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The Market Pricing of Disability Income Insurance for Individuals

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Individuals' needs for disability income insurance dominate those for life insurance, yet relatively few buyers and sellers enter into disability contracts compared to life contracts. This phenomenon appears contradictory to the existence of a workably competitive market. This study examines the relation of disability income insurance prices to underlying contractual and insurer characteristics. Our results are supportive of a competitive market scenario. We observe a strong relation between prices and elimination periods, which is consistent with the presence of adverse selection. Our results have implications for how individuals should choose some policy and insurer characteristics, but they also suggest that buyers may need to be better informed about other pricing factors.

I. INTRODUCTION

Based on actuarially expected losses, individuals' needs for disability income insurance (DII) dominate those for life insurance at all ages of their working lifetimes (Cox, Gustavson, & Stam, 1991). Despite such evidence, relatively few insurers offer individual DII (LIMRA, 1989) and only a small percentage of consumers purchases it (Cox, 1991).

Low purchase rates for DII can appear to be inconsistent with a competitive market environment, but direct scrutiny of the market for individual DII reveals many aspects of a workably competitive environment—similar to those observed in life insurance markets (Pritchett & Wilder, 1986). For example, no product suppliers have dominated historically with respect to market share or price leadership.[1] Also, barriers to entry and exit are not substantial and evidence of collusion or other anticompetitive activities is not apparent. Further, the same regulatory structure applies to both DII and life insurance markets. Given these similarities for both market and regulatory structures, the DII and life insurance markets

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should share approximately the same universe of potential buyers and sellers. Yet, the fact remains that life insurance is widely purchased while DII is not.[2]

In a competitive environment, we expect DII prices to effectively impound both contractual and insurer attributes. In this study, we focus on the general composition and strength of such pricing relations. We use a hedonic pricing model—similar to that applied by Walden (1985) for life insurance products—to determine the strength of pricing relations and to estimate the impact of various contractual provisions and insurer attributes on DII prices. Our results provide evidence of strong relations for some of these underlying characteristics.

Throughout our analysis, we emphasize the expected impact of the elimination period clause, as supported by the theory of adverse selection. The elimination, or waiting, period contained in DII policies is equivalent to the monetary deductible found in other types of insurance products. When a loss of health occurs, the insured first must absorb a loss of income, which is directly proportional to the duration of the elimination period, before receiving insurance benefits.[3] Our test results specific to elimination periods, although not direct measures of adverse selection, are quite consistent with its presence in DII markets.

Our results provide indications about how individuals with lower risk exposures should evaluate elimination periods. The impact of non-price factors, such as service, also is demonstrated. Although DII markets are shown to be reasonably efficient, our findings suggest that buyers may need to be better informed about disability definitions, preexisting conditions clauses, and insurer solvency.

In the next section, we focus on how the elimination period and other devices are used by insurers to reduce problems caused by adverse selection. We discuss the primary contractual components and insurer characteristics that are likely DII price drivers in section III. In section IV, we specify the data and model for testing price relations. We then present our results in section V and conclusions in section VI.

II. Adverse Selection and Elimination Periods

Studies of insurance markets often adopt Akerlof's (1970) thesis that insurance buyers have informational advantages because they know more about their personal risk characteristics than do insurers. This asymmetry of information can result in adverse selection in insurance markets. Adverse selection is the tendency of persons with higher risk exposures either to be more likely to buy insurance or to buy more insurance than persons with lower risk exposures (Cummins et al., 1983). Empirical research has confirmed the existence of adverse selection in the markets for automobile (Dahlby, 1983; Puelz & Snow, 1994), individual life (Beliveau, 1984), and individual health (Browne, 1992; Browne & Doerpinghaus, 1993) insurance. For reasons discussed below, we expect the presence of adverse selection to have a substantial impact on the design and pricing of DII contracts.

