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# **An International Analysis of Life Insurance Demand**

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## **ABSTRACT**

The service sector of the world economy has grown substantially since World War II. The worldwide insurance industry has had an average annual growth rate of over 10 percent since 1950. During the mid-1980s, the international life insurance industry grew at an average annual rate greater than 25 percent. This article identifies factors that lead to variations in the demand for life insurance across countries. Important factors are found to be the dependency ratio, national income, government spending on social security, inflation, the price of insurance, and whether Islam is the predominant religion in a country.

## **Introduction**

The service sector of the world economy has grown substantially since World War II. In 1989, the service sector accounted for approximately 60 percent of the world's gross domestic product (United Nations Conference on Trade and Development, 1990). The worldwide insurance industry, which makes up a significant portion of the service sector, has grown at a rate of over 10 percent annually since 1950. This growth rate has far exceeded that of economic development globally (United Nations Conference on Trade and Development, 1972, 1991; Dowling, 1982; and Swiss Reinsurance Company, 1990a). Table 1 presents data on the worldwide insurance industry, which has grown even more rapidly in recent years, at a rate of approximately 24 percent annually from 1984 to 1988.

Rapid growth in the life insurance sector has contributed much to this increase. The life insurance industry has grown at a rate of approximately 30 percent annually, while the nonlife industry has grown at a rate of 19 percent annually during this period. The share of total insurance premium volume accounted for by life insurance first exceeded the share of nonlife business in

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**Table 1**  
World Premium Volume in 1984 and 1988

|      | Premiums in Millions of U.S. Dollars |         |         | Percent Share in Total |         |      |
|------|--------------------------------------|---------|---------|------------------------|---------|------|
|      | Total                                | Nonlife | Life    | Total                  | Nonlife | Life |
| 1984 | 498,000                              | 281,500 | 216,500 | 100                    | 57      | 43   |
| 1988 | 1,171,000                            | 555,100 | 615,900 | 100                    | 47      | 53   |

Source: Swiss Reinsurance Company (1986, 1990b).

1987, and the gap has widened since that time (Swiss Reinsurance Company, 1990b). The share attributable to the life insurance sector increased from 43 percent of the total premium volume in 1984 to 53 percent in 1988. The life insurance industry has grown from 2.1 percent of world gross domestic product in 1984 to 3.4 percent in 1988.

While the worldwide insurance market, especially the life insurance market, has grown rapidly and the internationalization of the insurance business is becoming more widespread, these areas have not been greatly researched. Skipper (1987) classified and discussed the nature of protective barriers in international insurance services and provided an analysis of the protectionists' rationales. Shroath and Korth (1989) examined the foreign market entry patterns of U.S. property-liability insurers. Beenstock, Dickinson, and Khajuria (1988) studied the relationship between property-liability insurance expenditures and income for 12 industrialized countries. Outreville (1990) investigated the relationship between property-liability insurance premiums and the economic and financial development of 55 developing countries. Weiss (1991) examined the productivity of the property-liability insurance industries in the United States, West Germany, Switzerland, France, and Japan. Cummins (1973) studied the effect of macroeconomic variables on the U.S. life insurance industry and found life insurance and insured pension reserves are correlated with GNP and permanent income.

This article identifies the factors that lead to variations in the demand for life insurance across nations. In the next section, we set forth a model of the demand for life insurance. Each of the factors expected to affect the demand for life insurance is discussed and the hypotheses of the study are formulated. The empirical model used to test the hypotheses is then presented. The article concludes with a discussion of the major findings and suggestions for future research.

### The Theory of the Demand for Life Insurance

Theoretical models of the demand for life insurance have been derived by Yaari (1965), Fischer (1973), Pissarides (1980), Campbell (1980), Karni and Zilcha (1985, 1986), Lewis (1989), and Bernheim (1991). The models view life insurance as the means by which uncertainty in the household's income stream, related to the possible premature death of a household's primary wage earner, is reduced.

Lewis's (1989) treatment of the demand for life insurance differs from prior studies by setting the household's goal as maximization of the beneficiaries' expected lifetime utility. Earlier studies were based on the assumption that life insurance is purchased to maximize the lifetime utility of the individual purchasing the life insurance product, the primary wage earner. Lewis's analysis is consistent with the life insurance literature that suggests life insurance should be purchased to satisfy the needs of survivors (see, for instance, Rejda, 1986). His model does not explicitly rely on the primary wage earner having a bequest motive. However, it does require that the preferences of the beneficiaries be the basis for the amount of life insurance purchased by the household.

