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Disability Income Insurance and the Individual

Larry A. Cox

In this article, both institutional and research literature pertaining to disability income insurance issues is reviewed from the perspective of the individual. Primary issues include the nature of the risk, the quantity of purchase decision, the choice of product, and the selection of supplier. An ultimate objective is to provide the reader with the foundation necessary to initiate future research efforts focusing on disability-related loss exposures. Potential areas for future research are suggested.

Disability income (DI) insurance may be the basic risk management tool most frequently ignored by individuals. Despite wide acknowledgement of individual disability needs by authors of finance, insurance, and employee benefits textbooks, U.S. earners generally have not purchased the insurance necessary to counter the risk exposures implicit with disability. Researchers similarly have tended to ignore DI insurance issues, with the exception of studies limited to specific public programs.

In this study, both institutional and research literature on DI insurance issues is reviewed from the perspective of managing risk to the individual. The primary objective is to provide the reader with the foundation necessary to initiate future research efforts focusing on the many and varied DI issues not adequately addressed to date. In the next section, the loss exposure facing the individual is discussed. Subsequent sections examine the determination of insurance needs, sources of protection, and the selection of product and supplier. Conclusions and potential research issues are summarized in the final section.

The Disability Loss Exposure

The event of disability can cause several types of economic loss for the individual. Rejda (1984, pp. 199-202) suggests that loss categories include earned income losses, abnormally large medical expenses, loss of employee benefits,

Larry A. Cox • Department of Insurance, Legal Studies, and Real Estate, College of Business Administration, The University of Georgia, Athens, GA 30602.

and other expenses triggered by the disability of the earner, such as home nursing care or additional child care expenses. Implicit in Rejda's discussion are the differences between the loss exposure caused by disablement versus that caused by death.

With the event of death, the loss of the earner's income is certain and survivors' needs easily can be capitalized, given reasonable assumptions about the growth of the family's needs, inflation, and investment rates.[1] In the event of disability, however, the amount of loss is much less certain. The need for income replacement will depend upon the continuation of the individual's disability (quantified by actuaries for large cohorts of individuals as "continuance factors"). Thus, the disability loss exposure is more a Bayesian problem. Given that the loss occurs, the severity of the loss is contingent upon both (1) the individual's ability to recover or be rehabilitated and (2) whether such recovery or rehabilitation is complete or partial.

Potential "additional" losses, such as rehabilitation, physical therapy, nursing, or child care expenses, pose a difficult planning issue generally not addressed by insurers. Insurance to indemnify the individual for such losses, which often are excluded from medical expense insurance plans, generally is not part of the package of options offered by public agencies or private insurers. Rather, DI insurance benefits simply are tied to the individual's income, either contractually or, implicitly, via the maximum monthly benefit allowed by the insurer's underwriters. Research literature on the loss exposures posed by the additional expenses caused by disability is virtually non-existent and represents an opportunity for interested researchers.

Because existing DI insurance contracts primarily address the problem of earned income replacement, most research focuses upon the income replacement problem, as does this review. In the next section, the quantification of individual needs for DI insurance and sources of supply are discussed.

The Quantity Decision

Alternative Risk Management Techniques

Before a purchase of any DI insurance is considered, the individual must determine the extent to which disability loss exposures can be managed by implementing the other basic risk management techniques of (1) avoidance, (2) retention, (3) loss prevention, (4) loss control, and (5) combination. Using the first technique, the individual can avoid many hazards, such as risky hobbies or occupations, thereby reducing his or her disability loss exposure. Numerous potential perils cannot reasonably be avoided, however. An extreme implementation of the second method, retention of the entire risk, is not affordable to all but the very wealthy because of the possibility of permanent

disability. Partial retention, via a deductible included in a DI insurance policy, is possible, however. For DI insurance, the deductible is manifested in the elimination, or waiting, period provision.

