THE IMPACT OF CULTURE ON THE DEMAND FOR NON-LIFE INSURANCE

BY

SOJUNG CAROL PARK AND JEAN LEMAIRE

ABSTRACT

Regression techniques are applied to an unbalanced panel data that includes 68 countries observed over a ten-year period, to explore the factors that affect non-life insurance demand across nations. While previous literature has discovered several significant economic, demographic, and institutional variables, little attention has been devoted to cultural dimensions. We find that non-life insurance consumption is adversely impacted in countries where a large fraction of the population has Islamic beliefs. Also highly significant are three of the cultural scores developed by Hofstede in a celebrated study: Power Distance, Individualism, and Uncertainty Avoidance. An important finding is that culture impacts non-life insurance more in affluent countries, with an adjusted R-square coefficient increasing by 11.7%, than in developing countries where the R-square coefficient increase due to cultural impacts is only 1.2%. These results have implications for multinational insurers seeking to enter a new market. *Ceteris Paribus*, these insurers should target countries, and population segments within these countries, that exhibit low Power Distance, and high Individualism and Uncertainty Avoidance scores.

KEYWORDS

Non-life insurance, cultural variables, econometric analysis.

1. INTRODUCTION

Numerous publications in insurance journals explore the determinants of insurance consumption, and attempt to find variables that significantly impact life and non-life insurance purchases. All studies implicitly assume that policyholders are making rational decisions, maximizing benefits to dependents after death and protecting their assets, and focus on economic determinants such as income, legal system, and education using international panel data. However, it may be unreasonable to expect such a high degree of competence and rationality on the part of insureds confronted with the purchase of very

Astin Bulletin 42(2), 501-527. doi: 10.2143/AST.42.2.2182806

complex and abstract products. It may very well be that national culture has a strong impact on insurance purchase decisions. Humans do not share the same decision-making process when facing economic decisions. Consumers may respond to insurance solicitations according to their cultural beliefs, not only on economic rationality.

The main purpose of this paper is two-fold. First, we explore national culture as potential determinant of non-life insurance consumption. Hofstede (1983, 2001) provides four cultural dimensions that can describe cross-cultural differences across different countries: Individualism, Power Distance, Masculinity / Feminity, and Uncertainty Avoidance. We test the effect of these four cultural measures on non-life insurance demand using a large international panel data that includes 68 countries over a ten-year period. We also introduce affiliation to one of the world's largest religions as cultural variables. Second, we investigate the importance of economic and cultural factors on non-life insurance demand at different stages of economic development. A positive relationship between GDP and non-life insurance penetration emerges, as reported in all previous literature. However, the relationship deteriorates in richer countries; it even totally breaks down among upper income economies. Beenstock *et al*. (1988) observe a similar phenomenon, but do not investigate it further, relegating it to further research. Our main contribution is to subdivide our sample into developing and developed nations and investigate whether national culture can explain a substantial part of the residual insurance demand variations among the two subsets of countries.

The paper is organized as follows. The literature review in section 2 is followed by our list of variables in section 3. Section 4 presents our data and methodology. Results are discussed in section 5. Section 6 provides our summary and discusses conclusions.

2. Literature Review

The demand for insurance can be studied theoretically from a variety of perspectives, from adverse selection and demand elasticity (Thomas, 2009) to insurance as an investment tool competing with others (Mayers and Smith, 1983). Practical approaches include a large body of research that applies econometric models to select the most appropriate factors that explain variations in the demand for life insurance across countries, with, as most frequently cited papers, Beck and Webb (2003), Browne and Kim (1993), and Outreville (1996). The dependent variables for the vast majority of models are the life insurance density (number of US Dollars spent annually on life insurance per capita) and the life insurance penetration (total life premium volume divided by GDP), published annually in Swiss Re's publication *Sigma.* Explanatory variables that have been shown to significantly impact life insurance demand are GDP per capita, inflation (real, anticipated, or feared), development of the banking sector, institutional indicators (such as investors protection, contract

enforcement, and political stability), and whether Islam is the dominant religion or not. Variables that appear to have a borderline impact include education, old and/or young dependency ratio (ratio of the population above the age of 65, or below 15, to the number of persons age 15 to 64), urbanization, size of the social security system, life expectancy, and market structure.

Burnett and Palmer (1984) appear to be the first authors to introduce non-traditional explanatory variables, by showing that psychographic characteristics such as religion, work ethics, fatalism, socialization preference, and assertiveness can influence life insurance demand. Hofstede (1995) argues that national cultural features such as degree of solidarity, independence, and predictability influence the development of insurance, and consequently make the integration of insurance in the European Union a difficult endeavor. Ward and Zurbruegg (2000) and Hwang and Greenford (2005) hint at the possible impact of cultural values. It is, however, the work of Chui and Kwok (2008, 2009) that has to be considered as path-breaking, demonstrating that the inclusion of cultural factors in the set of explanatory variables greatly improves the predictive ability of regression analyses. Using an unbalanced panel data of 41 countries observed from 1976 to 2001, they include in their models four cultural variables introduced by Hofstede (1983, 2001): Individualism, Power Distance, Masculinity, and Uncertainty Avoidance. They find the first three variables to have a highly significant effect. The results prove to be robust, even after controlling for economic, institutional, and demographic factors such as GDP per capita, inflation, bank sector and stock market development, creditors rights, contract enforcement quality, dependency ratio, and religion. For instance, the inclusion of just one cultural variable, Individualism, increases the adjusted R^2 from 0.70 to 0.83 — a highly significant improvement.

Compared with the voluminous literature on life insurance country variations, very little empirical research has been devoted to the determinants of the demand for property-casualty insurance. In a cross-sectional analysis of consumption patterns limited to automobile insurance in 359 townships of the state of Massachusetts in 1979, Sherden (1984) finds that the demand for motor insurance is generally inelastic with respect to price and income, and that the demand for comprehensive and collision coverage increases substantially with increased population density. In a first international study using *Swiss Re* data, Beenstock *et al.* (1988) investigate the relationship between property-liability premiums per capita and GDP per capita for 45 countries in 1981. A log-linear model proves a strongly significant positive relationship, with an income elasticity exceeding unity: non-life insurance is a superior good, disproportionately represented in economic growth. The relationship between income and premiums, however, seems to deteriorate as countries get richer. Outreville (1990) uses a cross-sectional logarithmic model of non-life insurance penetration for 55 developing countries that confirms the Beenstock *et al.* (1988) main result of an income elasticity greater than unity. The level of financial development is the only other factor found to significantly impact non-life insurance.

Browne *et al.* (2000) study 22 OECD countries from 1987 through 1993 and focus on the premium density of two lines of insurance: motor vehicle (usually purchased by households) and general liability (normally bought by businesses). Panel data analysis demonstrates that income (GDP per capita), wealth, foreign firms market share, and the form of legal system (civil law or common law) are significant factors to explain the purchase of the two types of insurance. Per capita income has a much greater impact on motor insurance than on general liability. Esho *et al.* (2004) expand the work of Browne *et al.* (2000) by using a larger set of countries, and by introducing the origin of the legal system and a measure of property rights in their model. Dummy variables, characterizing the English, French, German, and Scandinavian legal system origin, are found to have an insignificant effect. Results show a robust relationship between the protection of property rights and insurance consumption, as well as a significant effect of loss probability and income. Esho *et al.* (2004) also include one of Hofstede's dimensions, Uncertainty Avoidance, as a proxy for risk aversion. They find a marginally positive relationship and conclude that culture does not seem to play an important role in non-life insurance demand.

Park *et al.* (2002) examine the impact of culture on insurance pervasiveness, defined as the combined penetration of life and non-life insurance. Four of Hofstede's cultural dimensions are included in the panel regression analysis in addition to GNP, socio-political stability, and economic freedom. In contrast with the life insurance demand studies of Chui and Kwok (2008, 2009), results show that only Masculinity is positively correlated with insurance pervasiveness. This conflicting result may be due to the aggregation of life and non-life insurance, which may produce a bias against finding meaningful relationships if the impact of culture on insurance demand is different for life and non-life insurance. Also, Park *et al.* (2002) only have three other control variables in their regression model; they did not include life- or non-life-specific control factors. The low number of controls may cause an omitted variable problem and result in biased coefficient estimates.

