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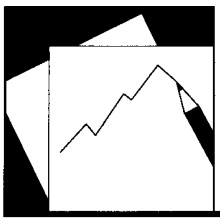

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Institutional Quality, Knightian Uncertainty, and Insurability: A Cross-Country Analysis

S. Nuri Erbaş and Chera L. Sayers

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Institutional Quality, Knightian Uncertainty, and Insurability: A Cross-Country Analysis

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Abstract

Knightian uncertainty (ambiguity) implies presence of uninsurable risks. Institutional quality may be a good indicator of Knightian uncertainty. This paper correlates non-life insurance penetration in 70 countries with income level, financial sector depth, country risk, a measure of cost of insurance, and the World Bank governance indexes. We find that institutional quality-transparency-uncertainty nexus is the dominant determinant of insurability across countries, surpassing the explanatory power of income level. Institutional quality, as it reflects on the level of uncertainty, is the deeper determinant of insurability. Insurability is lower when governance is weaker.

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I. INTRODUCTION

Insurance sector development in an economy should be placed in the broader context of financial sector development as a vehicle of economic development. As previous literature shows, there is a strong correlation across countries between the level of insurance coverage and the level of income.[2] Moreover, increasing insurance coverage may be correlated with higher growth.[3] Increasing attention in the literature on the connections between institutional quality and economic development has focused on the incentive effects of institutions on investment (e.g., property rights). An equally fundamental role of institutions, at least in the context of financial market development, is reducing economic uncertainty through market structures that serve to diversify risks. Therefore, insurance market development has a direct impact on investment or on economic development in general.

Frank Knight (2002), in his landmark contribution, *Risk, Uncertainty and Profit,* examines "structures and methods for reducing uncertainty." Those methods include increasing scientific knowledge and accumulation of data (e.g., actuarial data), along with consolidation and specialization by means of large-scale organization of economic activity. Uncertainty is consolidated and its costs are diversified through integrated business organizations and specialized markets, such as insurance markets. Thus, decision makers "shift" uncertainty to specialists, and unquantifiable uncertainty confronting decision makers becomes more quantifiable and "priceable." The presence of developed insurance markets and insurance coverage helps lower interest rates and stimulate investment, and to extend the time horizon of investment all of which are factors leading to higher growth and development in the long run. Consolidation, specialization, and generation and dissemination of data to enable systemic and scientific control of economic decisions are the main underlying characteristics that define robust market institutions.[4]

Although many other aspects of financial sector development have received ample attention in IMF work, the insurance sector has received less emphasis but has come under closer scrutiny in recent years.[5] This paper establishes an analytical link between insurance sector development and institutional development by examining the following specific question: What are the main underlying factors that determine the level of insurance coverage across countries? Income level is a principal determinant, along with financial depth, cost (price) of insurance, and country risk. However, income levels across countries are significantly correlated with institutional quality.[6]

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[2] For example, as measured by per capita income; see Outreville (1990).

[3] Ward and Zurbruegg (2000).

[4] For seminal arguments and evidence on the crucial link between institutional development and economic development, see North (1991); North and Weingast (1989).

[5] A recent IMF study on insurance and financial soundness linkages is by Das, Davies, and Podpiera (2003).

[6] For example, the Heritage Foundation's 2005 Report (p. 18) shows a strong correlation between real per capita income and the Index of Economic Freedom. The institutional quality income correlation is supported by the findings of Rodrik, Subramanian, and Trebbi (2002). Those authors present evidence that institutions' influence on growth and development has been more significant than that of geography and trade.

If institutional factors are good indicators of income level, they may be the underlying determinants of the level of insurability across countries. Our main hypothesis is that institutional quality is a good indicator of the level of uncertainty and transparency, and therefore insurability, in a given country.

We interpret transparency in the context of Knightian uncertainty (ambiguity).[7] Knightian uncertainty implies that the probabilities and associated payoffs for economic prospects are *not* known with precision. We argue that there is a critical link between greater institutional strength and greater transparency, which, in the Knightian context, can be interpreted as less uncertainty. The linkages between institutional quality, transparency, uncertainty, and insurability deserve analytical attention. In the absence of robust market institutions, uncertainty is higher. In general, it is plausible to postulate that higher uncertainty in a country implies lower insurability. It is also reasonable to postulate that lower institutional quality in a country implies lower transparency, and hence higher uncertainty and lower insurability. Therefore, to the extent that (i) the income level across countries is correlated with the level of institutional quality and (ii) institutional quality reflects on the degree of uncertainty, institutional quality can be hypothesized to be the "deeper" determinant of insurability. This argument is further inspired by some important experimental findings on decision making under uncertainty conducted at the individual level.[8] Due to uncertainty, insurers may ask a price based on the worst (highest) hazard probability and the buyers may offer a price based on the best (lowest) hazard probability; thus, uncertainty may create a wedge between the seller's and buyer's prices and result in market failures. Similarly, in many countries, institutional weaknesses may also result in economic uncertainty, which may deter insurance market development and result in low insurance coverage.