Loss prevention entails reduction of the probability of a loss event. Carefully managed behavior, e.g., taking proper safety measures at work and home, can reduce, but not completely eliminate the likelihood of a disability-related loss. Loss control techniques, professional physical therapy for example, may reduce the severity of loss if the disability occurs, but may have minimal impact in many cases and cannot reduce the probability of loss incidence. Finally, combining loss exposures, e.g., marrying another earner or having a large family, may reduce the impact of disability-related loss of income.[2] Unlike an institutional venture, however, the individual will not be able to combine enough exposures to provide adequate diversification. In addition, the combination of exposures within a single family still may be subject to a common disaster, such as the disability of several family members caused by a single, severe automobile accident.

The previous discussion indicates that alternative personal risk management methods may be used to reduce disability-related loss exposures and, possibly, the need for DI insurance. The degree to which such alternative methods may substitute for an individual's insurance requires further modelling and empirical examination, however. Because the individual cannot completely control his or her environment or diversify adequately his or her source(s) of earned income, he or she normally is forced to consider the final risk management method, i.e., transfer of the loss exposure to a public or private institution via an insurance contract. Determining the extent of DI insurance usage is the difficult question discussed next.

The Magnitude of the Need

Mehr and Gustavson (MG) (1987, pp. 426-428) provide a simple procedure for estimating DI insurance needs for the individual and his or her family. The method involves annual estimation summarized as follows:

$$N_t = E_t + X_t - I_t - S_t \tag{1}$$

where: N = gross disability income insurance needs;
E = total family expenses;
X = extra expenses caused by the earner's disability;
I = post-tax family income after the earner's disabiity;
S = Social Security disability income (SSDI) benefits; and
t = time period (year).

The individual would purchase DI insurance paying a monthly benefit in the amount indicated for the current year, N_t, less existing financial assets, but the benefit purchased would be adjusted over time following the needs estimation procedure contained in Equation 1. After-tax estimates are used because DI insurance policies generally provide tax-exempt benefits as long as the individual or his or her employer have not taken an income tax deduction for the premiums paid previously. MG do not discount the stream of annual estimates to the present, as would be the case for a life insurance needs estimate, because potential adverse selection problems, especially those created by moral hazard, prevent insurers from offering DI insurance benefits in a lump sum. Using a case example, MG demonstrate the potentially great variability of disability-related family needs over time and note that benefits based on an earner's present income may prove inadequate to meet the family's future needs, even when a cost-of-living rider is attached to the policy.

Cox, Gustavson, and Stam (CGS) (1990) introduce an expected value model to show that, from the individual's perspective, the need for income replacement caused by long-term disability (LTD) normally dominates the comparable need caused by death. Although their model discounts future cash flows in order to compare the actuarial expected values of LTD versus life insurance objectives for individuals, CGS caution that the model is not applicable for personal planning purposes. They call for better planning models that impound loss frequency information and account for insurance portfolio effects.

While generating preliminary evidence that individual needs for LTD insurance may dominate those for life insurance, CGS note that less than 22 percent of the public is covered by some form of long-term disability (LTD) insurance other than Social Security. Price (1986, p. 8) indicates that nearly 60 percent of U.S. wage and salary workers have some form of short-term disability (STD) income plan. In contrast, over 80 percent of U.S. households own life insurance (Stemnock, 1988).

The possibly inadequate response by individuals to the demonstrated need for LTD insurance must concern the researcher interested in individual financial management because of the potentially catastrophic loss exposure accepted by the vast majority of U.S. earners. Other problems observed in the U.S. marketplace include perceived product complexity, the paucity of standardized pricing, non-coordination of some private and public benefit programs, and availability problems for individuals in certain occupational classes. The public interest, as well as intellectual curiosity, demands that both individual behavior and the informational efficiency of DI insurance markets be studied carefully. Next, the literature concerning the availability and efficacy of alternative sources of DI insurance protection are discussed.

Sources of Disability Income Protection

Short-Term Disability Benefits

The majority of U.S. earners have some form of short-term disability (STD) protection, defined here as coverage during the first six months of disability. Private and governmental group plans provide 93 percent of STD coverage for the non-occupationally disabled, while private individual plans account for only 7 percent (Price, 1986). When studying either individual behavior or disability markets, the researcher should have a working knowledge of the sources and extent of STD benefits that may accrue to individuals before the need for LTD income arises. A discussion of STD income protection plans follows.

