Economic, Demographic, and Institutional Determinants of Life Insurance Consumption across Countries

Thorsten Beck and Ian Webb*

World Bank and International Insurance Foundation

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Life insurance has become an increasingly important component of the financial sector over the last 40 years by providing a variety of financial services for consumers and becoming a major source of investment in the capital market. What drives the large variance in life insurance consumption across countries, however, is still unclear. Using a panel with data aggregated at different frequencies for 68 countries over the period 1961-2000, this study finds that economic variables, such as income per capita, inflation and banking sector development, as well as religious and institutional indicators are the most robust predictors of the use of life insurance. Education, young dependency ratio, life expectancy, and size of social security do not appear to be robustly associated with life insurance consumption. Our results highlight the role that price stability and banking sector development may have if the savings and investment functions of life insurance are to be fully realized in an economy.

* World Bank, 1818 H St., N.W., Washington, D.C. 20433. Ph: (202) 473-3215, e-mail: Tbeck@worldbank.org. The International Insurance Foundation, 1233 Twentieth St., N.W., Washington D.C. 20036: Ph: (202) 296-2424, e-mail: webb@iifdc.org. We are grateful to Robert Cull, Lisa Gardner, Harold Skipper, Jr., participants at the Finance Forum in the World Bank, three anonymous referees and the editor of the journal for useful comments and discussions. All remaining errors are ours. This paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent, or those of the International Insurance Foundation.

1. Introduction

Life insurance companies play an increasingly important role within the financial sector. While during the period 1980-85 total assets of life insurance companies constituted only 11% of GDP for a sample of 13 countries, for which data are available, they constituted 28% for the period 1995-97 in the same countries. This increased importance is also reflected in the business volume of life insurers. Whereas life insurance penetration – the ratio of premium volume to GDP – was at 1.2% during the period 1961-65, it reached 4.2% in the period 1996-2000 for a sample of 19 countries, for which data are available. While this increased importance of life insurance both as provider of financial services and of investment funds on the capital markets is especially pronounced for developed countries, many developing countries still experience very low levels of life insurance consumption. However, even within the group of developing countries, there are striking differences. While South Africa's penetration ratio was 12.7% over the period 1996-2000, Syria's was less than 0.01%. Given the large variation in the use of life insurance across countries, the question of the causes of this variation and therefore the determinants of life insurance consumption arises.

Life insurance provides individuals and the economy as a whole with a number of important financial services. First, life insurance products encourage long-term savings and the re-investment of substantial sums in private and public sector projects. By leveraging their role as financial intermediaries, life insurers have become a key source of long-term finance, encouraging the development of capital markets (Catalan, Impavido and Musalem, 2000; Impavido and Musalem, 2000).[1] Indeed, several studies have found evidence that the development of the insurance sector is related to economic growth (Ward and Zurbruegg, 2000; Webb, 2000; Soo, 1996). Second, in the face of increasing urbanization, mobility of the

population, and formalization of economic relationships between individuals, families, and communities, life insurance has taken increasing importance as a way for individuals and families to manage income risk.

The importance of life insurance for economic and financial development directs us to investigate which economic, demographic, and institutional factors give rise to a vibrant life insurance market. A core set of socio-economic determinants has been identified as good predictors of life insurance consumption by several studies. The relatively limited data samples and different measures of consumption used in these studies, however, has limited their scope and made it difficult to generalize from their conclusions.

This paper improves on the existing literature in several ways. First, the new data set extends significantly the coverage of countries and time periods. Previous cross-sectional and panel studies have been limited in depth or in breadth.[2] We use a data set spanning 68 countries over the period 1961-2000 and aggregate data at different frequencies.

Second, panel analysis allows us to exploit both cross-country and time series variation in life insurance consumption and its potential determinants. We can thus better assess what has driven the rapid increase in life insurance consumption over the last four decades. At the same time, cross-sectional analysis allows us to analyze the effect of time-invariant determinants and control for biases induced by reverse causation and simultaneity.

Third, by using several alternative measures of life insurance consumption we provide additional depth and robustness to the results. Life insurance premium and life insurance in force, the outstanding face amounts plus dividend additions of life insurance policies, measure different aspects of life insurance consumption.

Finally, we introduce a new measure for exploring the role of life insurance in the economy - its relative weight within individual savings' portfolios. This variable measures the weight that life insurance premiums have in an economy's private savings.

The results of this study are expected to assist policy makers understand what drives the supply and demand of life insurance. The results may help design strategies for developing nascent life insurance markets and extending their benefits to a greater number of countries. The remainder of the paper is organized as follows. Section 2 describes our measures of life insurance consumption. Section 3 discusses potential determinants of life insurance consumption. Section 4 presents the empirical results and section 5 concludes.

2. Measuring Life Insurance across Countries

Life insurance policies are financial products that offer two main services: 1) income replacement for premature death; and 2) a long-term savings instrument. While there are a multitude of different types of policies, each offering the consumer different options with regard to coverage and investment choice, they can be broken down into two general categories : 1) those offering mortality coverage only; and, 2) those combining mortality coverage with a savings component. Policies within the first category are generally referred to in the U.S. and many other countries as "term" policies, while those in the second category are known as whole life, universal life, variable life, endowment, and by a variety of other names. Policies in the second category typically earn interest, which is returned to the consumer through policy dividends, cash-values on termination of the policy, or endowment sums on maturation of the policy. These policies incorporate varying amounts of mortality coverage while generally offering a substantial savings component.

In addition to the above-mentioned categories of life insurance, life insurers also sell annuity policies. An annuity is a contractual arrangement whereby, in return for a lump sum or a series of periodic payments up until the moment of annuitization, the insurer promises to the insured a series of periodic payments, often up until his/her death. Insurers providing annuities thus undertake risks associated with supperannuation or longevity of the insured.

As the different measures of life insurance consumption that we will be using in our empirical analysis aggregate both categories of life insurance policies as well as annuity policies, we cannot distinguish between the demand and supply of mortality risk coverage, longevity risk coverage, and savings through life insurance. This aggregation in the data produces a bias against finding significant relations.[3] Significant results between the variables hypothesized to affect insurance consumption and the amount consumed are therefore likely to be a sign of the added robustness of these relations.

Life Insurance Penetration is defined as the ratio of premium volume to GDP and measures the importance of insurance activity relative to the size of the economy. *Life Insurance Penetration*, however, is not a perfect measure of consumption since it is the product of quantity and price. A higher premium volume might therefore reflect a higher quantity, a higher price or a difference in the mix of mortality, savings and annuity elements purchased. Lack of competition and costly regulation might increase the price of insurance without implying a higher level of insurance consumption.

Life Insurance Density, our second indicator of life insurance consumption, is defined as premiums per capita expressed in constant dollars. It indicates how much each inhabitant of the country spends on average on insurance in constant dollars.[4] Although both *Life Insurance Penetration* and *Life Insurance Density* use gross premiums, there remain

important differences between both measures; *Life Insurance Penetration* measures life insurance consumption relative to the size of the economy, while *Life Insurance Density* compares life insurance consumption across countries without adjusting for the income level of the economy. Consumers that purchase life insurance policies to insure their dependents against mortality risk will potentially buy more coverage and thus a higher face value in richer countries, since the death benefit has to replace a larger income. We therefore expect *Life Insurance Density* to be more income elastic than *Life Insurance Penetration*.

Since life insurance policies can be regarded as much an insurance product as a savings product, we can relate the total premiums to private savings rather than income. This implies a portfolio rather than income approach, treating life insurance policies as one of several assets investors can choose from. We therefore construct **Life Insurance in Private Savings**, which equals total premiums divided by private savings and indicates the share of private savings that inhabitants of a country invest in life insurance policies.[5] Due to data restrictions, this indicator is only available for the period 1970-95.

Our final measure of life insurance consumption is **Life Insurance in Force to GDP.** It equals the sum of the face amounts plus dividend additions of life insurance policies outstanding as a share of GDP. It is a measure of mortality risk underwritten plus savings accumulated. Life insurance in force thus contains both the cash value of policies, associated with the savings component of life insurance policies and the net amount of risk faced by life insurers. Unlike the other three indicators, *Life Insurance in Force to GDP* does not include the price and so measures only quantity. Due to data restrictions, this indicator is only available for the period 1961-1994.

The mortality risk, savings and annuity components have different weights in the premium and in the stock measures. For a given structure of the insurance market, the mortality risk component, as measured by the net amount of risk, has a stronger weight in *Life Insurance in Force to GDP* than in the other three measures. In most, but not all countries, *Life Insurance in Force* does not include annuities. [6]

Table 1 presents summary statistics and correlations for all variables. We observe a large variation in levels of life insurance consumption across countries. Whereas Syria had a *Life Insurance Penetration* of less than 0.01 % of GDP during 1996-2000, South Africa's penetration ratio was 12.7 % during the same period. Syrians spent less than one dollar per year on life insurance services during 1996-2000, whereas Japanese spent more than 3,200 dollars. Ecuadorians invested less than 1% of total savings in life insurance policies in 1991-95, while U.K. citizens invested more than 40% during 1986-90. Similarly, Greece's *Life Insurance in Force to GDP* constituted less than 0.1% of GDP during 1976-80, whereas Japan's reached nearly 400% of GDP in 1991-95. There are large correlations between all three measures of life insurance consumption that are significant at the 1% level.