In Lewis's model there are two types of beneficiaries—a spouse and children. The spouse has a bequest motive and a capital stock at the time of the wage earner's death. The offspring have neither. Lewis finds that the amount of insurance which must be carried on the life of the primary wage earner to maximize the lifetime utility of any one child is given by the equation

$$(1 - Lp_i)f_i^* = \max \left\{ \left[ \frac{1 - Lp_i}{L(1 - p_i)} \right]^{1/\delta} C_i^* - b_i, 0 \right\}, \quad (1)$$

where  $L$  = the life insurance policy loading factor,

$p_i$  = the probability of the primary wage earner's death during age  $i$  of the child,

$f_i^*$  = the face value of the optimal life insurance policy,

$\delta$  = a measure of the child's degree of relative risk aversion,

$C_i^*$  = the present value of the child's consumption stream given that the wage earner survives until the child is no longer a dependent, and

$b_i$  = the child's bequest.

Lewis shows that when the child does not receive a bequest and the probability of death of the wage earner is small equation (1) is approximated by

$$f_i^* = \left( \frac{1}{L} \right)^{1/\delta} C_i^*. \quad (2)$$

Equation (2) states that for any one child the optimal level of life insurance on the wage earner is inversely related to the life insurance loading fee and directly related to the child's degree of risk aversion and the present value of consumption of the child if the wage earner survives until the child is mature.

The amount of life insurance that must be carried on the wage earner's life to maximize the lifetime utility of the spouse is given by

$$(1 - Lp_i)f_i^* = \max \left\{ \left[ \frac{1 - Lp_i}{L(1 - p_i)} \right]^{1/\delta} C_i^* - K_i + \frac{B}{(1+r)^{\tau-i}}, 0 \right\}, \quad (3)$$

where  $K_i$  is the human capital of the spouse at age  $i$ . The spouse is assumed to live with certainty until age  $\tau$  at which time the spouse is constrained to leave

a bequest of size  $B$ . The discount rate is  $r$ . All other terms are as previously defined.

Assuming that all family members have the same degree of risk aversion, the family's optimal purchase of life insurance on the wage earner's life is determined by summing the optimal amount of life insurance on the wage earner's life desired by each family member. This amount,  $F$ , is given by the equation

$$(1-L_p)F = \max\left\{\left[\frac{1-L_p}{L(1-p)}\right]^{1/8} TC - W, 0\right\}, \quad (4)$$

where  $TC$  is the present value of consumption from the current period to the age of each offspring at which he or she leaves the household and to age  $\tau$  of the spouse, assuming that the wage earner survives.  $W$  is household wealth net of the spouse's bequest.

Equation (4) indicates that life insurance consumption increases with the wage earner's probability of death and the present value of the family member's consumption, assuming that the wage earner survives. Life insurance consumption also increases with the family's degree of risk aversion. Life insurance consumption is negatively related to the policy loading charge and the family's wealth.

### Factors Affecting the Demand for Life Insurance

Here, we apply Lewis's theoretical findings to the analysis of the international demand for life insurance by assuming that the inhabitants of a country are homogeneous relative to those of other countries. Therefore, in the empirical estimation of the demand model, mean national values of variables represent a typical household in that country.

Lewis's model suggests that a number of variables may explain international differences in insurance demand. Variations in life expectancy are hypothesized to affect the demand for insurance to the extent that life expectancy is correlated with the probability of death in a country. Lewis's finding that the present value of family members' future consumption contingent upon the wage earner's survival is positively correlated with insurance demand suggests that national income, a country's dependency ratio, and the portion of the young adult population pursuing third-level education would all affect the demand for insurance. The degree of risk aversion in a country may be related to the predominant religion, and, therefore, religion may affect the demand for life insurance.

Social security payments by the government also may affect the demand for insurance as these payments represent a source of income to recipients contingent upon the wage earner's survival. In this way, social security payments are a source of income in Lewis's model. However, social security may also represent a substitute for private insurance analogous to wealth in Lewis's model.

The policy loading charge, or the price of insurance, is expected to be negatively correlated with the demand for life insurance. A variable representing the expected rate of inflation also is included in the demand model. In Lewis's one-period model, the inflation rate is not included as a determinant of life insurance demand. However, Babbel's (1981) empirical research has shown that inflation is an important determinant of the demand for life insurance. Babbel and Staking (1983) found that increases in interest rates result in an increase in the real cost of cash value life insurance products.