3. Data and Variables

"Life insurance is sold, non-life insurance is bought". This well-known aphorism suggests that culture may impact life and non-life insurance demand in different ways. Indeed, the penetration of these two major lines of business varies enormously across continents. In Asia, insurance penetration in life (4.5% of GDP) vastly exceeds non-life (1.6%). A reverse situation is observed in North America (4.5% non-life, 3.4% life). (Swiss Re, 2011)

Our study, devoted to the impact of cultural variables on non-life insurance purchases, uses an extensive number of explanatory variables. Swiss Re' studies annually include over 85 countries, based on a minimum premium threshold. Hofstede's 1983 study provides scores for his four cultural variables

TABLE 1

VARIABLE DEFINITIONS AND SOURCES

Variable	Abbreviation	Description	Time-sensitive?	Source	Hypothesized relationships
Density	DEN	Non-life insurance premium per capita adjusted for Purchasing Power Parity	Yes	*Sigma*, Swiss Re. PPP factors from IMF	
Penetration	PEN	Non-life insurance premiums divided by GDP	Yes	*Sigma*, Swiss Re	
Income per capita	GDP	GDP corrected for Purchasing Power Parity	Yes	*World Economic Outlook database*, IMF	Positive
Urbanization	URBAN	Percentage of population living in urban areas	Yes	*World Development Indicators*, World Bank	Positive
Education	EDUC	Percentage of population enrolled in third level education	Yes	http://www.barrolee.com/	Positive
Market Concentration	HERF	Modified Herfindahl Index: sum of squared market shares of ten largest non life insurers	Yes	International Insurance Fact Book, Insurance Information Institute	Negative
Legal System	COMMON	Dummy variables characterizing countries with a Common Law legal system	No	The World Factbook, CIA	Positive
Political Risk Index	PRISK	Political stability score based on a weighted average of 12 components	Yes	International Country Risk Guide, Political Risk Group	Positive
Legal System in Force	COMMON, ISLAM	Legal system of each country	No	Reynolds and Flores (1998)	Positive-COMMON Negative-ISLAM
Religion	BUDD, CHRT, MUSLIM	Percentage of individuals with Christian, Buddhist, and Islamic beliefs	No	The World Factbook, CIA	Negative
Power Distance	PDI	Cultural variable measuring inequality among people	No	http://www.geert-hofstede.com/hofstede_dimensions.php	Negative
Individualism	IDV	Cultural variable measuring attitude towards individual vs. collective behavior	No	http://www.geert-hofstede.com/hofstede_dimensions.php	Positive
Masculinity	MAS	Cultural variable measuring masculine vs. feminine attitudes	No	http://www.geert-hofstede.com/hofstede_dimensions.php	Ambiguous
Uncertainty Avoidance	UAI	Cultural variable measuring tolerance for uncertainty	No	http://www.geert-hofstede.com/hofstede_dimensions.php	Positive

Time-sensitive variables are collected annually from 1999 to 2008. Time-insensitive variables are constant during the 10-year period.

for 66 countries and three regions comprising 14 countries (the Arab World, East Africa, West Africa), for a total of 80 countries. Values for all other explanatory variables were found in international databases. The cross-section of all database resulted in an unbalanced panel data including 68 countries, with a population of 5.67 billion representing 82.7% of the world's total, observed during a ten-year period [1999-2008]. Most variables, for instance Market Concentration and GDP per capita, are provided on an annual basis from 1999 to 2008. Other variables, like the Legal System and cultural measures, do not evolve over time and are presented as a single time-invariant number. Table 1 summarizes variable definitions and sources.

3.1. Dependent Variables

1. *The Non-Life Insurance Penetration* (PEN). In its annual study of world insurance markets, the Swiss Reinsurance Company ranks over 85 countries according to non-life insurance penetration: non-life insurance premiums, as a percentage of GDP.

2. *The Non-Life Insurance Density, at Purchasing Power Parity* (DEN). Density, defined as premium per capita in US dollars, is also published annually by Swiss Re. To better reflect cost of living differences, we applied a Purchasing Power Parity (PPP) correction to the density. Premiums per capita can be converted to US Dollars either using market currency exchange rates, or at PPP. The use of market rates can lead to misleading conclusions when comparing per-capita living conditions across countries. Economists prefer to correct the data by a PPP factor that attempts to reflect the differences in prices and services between a country and the United States. We used PPP factors published by the International Monetary Fund. The PPP correction can be significant, with maximum values exceeding five for countries like Angola or Ukraine.

Nearly every single international comparative study uses insurance density and penetration as dependent variables. We correct density to better reflect purchasing power. These variables have the advantage of being easily available, annually, for a large number of countries. Swiss Re puts in a lot of effort in reconciling the different valuation techniques used around the world, and standardizes the data by providing figures that are gross of reinsurance and commissions. A disadvantage of density and penetration is that premiums across various lines of insurance are added up. In some countries motor insurance is the dominant non-life policy, while other nations emphasize more liability insurance. Automobile third-party liability auto coverage, the most common compulsory coverage for individuals, is legislated in numerous different ways across the world: sold by a private or a public insurer, included as part of the car registration fee, paid at the pump as a pay-as-you-drive gasoline tax, or guaranteed by the policyholder through the posting of a bond or the deposit of a large sum of money. Tort or no-fault systems have many variants. Policy limits, deductibles, widely vary. Moreover, the Swiss Re figures aggregate policies

sold to individual and corporate customers, who may exhibit different risk aversions. Aggregating premiums results in a loss of information, reducing the likelihood that significant explanatory variables will be discovered. Unfortunately, disaggregated premiums are only available for few countries.

Density and penetration measure slightly different effects. Penetration measures non-life insurance consumption relative to the size of the economy, while density compares non-life insurance purchases across countries without adjusting for income. High GDP countries will spend more on insurance in absolute terms, as they have more assets to protect. We therefore expect a very high correlation between insurance density and GDP – indeed one of the reasons for the paucity of research in determinants of non-life insurance may have been a belief that purchases are driven by wealth and little else. Penetration measures relative insurance consumption, as the overall wealth effect has been removed through division by GDP per capita. It measures how wealth is allocated to insurance in relative terms: two countries with similar GDP per capita may exhibit different insurance consumption patterns, an effect captured by penetration and not by density. For this reason we consider penetration to be our primary variable, and use density only for robustness checks.

Explanatory Variables

Economic and Institutional Variables

3. *The Gross Domestic Product per capita, at Purchasing Power Parity* (GDP). All previous studies, whether devoted to life or non-life insurance, conclude that income, measured as GDP per capita, is the most important factor affecting purchasing decisions. Obviously, increased income allows for higher consumption in general, makes insurance more affordable, and creates a greater demand for non-life insurance to safeguard acquired property. We expect income to have a strong, positive impact on non-life insurance demand.

4. *Urbanization: percentage of population living in urban areas* (URBAN). Several authors suggest that urbanization could be an important determinant for non-life insurance demand, for a variety of reasons. Sherden (1984) expects urban dwellers to perceive a higher risk of car accidents and thefts. Browne *et al.* (2000) observe that urban concentration increases the rate of interaction among individuals, with more activities undertaken in close proximity to neighbors, and consequently use urbanization as a proxy for loss probability. According to Esho *et al.* (2004), there is a greater concentration of assets in urban areas, leading to increased opportunities for crime and for evading detection. Hwang and Gao (2003) observe that many countries are facing a transition from an agricultural to an industrialized society. The city then becomes the center of economic development, with great impact on traditional values and perception of risk. Families become smaller, economic security in the form of informal agreements within a family or village no longer exists, so additional sources of financial security are needed. Life and non-life insurance

are efficient tools to provide this security. Also, the concentration of potential customers in a small geographic area such as a city simplifies the marketing and distribution of insurance. We expect the degree of urbanization of a country to be positively related to its consumption of non-life insurance.