3. Determinants of Life Insurance Consumption

This section describes the theoretical underpinnings of our empirical tests and different factors hypothesized to drive the demand and supply of life insurance policies. Table 2 summarizes the potential determinants of life insurance consumption and their hypothesized sign, while Table A1 describes construction and sources of the variables.[7]

3.1. Theoretical Underpinnings

Yaari (1965) and Hakansson (1969) were the first to develop a theoretical framework to explain the demand for life insurance. Within this framework, the demand for life insurance is attributed to a person's desire to bequeath funds to dependents and provide income for retirement. The consumer maximizes lifetime utility subject to a vector of interest rates and a vector of prices including insurance premium rates. This framework posits the demand for life insurance to be a function of wealth, expected income over an individual's lifetime, the level of interest rates, the cost of life insurance policies (administrative costs), and the assumed subjective discount rate for current over future consumption.

Lewis (1989) extends this framework by explicitly incorporating the preferences of the dependents and beneficiaries into the model. Specifically, he derives the demand for life insurance as a maximization problem of the beneficiaries, the spouse and the offspring of the life insurance policyholder. Deriving utility maximization by both spouse and offspring separately and assuming no bequest by the policyholder and an isoelastic utility function, Lewis shows that total life insurance demand can be written as follows:

$$(1-lp)F = \max\{[\frac{1-lp}{l(1-p)}]^{1/\delta} TC - W, 0\} \qquad (1)$$

where l is the policy loading factor – the ratio of the costs of the insurance to its actuarial value -, p the probability of the primary wage earner's death, F the face value of all life insurance written on the primary wage earner's life, δ a measure of the beneficiaries' relative risk aversion, TC the present value of consumption of each offspring until he/she leaves the household and of the spouse over his/her predicted remaining life span and W the household's net wealth. Life insurance demand increases with the probability of the primary wage earner's

death, the present value of the beneficiaries' consumption and the degree of risk aversion. Life insurance demand decreases with the loading factor and the household's wealth.

Life insurance consumption, however, is not only driven by consumer demand. There are important supply-side factors which affect the availability and price of life insurance. Insurance companies need both the human and information resources to effectively measure the pricing and reserving requirements for products as well as adequate investment opportunities in financial markets. An adequate protection of property rights and an effective enforcement of contracts also facilitate the investment function of life insurers. These supply factors are expected to affect the costs of life insurance products, and might therefore be represented by the policy-loading factor in the above-described Lewis model.

While there have been attempts to model the relation between the supply and demand of life insurance separately, data limitations have restricted the empirical testing of these hypotheses.[8] The available data do not allow us to distinguish between supply and demand. Furthermore, premium data do not allow us to observe the actual amount of insurance coverage purchased, as they are a combined measure of price and level of coverage. Unless the price is constant across countries, which is unlikely, assuming that the premium is equivalent to the amount of coverage would introduce a source of noise in our estimations. On the other hand, using the variable often used to proxy price (premiums over life insurance in force) requires one to make a troublesome assumption, namely, that the mix of policies remains constant across countries and time.[9]

Price, however, is undoubtedly an important determinant in the consumption of life insurance, and leaving it out may subject the empirical testing to omitted variable bias. We address this problem in two ways. First, we assume that the price is a function of several

supply-side factors. Varying levels of urbanization, monetary stability, institutional development, political stability, and banking sector development all impact the insurer's ability to provide cost-effective insurance. Second, we use panel estimation techniques that eliminate biases due to omitted variables, such as the price variable in our model.

In the following we will describe different variables that may be linked to the demand function described by Lewis (1989) as well as several supply factors that might proxy for the policy loading factor. While the Lewis model, described above, focuses on the mortality risk component of life insurance policies, we will link the different determinants also to the savings and annuity components of life insurance policies. Finally, the portfolio approach underlying *Life Insurance in Private Savings* adds an additional dimension to the discussion.

3.2. Demographic Variables

A higher *ratio of young dependents to working population* is assumed to increase the demand for mortality coverage and decrease the demand for savings through life insurance and annuities. On the one hand, a larger share of dependents increases the total present value of consumption of the insured's beneficiaries, and therefore the demand for life insurance that provides dependents with payments in the event of the premature death of the primary wage earner.[10] On the other hand, a high dependency ratio indicates the extent to which the population is too young to consider saving for retirement, and therefore reduced demand for savings through life insurance products. Beenstock, Dickinson, Khajuria (1986), Browne and Kim (1993) and Truett and Truett (1986) find that the young dependency ratio is positively correlated with life insurance penetration. Given opposite effects of the young dependency ratio on the mortality and savings components of life insurance, however, we predict that a higher young dependency ratio is ambiguously correlated with life insurance.

A higher *ratio of old dependents to working population* is assumed to increase the demand for the savings and annuity components and decrease the demand for the mortality risk component of life insurance. We conjecture that in countries with a larger share of retired population, savings through life insurance policies as well as protection against superannuation gains importance, while insurance against the death of the primary wage earner loses importance. The overall effect of the old dependency ratio is therefore predicted to be ambiguous.

Societies with longer *life expectancies* should have lower mortality coverage costs, lower perceived need for mortality coverage, but higher savings through life insurance vehicles and more demand for annuities.[11] This would imply an ambiguous correlation with the demand for life insurance products.[12] Previous authors [Beenstock, Dickinson, Khajuria (1986) and Outreville (1996)] have found life expectancy to be positively related to *Life Insurance Penetration*.

We expect that a higher level of *education* in a population will be positively correlated with the demand for any type of life insurance product. A higher level of a person's education may raise his/her ability to understand the benefits of risk management and long-term savings, therefore increasing an individual's level of risk aversion.[13] Education may also increase the demand for pure death protection by lengthening the period of dependency, as well as increasing the human capital of, and so the value to be protected in, the primary wage earner.[14] However, a positive relation between education and life insurance might also indicate that better access to long-tem savings and insurance instruments encourages access to higher education.[15] Truett and Truett (1990) and Browne and Kim (1993) find a positive

relation between life insurance consumption and the level of education. We use the average years of schooling in the population over 25 and the gross secondary enrollment rate.

The *religious inclination* of a population may affect its risk aversion and its attitude towards the institutional arrangements of insurance.[16] Religious opposition against life insurance, while stronger in European countries before the 19th century, still persists in several Islamic countries today.[17] Followers of Islam have traditionally been known to disapprove of life insurance because it is considered a hedge against the will of Allah.[18] Unsurprisingly, Browne and Kim (1993), and Meng (1994), find a dummy variable for Islamic countries to be negatively correlated with life insurance demand. This study employs a broader measure of religious inclination by including Protestantism, Catholicism and a composite of other religions, defined as the ratio of adherents of one religion over the entire population. While we expect the Muslim share of the population to be negatively related to life insurance demand, we do not have prior expectations about the signs on the other religion variables.

Economies with a higher *share of urban to total population* are expected to have higher levels of life insurance consumption. The concentration of consumers in a geographic area simplifies the distribution of life insurance products, as costs related to marketing, premium collection, underwriting and claim handling are reduced. A higher share of urban population is also correlated with less reliance on informal insurance agreements and therefore may induce a higher demand for formal insurance products.

3.3. Economic Variables

Life insurance consumption should rise with the level of *income*, for several reasons. First, an individual's consumption and human capital typically increase along with income, creating a greater demand for insurance (mortality coverage) to safeguard the income

potential of the insured and the expected consumption of his/her dependents.[19] Second, life insurance may be a luxury good, inasmuch as increasing income may explain an increasing ability to direct a higher share of income towards retirement and investment-related life insurance products. Finally, the overhead costs associated with administrating and marketing insurance can make larger size policies less expensive per dollar of insurance in force, which lowers the price of life insurance policies. Campbell (1980), Lewis (1989), Beenstock, Dickinson, Khajuria (1986), Truett and Truett (1990), Browne and Kim (1993), and Outreville (1996) have all shown that the use of life insurance is positively related to income, using both aggregate national account data and individual household data. We use real GDP per capita as well as an indicator of *permanent income*, calculated as the predicted value from a regression of the log of each country's real GDP per capita on a time trend. Insurance against mortality risk and consumption-saving decisions are related to permanent income or income over the life cycle rather than current income.

Theory suggests an ambiguous relation between life insurance and an economy's *private savings rate*. If agents save a larger share of their income, they might or might not be willing to increase savings in life insurance policies. We use the share of private savings in Gross National Disposable Income (GNDI).