Beyond the scope of this study are factors that affect the supply of insurance in different countries, including differences in production costs, governmental regulation, tax policy, and trade barriers. It is reasonable to assume that when less insurance is supplied the price of insurance will be higher and the amount consumed will be lower. A price variable, which implicitly controls for differences in costs, is included in one version of the model.

### *Life Insurance Consumption*

Prior research on life insurance consumption typically has used premium expenditures as the measure of insurance consumption (see, for instance, Hammond, Houston, and Melander, 1967; Ducker, 1969; Anderson and Nevin, 1975; Ferber and Lee, 1980; Goldsmith, 1983; Burnett and Palmer, 1984; and Beenstock, Dickinson, and Khajuria, 1986). However, in addition to factors affecting the demand for life insurance, premiums may vary significantly from country to country due to differences in the types of policies sold, the costs of writing life insurance, governmental regulation, and the competitiveness of the insurance market. For these reasons, life insurance premiums are not a perfect measure of insurance coverage.<sup>1</sup> Premium data have been widely used as a measure of coverage primarily because of their availability. As with most prior studies of life insurance consumption, ours employs premiums as a measure of insurance coverage, thus allowing for direct comparison with earlier work. Premiums are also used because premium data are available for far more countries than other measures of insurance.

The second measure of insurance coverage used in this study is life insurance in force, the sum of the face values of life insurance policies in effect in each country.<sup>2</sup> This variable is superior to premiums because it more accurately measures the extent of protection against premature death.

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<sup>1</sup> International life insurance premium data bundle together premiums for term policies, cash value policies, and annuities. Since life insurance and annuities are purchased to cover opposite risks, premature death and superannuation, respectively, their being bundled together in the premium data reduces the likelihood that significant relationships will be found between the variables hypothesized to affect insurance consumption and the amount consumed.

<sup>2</sup> The life insurance in force data are from the American Council of Life Insurance (ACLI). The data represent insurance on the lives of residents of the respective countries written by both domestic and foreign insurers. The ACLI reports that in a few cases annuities are included. Also, in a few cases, insurance issued by foreign insurers is not included and insurance issued by governmental agencies is.

### *Dependency Ratio*

An empirical study by Hammond, Houston, and Melander (1967) and a theoretical article by Campbell (1980) both found that one of the main purposes of life insurance is to protect dependents against financial hardship in the case of the wage earner's premature death.<sup>3</sup> This is consistent with the findings of Lewis, Beenstock, Dickinson, and Khajuria (1986) and Truett and Truett (1990) have provided empirical evidence that the consumption of life insurance and the number of dependents in a country are positively related.

The average number of dependents per potential life insurance consumer in a country is approximated by the dependency ratio. There are several definitions of a nation's dependency ratio. This study relies on the United Nations' definition; that is, the ratio of the total number of children under 15 to the total number of persons between 15 and 64.<sup>4</sup>

### *Religion*

The demand for life insurance in a country may be affected by the unique culture of the country to the extent that it affects the population's risk aversion (Douglas and Wildavsky, 1982). Henderson and Milhouse (1987) argued that an individual's religion can provide insight into the individual's behavior; understanding religion is an important component of understanding a nation's unique culture.

Zelizer (1979) notes that religion historically has provided a strong source of cultural opposition to life insurance; many religious people believe that a reliance on life insurance results from a distrust of God's protecting care. Until the nineteenth century, European nations condemned and banned life insurance on religious grounds. Zelizer also states that religious antagonism to life insurance still remains in several Islamic countries.

Wasaw (1986) tested the effect of Islam on life insurance consumption using an international data set. The results of his study indicated that, *ceteris paribus*, consumers in Islamic nations purchase less life insurance than those in non-Islamic nations. Therefore, it is hypothesized in this study that life insurance consumption is less in predominantly Islamic countries than in countries that are not predominantly Islamic.<sup>5</sup>

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<sup>3</sup> Empirical work by Ducker (1969), Berekson (1972), Anderson and Nevin (1975), Goldsmith (1983), Burnett and Palmer (1984), and Fitzgerald (1987) also considered the number of children as a determinant of individual life insurance consumption.

<sup>4</sup> A second dependency ratio, referred to as the total dependency ratio, is calculated by dividing the sum of children under 15 and adults aged 65 and over by the total number of persons aged 15-64. This ratio was used in a separate analysis. The results were not significantly different when this ratio was used.

<sup>5</sup> Although it may be argued that the reduced consumption of life insurance may be more attributable to severe governmental restrictions on the sale of life insurance and religious pressure than to a low degree of risk aversion, the supply restrictions and religious teachings may be thought of as emblematic of a society that is relatively low in its degree of risk aversion.