This paper's focus is on non-life insurance markets across a sample of 70 countries.[9] The data set is described in the Appendix. Broadly, non-life insurance includes all insurance excluding life insurance and pensions. The paper's contribution is examining whether the institutional quality-transparency-uncertainty nexus is a significant determinant of non-life insurability. The main finding is that this nexus is the dominant determinant of insurability across countries, surpassing the explanatory power of income level.

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[7] For a general justification of this interpretation, see Erbaş (2004). In the present study, we refer to Knightian uncertainty (ambiguity) as uncertainty.

[8] Hogarth and Kunreuther (1992); Kunreuther and others (1995). Even in developed insurance markets, there is considerable uncertainty about some types of contingencies to the extent that markets fail to provide adequate insurance coverage. Notable examples are natural catastrophes (floods, earthquakes, tsunamis); see Dacy and Kunreuther (1969); Froot (1999). More recently, terrorism insurance has also called for government intervention (subsidies to insurers, incentives for the insured).

[9] A significant indicator of insurability is non-life insurance penetration in a country, as measured by gross non-life insurance premiums paid as a percentage of GDP, which is the measure we use in this paper. For brevity and better focus, we exclude life insurance penetration, which reflects factors in addition to those considered in this paper, such as life expectancy, presence of social security, education levels, and cultural factors like religion; see Outreville (1996). An examination of life insurance penetration across countries along the lines of the present paper is left for future research.

II. INSTITUTIONAL QUALITY AND KNIGHTISAN UNCERTAINTY: AN INTERPRETATION

We postulate that the World Bank governance indexes (*WBI*s) are good indictors of the degree of Knightian uncertainty because they are based on subjective evaluations of the various aspects of governance that determine the range of possible events and outcomes of economic decisions. Probabilities and payoffs associated with economic decisions are not possible to ascertain with the precision of a one-dollar bet on the flip of a coin. Using Herbert Simon's terminology, against the background of the substantive problem of uncertainty about probabilities and payoffs in the Knightian sense, in reality, economic decisions are made in a procedural way (procedural rationality), based on subjective evaluations of risk according to the norms provided by the institutional environment. Even in actuarially sophisticated decisions such as insurance decisions, a degree of ambiguity remains because such decisions cannot be exhaustive to the extent that all possible contingencies are evaluated, including contingencies that are the products of a given institutional environment. The institutional environment provides the "satisficing" decision framework in the form of a set of suboptimal norms, which determine the rules of the game that guide procedural economic decisions. The degree of reliability of the norms, as perceived by economic actors, determines subjective evaluations of economic risks. Weak voice and accountability have an important bearing on transparency of policy decisions—erroneous, discretionary, and discriminatory policy actions are more possible and they are less likely to be redressed without accountability. Political instability indicates the possibility of fundamental changes in policies from one regime to the next. Similarly, perceptions of government effectiveness, regulatory quality, rule of law, and control of corruption are the subjective determinants of the risks associated with the implementation of policies and rules.

For example, insurers might have an adequate actuarial assessment of fire hazard in a given country, based on the quality and density of housing, access to fire hydrants and fire companies, and so on. But if the police and fire company reports are not reliable (e.g., due to corruption), or, if the institutions that adjudicate the cases that go to court are weak (e.g., due to lack of specialized courts; long delays in case resolution), then many more layers of uncertainty are added to the assessment of insurability by insurers. Consumers might make actuarially sophisticated decisions about purchasing fire insurance based on objective criteria, but an assessment of the likelihood that they will actually collect in a timely fashion might be ambiguous. Such uncertainties are at least difficult and often impossible to quantify; therefore, they may be based on subjective evaluations of the soundness of governance and the institutional environment. Thus, weak governance may increase uncertainty for both the insurer and consumer, and may result in low insurability.

III. METHODOLOGY

We propose the following general model: $NLP = f(X_1, X_2, X_3, ...)$, where the dependent variable *NLP* is the vector of values in the non-life insurance penetration sample. The independent variables $X_1, X_2, X_3, \ldots$ are vectors of real per capita income, financial depth, country risk, cost of insurance, and the various *WBI*s. All variables, including *NLP*, are normalized as $v_{ij} = (x_{ij} - \mu_i)/\sigma_i$, where x_{ij} is the observation for variable i in country j; μ_i is the sample mean; and, σ_i is the sample standard deviation for variable i, so that $X_i = \{v_{i1}, v_{i2}, \ldots, v_{i70}\}$.

