28)	24.4 (2.50)
RBW	834.9 (5.08)	698.4 (4.76)	602.5 (4.36)
SSI	249.9 (6.43)	257.4 (6.91)	261.5 (7.15)
Q ₁	24.7 (6.52)	24.9 (7.60)	24.2 (7.92)
Q ₂	23.7 (5.67)	25.0 (6.90)	25.7 (7.57)
Q ₃	21.8 (6.05)	23.5 (7.50)	23.9 (8.13)
rho .....	.749 (6.1)	.811 (8.0)	.852 (9.8)
Constant	-10.8 (-.25)	20.1 (.47)	41.9 (.95)
R ² .....	.95	.96	.95
SE/ \bar{Y} (normalized standard error) .....	.043	.041	.040

Proportion of Population Insured for Disability Who Apply

The same set of independent variables was used to fit a relationship for applications as a proportion of the insured population. These regression results are reported in table 4. The unemployment variable in the 1964-75 fit just makes the .05 significance level for a one-tailed test, but both the size of the coefficient and the *t* value increase as the period grows longer. (The same phenomenon was observed in the DWA equation in table 2.)

These equations do not predict as well as the DWA equation. The 1964-75 model overpredicts the number of applications per 100,000 insured population by 3.7 percent in 1976, 4.5 percent in 1977, and 12.9 percent in 1978. The 1964-77 model overpredicts 1978 by only 4.2 percent, which is an improvement over the equivalent DWA model.

In interpreting the model fit for the full period, it is found that a change of one percentage point in the unemployment rate changes the number of applicants per 100,000 insured by approximately 13 per quarter and 54 per year. A 1-quarter increase of one percentage point in the unemployment rate therefore increases the applications per 100,000 insured by approximately 38 (the sum of the unemployment and ratchet effects). A similar decrease reduces the number of applicants per 100,000 insured by 13. A one-percentage-point increase in the replacement rate proxy leads to an additional 600 applicants per 100,000 insured. The FINS variable tried in the DWA equations did not prove helpful

in the PROP equation because of the presence of the insured population as the denominator of both the dependent variable and the independent variable.

Conclusion

This article updates research done more than 5 years ago that established a relationship between labor-market conditions and applications for disability insurance benefits (both in absolute terms and in relation to the population insured for disability). New variables were introduced to represent (1) the ratchet effect of an increase in unemployment, (2) the relative value of the disability benefit, and (3) the proportion of insured workers aged 45 and over. Both the new and the old variables proved significant. With the presence of the new independent variables, it was no longer necessary to use a trend variable to pick up unexplained variation.

The research reported here strengthens the conviction that economic variables such as the unemployment rate and the relative value of the disability benefit have a significant impact on the disability program. To approximate the economic effects on applications, the 1964-78 equation in table 1 was simulated (1) keeping unemployment at the average 1969 levels, (2) keeping replacement rates at 1969 levels, and (3) keeping both unemployment and replacement rates at 1969 levels. The simulation results show that, if the 1970's had not been a period of high unemployment, applications during the 1970-78 period would have been approximately 800,000 (or 8 percent) less. Low replacement rates would have reduced applications by 1.1 million. If both the unemployment rate and the replacement rate had remained fixed, the average number of applications per year would have been reduced by more than 200,000 or about 19 percent.

A recent note demonstrates that such a relationship exists in the cross-section as well as in the time series data.¹⁹ The effect of the Social Security Amendments of 1977, which "decoupled" benefits should lead to a decrease in replacement rates and hence a decrease in applications. The cap on family benefits currently proposed would have a similar effect.

The 1970's have been a period of historically high unemployment rates, a situation not expected to improve in the short run. These high unemployment rates should continue to keep applications high. The demographic changes observed in the insured population—a greater proportion of persons below age 45 and a greater proportion of women—should continue in the future and tend to reduce applications.

¹⁹ Mordechai E. Lando, "Prevalence of Work Disability by State, 1976," *Social Security Bulletin*, May 1979.