Social Security. In the U.S., the Old-Age, Survivors and Disability Insurance (OASDI) program, popularly referenced as Social Security, provides substantial disability income benefits to eligible individuals. The basic definition of disability requires that the earner be unable to perform any substantial gainful activity that exists in the national economy. Substantial gainful activity now is defined as an activity generating more than $300 per month (Schwartz and Grundmann, 1989). The disability generally must be expected either to result in death or to last for a continuous period of not less than 12 months.

If the disabled earner meets both OASDI eligibility requirements and the OASDI definition of disability, benefit payments may commence, but only after a five-month elimination period. Disability benefits are determined as if the worker had reached normal retirement age and were eligible for retirement benefits, although the benefit formula differs somewhat from that used to calculate retirement benefits. Workers' compensation benefits may be fully or partially offset against the estimated OASDI payment if the total from both plans exceeds 80 percent of the earner's average earnings prior to the disability occurrence. Considering the lengthy waiting period and the required disablement expectation of one year, OASDI does not serve as a substantial source of STD protection for the individual.

Workers' Compensation. The purpose of workers' compensation laws, effective in all 50 states, is to bypass common law pertaining to negligence torts when a worker suffers an occupationally related injury or sickness. Instead of suing his or her employer, the worker merely files a workers' compensation claim and, upon approval, the employer or its insurer must pay state-mandated disability income benefits, medical care expenses, and death benefits. In turn, the worker's ability to sue for negligence is legally limited, as are the maximum benefits payable for disability income or death.

In 1987, 87 percent of the U.S. labor force was covered under workers' compensation laws (Nelson, 1989). Most states require that the disabled earner receive two thirds of his or her weekly earnings up to a maximum limit. The maximum weekly benefit ranged from $175 in Georgia to $1,094 in Alaska in mid-1988. Typical elimination periods are three to seven days for disability income benefits, although these periods usually are covered on a retroactive basis if the disability continues for a minimum, specified period of time, generally from one to six weeks.

The providers of workers' compensation benefits include private insurers, employer self-insurance plans, and state-run insurance funds. Four states require exclusive use of the state insurance fund, while four others require use of either the state fund or self-insurance. The remaining states allow use of private insurance as an alternative to either the state plan, if one exists, or self-insurance. Nelson (1988a) estimates that private insurers provide approximately 59 percent of workers' compensation benefits in the U.S., while state and self-insurance funds supply slightly over 20 percent each.

State-Mandated Temporary Disability Plans. California, Hawaii, New Jersey, New York, Rhode Island, and Puerto Rico require temporary disability insurance (TDI), or cash sickness, plans for most earners. The plans are intended to partially compensate earners for income losses caused by either non-occupational disability or maternity. Although TDI is mandated only in the six jurisdictions, approximately one fourth of the U.S. commercial and industrial labor force is employed in these jurisdictions and, therefore, is covered by a compulsory TDI plan (Kerns, 1989).

TDI laws generally define disability as the earner's inability to perform his or her regular or customary work, although New Jersey and New York use a somewhat stricter definition. TDI plans usually provide at least half of the earner's income up to a maximum benefit for a limited period of time. In 1988, the maximum weekly benefit varied from $104 in Puerto Rico to $252 in Rhode Island (Kerns, 1989). Benefit duration ranged from 26 to 39 weeks, with waiting periods of between three and seven days. Most jurisdictions do not require payment of TDI benefits if workers' compensation benefits are applicable, although California requires payment of TDI benefits to the extent they exceed workers' compensation payments.

The providers of TDI benefits encompass state-run plans, employer operated self-insurance funds, private insurers, and fraternal funds. The types of providers operating in each state often are determined by statutory law. At the extremes are Rhode Island, which mandates TDI only through the state-run fund, and Hawaii, which requires TDI coverage be provided only by private insurers or employer self-insurance. Other jurisdictions allow TDI coverage to be provided via state and/or private plans (Social Security Administration, 1990, p. 311).

Private Insurance. Two types of private STD benefit plans are dominant in the U.S. Sick leave plans generally offer full replacement of earnings with no waiting periods and are funded by operating earnings of the employer. The earner often receives an allocation of five to 15 days of sick leave per year, but can accumulate unused days for the future.