5. *Education: percentage of population enrolled in third-level education* (EDUC). Several authors [Browne and Kim (1993), Browne *et al.* (2000), Esho et al. (2004)] use the level of education in a country as a proxy for risk aversion. Our perspective is that education increases the awareness of risk and enables a better assessment of threats to financial stability. Educated people are more able to understand the benefits of insurance. Possibly, as suggested by Outreville (1990), a high degree of education is needed to have an impact, and education does not affect insurance demand during early stages of development. Along with most authors [Browne and Kim (1993), Browne *et al*. (2000), Esho *et al.* (2004), Outreville (1990, 1996), Truett and Truett (1990)] we expect a country's level of education to be positively correlated with demand for non-life insurance.

6. *Market Concentration: sum of squared market shares of ten largest non-life insurance companies* (HERF). Competition forces down the price of insurance, and makes it more affordable. Outreville's (1996) main conclusion is that a monopolistic market has a negative effect on life insurance growth. Browne *et al.* (2000) use the market share held by foreign insurers as a proxy for insurance price. The availability of market shares for large companies allows us to define a better proxy variable for competition, in the form of a modified Herfindahl Index: sum of squared markets shares of the ten largest insurers. Given that a high index value implies a high degree of insurer concentration and less competition, we expect a negative relationship between our measure of concentration and the demand for non-life insurance. Alternative measures of concentration, C3 and C5, the market shares held by the top three or five insurers, are introduced among our robustness checks.

7. *The Political Risk Index* (PRISK). Countries with little political and investment risk are more likely to have developed insurance markets, as the financial environment is more conducive to foreign investment, and financial contracts such as insurance policies are easier to enforce. The Political Risk Services Group publishes an International Country Risk Guide, rating most nations around the world according to political, financial, and economic risk. The Political Risk Index (that could also be called the Risk Index for International Business) is the outcome of a statistical model that analyzes the potential risks of international business operations. Countries receive scores on twelve risk components – that could each be considered as a potential explanatory variable.

- government stability (government unity, legislative strength, popular support)
- socioeconomic conditions (unemployment, consumer confidence, poverty)
- investment profile (contract viability, expropriation risk, profit repatriation, payment delays)

- internal conflict (civil war threat, political violence, civil disorder)
- external conflict (war, cross-border conflict, foreign pressures)
- corruption
- military interference in politics
- religious tensions
- law and order (strength and impartiality of judicial system, popular observance of the law)
- ethnic tensions
- democratic accountability
- bureaucratic quality.

The twelve measures of the Political Risk Index are highly correlated, with numerous correlation coefficients in excess of 0.6. Introducing all of these potential explanatory variables in the same regression model would lead to severe multicollinearity problems and reduce the power of the regression. We therefore applied a Principal Components Analysis to summarize the twelve scores, and used the primary factor in all our regressions. This primary factor has a very large eigenvalue of 5.49 and explains 46% of the total variance of all PRS scores. Given that countries with low political risk score high on the index, we expect a positive relationship between the principal component and non-life insurance consumption.

8. *The Legal System in Force* (COMMON, ISLAM). The legal system in force in a country may impact the development of insurance, as it specifies the liabilities of those responsible of damage, and defines the business environment of insurers (Browne *et al*, 2000). For instance, the United States leads the world in per capita consumption of liability insurance. The American legal system may be a contributing factor, by encouraging Americans to over-consume property-liability insurance (Syverud *et al.*, 1994). Browne *et al.* (2000) find the legal system to be a significant factor in the development of non-life insurance. Esho *et al*. (2004) also investigate the impact of the legal system, but find it non-significant after controlling for income and property rights. Recently, Park *et al.* (2010) showed that the use of a Common Law legal system is the most important determinant of toughness of bonus-malus systems in automobile insurance.

While every country has its own specific legal rules, scholars broadly subdivide all legal systems of the world in two families. Civil Law systems originated with Roman law and the Napoleonic code, and were spread around the world by France through conquest, colonization, cultural dominance, and imitation. Common Law systems are based on British law, and are in force in countries that were colonized or heavily influenced by England.

Some legal research [La Porta *et al*. (1998), Min (2006), Posner (2004)] claims that Common Law is more conducive to economic development than Civil Law. Common Law countries generally have higher law enforcement quality and stronger legal protection of creditors and investors. Common Law's reliance on judicial opinion may contribute to commercial growth,

as precedents provide reasonable guidance on issues and more certainty of outcome in case of a dispute. By contrast, in Civil Law countries, consistency is not guaranteed as judges must rule anew on each issue. As a result Common Law countries adapt more rapidly to changing conditions and new opportunities.

Following decolonization after World War II, the legal systems of predominantly Muslim countries began to rapidly evolve to conform to the unique socio-cultural Islamic fundamental principles governed by the Shariah (Kwon, 2007). Today, legal systems in Islamic countries bear little resemblance to their original French- or English-based origins. Kwon (2007) summarizes the Islamic principles applicable to financial services, explains why Islamic jurists oppose the structure of conventional insurance, and cites numerous examples of technical problems that insurers in Muslim countries must overcome to satisfy the principles of the Shariah. For example, transactions must be interest-free. In non-life insurance, no depreciation of property value is permitted. Deductibles, coinsurance, unlimited coverage, or the payment of non-economic damages are not allowed. Only proportional reinsurance contracts can be approved. Takaful insurance companies, which operate in accordance with Shariah principles, are progressively developing in countries like Sudan, Dubai, Malaysia, and Indonesia. Their premium income is included in our figures.

Given the likely significance of Islamic principles in non-life insurance consumption, we characterized the legal systems of all 68 countries in our sample using three time-independent dummy variables: COMMON, CIVIL, and ISLAM, using the classification suggested by Reynolds and Flores (1998). COMMON and ISLAM were included in regressions. Compared to Civil Law countries, we expect the development of non-life insurance to be positively related to COMMON Law, and negatively related to Islamic Law.

Cultural variables

9. *Religion: percentage of individuals with Buddhist, Christian or Islamic beliefs* (BUDD, CHRT, MUSLIM). Zelizer (1979) notes that, historically, religious clerics have opposed life insurance. Some religious people believe that reliance on insurance to protect one's life or property results from distrust in God's protective care. Until the 19th century, several European nations condemned and banned life insurance on religious grounds. Religious antagonism to insurance is still quite prevalent in many Islamic countries. In addition, the religious inclination of a population may affect its risk aversion (Beck and Webb, 2003). Browne and Kim (1993) find Islamic beliefs to significantly decrease life insurance purchases. We expect a high percentage of religious people in a country to negatively affect insurance purchases, especially in Islamic countries.

10. *Hofstede cultural variables.* In a celebrated study, Hofstede (1983) analyzed the answers of 116,000 cultural survey questionnaires collected within subsidiaries of a large multinational business organization, in 64 countries. Four

cultural dimensions of national culture emerged from the study, which collectively explain 49% of the variance in the survey data:

- *Power Distance* (PDI) is the degree of inequality among people which the population of a country considers as normal. The Power Distance index attempts to capture differences in how nations deal with inequality in wealth, power, and privileges. High Power Distance countries accept these inequalities more easily, and agree to a high degree of centralization of authority and autocratic leadership. Countries scoring high on Power Distance include China, Mexico, India, and the Arab World. Israel, New Zealand, Ireland, Scandinavian countries receive low scores. According to Chui and Kwok (2008), in high Power Distance nations, individuals surrender power and authority readily, but expect in return their superiors to be mindful of their welfare and take actions to reduce their risk, thereby reducing the need for insurance. We expect the impact of Power Distance on insurance consumption to be negative.
- *Individualism* (IDV) measures the degree to which people in a country prefer to act as individuals rather than as members of groups. In individualistic countries ties between individuals are loose: people are not expected to care much about persons beyond their immediate family. Collectivist societies are integrated into strong groups, beginning with the extended family, and unquestioned protection and loyalty among members of the group is expected. Examples of countries with high Individualism are the US, the UK, Australia, and the Netherlands. China, Korea, Thailand, Pakistan, and Central American countries are at the other end of the scale. People with an individual mindset tend to rely more on insurance for protection and less on network financial security. We expect the insurance consumption of a country to be positively related to its level of Individualism.
- *Masculinity* (MAS) evaluates whether biological gender differences impact roles in social activities. Some societies allow men and women nearly equal access to all occupations and roles. Others keep a sharp distinction between what men and women should do. In that case, men are given the more dominant and assertive roles in society, and women the more caring and service-oriented roles. In masculine societies, performing, achieving, making money, are given paramount importance. In feminine societies, helping others and the environment, having warm relationships, minding the quality of life, are key values. High-masculinity countries include Japan, Switzerland, Austria, and Venezuela. Sweden, South Korea, Uruguay, Portugal, have high-feminity values. In life insurance, Chui and Kwok (2008) find that feminine societies purchase more insurance, as these societies are very sensitive to the needs of their families and want to protect them against the financial consequences of an untimely death. The effect of Masculinity / Feminity on non-life insurance purchases may be ambiguous. Masculine societies may buy more insurance to be more in control of their future – a factor that may outweigh the higher level of care of feminine societies.