We expect *inflation* and its *volatility* to have a negative relationship with life insurance consumption. As life insurance savings products typically provide monetary benefits over the long term, monetary uncertainty has a substantial negative impact on these products' expected returns. Inflation can also have a disruptive effect on the life insurance industry when interest rate cycles spur disintermediation.[20] These dynamics make inflation an additional encumbrance to the product pricing decisions of life insurers, thus possibly reducing supply in

times of high inflation.[21] In addition to the inflation rate and its standard deviation, we also test for a relation between life insurance consumption and the *real interest rate*, defined as the difference between the nominal interest rate and inflation. Theory predicts a positive relation; a higher real interest rate increases life insurer's investment returns and so profitability, in turn offering improved profitability of financial relative to real investments for potential purchasers of life insurance policies.

We expect *banking sector development* to be positively correlated with life insurance consumption.[22] Well-functioning banks may increase the confidence consumers have in other financial institutions, e.g. life insurers. They also provide life insurers with an efficient payment system. The efficient development of the entire financial system - as might be reflected in the absence of interest rate ceilings and other distortionary policies – is thought to help life insurers invest more efficiently. However, a vibrant insurance sector might also foster the development of the banking sector, so that a positive relation between the two variables cannot necessarily be interpreted as evidence for causality. Outreville (1996) finds a significantly positive relationship between financial development and life insurance penetration. We use the total claims of deposit money banks on domestic nonfinancial sectors as share of GDP as indicator of banking sector development.

We expect the size of a country's *social security system* to be negatively correlated with the demand for life insurance products. Kim (1988) and Meng (1994) postulate that social security displaces private insurance. If a greater amount of retirement savings is being channeled through the government, or if the public sector provides substantial benefits to families of prematurely deceased wage earners, then there should be less demand for life

insurance products.[23] This study uses the share of public expenditures on social security and welfare as a share of GDP as an indicator of the size of the social security system.

The expected correlation of the *income distribution* of a country with life insurance consumption is ambiguous. Beenstock, Dickinson, Khajuria (1986) reason that wealthy sections of the population do not need insurance protection while poorer sections have a limited demand because they operate under income budget constraints.[24] A more equal income distribution with a larger middle class might therefore result in a higher demand for life insurance. On the other hand, while the middle-class may have the greatest demand for life insurance savings products, there may be a minimum level of income at which these policies become affordable. Accordingly, a large middle class in a poor country may result in less individuals being able to purchase life insurance than a less equal distribution with a larger and/or wealthier upper class. The resulting relation of income distribution with life insurance consumption is thus ambiguous. Beenstock, Dickinson, Khajuria (1986) find a negative relation between the Gini coefficient and *Life Insurance Penetration*.

We also test for a relation of life insurance consumption with the *Human Development Indicator (HDI)*, as constructed by the United Nations Development Programme (UNDP). Specifically, this indicator indicates the relative distance of a country's value between minimum and maximum values in life expectancy, education (both literacy and gross enrollment) and income (GDP per capita), averaged over the three areas. Values are therefore bounded between zero and one. However, given that we expect an ambiguous relation of life expectancy with life insurance, we do not necessarily expect a robust relation of the HDI with our measures of life insurance consumption. Outreville (1996) does not find a significant

relation of the HDI with life insurance consumption, while Outreville (1999) shows that the HDI is positively correlated with measures of financial development.

3.4. Institutional Determinants

The tenability of a vibrant life insurance market depends to a large extent on the institutional framework and political stability of a country. If fraud is common in claim reporting, then the insurance mechanism will become prohibitively costly for a large part of the population. The inability to appeal the breach of life insurance contracts by insurers reduces the value of an insurance contract to consumers and may deter them from committing large sums of money into these products. The lack of property protection and contract enforcement impedes life insurers' ability to invest efficiently and control the price of their products. Finally, the lack of political stability shortens the economic horizon of both potential buyers and suppliers of life insurance products, dampening the development of a healthy life insurance market.

To measure these institutional and political factors, we use three different indicators. *Rule of Law* measures the degree to which citizens of a country are able to use the legal system to mediate disputes and enforce contracts. We use the average number of *Revolutions and Coups* to indicate political stability of a country. *Institutional Development* is the average of six indicators that measure voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. While Rule of Law (1982-2000) and Revolutions and Coups (1961-1990) are available over longer time periods, Institutional Development is only available for one point in time (1998), so that we will use it only in the cross-country estimations.

3.5. Descriptive Statistics and Correlations

Panel A of Table 1 shows descriptive statistics and Panel B correlations of all dependent and the independent variables in our baseline regression. Table A2 shows the correlations of life insurance with other independent variables. As can be seen in Table 1 (Panel A), there is a large variation in the economic and financial development of countries, their demographic structure, and macroeconomic performance. Most of the explanatory variables are correlated with life insurance consumption at the 5% level, with the notable exception of the Real Interest Rate and Revolutions and Coups (Panels B and Table A2). Not all of the correlations, however, confirm the theoretical predictions. Countries with a lower share of young population and a higher share of old population have higher levels of life insurance consumption, while a higher life expectancy is positively correlated with life insurance. Life insurance is higher in countries where governments spend more on transfers and other subsidies and where income distribution is more equal. Many of the potential determinants of life insurance are highly correlated with each other. Richer countries have older populations, higher life expectancies, higher levels of schooling, less inflation and better developed banking systems. Countries with higher young dependency ratios have lower old dependency ratios and life expectancies and lower levels of education. The high correlations between the explanatory variables underline the importance of performing multivariate regression analysis, as well as the need to control for country-specific effects that might drive several or all of these explanatory variables.

4. Empirical Results

The correlation analysis in section 3 has shown significant correlations of life insurance consumption with many of the determinants postulated by theory, but also between many of these determinants. We therefore conduct multivariate regression analysis to assess, which determinants robustly predict life insurance consumption, even after controlling for other potential effects. The baseline regression contains real per capita GDP, young and old dependency ratios, average years of schooling, life expectancy, inflation rate and banking sector development.[25] In subsequent regressions we include a larger set of potential determinants of life insurance consumption.

4.1. Panel Analysis, 1961-2000

Our main results are based on an unbalanced panel of 68 countries, with data averaged over eight 5-year periods. [26] Using a panel allows us to (i) exploit both cross-country and time-series variation in the data, and (ii) control for differences across countries and over time that are not accounted for by any of the explanatory variables. [27] We will therefore control for both fixed country and time-specific effects in our regression and estimate the regression with either a fixed or a random effects model.[28] We average data over five years, since several of our explanatory variables are only available at a five-year frequency and others might be subject to short-tem business-cycle induced fluctuations.[29]

The results in Table 3 show that the variation of *Life Insurance Penetration* across countries can be explained by variation in income level, old dependency ratio, inflation and banking sector development. These four variables show significant coefficients in our baseline regression and in most of our robustness tests. Schooling, life expectancy, and the young dependency ratio are not robust predictors of life insurance consumption.

The results of our baseline regression in column 1 indicate that a 10% increase in real per capita income increases *Life Insurance Penetration* by 5.7%, thus confirming that life insurance is a luxury good. When we include Revolutions and Coups and the Private Savings Rate, however, the coefficient on income level turns insignificant, which is due to the smaller sample when including either of the two variables.[30] When we replace GDP per capita with permanent income – the predicted value from regressing each country's time series of GDP per capita on a time trend – the results are confirmed (column 9).

We find a positive relation between the old dependency ratio and *Life Insurance Penetration*. The coefficient size indicates that a 10% increase in the share of old population relative to the working population increases life insurance penetration by 12%. This suggests a higher demand for savings and annuity products as the population grows older.

Price stability is an important predictor of life insurance consumption. The coefficient on the inflation rate is significantly negative in all specifications. The effect of a stable macroeconomic environment is also economically large. If Brazil - country with one of the highest five-year average inflation rates in our sample - had achieved an average inflation rate over the period 1991-95 of the sample median 7% instead of the actual 212%, *Life Insurance Penetration* might have been 0.87% of GDP instead of 0.29%.[31] Replacing the inflation rate with the anticipated inflation rate – the average between current and next-year's inflation rate – confirms the results (column 6).[32] Inflation volatility does not explain any variation in life insurance penetration across countries, while the real interest rate is positively related with *Life Insurance Penetration*, when controlling for inflation (columns 7 and 8).

Banking sector development is positively correlated with *Life Insurance Penetration*. The coefficient on the indicator of banking sector development is significantly positive in all

specifications. As discussed above, the positive coefficient does not imply a causal impact of banking sector development on life insurance penetration. It shows that countries with well-developed banks also have higher levels of life insurance consumption. In our cross-country analysis, below, we will try to control for reverse causation and simultaneity bias.

Variation in the share of young population or in life expectancy cannot explain variation in *Life Insurance Penetration* across countries, confirming the hypothesis of offsetting effects of the young dependency ratio (life expectancy) on gross premiums, a positive (negative) effect on mortality risk and a negative (positive) effect on the saving and annuity components.[33] Neither average years of schooling nor secondary enrollment enter significantly at the 5% level in any of the regressions.

Turning to our additional explanatory variables, we find a positive relation between the private savings rate and life insurance penetration. Urbanization (column 2), Gini coefficient (column 3), Social Security (column 4), Revolutions and Coups (column 5), the Human Development Indicator (column 11), and Rule of Law (column 12) cannot explain cross-country variation in life insurance penetration.[34] The last column presents the baseline regression with the sample limited to developing countries. Only inflation and banking sector development continue to enter significantly at the 1% level, while income per capita enters significantly and positively at the 10% level. The old dependency ratio cannot explain variation in *Life Insurance Penetration* across developing countries.