Because we believe this is the first empirical study to examine such linkages in a cross-section of countries, we adopt an exploratory approach. We first explore the extent of cross-correlation between the variables by calculating the Pearson Product Moment Correlation Matrix. Adopting the null hypothesis that there is no correlation ($\rho = 0$) and letting r represent the sample correlation coefficient, the relevant t test is:

$$t = \frac{r}{\sqrt{(1-r^2)/(n-2)}}, \qquad (1)$$

where n is the number of observations. After the correlation tests, we run the following regression:

$$NLP = c_0 + \sum_{i=1}^{k} c_i X_i + u_i \,, \qquad (2)$$

where u_i is a random error term assumed to obey the properties of multiple regression.

As shown in Table 1, application of the test in (1) indicates that per capita income (*PCI*) and composite risk (*CORISK*) are very significantly correlated with *WBI*s, as well as with each other. This indicates that the variables we use to explain *NLP*, including *PCI* and *CORISK*, can be explained by *WBI*, and conversely. We therefore sequentially drop *PCI* and *CORISK* and regress *NLP* on the remaining variables and *WBI*s to explore whether the explanatory power of *WBI*s rises. To compare the explanatory power of the dropped variables, in turn, we drop *WBI*s and then regress on *PCI* and *CORISK*.

Table 1. Cross-Correlations (t values)

	NLP	PCI	M2/GDP	CORISK	C/P
Per capita income (PCI)	5.6				
M2/GDP	2.0	2.9			
Composite risk (CORISK)	5.4	10.2	3.9		
Non-life claims/premiums (C/P)	4.5	4.6	1.0	4.4	
Overall index	6.9	9.5	3.4	19.7	4.9
Voice and accountability	8.5	6.3	1.4	8.4	3.9
Political stability	5.4	8.6	2.9	17.0	3.7
Government effectiveness	5.6	8.6	4.2	17.3	4.9
Regulatory quality	5.9	6.9	2.9	10.8	3.9
Rule of law	5.3	9.1	3.9	16.3	5.1
Control of corruption	5.7	9.1	3.7	16.1	5.0

Source: Authors' estimates

IV. REGRESSION RESULTS

The results are presented in Tables 2-4 (the results that are statistically significant at the 5 percent level or more are highlighted). Generally, the results are statistically robust. It is clear from Table 2 that most *WBI*s—notably, the overall and voice and accountability indexes—outperform *PCI*, as well as the other independent variables, in explaining *NLP* variation across the sample countries. As expected, the *WBI* coefficients are positive that is, higher ranking in institutional quality indicates higher insurability; most *WBI* coefficients are more statistically significant than the other independent variables. Interestingly, the *C/P* variable (the ratio of non-life insurance claims to premiums) also has high explanatory power, outperforming *PCI* and the political stability and rule of law indexes; however, the *C/P* coefficient is positive, which is puzzling from the supply side because it indicates that high cost of insurance corresponds to high insurance coverage. It may be possible to interpret this result as an indication of higher quality and, therefore, higher cost of insurance in more developed countries. It is also possible that insurance claims are more likely to be honored by insurance companies in more developed legal and financial systems. Since this result indicates that *NLP* is negatively correlated with the inverse of *C/P* (i.e., *P/C*), it also implies that *NLP* rises as the price of insurance (as proxied by *P/C*) declines. This points to the possibility that, in countries with better governance, insurance is less expensive because uncertainty is lower.[10]

When *PCI* is dropped as an independent variable to see if the *NLP*-*WBI* correlations become stronger, we obtain the results in Table 3. Those results are broadly similar to those in Table 2 but the explanatory power of *WBI*s becomes higher. In turn, when the regression is run excluding *WBI*s but including *PCI* (Table 3, regression 9), *PCI* remains statistically insignificant.

When both *PCI* and *CORISK* are dropped, we obtain the results in Table 4. They are similar to the results in Tables 2 and 3; however, now the significance of *WBI*s rises and all *WBI*s become individually statistically significant. When the regression is run including *PCI* but excluding *CORISK* and *WBI*s (Table 4, regression 9), *PCI* becomes statistically significant; however, compared to most *WBI*s, *PCI* is less significant than the overall *WBI* index and voice and accountability index. When the regression is run including *CORISK* but excluding *PCI* and *WBI*s (Table 4, regression 10), we find that most *WBI*s outperform *CORISK*.[11]

[10] Indeed, as Table 1 shows, *C/P* is significantly positively cross-correlated (*P/C* is negatively correlated) with *PCI*, *WBI* and *CORISK*.