- *Uncertainty Avoidance* (UAI) scores tolerance for uncertainty. The Uncertainty Avoidance index assesses the extent to which people feel threatened by uncertainty and ambiguity, and try to avoid these situations. It measures the degree of preference for structured situations, with clear rules as to how one should behave. Societies try to cope with uncertainty by introducing laws, rules, regulations, religion in a broad sense, and technology. Uncertainty-avoiding societies promote employment stability, select managers on the basis of seniority, are suspicious towards foreigners as managers, and rely excessively on external consultants. People from societies with a high Uncertainty Avoidance index use more mineral water, consume less frozen foods, buy their cars new, avoid large do-it-yourself projects at home, and prefer skill and strategic contests over games of chance. They invest less in stocks. Japan, Russia, Belgium, Greece, and Spain are uncertainty-avoiding countries. Singapore, Sweden, Hong Kong, and the UK, are among the uncertainty-seeking nations. Note that, while Hofstede's concept of Uncertainty Avoidance is correlated with insurance researchers' measure of risk aversion, it is far from being identical. Risk avoiders are willing to pay a premium to reduce risk in their lives, uncertainty avoiders have other goals: they exhibit a strong preference for a well-structured, predictable society with clear rules and expectations. Still, we expect that uncertainty-avoidance countries tend to have a more developed insurance market.

Clearly the subdivision of explanatory variables into "Economic and Institutional" and "Cultural" is somewhat arbitrary. The two categories somewhat overlap. For instance, ISLAM as a legal system is not strictly an institutional variable, as it has religious connections The hypothesized relationships between non-life insurance consumption and our explanatory variables are summarized in the last column of Table 1.

4. Empirical Methodology

Panel data analysis uses at the same time the cross-sectional and time series aspects of the data. This approach increases dramatically the number of observations, and consequently the degree of freedom of tests and the significance of results, while reducing collinearity. The pooling of times series and cross-sectional data allows us to make inferences about a particular country based on observations from other countries, resulting in more accurate predictions.

Table 2 provides descriptive statistics for all variables. Table 3 provides correlations. Due to the high positive skewness and non-normality of insurance density and penetration, GDP per capita, and the modified Herfindahl Index, these variables have been transformed logarithmically.

Our basic model is described by the following equation:

$$\mathrm{Ins}_{it} = \alpha + \beta_1 X_{it,\,\mathrm{Econ}} + \beta_2 Y_{i,\,\mathrm{Inst}} + \beta_3\,\mathrm{PRIN} + \beta_4\, Z_{i,\,\mathrm{Cult}} + \gamma D_{\mathrm{Year}} + \varepsilon_{it}$$

TABLE 2

DESCRIPTIVE STATISTICS

Variable	Observations	Mean	Median	Standard Dev.	Minimum	Maximum	Skewness
Dependent variables							
Penetration	654	2.06	1.88	1.18	0.18	8.7	0.98
Density	654	454.36	257.56	485.14	1.40	3463.67	1.69
Explanatory variables							
Income (GDP)	654	18308.21	919.95	13936.93	795.94	82441.31	0.91
Urbanization	654	0.67	0.69	0.20	0.11	1	−0.67
Education	654	0.10	0.10	0.06	0.01	0.31	0.63
Herfindahl Index	654	0.11	0.06	0.13	0.01	1	3.95
C3	654	0.41	0.36	0.21	0.10	1	0.76
C5	654	0.53	0.49	0.22	0.15	1	0.37
Common Law	654	0.22	0	0.42	0	1	1.32
Islam	654	0.10	0	0.31	0	1	2.59
Political Risk Score	654	0.15	0.41	2.38	−6.34	4.17	−0.39
Christianity %	654	0.59	0.78	0.37	0	1	−0.54
Buddhism %	654	0.54	0	0.19	0	0.95	3.89
Muslim %	654	0.15	0.02	0.30	0	1	2.03
Power distance/100	654	0.05	0.06	0.02	0.01	0.09	−0.19
Individualism/100	654	0.43	0.38	0.24	0.06	0.91	0.29
Masculinity/100	654	0.51	0.52	0.19	0.05	1.1	0.14
Uncertainty avoidance/100	654	0.66	0.68	0.23	0.08	1.12	−0.37

TABLE 3

CORRELATIONS

	log PEN	log DEN	log GDP	URBAN	EDUC	log HERF	C3	C5	COMMON	ISLAM	PRISK	BUDD	CHRT	MUSLIM	PDI	IDV	MAS	UAI
log PEN	1.00																	
log DEN	0.87	1.00																
log GDP	0.68	0.95	1.00															
URBAN	0.49	0.69	0.72	1.00														
EDUC	0.44	0.55	0.54	0.49	1.00													
log HERF	−0.32	−0.30	−0.24	−0.32	−0.20	1.00												
C3	−0.31	−0.25	−0.19	−0.28	−0.16	0.96	1.00											
C5	−0.31	−0.27	−0.21	−0.29	−0.18	0.96	0.97	1.00										
COMMON	−0.01	−0.11	−0.15	−0.21	−0.01	−0.23	−0.22	−0.22	1.00									
ISLAM	−0.52	−0.42	−0.30	−0.22	−0.28	0.16	0.16	0.15	0.03	1.00								
PRISK	0.66	0.83	0.83	0.50	0.51	−0.08	−0.03	−0.05	0.01	−0.35	1.00							
BUDD	0.04	0.07	0.08	0.04	0.04	−0.23	−0.17	−0.19	−0.03	0.86	0.04	1.00						
CHRT	0.37	0.32	0.24	0.21	0.21	0.03	−0.02	−0.01	−0.07	−0.10	0.31	−0.41	1.00					
MUSLIM	−0.52	−0.45	−0.33	−0.23	−0.32	0.09	0.07	0.07	−0.06	−0.50	−0.42	−0.07	−0.62	1.00				
PDI	−0.58	−0.58	−0.51	−0.23	−0.33	0.53	0.04	0.07	−0.29	0.31	−0.58	0.02	−0.18	0.26	1.00			
IDV	0.58	0.65	0.60	0.39	0.43	−0.16	−0.13	−0.15	0.22	−0.20	0.68	−0.22	0.23	−0.22	−0.60	1.00		
MAS	0.05	0.03	0.01	−0.05	−0.05	−0.08	−0.09	−0.10	0.12	0.00	−0.07	0.02	−0.03	−0.04	−0.05	0.11	1.00	
UAI	−0.00	0.01	0.01	0.08	0.04	0.15	0.11	0.14	−0.46	−0.02	−0.13	−0.03	0.25	−0.04	0.29	−0.18	−0.01	1.00

where Ins_{it} is the non-life insurance consumption (natural logarithm of density or penetration) for country i in year t. α is a constant term. $X_{it,\,Econ}$ is an array of economic variables (GDP, Urbanization, Market Concentration, and Education) that vary with country and time. $Y_{i,\,Inst}$ is a vector of institutional variables (Legal System) that vary across countries, but remain constant over time. PRIN is the first principal component summarizing the PRS scores. $Z_{i,\,Cult}$ is an array of cultural variables (Hofstede measures, religion) that are country-dependent but time invariant. β_1, β_2, β_3, and β_4 are vectors of coefficients corresponding to these variables. D_{Year} is an array of annual dummy variables used to estimate the effect of time on insurance purchases, with γ the corresponding regression coefficient. We only include year fixed effects and do not include country fixed effects in our model because our main variables of interest – the cultural dimensions – are time invariant. ε_{it} is the error term for country i in year t.