The second major source of STD benefits is sickness and accident insurance offered via private insurers or employer self-insurance funds. Sickness and accident insurance typically replaces two thirds of the earner's weekly income after a waiting period of three to seven days. The duration of benefits usually is limited to between three and six months.

Sick leave plans provide a relatively higher level of benefits, approximately 76 percent of STD income losses for plan beneficiaries in 1983. In contrast, Price (1986) shows that the combination of individual and group sickness and accident insurance plans have provided only 35 to 38 percent of lost earnings for plan beneficiaries each year since 1970.

Houff and Wiatrowski (HW) (1989) survey STD plans available to employees of (1) medium and large private firms and (2) state and local governments. Among employees of private firms, 46 percent have sick leave only, 24 percent have sickness and accident insurance only, 25 percent have both, and a mere 6 percent have no STD coverage. For state government employees, 83 percent have sick leave only, 1 percent have sickness and accident insurance, 14 percent have both, and only 3 percent have none. For private employers, HW estimate that total STD benefits from both sick leave and sickness and accident insurance plans would range from 53 to 65 percent of pre-disability income, depending upon the employee's years of service. The duration of benefits is limited to between 110 and 134 work days, again depending upon years of service. Plans funded with sickness and accident insurance only normally provide longer benefit durations, however.

Although nearly 60 percent of all U.S. earners are covered by some form of STD plan, less than 48 percent of workers in the 45 non-TDI states have any such protection. Most STD benefits are provided through employer group plans, rather than through individual insurance policies. Sick leave plans tend to provide higher income replacement ratios, but sickness and accident insurance is likely to pay benefits for a longer duration in the event of a relatively more severe STD. Because STD plans are of limited duration, however, potentially catastrophic losses must be addressed by LTD plans, which are discussed subsequently.

Long-Term Disability Benefits

Social Security. For disabled individuals meeting the stringent definition of disability stated previously, Social Security disability income (SSDI) benefits provide an important source of income. Packard (1987) finds that SSDI

provides approximately two thirds of total income for unmarried, SSDI recipients and 40 percent of total income for the families of married recipients. Despite this financial support, Grad (1989) shows that fully 30 percent of the recipients remain near or below the poverty level. Based upon the most recent Census Bureau data, the median household income of SSDI beneficiaries is only $850 per month, while net worth is $18,884 and only $2,635 if the family home is excluded.

During the past decade, the probability of receiving SSDI benefits has declined for the disabled U.S. earner. After a substantial expansion of benefits in the 1960s and early 1970s, Reno and Price (1985) and Lando, Farley, and Brown (LFB) (1982) document the measures taken by the U.S. government to restrict SSDI payments. These incremental restrictions include (1) limiting income replacement ratios for some types of workers, (2) closely administering eligibility rules, and (3) lowering acceptance rates on applications for benefits. Regarding the latter, LFB show that acceptance rates for initial applications for SSDI benefits declined from over 50 percent in 1966 and 1967 to less than 22 percent in the early 1980s.[4]

Several studies analyze data from surveys of SSDI applicants and provide insight into the severity of disability losses for these applicants. Hennessey and Dykacz (HD) (1989) use a maximum likelihood Weibull function to predict the ultimate fate of SSDI beneficiaries. Independent variables included in the model are primary cause of disability, education, occupation, wealth, sex, race, and age. The results indicate that, after initial entitlement, only 11 percent will recover prior to retirement age 65, 36 percent will die, and 53 percent will remain disabled until retirement. The mean duration of SSDI benefits to qualifying beneficiaries exceeds nine years.

Dykacz and Hennessey (DH) (1989) then analyze the subset of SSDI beneficiaries who recover. A two part Weibull function is employed, using the predictive factors from HD. The authors predict that 43 percent of "recovered" beneficiaries will return to SSDI rolls within five years, 5 percent will die, and 52 percent will remain employed until retirement age, defined as age 62 in the study.