For the purposes of this study, a country is considered predominantly Islamic if more than half of the population follows Islam (see Table 2).<sup>6</sup>

**Table 2**  
Islamic Nations Included in the Sample

|          | <i>Percent of Population<br/>that Is Muslim</i> |
|----------|-------------------------------------------------|
| Egypt    | 94                                              |
| Iran     | 98                                              |
| Morocco  | 99                                              |
| Pakistan | 97                                              |
| Tunisia  | 99.5                                            |
| Turkey   | 99                                              |

### *Income*

Lewis (1989), Hakansson (1969), Fischer (1973), Fortune (1973), and Campbell (1980) have shown that the demand for life insurance is positively correlated with income. As income increases, life insurance becomes more affordable. In addition, the need for life insurance increases with income as it protects dependents against the loss of expected future income due to premature death of the wage earner. Using aggregated national data, Fortune (1973), Beenstock, Dickinson, and Khajuria (1986), and Truett and Truett (1990) have demonstrated that life insurance premium expenditures and national income are positively correlated.

Previous international studies of life insurance consumption have used gross national product (GNP) and gross domestic product (GDP) as measures of income. However, GNP and GDP less accurately reflect the amount of disposable personal income in a country than the national income measure used in this study. Because national income measures the income earned by the factors of production, this value is a better measure of income than GNP or GDP (Ruffin and Gregory, 1990). National income is defined as GNP minus depreciation (capital consumption) and indirect business taxes. Because national income is closer to disposable personal income than GNP, it is a more accurate measure of income than GDP or GNP.<sup>7</sup> Hence, our empirical model uses national income as a proxy for disposable personal income, which is unavailable.

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<sup>6</sup> A version of the model was estimated using a series of indicator variables for different religions in addition to Islam. These additional variables were found to have no effect and were omitted.

<sup>7</sup> Disposable personal income is equal to national income minus corporate profits and social security contributions, transfer payments, and personal income taxes.

### *Social Security*

Social security programs may affect the demand for life insurance in several different ways. First, social security programs proxy national wealth. Social insurance programs typically require a long-term commitment of tax revenues. Wealthy countries, with richer tax bases, would therefore be expected to have more generous programs. As Lewis has shown, wealth is a substitute for life insurance, which suggests a negative relationship between life insurance consumption and national expenditures on social security.

However, the relationship between national expenditures on social security and life insurance consumption is ambiguous *a priori*. To the extent that social security pension benefits cease upon the wage earner's death and are not replaced by survivorship benefits, the social security benefits represent a household asset that increases family consumption as long as the wage earner survives. As such, social security expenditures may be positively correlated with life insurance consumption.

Social security benefits are measured by aggregate government spending on social security. Disaggregated data by benefit type, which would be preferable, were not widely available.

### *Expected Inflation Rate*

Greene (1954), Fortune (1973), and Babbel (1981) have shown that inflationary expectations have a significant negative impact on life insurance consumption. Inflation erodes the value of life insurance, making it a less desirable good.

In an effort to mitigate the life insurance value erosion produced by inflation, insurers in many countries offer indexed life insurance policies whose face values are adjusted by some price index over time. Babbel (1981) showed with empirical data from Brazil that even the demand for indexed life insurance is reduced during inflationary periods. Since the death benefit of an indexed life insurance policy is typically adjusted only at the beginning of each year, to recover the value lost due to inflation during the previous year, the real value of life insurance is reduced if an insured dies during a year of high inflation.

Choate and Archer's (1975) delayed information hypothesis states that consumers' expectations of inflation rates are established by the inflation rate in prior years. Following this reasoning, we use the average inflation rate over the prior eight years in each country as a proxy for the expected rate of inflation.<sup>8</sup>

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<sup>8</sup> A two-year average was used in a separate version of the model, but the results of the analysis were not significantly different when the shorter rate was used.

### *Education Level*

Education lengthens the period of dependency. Therefore, in countries where individuals are educated over a longer period of time there should be a greater demand for life insurance. Moreover, a higher level of education may lead to a greater degree of risk aversion and more awareness of the necessity of insurance in general. Therefore, education is hypothesized to be positively related to life insurance consumption.

This study employs the enrollment ratio of third-level education, defined by the United National Educational Scientific and Cultural Organization (UNESCO), as the ratio of total enrollment in third-level educational institutions to the total population aged 20 to 24. Education at the third level is provided by different types of institutions, including universities, teacher-training institutes, and technical institutes.