5. Results

Our first regression results are presented in Table 4. We test the cultural influence on insurance consumption using all sample countries. Using STATA's "robust" option, we used Huber-White's estimators in our tests to allow for possible heterogeneity in the error structure: independence is still assumed but observations may have different variances. Year dummies proved to be consistently insignificant and are included but not reported in all tables. Column (1) summarizes our base regression model. Islam and, with the exception of Masculinity, all Hofstede cultural variables have a highly significant effect. The three religion variables – Muslim, Christian or Buddhist percentage – are excluded from our base regression because the correlation between Muslim percentage and Islam dummy variable is too high (0.86 in the whole sample, 0.97 in the developed country sample) and because Christian and Buddhist beliefs have an insignificant effect in all regression analyses. We provide full regression results including all religious variables as a robustness check.

The significantly negative coefficient of Islam Law demonstrates the powerful negative effect of Islamic beliefs on insurance demand, consistent with previous literature. Power Distance has a negative impact, Individualism and Uncertainty Avoidance a positive influence. Our hypothesized relationship concerning Masculinity / Feminity was ambiguous: our results show that the regression coefficient for the Masculinity / Feminity dimension does not differ significantly from zero, indicating that the impact of this factor, if any, is very small. In life insurance, Chui and Kwok (2008) found dominance of the feminine side, suggesting that feminine societies are more sensitive to the risk of early deaths for family members and purchase more life insurance. A similar phenomenon does not seem to take place in non-life insurance.

The coefficients of the five economic variables generally conform to our predictions: a higher income per capita, a low degree of political risk and a market that is not highly concentrated, all lead to highly significant increases

TABLE 4

CULTURAL INFLUENCE ON INSURANCE DEMAND

Variable	(1)	(2)	(3)	(4)	(5)
log GDP	0.134***	0.200***	0.218***	0.238***	0.092**
	(0.049)	(0.028)	(0.051)	(0.052)	(0.045)
URBAN	0.106		−0.051	−0.016	0.187
	(0.109)		(0.131)	(0.127)	(0.119)
EDUC	−0.188		0.645	0.216	0.061
	(0.310)		(0.395)	(0.369)	(0.315)
PRISK	0.036**		0.097***	0.068***	0.072***
	(0.017)		(0.017)	(0.017)	(0.016)
log HERF	−0.137***	−0.128***	−0.145***	−0.107***	−0.167***
	(0.016)	(0.015)	(0.021)	(0.017)	(0.018)
COMMON	−0.030	-0.056		0.076*	
	(0.037)	(0.038)		(0.044)	
ISLAM	−0.574***	−0.600***		−0.653***	
	(0.081)	(0.076)		(0.084)	
IDV	0.431***	0.521***			0.261***
	(0.086)	(0.082)			(0.090)
UAI	0.398***	0.344***			0.522***
	(0.079)	(0.074)			(0.079)
PDI	−8.021***	−8.121***			−10.091***
	(0.798)	(0.773)			(0.901)
MAS	0.063	0.024			0.096
	(0.062)	(0.060)			(0.062)
Constant	−1.230***	−1.753***	−2.071***	−2.081***	−0.977**
	(0.410)	(0.255)	(0.454)	(0.447)	(0.404)
Observations	652	652	652	652	652
Adjusted R-square	0.675	0.674	0.531	0.611	0.618
F Value	103.488	87.696	54.703	61.669	70.564

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers in brackets show standard errors. Year fixed effects are included but not reported here.

in non-life insurance demand. Contrary to our expectations, Third-level Education and Urbanization do not have an impact on insurance consumption. In fact, Education, Urbanization, and GDP per capita are highly correlated; GDP appears to be the best summary variable for that effect.

One concern about this full regression model in column (1) is the high correlation among some of the economic and institutional variables, as shown in Table 3. These high correlations may cause multicollinearity issues. Therefore, a more parsimonious model is presented in column (2): Urbanization, Education, and the Political Risk Score are deleted. The effect of GDP remains highly significant; the coefficient of log GDP increases. The adjusted R-square barely

suffers from the deletion of three variables. The coefficients of other variables in column (1) and (2) are quite robust, suggesting that the estimated coefficients of the cultural variables, Market Concentration and Legal System in the original model do not suffer from a multicollinearity issue. We conducted the remaining analyses in this paper using this parsimonious model as baseline regression. Only minor coefficient changes resulted and results remains qualitatively the same.

In order to examine how much variation is explained by the cultural and legal variables, we ran three additional regressions presented in columns (3) through (5). In column (3), only economic and institutional variables are included. In column (4), the two Legal System dummy variables are inserted. The adjusted R-square increases by 8% following the addition of these two Legal System variables. Column (5) includes in the model specification the four Hofstede variables – but not the Legal System variables. All together, these four variables increase the adjusted R-square coefficient by 8.7%. The partial F-test for the null hypothesis that, combined, the Hofstede variables have no impact, leads to a large F-statistic exceeding 40 and rejection at all common significance levels. The inclusion of the six legal and cultural variables raises the adjusted R-square coefficient from 0.531 [in column (3)] to 0.675 [in column (1)], a considerable 14.4% increase that amply demonstrates that culture and legal system do impact non-life insurance markets in a key way.

We present our main regression results in Table 5, where all countries have been subdivided into developing and developed countries. The list of developing and developed countries is provided in Appendix I (Source: http://data.worldbank.org/about/country-classifications/country-and-lending-groups#Low_income). We use the World Bank classification for this division. The World Bank defines four country groups — low income, lower middle income, upper middle income, and high income — based on the GNI of each country. The current GNI threshold for high income country is $12,276. We classify the 35 high income countries of our sample as developed and the remaining 33 as developing countries. The rationale behind this division is that, while culture permeates all aspects of life in all layers of societies, its influence on insurance can only be felt after basic needs, such as food, clothing, and shelter, are satisfied. Insurance is not a primary good — it is not needed when there are no assets to protect. Only once a given wealth level has been attained can insurance compete with other secondary goods such as brand name clothing and flat-screen TVs, and cultural preferences surface. Figures 1A and 1B illustrate the declining impact of income on non-life insurance consumption as income increases. When all countries of our sample are considered, a strong positive linear relationship emerges between Log (GDP) and Log (Concentration) (Figure 1A). The relationship all but disappears when only developed countries are considered (Figure 1B). Consequently, we expect to find a stronger cultural influence and a weaker income effect in richer countries.