DII is a form of health insurance covering indirect losses. If insured persons suffer losses of health such that they cannot perform their occupational duties, they recover a portion of their lost income. Following Akerlof (1970), we assume that applicants for any health insurance products, including DII, know more about their personal health on the contracting date than do insurers. Insurers have less information for reasons such as errors in health assessment by medical examiners serving as agents for the insurer, personal physicians'

sympathy for applicants, and inadequate histories of family health traits. Insurers, therefore, should have less complete information than applicants regarding their proper classification as relatively high or low risks.

In their seminal work, Rothschild and Stiglitz (1976) theorized that insurers will offer "price and quantity" menus to applicants as a method for reducing adverse selection. High-risk and low-risk applicants are likely to select different price-quantity combinations, thereby revealing their perceived level of risk to insurers. Specifically, Rothschild and Stiglitz predict a separating equilibrium in which high-risk applicants will buy relatively more insurance at a higher price, while low-risk applicants will buy less at a lower price.[4]

Puelz and Snow (1994) expand on the framework provided by Rothschild and Stiglitz to show specifically how insurers respond to adverse selection. They focus primarily on the relation of deductibles to price. According to Puelz and Snow, insurers first screen the pool of applicants and categorize them based on observable traits that relate to risk. They then offer various combinations of prices and deductibles to applicants within each risk category. Lower prices are offered in tandem with higher deductibles. Lower-risk applicants are expected to signal their status by selecting high-deductible policies. Puelz and Snow find support for these expectations based on results generated from one auto insurer's data.

Our observations indicate that insurers in DII markets use pricing methods similar to those found by Puelz and Snow for the automobile insurance industry. In DII markets, insurers first use the observable traits of age, gender, and occupation to place applicants in risk categories. Then, applicants in each risk category are offered a menu of prices and contractual provisions, including a variety of elimination periods. Because elimination periods essentially are deductibles and the levels selected by DII applicants serve as signals of riskiness to insurers, we expect a particularly strong relation to policy price.

Another way that insurers can control adverse selection is by marketing through brokers who are closer to the point of purchase and, therefore, should generate better estimates of applicants' health risks. Indeed, most of the larger DII providers use brokerage arrangements to distribute their products. Unlike the life insurance market, direct retailing and mass merchandising in the DII market are not common.[5] Because of our data limitations, however, assessing the impact of alternative distribution systems is beyond the scope of this study.

III. Characteristics Affecting Disability Income Insurance Prices

A. Contractual Attributes of Disability Income Insurance Products

1. Elimination Period

As explained previously, applicants' selections of particular elimination periods signal insurers as to their unobservable health status. Because insurers should heavily rely on this characteristic as an indicator of applicant risk and because longer elimination periods, by definition, reduce total benefits paid in the event of a disability, we anticipate a very strong, negative relation between price and elimination period.

2. Definition of Disability

The definition of disability is critical in determining whether insureds qualify as disabled for purposes of receiving claim payments. Buyers' applications for policies with particular definitions can provide signals to insurers about applicants' perceived health. Such decisions also can signal the applicants' levels of risk aversion, however.

Most insurers offer either "own occupation" or "any occupation" definitions of insurance.[6] The own occupation definition is considered more liberal because insureds must lose only their ability to perform the principal duties of their present occupations to qualify for benefits. Under the any occupation definition, insureds must be unable to perform the primary duties of any occupation for which they are suited by training, experience, or education. Many DII policies contain "split" definitions in which the own occupation criterion applies for a specified period, such as two years, and the any occupation standard applies thereafter. Because the own occupation definition is more liberal, we expect a positive relation between DII price and the time period for which this definition applies.

3. Prexisting Conditions

Most DII contracts contain a preexisting conditions clause. If a disability eventually arises out of an injury or illness incurred within a specified period—such as six months—before the policy was initiated, benefits will not be paid. Insurers include such a provision to prevent the adverse selection that would occur if applicants could begin receiving insurance coverage after probable health problems were revealed. Because longer exclusion periods reduce expected benefit payments to insureds, we anticipate a negative relation between the length of the exclusion period and policy price.