Table 4 present results with the other indicators of life insurance across countries as dependent variables. For each indicator we present two baseline regressions, one for the whole sample and one restricted to developing countries. *Life Insurance Density* increases with higher income per capita, a higher old dependency ratio, a lower inflation rate and better

developed banks (column 1). Once we restrict the sample to developing countries, however, only banking sector development enters significantly. We note that the income elasticity of *Life Insurance Density* is higher than for *Life Insurance Penetration*, as expected.[35]

Life Insurance in Private Savings increases with a higher old dependency ratio, lower inflation, and better developed banks (column 3). Interestingly, the share of savings in life insurance policies decreases with a higher saving rate. Considering this result jointly with the positive coefficient (0.359) on the savings rate in the regression of *Life Insurance Penetration* (Table 3, column 13) suggests that while private agents invest some of their additional savings in life insurance policies, overall there is a shift away from life insurance policies to other savings instruments in private agents' portfolio. GDP per capita does not explain the share of savings in life insurance policies. Turning to the sample of developing countries, only banking sector development (positively) and the private savings rate (negatively) can explain variation in the share of life insurance policies in private savings across developing countries.

Life Insurance in Force to GDP increases with higher income per capita, lower inflation, lower old dependency ratio and better developed banks. While the results on GDP per capita, inflation and banking sector development confirm the results using *Life Insurance Penetration* and *Density*, the results of the old dependency ratio are certainly surprising. The relatively stronger weight of the mortality risk component and the exclusion of annuities in *Life Insurance in Force to GDP* compared to the other three measures might explain the opposite sign.[36] Only the results for income per capita and inflation are confirmed in the sample restricted to developing countries.

4.2. Annual Panel, 1961-2000

Table 5 presents results for a panel of annual observations. Using annual instead of 5-year averages allows us to (i) maximize the information we have available and (ii) test the

sensitivity of our panel analysis to the frequency of the data.[37] As in the 5-year panel, *Life Insurance Penetration* increases with per capita income, the old dependency ratio, better developed banks and decreases with inflation. Interestingly, in the annual sample we also find a negative relation between the young dependency ratio and *Life Insurance Penetration* indicating that countries with a higher share of young population have lower levels of life insurance consumption.[38] As in the 5-year panel, anticipated inflation has a negative relation with *Life Insurance Penetration* (column 3), while the real interest rate, permanent income, and the private savings rate (column 2, 4 and 5) enter positively. Neither schooling nor life expectancy shows a robust relation with *Life Insurance Penetration*. Only income per capita, inflation and banking sector development explain variation in life insurance penetration across developing countries in the annual sample. Overall, the annual sample thus confirms the findings from the 5-year panel regressions.

4.3. Cross-country Analysis, 1980-2000

Table 6 presents results from cross-country regressions where we average data over the period 1980 to 2000 for all countries in our sample. While cross-country analysis does not allow us to control for omitted variables, as in the panel analysis, we can test the relation of life insurance across countries and several time-invariant variables and use instrumental-variable regressions to control for biases induced by simultaneity and reverse causation. As mentioned above, these biases might especially arise for educational attainment and banking sector development.

Countries with higher levels of economic and financial development, a more educated population, lower inflation and lower life expectancy have higher *Life Insurance Penetration*. Further, the old dependency ratio enters negatively and significantly at the 10% level.[39]

While the results on income per capita, inflation and banking sector development confirm the results from our panel analysis, the results on life expectancy, schooling and old dependency ratio differ from the previous results. Restricting the sample to developing countries confirms the results only for life expectancy, inflation, schooling and the old dependency ratio, but not for income per capita and banking sector development. The young dependency ratio, the private savings rate and Revolutions and Coups do not enter significantly in the regressions (columns 3 and 5). A larger share of Muslim population decreases *Life Insurance Penetration*, while a better institutional environment increases it (columns 4 and 6).

Econometric, sampling and frequency differences might explain the differences between panel and cross-country results. The panel estimations allow us to control for country-specific effects, which the OLS regressions do not.[40] Economic and demographic factors might have different relations with life insurance consumption across countries than within countries over time.

Our cross-country results have shown a positive relation between schooling and banking sector development and life insurance consumption. These results, however, do not allow us to make any inference concerning a causal relation between education and banking, on the one side, and the development of the life insurance sector, on the other side. We therefore present two Instrumental Variable (IV) regressions, where we extract the exogenous components of banking sector development and schooling to control for reverse causation and simultaneity bias in the empirical relation between these variables and life insurance. Specifically, we use dummy variables indicating the origin of a country's legal system and a variable – Good crops - proxying for agricultural endowments conducive to a large middle class and institutional development.[41] Legal origin and agricultural endowments are both

exogenous variables and are highly correlated with banking sector development and schooling as confirmed by the first stage regressions.[42] We use the Hansen test of overidentifying restrictions (OIR) to examine whether there is any impact of legal origin and endowments on *Life Insurance Penetration* beyond their impact through banking sector development, schooling or the other explanatory variables. In column 7 we instrument only for banking sector development and in column 8 for both banking sector development and schooling. While banking sector development enters significantly and positively, even after instrumenting, schooling turns insignificant in column 8 where we instrument for it. The test of overidentifying restrictions is not rejected in either case, confirming the adequacy of our instruments.[43] These results indicate that the relation between banking sector development and life insurance is not due to reverse causation and simultaneity bias, while the significant relation between education and life insurance is most likely a spurious one.

Overall, the cross-country results confirm the importance of income per capita, monetary stability and banking sector development in predicting life insurance across countries. We find evidence for the importance of religion and institutional development for life insurance. Finally, the demographic variables show a different relation with life insurance in the cross-section than in the panel.

5. Concluding Remarks

This paper analyzed the determinants of life insurance consumption in a panel of 68 countries over the period 1961-2000, using four different indicators of life insurance consumption. Our main results are based on a panel of eight non-overlapping 5-year periods.

We test for the sensitivity of the results with a panel of annual observations and a cross-country sample.

Our panel estimations show that countries with higher income levels, both current and permanent income, lower inflation and better developed banks have higher levels of life insurance consumption. A higher ratio of old to working population increases *Life Insurance Penetration* and *Density*, while it decreases *Life Insurance in Force to GDP*, perhaps reflecting the different weights of mortality risk, savings and annuity components. A higher private savings rate and a higher real interest rate are also associated with higher levels of life insurance consumption. The young dependency ratio, life expectancy and schooling are not strongly associated with life insurance consumption across countries.

The share of life insurance premiums in private savings is best predicted by the old dependency ratio, inflation, banking sector development and the private savings rate, but not by income per capita. The results suggest that the more aged the population and the lower the inflation, the more individuals will select life insurance over other forms of savings. The coefficient estimates on the private savings rate in the regressions of *Life Insurance Penetration* and *Life Insurance in Private Savings* indicate that additional private savings are partly invested in life insurance policies, but that the overall share of life insurance in private agents' portfolios decreases as they save more. While restricting the sample to developing countries turns many of the results less significant, macroeconomic stability and well developed banks continue to predict life insurance across developing countries.

The cross-country estimations confirm some of the panel results, while contradicting others. Most notably, we find a positive relation between schooling and life insurance, which is not robust, however, to controlling for biases induced by reverse causation and

simultaneity. The positive impact of banking sector development on life insurance, on the other hand, is robust to controlling for these biases by instrumenting with legal origin and endowments. This evidence suggests that, in addition to the positive effect that life insurance may have on the banking system, banking sector development facilitates the development of life insurance and its contractual savings function. This does not contradict the positive impact of life insurance on capital market development, found by other authors. While an efficient banking system might help develop the life insurance sector by offering payment services and raising confidence in financial services, life insurance and other forms of contractual savings might foster the development of capital markets through their demand for long-term financial investments.

In summary, income per capita, inflation and banking sector development are the most robust predictors of life insurance consumption across countries and over time. Further, religious and institutional differences can explain some of the variation in life insurance consumption across countries. There is no robust link from schooling and the demographic variables to life insurance consumption. Finally, we note that although life insurance is a luxury good, there is no relation between income distribution and life insurance consumption. While rising income per capita plays a role in driving its consumption, it does not appear that income distribution does.

The results of this paper constitute a thorough review of existing hypotheses regarding the demand and supply of life insurance consumption. They also have implications for policy makers. Both monetary stability and banking sector development have positive effects on economic development and growth independent of their positive effect on the development of the insurance sector. Price stability and banking sector development, moreover, may be

fundamental to the growth of savings and investments through life insurance, particularly in a developing economy.

[1] For the economic and social importance of life insurance, especially in developing countries, see also UNCTAD (1982), one of the first studies in this area.