Results fully confirm this conjecture. For developing countries [column (3)] the coefficient of the ISLAM dummy variable remains significantly negative. However, only Power Distance has a significant effect among the four Hofstede

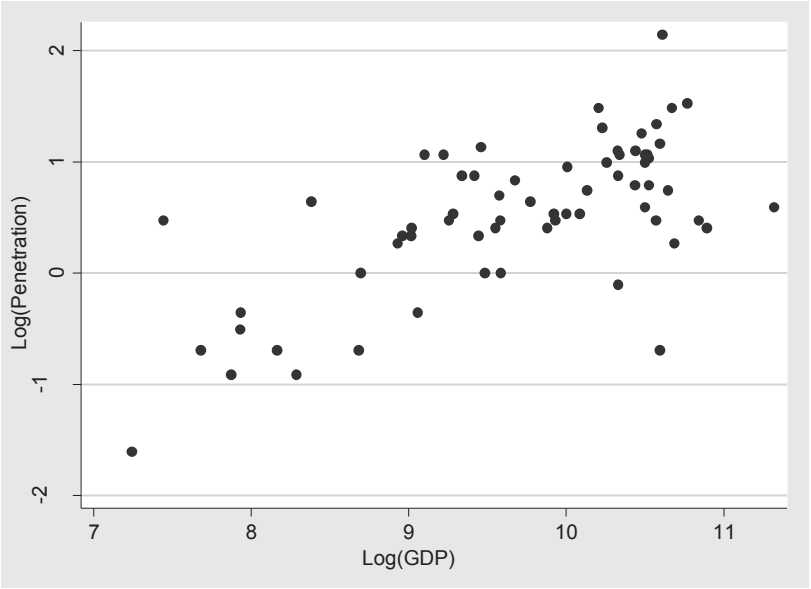

FIGURE 1A: Relationship between Log (GDP) and Log (Penetration), all countries.
Note: Correlation between Log (GDP) and Log (penetration): 0.6807

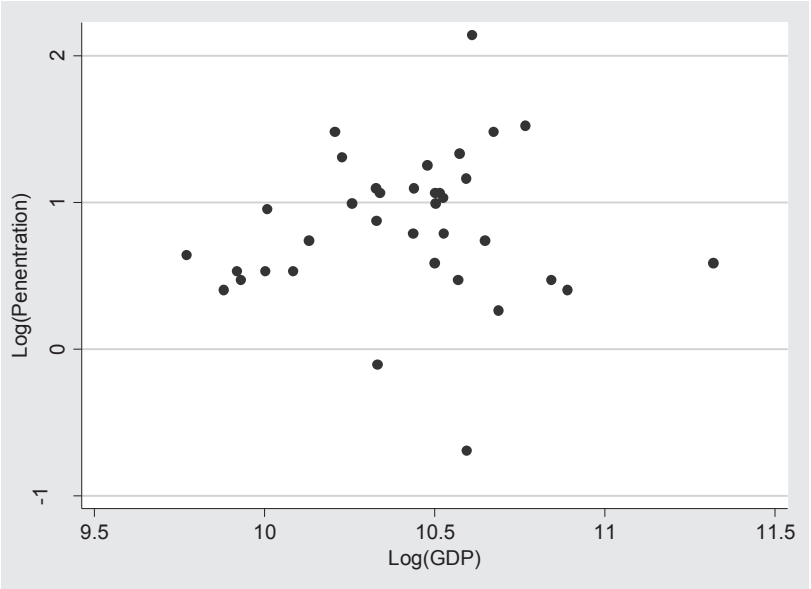

FIGURE 1B: Relationship between Log (GDP) and Log (Penetration), developed countries.
Note: Correlation between Log (GDP) and Log (penetration): 0.0975

TABLE 5

MAIN RESULT – IMPORTANCE OF CULTURAL VARIABLES FOR DEVELOPING AND DEVELOPED COUNTRIES

	(1)	(2)	(3)	(4)	(5)	(6)
	Developing Countries			Developed Countries		
log GDP	0.496***	0.445***	0.379***	−0.481***	−0.279***	−0.195***
	(0.082)	(0.079)	(0.095)	(0.054)	(0.054)	(0.052)
URBAN	0.056	0.173	−0.039	−0.229*	−0.098	0.055
	(0.232)	(0.220)	(0.244)	(0.139)	(0.145)	(0.115)
EDUC	−2.012***	−2.042***	−1.452***	2.567***	2.121***	0.561
	(0.493)	(0.514)	(0.525)	(0.403)	(0.420)	(0.392)
PRISK	0.092***	0.076***	0.060**	0.167***	0.116***	0.060***
	(0.023)	(0.027)	(0.029)	(0.018)	(0.019)	(0.014)
log HERF	−0.121***	−0.095***	−0.117***	−0.174***	−0.125***	−0.183***
	(0.033)	(0.027)	(0.033)	(0.018)	(0.017)	(0.018)
COMMON		0.174***	−0.049		0.009	0.021
		(0.064)	(0.100)		(0.050)	(0.029)
ISLAM		−0.428***	−0.460***		−0.575***	−0.334***
		(0.108)	(0.101)		(0.101)	(0.117)
IDV			0.235			0.501***
			(0.233)			(0.107)
UAI			−0.004			0.491***
			(0.196)			(0.074)
PDI			−6.120***			−7.968***
			(2.105)			(0.858)
MAS			0.269			−0.133**
			(0.253)			(0.054)
Constant	−4.284***	−3.833***	−2.994***	4.829***	2.946***	1.893***
	(0.664)	(0.650)	(0.795)	(0.517)	(0.513)	(0.512)
Observations	304	304	304	348	348	348
Adjusted R-square	0.468	0.528	0.540	0.441	0.490	0.607
F Value	26.100	28.543	24.151	29.969	41.244	48.531

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers in brackets show standard errors. Year fixed effects are included but not reported here.

cultural variables. Individualism, Uncertainty Avoidance, and Masculinity have no significant effect, even at the 10% level. The inclusion of legal and cultural variables only raises the adjusted R-square coefficient from 0.468 to 0.540, a 7.2% increase; most of the improvement is due to the ISLAM variable, as the four Hofstede variables only raise the adjusted R-square coefficient from 0.528 [column (2)] to 0.540 [column (3)], a meager 1.2% increase.

A totally different picture emerges for the developed countries [column (6)]. In this regression, all cultural variables have a significant effect, even Masculinity / Feminity. While, according to Chui and Kwok (2008), feminine societies

are more sensitive to the well-being of dependents and purchase more life insurance, it may be that masculine societies are more oriented towards goods they want to protect, and purchase more non-life insurance. The legal and cultural variables bring the adjusted R-square coefficient from 0.441 to 0.607, a spectacular 16.6% increase. Furthermore, this improvement is not just due to the Islam religion, as the four Hofstede variables alone increase the adjusted R-square by 11.7%. This result demonstrates the tremendous impact of culture on insurance purchases for those whose income allows them to make choices among non-essential goods.

The large influence of culture in affluent countries coincides with the inversed effect of log GDP. That is, penetration for rich countries is negatively affected by growth, in a highly significant way. A separate analysis of insurance density for affluent countries (not shown) proves that GDP still impacts density in a positive way. As they become richer, people consume more insurance, but the pace of increase slows down: a saturation effect seems to develop. Possibly, once well-off individuals have satisfied their basic insurance needs (homeowners and auto policies), there is less room for growth. In the competition for luxury goods for prosperous individuals, insurance is unattractive and loses out to more glamorous purchases.

Also, in many rich countries the number of cars per 1,000 inhabitants seems to have reached a plateau, and as a result, auto insurance income stabilizes. It is also possible that insurance consumption even decreases: as traffic safety improves, the number of car accidents and traffic fatalities decrease, reducing the cost of auto insurance. Wealthy drivers do not need to purchase collision insurance, or only carry it for a few years, as they can afford the loss of their depreciated car; they may also select higher deductibles. Poorer people need full coverage for all assets that they ill-afford to lose; well off individuals may decide not to insure, or to partly insure, goods that are not essential to their lifestyle.

Another noteworthy result is the effect of Education in the subsample regressions. In the whole sample regression, the Education variable has an insignificant effect. However, in subsample regressions, the coefficient is significantly negative in developing countries, and positive and insignificant in the developing countries regression, supporting the argument found in Outreville (1990) that education may not increase insurance demand during early stages of economic development.