4. Residual Disability Benefit

DII policies vary considerably with respect to the treatment of partial disability. Some specify no benefits whatsoever unless insureds meet the total disability definition. Others provide payment of "residual" benefits only if the partial disability follows a previous total disability. The most liberal clause pays benefits for a partial disability whether or not it is immediately preceded by a period of total disability. The residual disability benefit is stated as a percentage, usually based on insureds' weekly work hours during their partial disability, of the total disability benefit.

Adding a residual disability provision to a DII contract can provide incentives for insureds to malinger. Many insurers offer a generous residual benefit structure, however, to increase disabled insureds' incentives to return to work, thereby reducing the likelihood of extended, total disabilities. Generally, a residual disability benefit should raise insureds' expectations of receiving benefits and, therefore, be positively reflected in DII prices. These prices should be further enhanced if residual disability benefits are not conditional on an immediately preceding total disability.

5. Other Contractual Provisions

Other policy provisions are used to control the risk facing insurers. These include clauses addressing causes of loss (e.g., sickness and accident), benefit amount and duration, and

participating dividends. In this study, we are able to control for causes of loss and benefit amounts and durations by analyzing only policies with identical provisions.[7] The participation factor is perfectly proxied by the organizational form variable, which is among the insurer characteristics discussed below.

B. Insurer Characteristics

1. Organizational Form

The major DII insurers have either a stock or mutual (or mutual-like) organizational structure. To explain the effects of organizational structure on the corporate policies of insurers, Mayers and Smith (1981) developed the Managerial Discretion Hypothesis (MDH). They posit that mutual firms have a comparative advantage in insurance lines where less managerial discretion is required: for example, where stable actuarial tables and long-term contracts are the norm and where renewal options are relatively valuable (Mayers & Smith, 1981; Smith, 1986). Although the sensitivity of disability claims to economic changes over time may make actuarial tables somewhat less stable than those for life insurance, the DII market is characterized by relatively well-defined actuarial experience, long-term contracts, and the great importance of renewal options. If the costs of controlling insurer management are lower for mutual firms in such an environment, then consumers will discount prices for DII issued by stock insurers. Stock firms can overcome this disadvantage, however, if stockholders agree to limit dividend, investment, and financing policies (Mayers & Smith, 1981).

The evidence regarding the impact of organizational form on insurance prices is both scant and mixed. Myers and Pritchett (1983) observed higher premiums for the participating life insurance policies issued by mutual insurers versus those issued by stock insurers. Walden (1985) did not find organizational form to be a significant factor affecting life insurance prices when other contract and insurer variables were considered, however. Given the conflicting empirical evidence and the countervailing theoretical arguments of Mayers and Smith, we cannot predict the direction of any relation between organizational form and DII prices.

2. Default Risk

In well-functioning markets, insureds should discount prices of DII issued by insurers with greater default risk. We expect a negative relation between DII prices and the default risk of insurers. Further, we expect buyers of longer duration policies to be relatively more concerned with default risk because of the greater magnitude of their potential claims.

3. Market Share

Higgins, Shughart, and Tollison (HST; 1989) show that firms with larger market shares strive to acquire more market information and this leads to greater variation in both price and such non-price characteristics as product quality. HST conclude that higher market share will increase the degree to which differentiated price-quality combinations are offered to consumers. If larger firms are able to command premium prices by offering attractive non-price characteristics, as suggested by both HST and Carlton (1986), the relation between market share and DII prices will be positive.

IV. Research Design

A. Data

Our data encompass DII prices for 54 insurers at year-end 1988 collected from National Underwriter Company's 1989 Disability Income & Health Insurance. These data allow us a relatively large number of observations, because after 1988 many large insurers began marketing products of the largest DII issuers via private labelling or co-marketing agreements (Conning & Company, 1993, pp. 48–50). Discount rates are derived from seasoned U.S. Treasury bond rates as of December 30, 1988.

To estimate default risk, we use Insurance Regulatory Information System (IRIS) ratios published by the National Association of Insurance Commissioners (NAIC; 1989). The NAIC uses the 12 IRIS ratios as an initial screen of insurer solvency. Insurers with four or more ratios outside defined "usual ranges" for each ratio are reviewed more closely by regulators to determine if remedial measures must be taken. Market shares are calculated from survey data published by LIMRA (1989).