[11] Since the *CORISK* index assigns low values to high risk countries and conversely, our prior is that the sign of its coefficient should be positive, that is, *NLP* is high when *CORISK* value is high, and conversely.

Table 2. Non-Life Penetration Regressions

	1		2		3		4		5		6		7		8	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Intercept	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Real per capita income (PCI)	0.2	1.5	0.2	1.5	0.2	1.6	0.3	1.6	0.3	1.7	0.3	1.7	0.3	1.7	0.3	1.6
M2/GDP	-0.3	-1.2	-0.4	-1.7	-0.2	-1.5	-0.1	-0.2	0.0	0.1	-0.1	-0.3	0.1	0.6	0.0	0.1
Composite risk (CORISK)	0.2	1.5	0.0	0.4	0.1	1.5	0.0	0.5	0.0	0.1	0.0	0.3	0.0	0.2	0.0	0.2
Non-life claims/premiums (C/P)	**0.2**	**2.0**	0.2	1.6	0.2	2.0	**0.2**	**2.2**	0.2	1.8	**0.2**	**2.0**	**0.2**	**2.0**	0.2	1.8
Overall index			**0.8**	**3.2**												
Voice and accountability	**0.6**	**4.1**			**0.7**	**5.5**										
Political stability	0.1	0.7					0.3	1.3								
Government effectiveness	0.0	0.0							0.2	1.0						
Regulatory quality	0.1	0.3									**0.4**	**2.3**				
Rule of law	-0.3	-0.7											0.1	0.4		
Control of corruption	0.2	0.5													0.2	1.0
Adjusted R^2	0.5		0.4		0.6		0.4		0.4		0.3		0.3		0.4	
Multiple R^2	0.8		0.7		0.8		0.6		0.6		0.6		0.6		0.6	

Source: Authors' estimates

Table 3. Non-Life Penetration Regressions Excluding PCI

	1		2		3		4		5		6		7		8		9	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Intercept	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Real per capita income (PCI)																	0.3	1.7
M2/GDP	-0.2	-0.8	-0.3	-1.3	-0.1	-0.7	0.1	0.4	0.2	0.9	0.1	0.7	0.3	1.3	0.2	0.8	0.2	1.2
Composite risk (CORISK)	0.2	1.6	0.0	0.4	0.1	1.6	0.1	0.5	0.0	0.1	0.0	0.3	0.0	0.2	0.0	0.2	0.0	0.3
Non-life claims/premiums (C/P)	**0.2**	**2.2**	0.2	1.9	0.2	2.3	**0.3**	**2.6**	**0.3**	**2.2**	**0.3**	**2.4**	**0.3**	**2.3**	**0.2**	**2.1**	**0.2**	**2.2**
Overall index			**0.8**	**3.3**														
Voice and accountability	**0.6**	**4.2**			**0.7**	**5.6**												
Political stability	0.2	0.8					0.3	1.4										
Government effectiveness	0.0	-0.1							0.2	1.0								
Regulatory quality	0.0	0.2									**0.4**	**2.3**						
Rule of law	-0.3	-0.6											0.1	0.6				
Control of corruption	0.2	0.6													0.3	1.2		
Adjusted R^2	0.5		0.4		0.5		0.3		0.3		0.4		0.3		0.3		0.4	
Multiple R^2	0.8		0.7		0.8		0.6		0.6		0.6		0.6		0.6		0.6	

Source: Authors' estimates

Table 4. Non-Life Penetration Regressions Excluding PCI and CORISK

	1		2		3		4		5	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Intercept	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M2/GDP	-0.2	-0.8	0.0	0.1	0.1	1.4	0.1	0.7	0.0	0.2
Non-life claims/premiums (C/P)	0.2	1.6	0.2	1.9	**0.2**	**2.2**	**0.3**	**2.8**	**0.3**	**2.2**
Overall index			**0.5**	**4.6**						
Voice and accountability	**0.6**	**4.2**			**0.6**	**6.8**				
Political stability	0.1	0.4					**0.4**	**3.5**		
Government effectiveness	-0.1	-0.3							**0.4**	**3.3**
Regulatory quality	0.1	0.3								
Rule of law	-0.3	-0.7								
Control of corruption	0.2	0.5								
Adjusted R^2	0.5		0.4		0.5		0.3		0.3	
Multiple R^2	0.8		0.7		0.8		0.6		0.6	