[2] Browne and Kim (1993) use data for 45 countries for the year 1987, and Outreville (1996) for 48 countries for the year 1986. Truett and Truett (1990) produce estimates for two countries, the U.S. and Mexico, over the period 1960 to 1982, and Beenstock, Dickinson, and Khajuria (1986) for 10 Organization for Economic Cooperation and Development (OECD) countries over the period 1970-1981.

[3] See Browne and Kim (1993), footnote 1.

[4] We also calculate an alternative measure of life insurance density, using international real dollars. Specifically, instead of applying exchange rates, the local currency premiums are multiplied with the Purchasing Power Parity (PPP) conversion factor, which is defined as the number of units of a country's currency required to buy the same amount of goods and services in the domestic market as one U.S. dollar would buy in the U.S. Using PPP conversion factors is preferable to using exchange rates, since the latter are distorted by differences in exchange rate regimes. Furthermore, PPP conversion factors take into account that the price of nontraded goods relative to traded goods increases with the income level of economies. Since the death benefit of life insurance policies has to cover the typical household expenditures in both traded and nontraded goods, using exchange rates biases the insurance density of developing countries downward. However, since data on the PPP conversion factor are only available for the period 1975-2000, the insurance densities in international real dollars are constrained to this period. We run all our regressions using this alternative indicator of life insurance density, without significant differences, so that we report only results with the general measure available over a longer time period.

[5] According to the UN National Accounts, life insurance premiums that imply claims of policy holders on insurance companies' technical reserves are treated as savings, while insurers' costs and profits are part of consumption. See United Nations Statistics Division (1993).

[6] See Browne and Kim (1993).

[7] For an excellent overview of the potential determinants of the demand and supply of life insurance products, see Skipper and Black (2000), chapter 3.

[8] Compare Beenstock, Dickinson, and Khajuria (1986).

[9] Browne and Kim (1993) use such a price variable, but note the bias introduced by different composition of the overall insurance portfolio across countries.

[10] This would result in a higher *TC* in Eq. (1).

[11] A higher life expectancy would be reflected by a lower *p* in Eq. (1).

[12] Compare Beenstock, Dickinson, Khajuria (1986).

[13] This would be reflected by a lower δ in Eq. (1). However, as pointed out by Browne, Chung and Frees (2000) quoting unpublished work by Outreville and Szpiro, risk aversion might also be negatively correlated with education.

[14] This would be reflected by a higher TC in Eq. (1).

[15] We are grateful to one of the referees for pointing this out. A similar debate on the role of education has taken place in the empirical growth literature; see Bils and Klenow (2000).

[16] This would be reflected by cross-country variation in δ in Eq. (1).

[17] Zelizer (1979) discusses the role that religions have in creating a cultural opposition to life insurance.

[18] The advent of Takaful insurance – a scholar approved insurance, licensed and marketed in countries with Muslim population - in the last decade, however, has increased the acceptance of life insurance amongst some Islamic populations. For further information see, http://www.insurance.com.my/zone_takaful/introduction.htm.

[19] This would be reflected by a higher TC in Eq. (1).

[20] Fixed interest rates and loan options imbedded in some life insurance policies, for example, spurred disintermediation in the U.S. life insurance market during the inflationary 1970's and 1980's.

[21] Cargill and Troxel (1979) discuss the various impacts that inflation can have on the market for life insurance.

[22] Outreville (1992) also proposes a relationship between financial development and insurance markets.

[23] This would be reflected in a higher *W* in Eq. (1).

[24] The possibility of declining risk aversion with greater wealth, and the replacement of life insurance coverage with surplus assets in an individual's portfolio is expected to reduce the demand for life insurance among the wealthy.

[25] We include the dependent and several independent variables in logs, so that the coefficients can be interpreted as elasticities.

[26] Table A3 lists the countries in the sample. The number of countries varies across the different life insurance measures and the samples do not completely overlap.

[27] The latter can be variables that are not included in our estimation since they are not varying over time or other underlying country characteristics that are not captured in any of our variables. Among these omitted variables might be the regulation of the insurance sector, taxation, and the price variable, for which we use proxy variables such as the supply determinants described above, but do not have any direct measure.

[28] We test for the appropriateness of the fixed or random effects model with the Hausman test. Under the null hypothesis that random- and fixed effects estimates are not statistically different, both estimators are consistent, but the fixed effects model is inefficient. Under the alternative hypothesis that both estimates are statistically different only the fixed-effects model gives consistent coefficients. We use the fixed effects model when the null hypothesis is rejected at the 10% level, and the random-effects model otherwise.

[29] Specifically, average years of schooling is available only at a five-year frequency and life expectancy, the share of the urban population and the Gini coefficient are not available on a yearly frequency for most countries. Further, the inflation rate and banking sector development might be subject to short-term business-cycle induced fluctuations.

[30] We re-run the regressions without the Private Savings Rate or Revolutions and Coups, but restricting the sample accordingly. In neither case does income per capita enter significantly.

[31] This result matches the findings by Babbel (1981) that even the demand for inflation-indexed life insurance policies decreases during inflationary periods in Brazil.

[32] Following Browne and Kim (1993), we also used the average of current and previous year inflation, since consumers' inflation expectations might be determined by previous inflation experience. The results do not change.

[33] Since the young and old dependency ratios and life expectancy are highly correlated with each other, this result might be driven by multicollinearity. We therefore test the robustness of the results by including only one of the three variables at a time. The results do not change.

[34] We also tried two alternative indicators of institutional development, Corruption and Bureaucratic Quality, also from ICRG. Neither of the two enters significantly in the regressions.

[35] See the discussion in section 2.

[36] This might also explain the negative sign on life expectancy. When we consider regressions with only the old or the young dependency ratio or life expectancy, only the old dependency ratio and life expectancy enter negatively and significantly at the 5% level.

[37] Since schooling data are only available on a 5-year frequency, we repeat the values for the intermediate years from the initial year of the corresponding 5-year period.

[38] As in the 5-year panel, we include the young and old dependency ratios and life expectancy separately, confirming our results.

[39] As in the 5-year panel, we control for mulitcollinarity by including only one of the following regressors at a time: old dependency ratio, young dependency ratio and life expectancy. While life expectancy continues to enter significantly and negatively, neither of the two dependency ratios enters significantly.

[40] Most developing countries do not have life insurance data before 1978, so that the unbalanced panel regressions might be biased towards developed countries. We therefore re-ran all regressions of the 5-year panel, limiting the sample to the period 1981-2000. The results do not change significantly.

[41] Beck, Demirguc-Kunt and Levine (2003), among many others, show that legal origin explains variation in financial development across countries. Easterly and Levine (2003) show that Good crops is a good predictor of institutional development.

[42] Legal origin and endowment explain 43% of the variation in schooling and banking sector development.

[43] We also ran a IV regression where we only instrumented schooling. The OIR test, however, is rejected.

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Table 1: Descriptive Statistics and Correlations

Panel A: Descriptive Statistics

	Mean	Median	Standard Deviation	Maximum	Minimum	Observations
Life Insurance Penetration	1.69	1.03	1.97	12.69	0.00	322
Life Insurance Density	264.51	68.88	442.45	3,275.39	0.14	322
Life Insurance in Private Savings	7.64	4.64	8.24	44.90	0.00	203
Life Insurance in Force to GDP	56.25	29.85	60.69	398.43	0.09	216
GDP per capita	9,463	4,393	10,090	45,061	193	451
Young Dependency	55.14	50.64	23.02	107.26	21.41	451
Old Dependency	12.52	9.64	6.44	27.65	4.50	451
Life Expectancy	68.17	70.71	8.07	80.48	41.63	451
Schooling	5.76	5.60	2.72	12.18	0.63	451
Inflation	14.37	7.32	25.63	222.33	-0.10	451
Banking sector development	47.29	38.62	32.65	180.88	5.41	451
Gini	37.41	34.89	9.61	61.88	20.46	221
Urbanization	60.26	61.00	21.63	100.00	8.11	451
Social Security	12.13	9.57	8.98	38.26	0.46	343
Real interest rate	26.44	1.80	260.74	3,686.98	-46.13	402
Anticipated inflation	14.31	7.41	25.52	232.85	-0.03	451
Permanent income	9,450	4,329	10,172	51,429	176	451
Secondary enrollment	67.71	69.51	29.58	152.84	7.67	399
Private Savings Rate	20.54	20.95	5.93	37.45	2.81	264
Revolutions and Coups	0.17	0.00	0.34	2.60	0.00	312
Human Development Indicator	0.75	0.77	0.13	0.93	0.35	304
Rule of Law	4.13	4.00	1.53	6.00	1.00	245
Inflation volatility	6.94	2.79	16.50	169.73	0.21	451
Institutional Development	0.48	0.54	0.78	-1.33	1.72	69
Catholic	41.04	29.80	40.03	0	96.9	69
Muslim	13.12	0.55	29.28	0	99.4	69
Protestant	14.64	2.60	25.26	0	97.8	69
British legal origin	0.26	0.00	0.44	0	1	69
French legal origin	0.45	0.00	0.50	0	1	69
Socialist legal origin	0.12	0.00	0.32	0	1	69
German legal origin	0.09	0.00	0.28	0	1	69
Scandinavian legal origin	0.07	0.00	0.26	0	1	69
Good crops	1.15	1.06	0.32	0.65	2.44	65