### *Average Life Expectancy*

Average life expectancy is the number of years the average individual in a country is expected to live. This is used as a proxy for the probability of death. Because the probability of death is hypothesized to be positively related to the amount of life insurance consumed, average life expectancy is hypothesized to be negatively related to life insurance consumption.<sup>9</sup>

### *Policy Loading Charge*

The policy loading charge is proxied by the ratio of total expenditures on life insurance premiums to the amount of life insurance in force. This ratio is interpreted as the cost per dollar of life insurance coverage. Unfortunately, the available premium data do not differentiate between term and cash value products. In addition, the available premium data for a few of the countries in the sample include annuity premiums. Although disaggregated data would be preferable, such information is available for relatively few countries. A bias resulting from these data limitations is that our price measure is relatively higher in countries where more cash value insurance is purchased and where annuity premiums are included. Price is expected to be negatively related to insurance consumption. Table 3 summarizes our hypotheses.

## **Estimation of the Life Insurance Demand Model**

To test our hypotheses, ordinary least squares is used to estimate the following log linear equation:<sup>10</sup>

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<sup>9</sup> A second proxy for the probability of death, the death rate among 30-34-year-old males, was tested as well. Since the choice of proxy did not affect the findings of the study in any significant way, only the results using the average life expectancy variable are reported and discussed.

<sup>10</sup> The log linear specification is frequently used for estimating demand models. A desirable characteristic of this specification is that the estimated coefficients are interpreted as elasticities (see Deaton and Muellbauer, 1980).

$$\log(Y_i) = \beta_0 + \beta_1 \log(\text{DEP}_i) + \beta_2 \text{MUS}_i + \beta_3 \log(\text{INC}_i) + \beta_4 \log(\text{SSE}_i) + \beta_5 \log(\text{INF}_i) + \beta_6 \log(\text{EDUC}_i) + \beta_7 \log(\text{LE}_i) + \beta_8 \log(\text{P}_i) + e_i,$$

where,  $Y_i$  = life insurance per capita in country  $i$ ,  
 $\text{DEP}_i$  = dependency ratio in country  $i$ ,  
 $\text{INC}_i$  = income per capita in country  $i$ ,  
 $\text{SSE}_i$  = social security expenditures per capita in country  $i$ ,  
 $\text{INF}_i$  = expected inflation rate in country  $i$ ,  
 $\text{P}_i$  = insurance loading charge in country  $i$ ,  
 $\text{EDUC}_i$  = rate of third-level education in country  $i$ ,  
 $\text{LE}_i$  = Life expectancy in country  $i$   
 $\text{MUS}_i$  = Classification variable which takes the value of 1 if country  $i$ 's population is predominantly Islamic and 0 otherwise, and  
 $e_i$  = the random error term.

**Table 3**  
 Summary of the Predicted Signs  
 of the Regression Coefficients

| <i>Variable</i>    | <i>Hypothesized Sign</i> |
|--------------------|--------------------------|
| Dependency Ratio   | Positive                 |
| Islamic Nation     | Negative                 |
| Income             | Positive                 |
| Social Security    | Uncertain                |
| Inflation          | Negative                 |
| Education          | Positive                 |
| Life Expectancy    | Negative                 |
| Price of Insurance | Negative                 |

Three versions of the model were estimated. The model was estimated first with premiums as the measure of insurance consumption using data from 1987. Because most prior studies have used premiums as the measure of insurance consumption, the estimation of this model provides for direct comparison with earlier work. Further, since premium data were available for more countries than life insurance in force data, this estimation includes the greatest number of observations.

The second version of the model also uses data from 1987 but with life insurance in force as the measure of insurance consumption. Data were available from significantly fewer countries to estimate this model. The major advantages of this model are that life insurance in force is a more accurate measure of life insurance consumption than premiums and that the model allows for the inclusion of a proxy for the price of life insurance.<sup>11</sup>

<sup>11</sup> Data limitations precluded treating price as an endogenous variable. Because a complete structural model is not estimated, identification and simultaneity may be problems if supply is not infinitely elastic.

The final version of the model uses data from 1980 with life insurance in force as the measure of insurance consumption. Premium data are not available for 1980. This version of the model was estimated to test the temporal stability of the analysis. The year 1980 was chosen because it was a census year for many countries. Demographic numbers between census years are typically extrapolated.

Tests for heteroskedasticity and multicollinearity indicated that these assumptions of ordinary least squares estimation were not violated. A variance inflation factor test was used for multicollinearity; White's (1980) test failed to reject the hypothesis of homoskedasticity at the 5 percent level of significance.