The studies by HD and DH suggest that very few SSDI recipients will return to the job market and that nearly half of those recovering will again become disabled. The empirical analysis contained in these two studies is based upon surveys of beneficiaries conducted in the 1970s, well prior to the stringent enforcement of eligibility rules and disability definitions that generally are affiliated with the Reagan administration. Recovery rates are likely to be even lower for current SSDI beneficiaries.

Halpern and Hausman (HH) (1986) develop a model of individual choice for SSDI benefits and apply it to the previously cited survey data. A log likelihood function is implemented to test the impact of administrative policies regarding acceptance rates and benefit levels on the individual's propensity to leave the labor force and apply for benefits. HH find that probable acceptance

rates do not have a large effect on the decision to apply, while benefit levels have a somewhat greater effect. Nevertheless, the effects of benefit levels on the application decision are not as strong as previous research indicated. The type of disabling illness or injury, e.g., breathing difficulty or blindness, is found to have a very substantial effect on the decision to apply, however.

Bound (1989) addresses the issue of whether historically increasing SSDI benefits has created a disincentive for individuals to remain in the labor market. He focuses on the applicants rejected for SSDI benefits as a natural control group for comparison with SSDI beneficiaries. Applying logit analysis, Bound finds rates of labor force non-participation similar to those for SSDI beneficiaries. Most of the rejected applicants report substantial health limitations. Bound concludes that his direct evidence indicates that SSDI benefits do not generate disincentives to work.

Several research efforts provide information on the attitudes and behavior of different demographic cohorts vis-à-vis SSDI benefits. Greenblum and Bye (GB) [1987] analyze survey data from the Social Security Administration and find that belief in the importance of work does not decline after individuals begin receiving SSDI benefits. GB conclude that vocational rehabilitation and incentive programs promoting a return to work are very important. Mudrick (1988) uses the same data to explore the relationship between the demographic characteristics, attitudes, and social roles of individuals with their disability status. Logit regression analysis indicates that pain and fatigue are strongly related to disability. The linkage of self-esteem and work is inversely related to disability claims.

Molho (1989) examines the relationship between demographic factors and the British equivalent of SSDI claims. Using both OLS and logit regression, he finds that the non-economic factors of age and medical history are the primary predictors of claims. Traditional economic factors, including regional economic status and housing environment, have only a secondary influence. An overview of the three previously cited studies supports the preference of most disabled individuals to return to work and, hence, the necessity of rehabilitation efforts that may remove many individuals from SSDI rolls.

Workers' Compensation. All workers' compensation plans cover occupationally related LTD claims and most states require benefits to be paid for the entire life of a permanently disabled worker. Some states impose limits on benefit duration, however, with West Virginia mandating the shortest limit of 208 weeks.[5]

A substantial majority of states place no cap on the total amount of disability income benefits paid to a worker, but a significant minority do impose such limits, ranging from $45,000 in Maryland to $198,590 in New Mexico during 1989. Seventeen states require that any Social Security disability benefits and/or unemployment benefits received by the disabled earner be used as offsets

against workers' compensation disability income benefits (U.S. Chamber of Commerce, 1989, pp. 18-20). Federal law generally requires Social Security benefits to be supplemental to state workers' compensation benefits, but excepts these 17 states, which passed "reverse" offset laws prior to February 1981.

Devol (1986) investigates the extent to which workers' compensation plans can replace the pre-disability income of the average worker in a high-benefit state (Massachusetts) and a low-benefit state (Georgia). She constructs expected value models that incorporate such factors as workers' compensation claims experience, wage inflation and life cycles, employee benefit losses, and typical worklife experience. Her results indicate that, on an after-tax basis, workers' compensation benefits replace over 85 percent of the worker's income for disabilities lasting one year. For longer-term disabilities, income replacement ratios drop to as low as 40 percent of after-tax income. If the state of residence does not use a Social Security offset, the income replacement ratios are raised significantly.

Workers' compensation plans pay both STD and LTD benefits. Nelson (1988b) reports that approximately 75 percent of all workers' compensation claims are for STD, yet the 25 percent pertaining to LTD claims account for 75 percent of the benefits paid by these plans. Despite the large proportion of benefits paid by workers' compensation plans for LTD claims, this source may represent a relatively small factor for disabled individuals in the U.S. Packard (1987) reports that, among beneficiaries of Social Security disability payments, less than 3 percent of total income is supplied by workers' compensation plans. These data do underestimate somewhat the impact of workers' compensation because of the Social Security benefit offsets implemented in 17 states, however.