Panel B: Correlations

	Life Insurance Penetration	Life Insurance Density	Life Insurance in Private Savings	Life Insurance in Force to GDP	GDP per capita	Young dependency	Old dependency	Life expectancy	Schooling	Inflation
Life Insurance Density	0.7881***	1.0000								
Life Insurance in Private Savings	0.9357***	0.6918***	1.0000							
Life Insurance in Force to GDP	0.7729***	0.7434***	0.6444***	1.0000						
GDP per capita	0.5219***	0.7481***	0.4241***	0.4870***	1.0000					
Young dependency	-0.3673***	-0.4667***	-0.3511***	-0.3949***	-0.7297***	1.0000				
Old dependency	0.2885***	0.4680***	0.3261***	0.2348***	0.7763***	-0.8278***	1.0000			
Life expectancy	0.2784***	0.4673***	0.2834***	0.4169***	0.6912***	-0.8310***	0.7159***	1.0000		
Schooling	0.5001***	0.5471***	0.5181***	0.5724***	0.7330***	-0.7980***	0.7217***	0.7882***	1.0000	
Inflation	-0.2594***	-0.2274***	-0.2553***	-0.1769***	-0.2022***	0.0339	-0.0973**	-0.0424	-0.0523	1.0000
Banking sector development	0.5031***	0.5866***	0.3916***	0.4462***	0.6748***	-0.6150***	0.5086****	0.5622***	0.5245***	-0.2148***

Table 2: Determinants of Life Insurance Consumption Across Countries: Expected Results

		Savings Component	Mortality Risk Component	Annuity Component	Combined Effect
Demographic	Young Dependency Ratio	-	+	-	ambiguous
	Old Dependency Ratio	+	-	+	ambiguous
	Life expectancy	+	-	+	ambiguous
	Education	+	+	+	+
	Religion	-muslim	-muslim	-muslim	-muslim
	Urbanization ratio	+	+	+	+
Economic	Income	+	+	+	+
	Private Savings in GNDI	ambiguous	no effect	ambiguous	ambiguous
	Inflation	-	-	-	-
	Inflation volatility	-	-	-	-
	Real interest rate	+	+	+	+
	Banking sector development	+	+	+	+
	Social Security	-	-	-	-
	Gini coefficient	ambiguous	ambiguous	ambiguous	ambiguous
Institutional	Rule of Law	+	+	+	+
	Revolutions and Coups	-	-	-	-
	Institutional Development	+	+	+	+

This table assumes the division of life insurance consumption into the savings, mortality risk and annuity components. The first column describes the expected effects on the savings component, the second column on the mortality risk component and the third column on the annuity component. The fourth column presents the combined predicted effect in our regression analysis.

Table 3: The Determinants of Life Insurance Penetration in a Panel, 1961 - 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Developing countries
Econometric model	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Random effects
Constant	-7.069	-8.372	-6.073	-5.662	-8.011	-7.133	-6.839	-4.578	-9.357	-7.895	-5.136	-7.085	-3.715	-2.380
	(1.92)*	(2.07)**	(0.86)	(1.47)	(1.06)	(1.94)*	(1.86)*	(1.25)	(2.44)**	(2.00)**	(1.89)*	(1.38)	(0.64)	(0.41)
GDP per capita	0.567	0.552	0.770	0.424	0.180	0.580	0.503	0.699		0.668		0.795	-0.017	0.375
	(2.89)***	(2.80)***	(2.82)***	(2.00)**	(0.69)	(2.96)***	(2.50)**	(3.54)***		(3.24)***		(2.73)***	(0.08)	(1.72)*
Young dependency	-0.357	-0.326	-0.369	-0.964	-0.079	-0.354	-0.405	-0.518	-0.270	-0.465	-0.681	-0.565	-0.930	0.042
	(1.12)	(1.02)	(1.01)	(2.73)***	(0.22)	(1.11)	(1.27)	(1.59)	(0.84)	(1.36)	(1.65)	(1.04)	(2.47)**	(0.06)
Old dependency	1.196	1.195	0.920	1.105	1.308	1.192	1.159	1.230	1.076	1.238	1.757	1.471	1.302	0.226
	(3.90)***	(3.89)***	(2.43)**	(2.75)***	(3.82)***	(3.89)***	(3.77)***	(3.61)***	(3.42)***	(3.65)***	(3.96)***	(2.23)**	(3.24)***	(0.40)
Life expectancy	-0.168	-0.091	-0.900	0.356	0.415	-0.178	-0.098	-0.779	-0.069	-0.115		-0.470	0.212	-0.963
	(0.22)	(0.12)	(0.52)	(0.46)	(0.22)	(0.23)	(0.13)	(1.01)	(0.09)	(0.15)		(0.51)	(0.16)	(0.94)
Schooling	-0.048	-0.129	0.586	0.194	0.043	-0.054	-0.029	-0.221	-0.097			-0.294	0.420	-0.075
	(0.23)	(0.55)	(1.85)*	(0.87)	(0.14)	(0.26)	(0.14)	(1.04)	(0.47)			(0.88)	(1.64)	(0.23)
Inflation	-1.028	-1.038	-1.396	-1.058	-0.827		-0.806	-1.659	-1.060	-1.047	-1.049	-0.984	-1.138	-1.187
	(5.18)***	(5.22)***	(4.70)***	(5.50)***	(3.37)***		(3.15)***	(5.79)***	(5.36)***	(5.26)***	(4.85)***	(4.27)***	(4.98)***	(4.28)***
Banking sector	0.352	0.353	0.438	0.227	0.422	0.353	0.354	0.331	0.349	0.332	0.344	0.268	0.368	0.598
development	(4.62)***	(4.62)***	(4.70)***	(2.80)***	(5.11)***	(4.64)***	(4.65)***	(4.14)***	(4.62)***	(4.09)***	(3.76)***	(2.38)**	(4.69)***	(3.76)***
Urbanization		0.277												
		(0.78)												
Gini			0.002											
			(0.17)											
Social security				0.051										
				(0.50)										
Revolutions and Coups					-0.065									
					(0.56)									
Anticipated inflation						-1.025								
						(5.22)***								
Inflation volatility							-0.056							
							(1.37)							
Real interest rate								0.302						
								(2.78)***						
Permanent income									0.792					

									(3.28)***					
Secondary enrolment										-0.029				
										(0.14)				
HDI											2.423			
											(1.51)			
Rule of Law												-0.001		
												(0.02)		
Private Savings Rate													0.359	
													(2.56)**	
F-test time dummies	2.67**	2.59**	3.23***	1.31	3.95***	2.75***	1.89*	2.45**	2.02*	1.76	0.46	1.12	3.39**	4.02
Observations	322	322	177	277	190	322	322	304	322	298	266	224	205	141
Number of Countries	66	66	58	61	53	66	66	64	66	65	65	66	57	37
Time period	1961-2000	1961-2000	1961-2000	1966-2000	1961-1990	1961-2000	1961-2000	1961-2000	1961-2000	1961-2000	1976-2000	1981-2000	1971-1995	1961-2000
R-squared within	0.6627	0.6635	0.7275	0.6808	0.6387	0.6631	0.6653	0.6895	0.6659	0.6573	0.6073	0.5723	0.7189	0.4856
R-squared between	0.3234	0.3086	0.4014	0.2889	0.2414	0.3234	0.3266	0.3235	0.3328	0.3252	0.3	0.3749	0.3791	0.1219
R-squared overall	0.3827	0.3679	0.5074	0.349	0.3372	0.3822	0.3876	0.366	0.3834	0.3889	0.3428	0.3695	0.3957	0.1777
Hausmann test (p-value)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.058	0.001	0.001	0.444

t-statistics in parentheses. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively

Table 4: The Determinants of Life Insurance in a Panel, 1961 - 2000; Alternative Measures of Life Insurance