### *Countries Included in the Study and Data Sources*

Previous studies using national data have analyzed consumers' life insurance purchasing behavior in either a single country or a very limited number of countries. One strength of the current study is that the sample of countries is spread throughout the world. Their national economies range from underdeveloped to advanced. See Appendix 1 for a list of the countries analyzed in the study, and see Appendix 2 for information on our data sources.

Following Fortune (1973), Babbal (1981), Beenstock, Dickinson, and Khajuria (1986), and Truett and Truett (1990), national data are converted to a per capita basis for the purposes of the study. Table 4 reports descriptive statistics for the variables included in the regressions.

### **Empirical Findings**

Table 5 reports the estimated parameters of the test equations and the corresponding t-statistics. The income variable is statistically significant and positively correlated with life insurance in all of the models. As income increases, life insurance becomes relatively more affordable. The estimated income elasticity in the model that includes the price proxy is 0.32.

The inflation variable is statistically significant and negatively related to life insurance in all models. This supports the hypothesis that inflation has a dampening effect on the amount of insurance purchased in a country.

The relationship between the dependency ratio variable and life insurance is significant in all models. These findings are consistent with prior studies by Hammond, Houston, and Melander (1967), Ducker (1969), Berekson (1972), Burnett and Palmer (1984), Beenstock, Dickinson, and Khajuria (1986), and Truett and Truett (1990), which showed that the number of dependents is positively correlated with life insurance consumption. Findings by Ferber and Lee (1980) and Goldsmith (1983) that the number of dependents is not positively related to the amount of insurance purchased are not supported by the current study.

The education variable is positively and significantly related to premiums in the 1980 life insurance in force model but not significant in either of the other

**Table 4**  
Variable Descriptive Statistics

|                  | <i>Data Set</i>   | <i>Mean</i> | <i>Standard<br/>Deviation</i> | <i>Minimum</i> | <i>Maximum</i> |
|------------------|-------------------|-------------|-------------------------------|----------------|----------------|
| Life Insurance   | 1987 <sup>a</sup> | ---         | ---                           | ---            | ---            |
| in Force         | 1987 <sup>b</sup> | 11,924      | 14,821                        | 5.57           | 71,880         |
| Per Capita \$    | 1980              | 5,301       | 6,408                         | 0.28           | 24,097         |
| Premiums Per     | 1987 <sup>a</sup> | 147.7       | 314.53                        | 4.26E-4        | 1,343.14       |
| Capita \$        | 1987 <sup>b</sup> | 186.25      | 342.10                        | 1.57E-3        | 1,343          |
|                  | 1980              | ---         | ---                           | ---            | ---            |
| Dependency Ratio | 1987 <sup>a</sup> | 48.70       | 23.09                         | 21.60          | 107.70         |
|                  | 1987 <sup>b</sup> | 42.70       | 18.21                         | 21.60          | 86.24          |
|                  | 1980              | 45.05       | 16.17                         | 27.40          | 84.30          |
| Islamic (1 if    | 1987 <sup>a</sup> | 0.13        | 0.34                          | 0              | 1              |
| Islamic nation,  | 1987 <sup>b</sup> | 0.11        | 0.31                          | 0              | 1              |
| 0 otherwise)     | 1980              | 0.04        | 0.19                          | 0              | 1              |
| Income Per       | 1987 <sup>a</sup> | 7,991       | 7,979                         | 1.12           | 28,830         |
| Capita \$        | 1987 <sup>b</sup> | 9,004       | 7,258                         | 15.04          | 19,377         |
|                  | 1980              | 7,178       | 4,827                         | 1.54           | 14,339         |
| Social Security  | 1987 <sup>a</sup> | 1,106       | 1,422                         | 4.9E-3         | 4,179          |
| Benefits Per     | 1987 <sup>b</sup> | 1,349       | 1,417                         | 1.54           | 4,007          |
| Capita \$        | 1980              | ---         | ---                           | ---            | ---            |
| Inflation        | 1987 <sup>a</sup> | 26.50       | 53.71                         | 1.20           | 290.50         |
|                  | 1987 <sup>b</sup> | 24.42       | 58.88                         | 1.30           | 290.50         |
|                  | 1980              | 1,986.48    | 10,080.27                     | 6.62           | 52,423         |
| Third-Level      | 1987 <sup>a</sup> | 24.19       | 13.78                         | 1.50           | 59.60          |
| Education %      | 1987 <sup>b</sup> | 28.98       | 12.07                         | 5.00           | 59.60          |
|                  | 1980              | 24.99       | 9.68                          | 11.20          | 56.00          |
| Life Expectancy  | 1987 <sup>a</sup> | 66.99       | 6.77                          | 48.80          | 75.54          |
|                  | 1987 <sup>b</sup> | 68.85       | 5.20                          | 57.50          | 75.54          |
|                  | 1980              | 69.83       | 4.49                          | 57.80          | 75.54          |

Note: The Muslim variable takes the value of 1 for the countries listed in Table 2 and 0 elsewhere.