In unreported results, we tried a few classifications of developed and developing countries based on their GDP. As we increase the threshold for developed country from the World Bank classification (where a country is classified as developed if its GNI is $12,276) to higher GDP levels, we find that the cultural factors in developed countries become more influential. For instance, the legal and cultural variables increase the adjusted R-square by a spectacular 21.12% among which the four Hofstede factors account for 16.16% when we use a $20,000 GDP threshold. On the other hand, the Hofstede factors only improve the adjusted R-square by 1.8% in developing countries. This provides further

TABLE 6

ROBUSTNESS TESTS

Variable	(1) Fama - MacBeth	(2) Cluster	(3) Robust	(4) log Density	(5) C3	(6) C5	(7) Full model
log GDP	0.135***	0.134	0.281***	1.094***	0.147***	0.145***	0.146***
	(0.012)	(0.147)	(0.036)	(0.053)	(0.048)	(0.048)	(0.051)
URBAN	0.109***	0.106	−0.136	0.224	0.075	0.093	0.110
	(0.035)	(0.320)	(0.114)	(0.154)	(0.112)	(0.113)	(0.115)
EDUC	−0.181	−0.188	0.050	−0.133	−0.125	−0.158	−0.342
	(0.138)	(0.935)	(0.281)	(0.302)	(0.313)	(0.312)	(0.313)
PRISK	0.036***	0.036	−0.010	0.055***	0.033*	0.035**	0.024
	(0.006)	(0.048)	(0.014)	(0.017)	(0.017)	(0.017)	(0.018)
log HERF	−0.136***	−0.137***	−0.129***	−0.137***			−0.142***
	(0.005)	(0.047)	(0.017)	(0.017)			(0.017)
C3					−0.686***		
					(0.082)		
C5						−0.600***	
						(0.077)	
COMMON	−0.030**	−0.030	−0.019	−0.048	−0.045	−0.030	−0.013
	(0.013)	(0.109)	(0.042)	(0.038)	(0.037)	(0.037)	(0.037)
ISLAM	−0.572***	−0.574**	−0.771***	−0.556***	−0.568***	−0.578***	−0.237***
	(0.021)	(0.248)	(0.051)	(0.076)	(0.080)	(0.080)	(0.081)
MUSLIM							−0.437***
							(0.084)
BUDD							−0.039
							(0.069)
CHRT							−0.031
							(0.060)
IDV	0.425***	0.431*	0.430***	0.487***	0.466***	0.460***	0.441***
	(0.039)	(0.256)	(0.092)	(0.091)	(0.088)	(0.087)	(0.093)
UAI	0.398***	0.398*	0.422***	0.380***	0.355***	0.376***	0.414***
	(0.015)	(0.238)	(0.075)	(0.075)	(0.077)	(0.079)	(0.083)
PDI	−8.004***	−8.021***	−7.952***	−7.506***	−7.865***	−7.660***	−8.579***
	(0.358)	(2.346)	(0.927)	(0.756)	(0.790)	(0.767)	(0.802)
MAS	0.064***	0.063	0.004	0.075	0.018	0.016	0.007
	(0.024)	(0.183)	(0.080)	(0.062)	(0.066)	(0.067)	(0.063)
Constant	−1.169***	−1.230	−2.485***	−5.593***	−0.643	−0.614	−1.255***
	(0.096)	(1.237)	(0.312)	(0.431)	(0.445)	(0.443)	(0.429)
Observations	652	652	652	652	652	652	652
Adjusted R-square		0.675	0.735	0.940	0.677	0.674	0.682
F Value	2,291.922	19.760	91.433	678.356	108.325	107.471	100.298

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Numbers in brackets show standard errors. Year fixed effects are included but not reported here.

support that the cultural influence is stronger in affluent countries and also shows that our conclusions are robust to the definition of developed vs. developing country.

A variety of robustness tests is summarized in table 6. Several alternative panel regression estimation techniques were used to examine the sensitivity of our results to the selected estimation method. We also checked if cultural variables impact the other common measure of insurance demand, density. In column (1), the Fama-MacBeth regression model was applied to check for possible within year cross-sectional correlations of error terms. This technique runs the same regression model on an annual basis; each regression coefficient is the average of the ten annual coefficients. In column (2), the Cluster option in STATA was used to take into account a possible within-country clustered error structure. Indeed, an upward bias in t-statistics may occur if residuals of some countries in GLS regression are correlated. The Cluster option allows for this possibility. Column (3) provides robust regression results, using the "rreg" (robust regression) command in STATA, which uses an iteratively re-weighted least-squares estimation approach to accommodate outliers or non-normality problems (Hamilton, 2003). Different weights are assigned to observations based on specific criteria; some outliers may even be excluded from the sample — although it did not happen in this study. Column (4) presents the regression model that uses log (density) instead of log (penetration) as dependent variable. We selected a modified Herfindahl Index as our measure of concentration. Although the Herfindahl Index is the most widely used measure of concentration, one concern is that this Index could be somewhat misleading because it may treat differently large and small countries. In addition, our Index for many countries may be impacted by the fact that only the market share of the top ten insurers is available from the AXCO data. Therefore, we checked the robustness of our Market Concentration measure by using C3 (market share of top three insurers) and C5 (market share of top five insurers), which are less subject to these issues. Columns (5) and (6) use C3 and C5 as alternative measures of Market Concentration — with no change in significance. Finally, column (7) is the full regression model that includes all variables including the three religion ratio variables. Noteworthy is the fact that Muslim percentage has a strongly significant negative effect, even with the ISLAM legal variable included in the regression.

The robustness checks confirm the conclusions obtained in previous models: Islam and the cultural variables add considerable explanatory power to all regressions. While adherence to Christian or Buddhist beliefs has no demonstrated impact on insurance demand, a large percentage of believers in the Muslim faith strongly interferes with the development of non-life insurance even after controlling for the Islam Law dummy variable. Among the cultural variables designed by Hofstede, Power Distance and Uncertainty Avoidance have a consistently significant effect at the 1% level in all model specifications. Individualism has the predicted positive effect, but with a level of significance that varies — only 10% in some models despite the large sample size. Finally,

the effect of Masculinity / Feminity remains insignificant in all specifications (except the Fama-MacBeth regression) when the full sample of all countries is studied.

6. Conclusions and Discussion

A large body of literature attempts to explain the determinants of life and non-life insurance purchase across nations. Researchers have mostly focused on economic, demographic, and institutional variables, and shown that high income per capita, low inflation, political stability, a developed banking sector, and good protection of investors and creditors, are conducive to higher demand for insurance. In life insurance, Chui and Kwok (2008, 2009) included four cultural variables defined by Hofstede (1983, 2001) among their set of explanatory variables. Their analysis demonstrates that three cultural dimensions (Individualism, Power Distance, and Masculinity) greatly improve the predictive ability of models, after controlling for several factors such as GDP per capita, inflation, bank sector and stock market development, creditors rights, contract enforcement quality, dependency ratio, and religion.

Our research focused on non-life insurance. Along with several economic and institutional controls, we included in our set of explanatory variables religion (percentage of the population adhering to Buddhism, Christianity, or Islam) and the Hofstede cultural variables (Individualism, Power Distance, Masculinity, and Uncertainty Avoidance). We applied several regression methods to an unbalanced international panel data comprising 68 countries observed from 1999 to 2008. The dependent variable was the logarithm of penetration, the fraction of GDP devoted to non-life insurance. Empirical findings for the most part conformed to our theoretical predictions. As economies develops, non-life insurance demand increases. While Christian and Buddhist values do not appear to have any impact, the development of insurance markets is profoundly negatively affected by Islamic beliefs. Among the Hofstede cultural variables, Power Distance, Individualism, and Uncertainty Avoidance prove to be highly significant. Whether a country exhibits masculine or feminine cultural values has at most a borderline impact on insurance.

Our results are amplified when our panel is subdivided into developing and developed nations. While cultural values are probably similar among the poor and the rich in a given country, they can only affect insurance decisions once an income threshold has been reached. Basic needs in terms of housing, clothing, and food, need to be satisfied before insurance decisions are contemplated. Above the threshold, insurance has to compete against other non-essential goods such as a brand-name car, an I-Pad, or leisure travel. We thus conjectured that the impact of cultural variables would be primarily found in richer countries.

Empirical findings amply confirmed these predictions. For developed countries, the adjusted R-square coefficient, that stood at 0.441 with all economic

and institutional variables in the model, increases to 0.490 when legal system variables are introduced and jumps to 0.607 when the four Hofstede cultural variables are introduced. In other words, 21% of the unexplained variation in insurance demand across affluent countries is eliminated by Hofstede factors and 8.8% by the legal system. The corresponding percentages are 7.2% for the Hofstede factors and 1.2% for the legal system, showing that cultural influence is much smaller in developing countries.