B. Method

1. Test Model

The characteristics model, first introduced by Lancaster (1971), allows the hedonic decomposition of prices. We employ OLS regression to estimate the DII pricing relation. Jones (1988) verifies that this approach is robust over nonlinear price functions and different market structures. Our model follows:

$$DP = \gamma_0 + \gamma_1 EP + \gamma_2 PREX + \gamma_3 DEF + \gamma_4 RSID1 + \gamma_5 RSID1{*}\text{RSID2} + \gamma_6 ORG + \gamma_7 DRISK + \gamma_8 MS + \varepsilon \quad (1)$$

where:
- DP = price of the disability income insurance,
- EP = elimination period,
- DEF = definition of disability,
- $PREX$ = exclusion period for preexisting conditions,
- $RSID1$ = residual disability benefit (yes = 1; no = 0),
- $RSID2$ = contingency of residual disability benefit on previous total disability (no = 1; yes = 0),
- ORG = organizational form (mutual or fraternal = 1; stock = 0),
- $DRISK$ = default risk, and
- MS = market share.

We apply the model to policies with both long (to age 65) and short (two-year) durations.

2. Price Proxy

The proxy for DII price is the discounted present value, divided by $1,000, of annual standard-rate premiums over the duration of the policy.[8] The benefit amount is assumed to be $2,000 per month for a unisex-rated individual aged 35.[9] Unisex-rated policies are used because the larger DII providers generally offered such policies in 1988 and, as a result,

sample size is maximized.[10] The insurers in our sample account for approximately 40% of the DII premiums written in 1988.

3. Contract Options

The ratio of the elimination period to the maximum benefit period serves as the elimination period (*EP*) estimate. The proxy for the definition of disability (*DEF*) is the period for which the own occupation definition applies divided by the maximum benefit period. The preexisting conditions proxy (*PREX*) is the exclusion period applicable for preexisting conditions divided by the maximum benefit period.

Two binary variables represent the residual disability benefit. The first (*RSID1*) equals one if the policy includes a residual disability benefit and zero if not. The second (*RSID2*) equals one if the residual disability benefit is unconditional with respect to a previous total disability and zero if it is conditional. Because the *RSID2* variable applies only if a residual disability benefit exists initially, we include the product of the two proxies (*RSID1*RSID2*), which represents the interaction effect between the two, rather than the *RSID2* proxy itself. Consequently, we must consider the coefficients for both *RSID1* and *RSID1*RSID2* in tandem.

4. Insurer Characteristics

We use a binary variable to denote organizational form (*ORG*), with one indicating a mutual or fraternal structure and zero a stock firm. The default risk proxy (*DRISK*) is the percentage of 12 IRIS ratios for each insurer that fall outside the "usual range" defined by the NAIC. The market share proxy is the percentage of 1988 DII premiums written by each company compared to the industry total.

C. Limitations of the Research Design

The screening of DII policies for homogeneous risk categories—such as those based on age, gender, and occupation—and product attributes—such as benefit levels and duration—necessarily reduces sample size. Response bias in the data may exist because insurers voluntarily report to National Underwriter, but we cannot predict the direction of any such bias. We also cannot be certain that all the policies in our data set are representative of what each insurer actually sells. In some instances, information on a contract provision may not be published in the data source. We then assume this provision does not exist, which may not always be true. Finally, we do not have data to test for effects of alternative distribution systems and claims practices, so these remain outside the scope of this study.