Hansen, MacAvoy, and Smith (HMS) (1989) provide a broad view of programs, including workers' compensation, that deliver benefits to earners suffering from occupationally related disease or disability. HMS categorize the various types of programs and supply a general analysis of how major attributes of each program affect claims, administrative costs, compensation errors, and worker safety from the perspective of the public policymaker.

While public LTD benefit programs are demonstrably important to the average earner in the U.S., private sources may be of greater importance to upper-middle and upper class earners. The researcher must be aware of how public programs may affect both private markets and individual decisions, however. Table 1 summarizes some major provisions of public programs applicable for U.S. citizens employed in the states of New York and Texas. As shown in the table, individuals employed in these two diverse states are subject to very different "safety nets" of publicly funded disability protection that apply even before private plans are considered. In the next section, private LTD plans are examined.

TABLE 1.
Public Disability Protection Plans Available to Individuals on January 1, 1989

Plan	*State*	*Provisions*
Workers compensation	New York	• 2/3 × Compensation • Weekly maximum: $300 • Maximum duration: life • Elimination period: 7 days • Social Security offset
	Texas	• 2/3 × Compensation • Weekly Maximum: $238 • Maximum duration: 401 weeks • Elimination period: 7 days • No Social Security offset
Temporary	New York	• 1/2 × Compensation • Weekly maximum: $170 • Maximum duration: 26 weeks • Elimination period: 7 days • Covers non-occupational disability only
	Texas	• No plan
Social Security	All	• Benefits based on compensation and family size • Monthly maximum: $1,090/individual $1,635/family • Maximum duration: age 65 • Elimination period: 5 months • Workers compensation offset

Sources: U.S. Chamber of Commerce (1989), Hay/Huggins (1990).

Private Sources. The preponderance of LTD insurance contracts in the U.S. are provided to individuals through employer group plans. Data from the *1988 Update: Source Book of Health Insurance Data* coupled with general population data indicates that approximately 15 percent of the working population is covered by private group LTD plans, while about 7 percent own private individual policies. The U.S. Bureau of Labor Statistics (BLS) (1989) provides detailed information on employer group LTD coverage for employees of large and medium size firms. Approximately 42 percent of these employees are covered by group LTD plans. White-collar workers are more than twice as likely to receive coverage as their blue-collar counterparts, although 38 percent of the latter are eligible to receive immediate disability pension benefits.

Typical benefit levels for group LTD plans are set at 50 to 60 percent of pre-disability earnings, subject to a monthly maximum that ranges between $2,500 and $5,000. For 63 percent of group plan participants, offsets for SSDI

and workers' compensation benefits apply when total disability benefits exceed 70 to 75 percent of pre-disability earnings. An additional 7 percent are subject to even lower total benefit ceilings. The normal waiting period for group LTD plans is six months.

Blostin, Burke and Lovejoy (BBL) (1988) compare a prior version of the BLS study with an analysis of group benefits available to employees of state and local governments. For the years studied, BBL find that only 31 percent of the government employees received group LTD coverage as opposed to 48 percent of corporate employees. Government workers were twice as likely as corporate workers (80 percent versus 40 percent) to have access to immediate disability benefits from their retirement plans, however.

Virtually all U.S. earners have the option of buying individual LTD contracts from private insurers, although relatively few do so. Edmonston and Scott (ES) (1987) supply an insightful consumer survey of individuals who have purchased individual LTD policies. The response data encompass buyers of 6,489 noncancellable policies from 27 insurers.

Demographic analysis by ES reveals that males account for 78 percent of the LTD policies purchased and 84 percent of premiums paid. The median age of buyers is 35 for males and 36 for females. Purchasers' incomes are approximately four times that of the average U.S. citizen, with median incomes of $54,700 for males and $28,600 for females. Professionals and executives are the dominant purchasers of individual LTD, generating 86 percent of total premiums derived from male buyers and 76 percent from female buyers. In the next section, information about private DI insurance products and suppliers that is necessary for the individual to make a rational decision is discussed.