	(1)	(2)	(3)	(4)	(5)	(6)
	Life Insurance Density	Life Insurance Density	Life Insurance in Private Savings	Life Insurance in Private Savings	Life Insurance in Force to GDP	Life Insurance in Force to GDP
Sample	Whole sample	Developing countries	Whole sample	Developing countries	Whole sample	Developing countries
Econometric model	Fixed effects	Fixed effects	Fixed effects	Random effects	Random effects	Random effects
Constant	-13.342	-19.270	1.232	-4.909	8.977	7.699
	(2.13)**	(1.69)*	(0.18)	(0.46)	(1.21)	(0.63)
GDP per capita	1.471	0.745	-0.254	-0.432	0.924	0.759
	(4.41)***	(1.09)	(0.98)	(1.23)	(3.81)***	(2.28)**
Young dependency	-0.299	1.208	-0.756	1.000	0.258	-0.428
	(0.55)	(0.82)	(1.71)*	(1.03)	(0.47)	(0.38)
Old dependency	1.730	0.885	1.604	1.511	-1.313	-1.423
	(3.31)***	(0.41)	(3.40)***	(1.41)	(3.03)***	(1.40)
Life expectancy	0.023	1.392	0.188	0.111	-3.403	-1.644
	(0.02)	(0.69)	(0.12)	(0.05)	(1.94)*	(0.51)
Schooling	-0.169	-0.054	0.586	0.038	0.572	-0.231
	(0.48)	(0.06)	(1.95)*	(0.08)	(1.39)	(0.41)
Inflation	-0.757	-0.600	-0.706	-0.473	-1.394	-1.979
	(2.24)**	(1.15)	(2.62)***	(1.18)	(2.64)***	(2.25)**
Banking sector development	0.375	0.938	0.371	0.750	0.446	0.204
	(2.89)***	(2.69)***	(4.02)***	(3.22)***	(2.91)***	(0.58)
Private Savings Rate			-0.660	-0.561		
			(3.97)***	(2.30)**		
F-test time dummies	1.17	0.18	3.40**	8.33*	15.05**	6.87
Observations	322	141	203	88	216	75
Number of Countries	66	37	56	28	47	22
Time period	1961-2000	1961-2000	1971-1995	1971-1995	1961-1995	1961-1995
R-squared within	0.6057	0.2437	0.7002	0.5517	0.3525	0.4181
R-squared between	0.7146	0.3278	0.1914	0.0228	0.4895	0.3906
R-squared overall	0.7211	0.3141	0.2878	0.0756	0.4256	0.3437
Hausmann test (p-value)	0.001	0.021	0.0092	0.4985	0.491	0.9615

t-statistics in parentheses. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively

Table 5: The Determinants of Life Insurance Penetration in an Annual Panel, 1961 - 2000

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Developing countries
Econometric model	Fixed effects	Random effects	Fixed effects	Fixed effects	Fixed effects	Random effects
Constant	-3.288	13.928	-5.831	-1.828	-6.478	-3.694
	(1.16)	(3.01)***	(2.19)**	(0.62)	(2.21)**	(0.80)
GDP per capita	0.665	0.088	0.517	0.689		0.394
	(4.89)***	(0.72)	(3.92)***	(4.96)***		(2.15)**
Young dependency	-0.586	-0.712	-0.401	-0.713	-0.474	0.069
	(2.87)***	(2.94)***	(2.09)**	(3.32)***	(2.32)**	(0.13)
Old dependency	0.920	0.506	1.137	0.901	0.689	0.121
	(4.97)***	(2.40)**	(6.55)***	(4.38)***	(3.53)***	(0.25)
Life expectancy	-0.631	-4.056	-0.406	-0.890	-0.601	-0.688
	(1.02)	(3.59)***	(0.68)	(1.37)	(0.99)	(0.81)
Schooling	-0.068	0.852	0.010	-0.156	-0.141	-0.154
	(0.45)	(4.49)***	(0.07)	(0.97)	(0.94)	(0.56)
Inflation	-0.645	-0.687		-0.788	-0.686	-0.708
	(4.97)***	(4.38)***		(4.41)***	(5.32)***	(3.88)***
Banking sector development	0.062	0.412	0.405	0.083	0.060	0.727
	(2.29)**	(8.47)***	(9.55)***	(2.74)***	(2.20)**	(6.87)***
Private Savings Rate		0.184				
		(2.47)**				
Anticipated inflation			-0.834			
			(6.13)***			
Real interest rate				0.172		
				(2.07)**		
Permanent income					1.034	
					(5.91)***	
F-test time dummies	2.03***	80.21***	2.01***	1.73***	1.47**	20.34
Observations	836	463	779	782	836	288
Number of Countries	66	55	66	63	66	37
Time period	1961-2000	1970-1995	1961-2000	1961-2000	1961-2000	1961-2000
R-squared within	0.6166	0.6716	0.6589	0.6151	0.6221	0.4383
R-squared between	0.3106	0.4882	0.3396	0.3072	0.3292	0.1289
R-squared overall	0.3767	0.5245	0.4027	0.3523	0.3916	0.1945
Hausmann test (p-value)	0.001	0.1384	0.001	0.001	0.001	0.9758

t-statistics in parentheses. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively

Table 6: The Determinants of Life Insurance Penetration in a Cross-Section 1980 - 2000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample	Whole sample	Developing countries	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample	Whole sample
Econometric model	OLS	OLS	OLS	OLS	OLS	OLS	IV	IV
Constant	39.729	51.455	32.775	32.466	41.322	41.991	33.825	29.156
	(2.98)***	(2.24)**	(3.08)***	(2.83)***	(2.97)***	(3.17)***	(2.74)***	(1.97)*
GDP per capita	0.595	0.621	0.342	0.660	0.616	0.396	0.560	0.628
	(3.45)***	(1.68)	(1.63)	(4.48)***	(3.52)***	(2.63)**	(2.76)***	(2.62)**
Young dependency	-0.980	-2.237	-0.397	-0.274	-1.349	-0.806	-0.190	-0.192
	(1.00)	(1.00)	(0.41)	(0.39)	(1.19)	(0.85)	(0.17)	(0.16)
Old dependency	-0.665	-1.487	0.188	-0.374	-0.775	-0.759	-0.734	-0.711
	(1.68)*	(1.79)*	(0.39)	(1.00)	(1.84)*	(1.84)*	(1.10)	(0.96)
Life expectancy	-10.618	-11.576	-10.113	-9.543	-10.599	-10.853	-10.961	-10.067
	(4.40)***	(3.51)***	(5.68)***	(3.97)***	(4.36)***	(4.61)***	(4.48)***	(3.45)***
Schooling	1.824	1.904	2.118	1.137	1.705	1.554	1.871	1.021
	(5.06)***	(2.92)***	(4.98)***	(2.35)**	(4.45)***	(3.97)***	(3.74)***	(0.89)
Inflation	-1.830	-2.003	-2.183	-2.102	-1.756	-1.213	-0.371	0.286
	(4.10)***	(2.11)**	(2.73)***	(5.06)***	(3.39)***	(2.38)**	(0.32)	(0.19)
Banking sector development	0.631	0.298	0.234	0.750	0.622	0.639	1.802	2.229
	(2.59)**	(0.69)	(0.60)	(3.67)***	(2.44)**	(2.51)**	(2.44)**	(2.32)**
Private Savings Rate			1.284					
			(1.37)					
Muslim				-0.018				
				(2.60)**				
Catholic				-0.002				
				(0.59)				
Protestant				-0.009				
				(1.42)				
Revolutions and Coups					0.508			
					(1.39)			
Institutional Development						0.729		
						(2.22)**		
Observations	66	37	58	66	63	66	62	62
R-squared	0.70	0.54	0.74	0.78	0.70	0.72	0.61	0.51

Instrumented:		Banking sector development	Banking sector development, Schooling
Instruments:		Legal origin dummies, Good crops	Legal origin dummies, Good crops
OIR (p-value)		0.1793	0.2374

t-statistics in parentheses. *,**,*** indicate significance at the 10%, 5% and 1% level, respectively

Table A1: Variable definitions and sources

Variable	Description	Source
Life Insurance Penetration	Life insurance premiums divided by GDP	Sigma, International Financial Statistics (IFS)
Life Insurance Density	Life insurance premiums per capitain real dollars. Calculated as life insurance premiums multiplied with average period exchange rate, divided by population and U.S. Consumer Price Index	Sigma, IFS, World Development Indicators (WDI)
Life Insurance to Private Savings	Life insurance premiums relative to private savings	Sigma, Loayza et al. (1999)
Life Insurance in Force to GDP	Outstanding life insurance policies relative to GDP. Calculated as the sum of face amounts plus divided additionas of life insurance policies outstanding as share of GDP.	American Council of Life Insurance (ACLI), IFS
GDP per capita	GDP per capita in constant 1995 US dollars	WDI
Young Dependency	Ratio of population under 15 years to population between 15 and 65 years	WDI
Old Dependency	Ratio of population over 65 years to population between 15 and 65 years	WDI
Life expectancy	Life expectancty at birth	WDI
Schooling	Average years of schooling in the population over 25	Barro and Lee (1996). Up-date from web-page
Inflation rate	Log difference of Consumer Price index (line 64)	IFS
Banking sector development	{(0.5)*[F(t)/P_e(t) + F(t-1)/P_e(t-1)]}/[GDP(t)/P_a(t)], where F is claims by deposit money banks and other financial institutions to domestic non-financial sectors (lines 22a-d), GDP is line 99b, P_e is end-of period CPI (line 64) and P_a is the average CPI for the year.	IFS
Urbanization	Share of urban population in total population	WDI
Gini	The Gini index measures the area between the Lorenz curve, the cumulative percentages of total income received against the cumulative number of recipients and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of zero represents perfect equality, while an index of 100 implies perfect inequality.	Deininger and Squire (1996) and Lundberg and Squire (2001)
Social security	Government subsidies and other current transfers by government as share of GDP	WDI
Real interest rate	Nominal interest minus inflation rate. Nominal rate is either the average lending rate or, if not available, the discount rate	IFS