V. Empirical Results and Discussion

Table 1 contains selected statistics for the data gathered from the full sample of 44 policies providing benefits to age 65. As shown by these results, the annual premium per $100 of monthly benefit varies widely between these policies. Elimination periods also vary substantially—from 30 to 180 days. Over half the policies contain a 30-day elimination period, however. Although we are certain that most insurers routinely offer a range of

TABLE 1
Selected Statistics for the Full Sample of Policies with Durations to Age 65

Variables	*Mean*	*Std. Dev.*	*Minimum*	*Q1*	*Median*	*Q3*	*Maximum*	*Number > 0*
Premium	42.04	9.36	24.70	34.50	40.94	49.40	67.19	44
Elimination period	48.41	32.49	30	30	30	75	180	44
Preexisting conditions	.57	.90	0	0	0	2	2	13
Residual disability	.57	.50	0	0	1	1	1	25
Organizational form	.41	.50	0	0	0	1	1	18
IRIS ratios	1.02	.98	0	0	1	2	3	27

Notes: Premium = annual premium per $100 monthly benefit; Elimination period = number of days in elimination period; Preexisting conditions = number of years in period stated in preexisting conditions clause; Residual disability = 1 if residual disability benefit exists, 0 otherwise; Organizational form = 1 if mutual or fraternal insurer, 0 otherwise; IRIS ratios = number of IRIS ratios outside NAIC-prescribed range.

elimination periods, the prices published for each insurer in our data source generally reflect only one, and at most two, elimination periods.

The statistics for the preexisting conditions and residual disability provisions indicate that many insurers do not offer these provisions. As stated previously, however, these options may be offered but not published in our data source. Although not contained in Table 1, the statistics for the definition of disability variable show that 40 of the 44 policies contain some form of "own occupation" definition. Consequently, pricing anomalies among the few "any occupation" policies easily can produce spurious test results. The results for the IRIS ratios indicate that most of the insurers in the sample were quite solvent and none were targeted for regulatory attention. Thus, solvency distinctions based on IRIS ratios are quite subtle at best for the sample insurers.

Table 2 contains regression results for DII policies with benefit durations to age 65. Regression (1) accounts for all available policies, including those issued by insurers for which no market share is available. As expected, a strongly negative relation between price and the elimination period is apparent. No other characteristics are significant, however. We do not find this surprising in that some insurers in the full sample may be relatively inactive and their policies not competitive, even though they publish pricing information.

The condition index, a measure of collinearity developed by Belsley, Kuh, and Welsch (1980), is relatively low for all the regressions reported in Table 2. Greene (1990) suggests that collinearity is not a problem unless the condition index exceeds 20. We also applied the Breusch-Pagan test for all the reported regressions and we cannot reject homoscedasticity at the .001 level, so heteroscedasticity is not a problem in our data set.

In Regression (2), we test only the policies of insurers for which we have market share data. The goodness-of-fit improves, as evidenced by the increase in the coefficient of determination (adjusted R^2), despite the loss of five observations. The elimination period remains significantly negative at the .01 level and the market share coefficient is significantly positive, as expected, at the .01 level. The latter finding supports the premise that insurers serving as market leaders devise attractive packages of both price and non-price—for example, quality and service—factors.

To further assure that the data we are using is representative of competitive market conditions, we next analyze only the policies of insurers with a minimum market share of

TABLE 2
Regression Results for Unisex Pricing of Disability Income Insurance With Durations to Age 65

Regression Number	*Independent Variables (Expected Sign)*[a]									*Statistics*		
	INT	*EP (–)*	*DEF (+)*	*PREX (–)*	*RSID1*	*RSID1*RSID2 (Combined +)*	*ORG (?)*	*IRIS (–)*	*MS (+)*	*Adjusted R^2*	*Condition Index*	*Observed*
(1)	12.4*	–469.2*	–.737	.224	–1.23	1.15	.356	–1.63	—	.391	8.55	44
	(.803)	(90.52)	(.693)	(9.68)	(.715)	(.787)	(.607)	(3.38)	—			
(2)	11.3*	–455.0*	–.579	1.71	–.395	.752	–.527	–1.81	30.5*	.512	.949	39
	(.804)	(84.9)	(.692)	(10.54)	(.786)	(.761)	(.628)	(3.50)	(10.1)			
(3)	12.1*	–447.1*	–1.61	1.08	–2.19**	2.50**	–.457	1.10	27.4*	.618	11.36	31
	(.966)	(91.3)	(.907)	(11.14)	(1.02)	(1.04)	(.635)	(3.73)	(9.8)			