	6		7		8		9		10	
	Coef.	t	Coef.	t	Coef.	t	Coef.	t	Coef.	t
Intercept	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Real per capita income (PCI)							**0.4**	**3.5**		
M2/GDP	0.1	0.6	0.0	0.4	0.0	0.4	0.1	0.7	0.0	0.1
Composite risk (CORISK)									**0.4**	**3.2**
Non-life claims/premiums (C/P)	**0.3**	**2.6**	**0.3**	**2.3**	**0.3**	**2.2**	**0.3**	**2.4**	**0.3**	**2.6**
Regulatory quality	**0.4**	**4.0**								
Rule of law			**0.4**	**3.0**						
Control of corruption					**0.4**	**3.3**				
Adjusted R^2	0.4		0.3		0.3		0.3		0.3	
Multiple R^2	0.6		0.6		0.6		0.6		0.6	

Source: Authors' estimates

V. CONCLUSIONS

The foregoing results show that, when institutional quality, as proxied by the World Bank governance indexes (*WBI*s), is taken into consideration, *PCI* (per capita income) is not a significant determinant of non-life insurance penetration (*NLP*) across the sample countries. Similarly, *WBI*s also outperform *CORISK* (composite risk). Cost (price) of insurance (*C/P*) is significant, while financial depth (*M2/GDP*) is insignificant. However, most *WBI*s (in particular, the overall index the voice and accountability and regulatory quality indexes) outperform *PCI* and the other independent variables in explaining *NLP*. These results suggest that that *PCI* is a "catch-all" variable that captures the impact of a variety of factors on the level of *NLP*, including institutional quality and uncertainty. Therefore, a good case can be made that institutional quality, as it reflects on uncertainty, is the deeper determinant of insurability. Institutional quality is one of the main determinants of income level, as well as

the presence of unquantifiable risks or Knightian uncertainty, across countries. When institutional quality is lower, uncertainty is higher and insurability is lower; at the same time, income levels tend to be lower. To the extent that non-life insurance penetration is a good indicator of insurability and *WBI*s are good indicators of Knightian uncertainty, the results support our main hypothesis that the institutional quality-transparency-uncertainty nexus is the dominant determinant of insurability.

In general, weak governance results in uninsurable risks; at least, it tends to make risks more difficult to quantify, which results in lower insurability. Using Knight's argument, "the structures and methods for reducing uncertainty" are not as developed and are undermined by weak governance in countries where insurance coverage is low.

An important policy implication of our findings is that insurance market development should be a priority in the broad policy of promoting financial sector development. Lower uncertainty due to higher insurability is likely to induce higher domestic and foreign investment. To the best of our knowledge, plausible correlations between investment flows, Knightian uncertainty, and the level of insurance coverage across countries have not been examined. We propose such an examination for future research.

Data Description and Sources

Variable	Description and sources
Non-life insurance penetration (*NLP*)	Yearly gross non-life insurance premiums in percent of GDP, 1994-2003 average. **Source**: *Swiss Re SIGMA Insurance Research*.
Institutional Quality Indexes (*WBI*)	*WBI*s comprise: (a) voice and accountability; (b) political stability; (c) government effectiveness; (d) regulatory quality; (e) rule of law; (f) control of corruption. *WBI*s rank each country such that a low index number indicates a low ranking, and conversely. In each WBI category, the simple average of a country's rank (0-100) in 1996, 1998, 2000, and 2002 is taken. To calculate an overall index (not provided by the World Bank), the simple average of the 1996–2002 indexes for each country is used. **Source**: Kaufman, Kraay, and Masfruzzi (2004, revised version).
Country risk (*CORISK*)	Composite risk ratings by the *International Country Risk Guide*. Average of 1992–2002 yearly ratings. In contrast to WBI, composite risk rating assigns a low value to a high-risk country, and conversely.
Cost (price) of insurance (*C/P*)	Ratio of gross claims to gross premiums. Average of yearly data for 1996–2003, as available during the period. Only a sample of insurance companies operating in a country report such data to the data provider. Therefore, the ratio calculated for each sample country does not reflect the country-wide ratio. *C/P* is included as an independent variable as a proxy for the cost of insurance supply. From the demand side, the inverse of the *C/P* ratio can be interpreted as a proxy for the price of insurance to consumers (Outreville, 1990). **Source**: *Insurance Information Statistics (ISIS) database*.
M2; *GDP*; real per capita income in 1995 U.S. dollars (*PCI*)	*M2/GDP* ratio is used as a proxy for financial depth. Averages of 1994–2003 yearly data for *M2/GDP*; averages of 1994–2001 yearly data for real per capita income. **Source**: IMF *International Financial Statistics*.

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