Anticipated inflation rate	Average of current and next year inflation rate	IFS
Permanent income	Predicted value of a regression of each country's real GDP per capita on a time trend	WDI, own calculations
Secondary enrolment	Gross enrolment in secondary education	WDI
Private Savings Rate	Private savings as share of Gross National Disposable Income	Loayza et al. (1999)
Revolutions and Coups	Average number of revolutions and coups per year	Banks (1994)
Human Development Indicator	Average of a country's achievements in life expectancy, education (literacy and gross enrollment) and GDP per capita, normalized between zero and one.	UNDP (2002)
Rule of Law	Measure of the extent to which citizens of a county trust the legal system to settle disputes. It ranges from 6, strong law and order tradition, to 1, weak law and order tradition.	ICRG
Inflation volatility	Standard deviation of Inflation	IFS
Institutional Development	Average value of six indicators measuring voice and accountability, political stability, regulatory quality, government effectiveness, control of corruption and rule of law. Each of these indicators, in turn is constructed from a wide array of survey indicators in the respective area.	Kaufman, Kraaay and Lobaton-Zoido (1999)
Catholic	Share of Catholic adherents in total population	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
Muslim	Share of Muslim adherents in total population	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
Protestant	Share of Protestant adherents in total population	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
British legal origin	Dummy variable that takes value one the country's legal system is of British origin	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
French legal origin	Dummy variable that takes value one the country's legal system is of French origin	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
Socialist legal origin	Dummy variable that takes value one the country's legal system is of Socialist origin	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
German legal origin	Dummy variable that takes value one the country's legal system is of German origin	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)
Scandinavian legal origin	Dummy variable that takes value one the country's legal system is of Scandinavian origin	La Porta, Lopez-de-Silanes, Shleifer and Vishny (1999)

Good crops	(1+zmaize+zwheat)/(1+zrice+zsugarcane), where zX equals the share of the land area that is judged to be suitable by FAO for growing crop X. Maize and Wheat are considered to be crops that foster a large middle class with egalitarian institutions in contrast to rice and sugarcane, which tend to produce a powerful elite and more closed institutions.	Easterly and Levine (2003)

Table A2: Additional Correlations

	Life Insurance Penetration	Gini	Urbanization	Social security	Real interest rate	Anticipated inflation	Permanent income	Secondary enrolment	Private Savings Rate	Revolutions and Coups	HDI
Gini	-0.2626***	1.0000									
Urbanization	0.2390***	-0.3428***	1.0000								
Social security	0.2883***	-0.6471***	0.5010***	1.0000							
Real interest rate	-0.0851	0.2067***	0.0842*	-0.0220	1.0000						
Anticipated inflation	-0.2586***	0.2571***	0.0917*	-0.0739	0.6610***	1.0000					
Permanent income	0.5321***	-0.5737***	0.5831***	0.6096***	-0.0421	-0.2065***	1.0000				
Secondary enrolment	0.5475***	-0.6193***	0.6562***	0.7204***	-0.0461	-0.1225**	0.7617***	1.0000			
Private Savings Rate	0.1902***	-0.2494***	0.1668***	0.1749***	0.0799	-0.0136	0.3366***	0.3194***	1.0000		
Revolutions and Coups	-0.0698	0.1528**	-0.2570***	-0.2867***	0.0756	0.0879	-0.3100***	-0.2630***	-0.1847***	1.0000	
HDI	0.4415***	-0.4772***	0.7555***	0.6363***	0.0008	-0.0826	0.7705***	0.8544***	0.2761***	-0.2812***	1.0000
Rule of Law	0.3519***	-0.6012***	0.5253***	0.6120***	-0.0593	-0.2483***	0.7354***	0.7050***	0.3078***	-0.4591***	0.7611***
Inflation volatility	-0.2125***	0.2094***	0.0385	-0.0700	0.5876***	0.9002***	-0.1860***	-0.1120**	-0.0398	0.1246**	-0.0535
Institutional Development	0.5232***	-0.6076***	0.6233***	0.6477***	-0.0813	-0.3256***	0.8112***	0.8363***	0.3307**	-0.2650**	0.8547***
Catholic	-0.2069*	0.2286*	0.0851	0.0348	0.2258*	0.2500**	-0.1082	-0.0890	-0.2702**	0.1945	0.1090
Muslim	-0.3057**	0.0878	-0.2667**	-0.2842**	-0.0878	-0.0604	-0.3167***	-0.3291***	-0.1323	-0.0248	-0.4936***
Protestant	0.3165**	-0.2236*	0.2488**	0.3201***	-0.0950	-0.2097*	0.5781***	0.4440***	-0.0659	-0.1618	0.3531***
British legal origin	0.3364***	0.1623	-0.1080	-0.1716	-0.1192	-0.1887	-0.013	-0.0667	0.2068	0.0077	-0.1031
French legal origin	-0.4565***	0.4044***	-0.0302	-0.2524**	0.1937	0.1773	-0.3384***	-0.3296***	-0.4266***	0.1928	-0.2571***
Socialist legal origin	-0.2333*	-0.4044***	-0.1189	0.3565***	-0.0410	0.2621**	-0.2169*	0.0950	0.3284**	-0.0810	0.0844
German legal origin	0.4518***	-0.2774**	0.1484	0.0397	-0.0575	-0.1917	0.4395***	0.2421**	0.3667***	-0.1227	0.2566**
Scandinavian legal origin	0.1000	-0.2591**	0.2296*	0.3059**	-0.0553	-0.1303	0.4621***	0.3842***	-0.1257	-0.1552	0.3070***
Good crops	0.1048	-0.6832***	0.3525***	0.5585***	-0.0373	0.0841	0.3076**	0.4809***	0.1646	-0.2639**	0.4157***

*,**,*** indicate significance at the 1%, 5% and 10% level, respectively

	Rule of Law	Inflation Volatility	Institutional Development	Catholic	Muslim	Protestant	British legal origin	French legal origin	Socialist legal origin	German legal origin	Scandinavian legal origin
Inflation volatility	-0.2076***	1.0000									
Institutional Development	0.8513***	-0.2305*	1.0000								
Catholic	-0.1380	0.2596**	-0.0200	1.0000							
Muslim	-0.3333***	-0.1232	-0.4567***	-0.4221***	1.0000						
Protestant	0.4883***	-0.1825	0.4861*'**	-0.3243***	-0.2348*	1.0000					
British legal origin	0.0492	-0.1794	0.1092	-0.3584***	-0.0229	0.0441	1.0000				
French legal origin	-0.4847***	0.1201	-0.4114***	0.5157***	0.2495**	-0.4050***	-0.5568***	1.0000			
Socialist legal origin	0.1489	0.2712	-0.0528	0.0009	-0.1357	-0.1563	-0.2232*	-0.3271***	1.0000		
German legal origin	0.2573**	-0.1469	0.2632**	-0.0812	-0.1356	0.0470	-0.1902	-0.2787**	-0.1118	1.0000	
Scandinavian legal origin	0.3785***	-0.0967	0.3804**	-0.2847**	-0.1244	0.8429***	-0.1723	-0.2525**	-0.1012	-0.0863	1.0000
Good crops	0.4268***	0.0872	0.3737**	-0.0166	-0.1789	0.0545	-0.1183	-0.2963**	0.4418***	0.1977	0.0042

Table A3: Countries in the Sample

	Life Insurance Penetration / Density	Life Insurance in Private Savings	Life Insurance in Force to GDP
Algeria	*		
Argentina	*	*	
Australia	*	*	*
Austria	*	*	*
Belgium	*	*	*
Brazil	*	*	*
Bulgaria	*		
Cameroon	*	*	
Canada	*	*	*
Chile	*	*	*
China	*	*	
Colombia	*	*	
Costa Rica	*	*	*
Croatia	*		
Cyprus	*	*	
Czech Republic	*		
Denmark	*	*	*
Dominican Republic	*	*	*
Ecuador	*	*	*
Egypt	*	*	*
El Salvador	*		
Fiji			*
Finland	*	*	*
France	*	*	*
Germany	*	*	*
Great Britain	*	*	*
Greece	*	*	*
Guatemala	*	*	*
Honduras			*
Hong Kong	*	*	
Hungary	*		
Iceland	*	*	*
India	*	*	*
Indonesia	*	*	*
Iran	*	*	
Ireland	*	*	*
Israel	*	*	*
Italy	*	*	*
Japan	*	*	*
Kenya	*	*	

Korea	*	*	*
Malaysia	*	*	*
Mexico	*	*	*
Netherlands	*	*	*
New Zealand	*	*	*
Norway	*	*	*
Pakistan	*	*	*
Panama	*	*	
Peru	*	*	*
Philippines	*	*	*
Poland	*		*
Portugal	*	*	*
Romania	*		
Singapore	*	*	
Slovenia	*		
South Africa	*	*	*
Spain	*	*	*
Sweden	*	*	*
Switzerland	*	*	*
Syria	*		
Taiwan	*	*	*
Thailand	*	*	*
Tunisia	*	*	*
Turkey	*	*	
Uruguay	*	*	*
USA	*	*	*
Venezuela	*	*	*
Zimbabwe	*	*	