The Product and Supplier Decisions

Product Selection

Much of the literature on DI insurance products represents primarily a description of these relatively complex contracts, e.g., Morris (1986) and Soule (1984). In a similar fashion, Lyons (1987) describes the income tax treatments of premiums paid and benefits received for various types of disability plans that apply to individual employees and small business owners.

The Edmonston and Scott (ES) (1987) study supplies information about the contractual options of LTD policies typically selected by individuals. Among their findings, ES observe that waiting periods vary widely, but a plurality of policies contain 60 to 90 day waiting periods. Benefit durations are typically quite long-term, with two thirds providing benefits ranging from 10 years to payments until age 65. Over half of the purchasers select an "own occupation" definition, which means that benefits will be received if a disabled policyholder

cannot perform at least one significant duty of his or her current occupation. More than 50 percent of the policies provide proportional benefits if the policyholder can perform his or her normal duties on a part-time, but not full-time, basis.

Cox and Gustavson (CG) (1990) explore individual LTD insurance prices for a cross-sectional sample of 54 insurers in 1988. CG show preliminary evidence of price dispersion exceeding that for other types of insurance and consumer products. Regression analysis indicates that the elimination period is significantly related to price for all the types of policies tested. Other variables having a significant impact on price for some types of LTD policies include the definition of disability, the residual (or partial) disability provision, and the organizational form of the insurer.

Although surveys of DI insurance attributes and prices are available to the public (Blease and Pallay, 1990), the present literature offers little to guide the individual in making an optimal purchase decision. For instance, while a number of studies investigate comparative price indices for life insurance, e.g., Schleef (1989), no such information has been developed for the relatively more complex DI insurance products.

Effort also should be devoted to the optimal selection of contractual options. The individual should be fully informed of trade-offs between the various contractual options, and between these options and financial assets or alternative risk management techniques. For example, the elimination period is itself an alternative risk management technique (risk retention). The choice of elimination period should not be made in isolation, but only after considering (1) other risk management methods, (2) other contractual options, such as benefit duration or the residual disability provision, and (3) available liquid assets. Virtually no modelling has been provided to help the individual make the optimal decision, however. Next, the selection of the product supplier is considered.

Insurer Selection

A healthy stream of literature focuses upon the financial solvency of insurers, e.g., Ambrose and Seward (1988) and BarNiv and Hershbarger (1990). Studies of this genre attempt to identify econometric techniques and variables that will provide the most reliable predictions of insolvency. Researchers typically test their proposed models against the Insurance Regulatory Information System (IRIS) promulgated by the National Association of Insurance Commissioners (NAIC). With the IRIS system, the NAIC establishes "acceptable" ranges for 12 financial ratios. Life and health insurers with four or more ratios outside the acceptable range are targeted for special attention by the NAIC. The results of the IRIS tests can be replicated by researchers and are available to individuals and their advisors (Belth, 1990a). As shown

by BarNiv and Hershbarger, however, the predictive capacity of the IRIS system is limited and multiple classification techniques may be advisable.

The standard source of information regarding both the financial and operational status of insurers has been *Best's Life and Health Reports* published by the A.M. Best Company. Within the last few years competing firms, most notably Standard and Poor's, Moody's, and Duff and Phelps, have begun evaluating and rating insurers. Belth (1990b) documents substantial inconsistencies between Best's ratings and those of the competition, citing increasing liberalization of Best guidelines over time as a primary cause. While the individual now has access to more information on insurers via the rating services, an additional source of noise has been introduced and additional research is likely on the impact of this development.

In addition to financial risk, the individual should assess the underwriting risk and efficiency of insurers, if possible. Little guidance based upon research can be offered, however. One reason may be the obfuscating statutory accounting practices of insurers. For instance, although overall ratios for underwriting losses to premiums and underwriting expenses to premiums are available for total accident and health insurance lines written by the life and health insurer, information specific to disability lines only is not (Zucconi, 1987, pp. 176-181, 226-227; Doligalski, 1990).