<sup>a</sup> 1987 premium equation.

<sup>b</sup> 1987 life insurance in force equation.

two models. The inconsistent results prevent any firm conclusions from being drawn.

The classification variable Muslim is negative in all of the models and statistically significant in two. The results suggest that life insurance consumption is less in predominantly Islamic countries, other things equal.

The social insurance variable is significant and positively related to life insurance consumption in both models in which it appears. This is consistent with the hypothesis that pension benefits represent assets which individuals protect against premature loss. The hypothesis of a negative relationship, resulting from life insurance provided by social insurance programs substituting for private life insurance, is not supported by this study. However, the available data is not well suited to test this hypothesis. Disaggregated social insurance benefit payments data, which are available in very few countries, are needed.

**Table 5**  
**Analysis of the Variation in the Consumption of Insurance**

|                  | Life Insurance<br>in Force, 1980 <sup>a</sup><br>N = 27, R <sup>2</sup> = 0.90 |          | Premiums, 1987<br>N = 45, R <sup>2</sup> = 0.71 |          | Life Insurance<br>in Force, 1987<br>N = 28, R <sup>2</sup> = 0.88 |          |
|------------------|--------------------------------------------------------------------------------|----------|-------------------------------------------------|----------|-------------------------------------------------------------------|----------|
|                  | Parameter                                                                      | T-Stat   | Parameter                                       | T-Stat   | Parameter                                                         | T-Stat   |
| Dependency Ratio | 2.79                                                                           | 1.96*    | 4.00                                            | 2.09**   | 2.53                                                              | 1.97*    |
| Islamic          | -0.72                                                                          | -0.49    | -2.98                                           | -2.36**  | -2.23                                                             | -2.09**  |
| Income           | 0.88                                                                           | 6.77***  | 0.58                                            | 2.54**   | 0.32                                                              | 2.10**   |
| Social Security  | ----                                                                           | ----     | 0.88                                            | 4.41***  | 0.57                                                              | 4.17***  |
| Inflation        | -0.49                                                                          | -3.11*** | -1.43                                           | -4.02*** | -0.96                                                             | -4.26*** |
| Education        | 2.73                                                                           | 3.50***  | 0.28                                            | 0.34     | 0.39                                                              | 0.60     |
| Life Expectancy  | 12.22                                                                          | 1.69     | -3.49                                           | -0.41    | 6.97                                                              | 1.29     |
| Price            | ----                                                                           | ----     | ----                                            | ----     | -0.24                                                             | -2.78*** |

<sup>a</sup> This regression was done with and without the social security variable. Because social security data were not available for several of the countries in 1980, inclusion of the social security variable limited the data set to 19 countries, none of which were predominantly Islamic. The analysis that included the social security variable yielded results largely similar to those without the variable. The major differences were that the dependency ratio variable was significant at the 2 percent level rather than the 6 percent level and the education variable was significant at the 12 percent level rather than the 1 percent level. The social security variable was not significant at the 10 percent level.

\* significant at 0.10    \*\* significant at 0.05    \*\*\* significant at 0.01

The life expectancy variable was not significant in any of the models, possibly because individuals may not accurately estimate their probability of death. An alternative explanation is that the proxy is not accurate. The ideal variable would be the death rate among heads of households in a country. The life expectancy variable is based on the average lifetime of all citizens in a country.

The price variable was included only in the 1987 life insurance in force model. As expected, the results suggest that price is negatively related to life insurance consumption. The estimated price elasticity is -0.24.

### Conclusion

The world life insurance industry has grown significantly in the last 10 years. The findings in this study, that life insurance is positively correlated with national income and wealth (as proxied by social security expenditures) and negatively correlated with inflationary expectations, suggest that economic development and economic stability greatly increase life insurance consumption.