Most variables are significant at the 1% level. These findings are all the more impressive as the unavoidable use of national statistics, that implicitly assume that mean national values are representative of a typical household and that the inhabitants of a country are homogeneous, reduces the chances of discovering meaningful relationships. Also, the use of insurance penetration that aggregates all lines of non-life insurance, those purchased by individuals (such as motor insurance) and those bought by corporations (liability policies), also reduces the significance of all variables.

Our results have several implications for multinational insurance companies seeking to enter a new market. While it is fairly obvious that these insurers should consider countries with low political risk, increasing income, and educated citizens, this research demonstrates that culture should also be incorporated in the decision process. Non-life insurance demand in emerging countries that score low on Power Distance and high in Individualism and Uncertainty Avoidance have a higher growth potential than other developing countries, at equal Levels of Income, Market Concentration, and Political Risk, as their economies become more affluent. Within heterogeneous countries such as China, market segmentation strategies should direct foreign insurers to aim their promotional efforts at segments of the population that exhibit the best scores on the cultural variables.

Acknowledgements

Thanks are expressed to Gloria Aghaulor, Jonathan McBeath, and Aranee Treerattanapun for considerable research assistance, and to two anonymous referees for outstanding suggestions.

Park appreciates the support of the Institute of Management Research at Seoul National University.

APPENDIX I

List of developing and developed countries in this study (Alphabetical)

Developing Countries	Developed Countries
Argentina	Australia
Bangladesh	Austria
Brazil	Belgium
Bulgaria	Canada
Chile	Czech Republic
China	Denmark
Colombia	Estonia
Costa Rica	Finland
Dominican Republic	France
Ecuador	Germany
Egypt	Greece
El Salvador	Hong Kong
Guatemala	Hungary
India	Ireland
Indonesia	Israel
Jamaica	Italy
Kenya	Japan
Malaysia	Kuwait
Mexico	Luxembourg
Morocco	Malta
Nigeria	Netherlands
Norway	New Zealand
Pakistan	Poland
Panama	Portugal
Peru	Singapore
Philippines	Slovakia*
Romania	Republic of Korea
Russia	Spain
South Africa	Sweden
Thailand	Switzerland
Turkey	Taiwan*
Venezuela	Trinidad and Tobago
Vietnam	United Arab Emirates
	United Kingdom
	United States

Note: * Country not listed in the World Bank classification, assigned to developed group based on GDP level.

References

Beck, T. and Webb, I. (2003) Economic, Demographic and Institutional Determinants of Life Insurance Consumption Across Countries. *World Bank Economic Review* **17**, 51-99.

Beenstock, M., Dickinson, G. and Khajuria, S. (1988) The Relationship between Property-Liability Insurance and Income: An International Analysis. *Journal of Risk and Insurance* **55**, 259-272.

Browne, M. and Kim, K. (1993) An International Analysis of Life Insurance Demand. *Journal of Risk and Insurance* **60**, 616-634.

Browne, M., Chung, J. and Frees, E. (2000) International Property-Liability Insurance Consumption. *Journal of Risk and Insurance* **67**, 73-90.

Burnett, J.J. and Palmer, B.A. (1984) Examining Life Insurance Ownership through Demographic and Psychographic Characteristics. *Journal of Risk and Insurance* **51**, 453-467.

Chui, A. and Kwok, C. (2008) National Culture and Life Insurance Consumption. *Journal of International Business Studies* **39**, 88-101.

Chui, A. and Kwok, C. (2009) Cultural Practices and Life Insurance Consumption: An International Analysis using GLOBE Scores. *Journal of Multinational Financial Management* **19**, 273-290.

Esho N., Kirievsky, A., Ward, D. and Zurbruegg, R. (2004) Law and the Determinants of Property-Casualty Insurance. *Journal of Risk and Insurance* **71**, 265-283.

Hamilton, L.C. (2003) *Statistics with STATA*. Version 8. Duxbury Press, Pacific Grove, CA.

Hofstede, G. (1983) The Cultural Relativity of Organizational Practices and Theories. *Journal of International Business Studies* **14**, 75-89.

Hofstede, G. (1995) Insurance as a Product of National Values. *The Geneva Papers* **20**, 423-429.

Hofstede, G. (2001) *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations*. 2nd edition. Sage Publications, Thousand Oaks, CA.

Hwang, T. and Gao, S. (2003) The Determinants of the Demand for Life Insurance in an Emerging Economy – The Case of China. *Managerial Finance* **29**, 82-96.

Hwang, T. and Greenford, B. (2005) A Cross-Section Analysis of the Determinants of Life Insurance Consumption in Mainland China, Hong Kong, and Taiwan. *Risk Management and Insurance Review* **8**, 103-125.

Kwon, J. (2007) Islamic Principle and Takaful Insurance: Re-evaluation. *Journal of Insurance Regulation* **26**, 53-81.

La Porta, R., Lopez-de-Silanes, F., Schleifer A. and Vishny, R. (1998) Law and Finance. *Journal of Political Economy* **106**, 1113-1155.

Mayers, D. and Smith, C. (1983) The Interdependence of Individual Portfolio Decisions and the Demand for Insurance. *Journal of Political Economy*, **91**, 304-311.

Min, Y.T. (2006) A Note on Some Differences in English Law, New York Law, and Singapore Law. *Singapore Academy of Law*.

Outreville, J.-F. (1990) The Economic Significance of Insurance Markets in Developing Countries. *Journal of Risk and Insurance* **57**, 487-498.

Outreville, J.-F. (1996) Life Insurance Markets in Developing Countries. *Journal of Risk and Insurance* **63**, 263-278.

Park, H., Borde, S. and Choi, Y. (2002) Determinants of Insurance Pervasiveness: A Cross-National Analysis. *International Business Review* **11**, 79-96.

Park, S., Lemaire, J. and Chua, C.T. (2010) Is the Design of Bonus-Malus Systems Influenced by Insurance Maturity or National Culture? *The Geneva Papers: Issues and Practice* **35**, S7-S27.

Posner, R. (2004) Law and Economics in Common-Law, Civil-Law, and Developing Nations. *Ratio Juris*, **17**, 66-79.

Reynolds, T. and Flores, A. (1998) Foreign Law: Current Sources of Codes and Basic Legislation in Jurisdictions of the World. *Rothman, Littleton, Colorado*.

Sherden W. (1984) An Analysis of the Determinants of the Demand for Automobile Insurance. *Journal of Risk and Insurance* **51**, 49-62.

Swiss Re. (2011) World Insurance in 2010, *Sigma 2|2011.*

Syverud, K.D., Bovbjerg, R.R., Pottier, S.W. and Will, R.W. (1994) On the Demand for Liability Insurance: Comments. *Texas Law Review* **72**, 1629-1702.

THOMAS, R. (2009) Demand elasticity, risk classification and loss coverage: when can community rating work? *ASTIN Bulletin* **39**, 403-428.
TRUETT, D. and TRUETT, L. (1990) The Demand for Life Insurance in Mexico and the United States: A Comparative Study. *Journal of Risk and Insurance* **57**, 321-328.
WARD, D. and ZURBRUEGG, R. (2000) Does Insurance Promote Economic Growth? Evidence from OECD Countries. *The Journal of Risk and Insurance* **67**, 489-506
ZELIZER V. (1979) *Morals and Markets: The Development of Life Insurance in the United States.* Columbia University Press, New York.

SOJUNG CAROL PARK
College of Business Administration
Seoul National University
Gwanak-gu,
Seoul 151-916
Republic of Korea
Phone: +82-2-880-8085
E-Mail: sojungpark@snu.ac.kr

JEAN LEMAIRE
Wharton School
University of Pennsylvania
3620 Locust Walk, 3404 Steinberg Hall-Dietrict Hall
Philadelphia, PA 19104-6218
U.S.A.
E-Mail: lemaire@wharton.upenn.edu.