Notes: Prices are discounted values of annual premiums for an individual age up to 35 years.
[a]INT = intercept; DEF = ratio of "own occupation" duration to total policy duration; PREX = ratio of duration for preexisting conditions clause to total duration; EP = ratio of elimination period to total duration; RSID1 = 1 if residual disability benefit offered, O otherwise; RSID2 = 1 if residual disability benefit not conditional on previous total disability, O otherwise; RSID1*RSID2 = interaction effect; ORG = 1 if mutual or fraternal insurer, O if stock insurer;
DRISK = number of IRIS ratios outside NAIC-prescribed range divided by total ratios required; MS = market share. Values in parentheses are standard deviations.
*Significant at the .01 level.
**Significant at the .05 level.

TABLE 3
Regression Results for Unisex Pricing of Disability Income Insurance With Two-year Durations

Regression Number	*Independent Variables (Expected Sign)*[a]									*Statistics*		
	INT	*EP (–)*	*DEF (+)*	*PREX –)*	*RSID1*	*RSID1*RSID2 (Combined +)*	*ORG (?)*	*IRIS (–)*	*MS (+)*	*Adjusted R^2*	*Condition Index*	*Observed*
(1)	1.09*	–5.05*	.056	.072	–.162	.157	.169	–.204	—	.395	16.88	25
	(.224)	(1.47)	(.178)	(.102)	(.126)	(.119)	(.113)	(6.31)	—			
(2)	1.04*	–4.77*	–.057	.052	–.085	.205	–.094	.334	5.04**	.532	18.43	20
	.237)	(1.48)	(.193)	(1.22)	(.144)	(.126)	(.140)	(.714)	(1.85)			
(3)	.928*	–4.60*	–.067	.206	–.412**	.486*	–.275	2.11**	5.92*	.734	18.01	17
	(.209)	(1.25)	(.157)	(.116)	(.166)	(.140)	(1.30)	(.865)	(1.58)			

Notes: Prices are discounted values of annual premiums for an individual aged 35. For definitions of variables, see Table 2.
*Significant at the .01 level.
**Significant at the .05 level.

one percent in Regression (3). Despite the loss of eight more observations, the adjusted R^2 increases by over 10 percentage points to 61.8%. The elimination period and market share coefficients again are significant in the expected directions. Both the residual disability coefficients also are significant at the .05 level, but exhibit opposite signs. To assess the combined effect for residual disability, we add the *RSID1* coefficient to the product of the second coefficient (*RSID1*RSID2*) multiplied by the *RSID1* value (zero or one) for each policy in the subsample. The resulting effect is indeterminate as price is positively related to the residual benefit clauses for only 15 (48%) of the insurers in the subsample.

Table 3 exhibits regression results for unisex-rated policies with relatively short, two-year durations. The coefficients for the elimination period and market share are significant and in the expected direction for all three regressions. Results for the residual disability variables again are mixed, although the combined effect is significantly positive for the majority of firms in the reduced sample of more active DII insurers, as shown by Regression (3).

One abnormal result is the positive relation, significant at the .05 level, between default risk (*DRISK*) and price for the reduced sample examined in this regression. This may be a spurious result because our IRIS proxy does not greatly discriminate between all sample insurers, as we explained previously, and this subsample is very small. Another possible explanation is that buyers of very short duration policies should be less sensitive to default risk than are buyers of long-term policies because they have much less at risk. We also note that, because of historically low failure rates in the life insurance industry, insureds may have been little concerned with insurer solvency risk in 1988. The failures of such visible life/health insurers as Executive Life, First Capital, and Mutual Benefit have changed public perception of insurer default risk in subsequent years.