Future research is warranted in several different areas. First, a study of the cost of producing life insurance in different countries would be valuable. Weiss (1991) has done similar work focusing on property-liability insurance. Although the current study has focused only on the demand for life insurance, a variety of factors affect the supply of insurance, which would be expected to affect national consumption. These include, but are not limited to, governmental regulations regarding solvency, trade barriers, the availability of capital,

technical expertise, and an infrastructure that allows for the marketing and servicing of life insurance policies.

As more data become available, an analysis of insurance consumption in a wider sample of countries would likely lead to a greater understanding of insurance demand. Further, a time series study of demand could potentially lead to a greater knowledge of the growth and maturation of insurance markets.

# **Appendix 1** *Table 1* **Countries Included in the Analysis**

|               | <i>Life Insurance<br/>in Force, 1987</i> | <i>Premiums, 1987</i> | <i>Life Insurance<br/>in Force, 1980</i> |
|---------------|------------------------------------------|-----------------------|------------------------------------------|
| United States | X                                        | X                     | X                                        |
| Canada        | X                                        | X                     | X                                        |
| Mexico        | X                                        | X                     | X                                        |
| Chile         | X                                        | X                     | X                                        |
| Brazil        |                                          | X                     | X                                        |
| Argentina     | X                                        | X                     |                                          |
| Panama        |                                          | X                     |                                          |
| Uruguay       |                                          | X                     | X                                        |
| Great Britain | X                                        | X                     | X                                        |
| West Germany  | X                                        | X                     |                                          |
| France        | X                                        | X                     | X                                        |
| Switzerland   | X                                        | X                     |                                          |
| Netherlands   | X                                        | X                     | X                                        |
| Spain         | X                                        | X                     | X                                        |
| Sweden        | X                                        | X                     | X                                        |
| Italy         | X                                        | X                     | X                                        |
| Finland       | X                                        | X                     | X                                        |
| Austria       | X                                        | X                     | X                                        |
| Denmark       | X                                        | X                     | X                                        |
| Norway        | X                                        | X                     | X                                        |
| Ireland       | X                                        | X                     | X                                        |
| Belgium       | X                                        | X                     |                                          |
| Portugal      |                                          | X                     |                                          |
| Luxembourg    |                                          | X                     | X                                        |
| Turkey        |                                          | X                     | X                                        |
| Yugoslavia    |                                          | X                     | X                                        |
| Iceland       |                                          | X                     | X                                        |
| Japan         | X                                        | X                     | X                                        |
| South Korea   | X                                        | X                     | X                                        |
| Israel        | X                                        | X                     |                                          |
| Thailand      | X                                        | X                     |                                          |
| Philippines   | X                                        | X                     |                                          |
| Singapore     |                                          | X                     | X                                        |
| Pakistan      | X                                        | X                     |                                          |
| Iran          |                                          | X                     |                                          |
| South Africa  | X                                        | X                     | X                                        |
| Zimbabwe      |                                          | X                     | X                                        |
| Egypt         | X                                        | X                     |                                          |
| Morocco       |                                          | X                     |                                          |
| Nigeria       |                                          | X                     |                                          |
| Kenya         |                                          | X                     |                                          |
| Cameroon      |                                          | X                     |                                          |
| Tunisia       | X                                        | X                     |                                          |
| Australia     | X                                        | X                     |                                          |
| New Zealand   |                                          | X                     |                                          |

## Appendix 2

### Data Sources

entry

| <i>Data Item</i>                                                    | <i>Sources</i>                                | <i>Publisher</i>                                                          |
|---------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------|
| Life Insurance<br>in Force                                          | <i>Life Insurance<br/>Fact Book</i>           | American Council of<br>Life Insurance                                     |
| Premiums                                                            | <i>Sigma</i>                                  | Swiss Reinsurance<br>Company                                              |
| Income, Inflation                                                   | <i>International Financial<br/>Statistics</i> | International Monetary<br>Fund                                            |
|                                                                     | <i>World Development<br/>Report</i>           | The World Bank                                                            |
|                                                                     | <i>World Tables</i>                           | The World Bank                                                            |
| Population, Dependency<br>Ratio, Life Expectancy,<br>Exchange Rates | <i>Statistical Yearbook</i>                   | The United Nations                                                        |
| Education Level                                                     | <i>UNESCO Statistical<br/>Yearbook</i>        | United National<br>Educational Scientific<br>and Cultural<br>Organization |
| Islamic Countries                                                   | <i>The World Factbook</i>                     | Central Intelligence<br>Agency                                            |
| Social Security                                                     | <i>National Accounts<br/>Statistics</i>       | The United Nations                                                        |

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