Past records of claims service and rehabilitation intervention also are likely to vary widely across insurers. For instance, one insurer recently revealed a new group plan with the announced goal of early intervention and rehabilitation resulting in "a quick return to work, accompanied by a smooth flow of financial support" (Koco, 1990). Unless further disclosure is provided by insurers or regulators, the individual (or employer) will have no way of evaluating such marketing claims.

For the most part, research into DI insurance has been descriptive in nature and focused upon social programs and public policy. The many empirical studies addressing SSDI and workers' compensation benefits indicate that these programs are likely to be of limited value to middle and upper class individuals. The research pertaining to private DI insurance markets also has been largely descriptive, but does provide some insight into the buying behavior of different demographic groups and the pricing of individual products. The available evidence only raises more questions about the limited acceptance of individual DI insurance plans by the buying public and the extent to which essential information is available to individuals. Concluding remarks are provided in the following section.

Conclusions

The preponderance of research efforts pertaining to disability income protection focuses upon social insurance and public policy. Much of this

research has been conducted or sponsored by U.S. government agencies, which may explain the dominance of a public policy perspective. As with many other areas of individual financial management, optimal risk management practices applicable to the disability loss exposure have not been adequately modelled. Potential research topics may be found in the categories of disability insurance markets, individual planning, and insurance portfolio formation.

A number of questions regarding disability insurance markets need further investigation. For example, why is disability insurance so widely recognized as a fundamental need by financial planners and authors, yet relatively little insurance is purchased, especially to meet the LTD exposure? Are individuals really exhibiting behavior that is close to optimal? Are disability insurance markets efficient in terms of information dissemination? If not, how can informational constraints best be relaxed or removed? Can comparative cost indices be constructed that will be adequate and comprehensible for implementation by consumers?

Many individual planning questions may interest the prospective researcher. How can disability income needs be better modelled in financial planning programs? Can "additional" disability-related costs, such as nursing care or child care, be reasonably predicted and included in individual needs models? Can optimal packages of contractual options be modelled? What trade-offs may the individual reasonably consider between DI insurance, alternative risk management techniques, liquid financial assets, and disability pension benefits?

Supplier attributes also deserve closer examination. How can the individual best assess the underwriting leverage and efficiency of prospective suppliers? How can claims service and rehabilitation services be evaluated?

Once the preceding issues are investigated, the scope of disability income research can be expanded. For instance, can optimal portfolios containing disability, medical expense, life, and other types of insurance be developed using models comparable to those described in modern portfolio theory? Can optimal insurance and investment portfolios be reconciled and solutions devised that can be reasonably implemented by individuals? Can integrated packages of disability income insurance be produced to replace the current agglomeration of programs available from public and private suppliers?

The paucity of rigorous research in DI insurance provides a unique opportunity to the innovative researcher. Major objectives of this review have been (1) to provide the prospective researcher with a foundation for understanding essential disability insurance issues and the underlying market structure and (2) to stimulate interest in some of the previously discussed research topics related to disability income insurance, an area largely ignored in the academic research literature of economics, finance, and insurance.

NOTES

1. For examples of models capitalizing survivor needs caused by the death of an earner, see Belth (1964), Rose and Mehr (1980), and Gustavson (1982).
2. For example, Goldsmith [1983] offers preliminary empirical evidence that individuals may substitute a spouse's human capital for the purchase of life insurance.
3. The law determining primacy between OASDI disability benefits and state-mandated workers compensation plans is explained in the subsequent section on long-term workers compensation benefits.
4. Official Social Security Administration [1990, p. 260] acceptance rates are higher than those estimated by LFB, rising from a low of 26.5 percent in 1982 to the 33-34 percent range in the mid-1980s. Acceptances spiked upward to 44 percent in 1988, a year in which applications fell by 23 percent. In response to recent budgetary problems, the Administration has used such strategies as simply suspending all SSDI hearings [Pear, 1990] and relying upon a single, unreliable diagnostic test to determine whether applicants should receive benefits [Lambert, 1990].
5. For a by-state synopsis of workers compensation requirements for benefits paid, see U.S. Chamber of Commerce [1989].
6. For a discussion of how typical offsets are structured in group LTD plans, see Hill [1987, pp. 18-19].

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