VI. Summary and Conclusions

In our analysis, we show that the individual disability income insurance (DII) market is similar in many ways to the more heavily researched life insurance market. Our empirical results indicate that DII prices effectively impound several contractual and insurer characteristics in a manner consistent with a competitive environment. Even though our data set is limited and subject to some strong assumptions, our results show that elimination period provisions and insurers' market share are strongly related to DII prices, while residual disability benefits also are significant factors in some instances.

Given the incentive structure of the individual DII market, we expect insurers to face adverse selection. In this environment, we expect them to offer a broad menu of deductibles to distinguish between high- and low-risk applicants. Our results confirm that insurers do offer a wide variety of elimination periods and that these provisions are quite important in determining DII prices. Such evidence is generally supportive of a scenario in which adverse selection is present.

From the individual's perspective, our results show that the elimination period is a very important pricing factor and that low-risk buyers are given substantial price incentives to choose longer elimination periods. Whether high-risk buyers should do the same is a central economic question that we cannot resolve, however. Our results also indicate that individuals willing to forgo non-price attributes, such as service, can extract lower prices from smaller

DII providers. Finally, our findings provide a preliminary indication that disability definitions, preexisting conditions clauses, and insurer solvency may not be fully impounded in DII prices. If subsequent investigations confirm these results, then individuals need to be better informed about these factors by financial advisors and educators.

Because of data limitations, we cannot provide a direct test of adverse selection in the DII market. We anticipate that further refinement of the theory of adverse selection and direct testing will provide more definitive answers as to why individuals' purchase rates are so low. Efforts exploring the impact of insurers' claims practices and their marketing and distribution policies on adverse selection also represent potential contributions. Alternative data sets also may advance our knowledge with respect to contractual and insurer characteristics that did not have a significant impact on prices in our study. New research initiatives inevitably will face difficult constraints, however, because the available public data are quite limited and this problem is likely to be exacerbated as market power becomes increasingly concentrated within a small group of insurers.

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NOTES

1. According to the Life Insurance Marketing and Research Association (LIMRA; 1989), the largest provider of individual disability income insurance wrote only 12.6% of premiums written on both guaranteed renewable and noncancellable policies combined in 1988. The top four insurers accounted for only 37.2% of the market surveyed by LIMRA. More recent information, discussed below, indicates increasing market concentration since that time.

2. The Life Insurance Fact Book (American Council of Life Insurance, 1994) indicates that 67% of all adults own some type of life insurance, while Cox, Gustavson, and Stam (1991) find that only 22% of U.S. earners own DII.

3. For further discussion of the elimination period and how it varies from a probationary period or time deductible, see Fluet (1992).

4. Other researchers, most notably Wilson (1977) and Miyazaki (1977), disagree with Rothschild and Stiglitz's view of a separating equilibrium. They theorize a pooling equilibrium in which both high-risk and low-risk applicants purchase insurance at the same price, such that low-risk applicants subsidize their high-risk counterparts.

5. One exception is the direct marketing of accidental disability insurance by banks to cover individuals' monthly mortgage payments.

6. A growing minority of policies contains definitions based upon the percentage of income lost. Such "loss of income" definitions can be either more or less generous than ones with own occupation definitions, depending upon the specific terms.

7. We initially examined renewability provisions, which should be of great value to insureds. All firms in our sample offered renewability clauses, but between-firm differences were small. We now omit them from our analysis because they provide no incremental explanatory power with regard to prices.

8. Annual DII premiums are discounted by seasoned, U.S. Treasury Bond rates for bonds with maturity dates equal to the benefit duration.

9. No dividend schedules for the sample policies are provided by our data source. Our anecdotal evidence indicates that major insurers issuing policies labeled as participating by National

Underwriter do not publish such schedules, although they do so for life insurance products. In fact, representatives of several large mutual insurers informed us that dividends are rarely, if ever, declared on DII policies.

10. At the time of this writing, many leading DII issuers are returning to gender-based pricing by charging females higher rates (Blease, 1995). Although the frequency of disability during the working lifetime has been greater historically for cohorts of females (see Cox, Gustavson, & Stam, 1991), recent industry experience now indicates that loss severity is higher for females, too (Conning & Company, 1993).

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