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## Globalization, political institutions, financial liberalization, and performance of the insurance industry

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### ABSTRACT

This paper investigates the impacts of globalization, political institutions, and financial liberalization on the performance and risk-taking of insurance firms covering 1324 individual firms in 30 selected OECD countries. We find that greater globalization and a stable political institution lead insurance companies to exhibit a better performance—i.e., insurers adjust their strategies while being aware of institutional changes. By contrast, financial liberalization has an inverse impact on insurance company performance. Thus, greater globalization and a stable political environment both drive less risk-taking for insurers. These findings are particularly important to insurance markets' competitors and national policy-makers.

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## 1. Introduction

Measuring the performance of insurers has gained importance in the literature, because a strong performance not only increases the market value of that firm, but also leads towards growth for the whole industry, which helps the overall prosperity of the economy. Life insurance has indeed become an increasingly important part of the financial sector over the past 40 years, providing a range of

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27 financial services for consumers and becoming an essential source of investment in the capital market  
28 for developed economies (Beck & Webb, 2003). In fact, insurance companies are now providing the  
29 mechanism of risk transfer and helping to channelize funds in an appropriate way to support business  
30 activities in the economy (Haiss & Sümegei, 2008). Due to the increased importance of life insurance in  
31 the financial market and economy, our study's goal is to recognize previous works related to the life  
32 insurance development issue in terms of the impact of the insurance market's structure on growth in  
33 the market.

34 Another motivation of this article is to complement prior studies—i.e., with respect to risk-taking  
35 and profitability under certain operating environmental characteristics, previous studies discussing  
36 these effects mainly focus on the banking sector (Kaminsky & Reinhart, 1999; Laeven & Levine, 2009).  
37 They find that bank regulation and structure ownership significantly affect bank risk-taking and/or  
38 performance. Cubillas and Gonzalez (2014) also analyze the effect of financial liberalization on bank  
39 risk-taking. Conversely, only a few studies target the insurance industry (Cummins & Venard, 2008;  
40 Fields, Gupta, & Prakash, 2012; Pasiouras & Gaganis, 2013), and they argue that the quality of the  
41 environment plays an essential role in affecting insurer profitability/performance and risk-taking  
42 differently. On the other hand, changes in insurance firms' risk-taking or performance may poten-  
43 tially influence stakeholders and shareholders—for example, stakeholders benefit from an increase in  
44 profitability.

45 Given the importance of insurer profitability and risk-taking for stakeholders or shareholders in  
46 the insurance industry, our study examines both the impacts of environmental factors and firm-level  
47 internal characteristics on the performance and risk-taking of life insurance firms at the international  
48 level. We employ a dynamic panel data framework on 1324 individual life insurance firms across 30  
49 OECD countries covering the period 2004–2011. We analyze how globalization, political institutions,  
50 and financial liberalization influence the life insurance sector among these countries.<sup>1</sup> Using a wide  
51 range of environmental proxies allows us to examine how they work within the life insurance sector.

52 This paper contributes to existing relevant studies in the literature through three primary points.  
53 First, we investigate the impacts of the operational environment (globalization, political institutions,  
54 and financial liberalization) on the performance and risk-taking of life insurance firms from an inter-  
55 national perspective. If environmental characteristics play an essential role in the OECD life insurance  
56 sector, then we expect our findings to have significant policy implications for insurers and policy-  
57 makers in those developed countries. We identify that greater globalization and a stable political  
58 environment result in better insurer performance and less risk-taking for insurers, whereas financial  
59 liberalization harms the life insurance industry.

60 Second, the earlier empirical literature has mostly relied on a pooled OLS estimation in analyzing  
61 the effects of environmental quality on the performance and risk-taking of insurers across countries  
62 (Fields et al., 2012; John, Litov, & Yeung, 2008), but the empirical pooled OLS estimators may be  
63 biased and inconsistent due to potential heterogeneity. In this study we employ the dynamic panel  
64 Generalized Method of Moments (GMM) approach to generate consistent and efficient parameter  
65 estimates.

66 Third, unlike previous studies that have adopted an aggregated institutional variable, we apply  
67 different measures in terms of globalization, political institutions, and financial liberalization that  
68 enable us to distinguish nine different dimensions of operating environments. For the risk-taking  
69 dependent variable calculation, we compute the firm-level coefficient of variation (CV) of the solvency  
70 ratio and leverage ratio by their average value under a three-year rolling time window. The coefficients  
71 of variation in the solvency ratio and leverage ratio make risky measurements more available.<sup>2</sup>

72 It is quite beneficial for policymakers, insurers, and investors to understand the influence of glob-  
73 alization, political institutions, and financial liberalization on firm performance and risk-taking in  
74 insurance markets. For policymakers, globalization, political institutions, and financial liberalization

<sup>1</sup> We pay particular attention to the sample period 2004–2011 due to the restriction of available data for life insurance companies.

<sup>2</sup> Fields et al. (2012) use all information to average value at a certain time period; for instance, for a firm with information from 1990 to 2010, the CV for 1993 will use information from 1990–1993, while the CV for 2010 will use all the information from 1990 to 2010.

are associated with the insurance firm's development, and any policy settings related to a change in environment characteristics may influence the life insurance sector significantly if those characteristics are important determinants of insurance performance. For insurers, a manager who pursues self-interested objectives, such as profitability, market power, and benefits, may place more weight on increasing the firm's growth or reducing the firm's risk-taking according to changes in environment characteristics. For investors, knowledge about the relationship among environment characteristics and global/local life insurance performances provides great benefit for risk management purposes.

Employing a dynamic panel GMM approach, we find that greater globalization and a stable political institution result in better insurance company performance, but financial liberalization exhibits an inverse impact. For the insurer's risk-taking concern, we find limited evidence that greater globalization and a stable political institution result in less risk-taking. In addition, we conduct two robustness checks: First, we drop countries with less than 10 firms from sampling, and the subsequent estimation results are all supportive of our main findings. Second, we eliminate data covering the 2008–2009 financial crisis period. Following this, we do find evidence that globalization and financial liberalization proxies play an important role on a firm's performance or risk-taking in the life insurance industry without any economic shock consideration, but the effects of the three sub-indices for political institution on the life insurance sector are not influenced by the crisis period. Our evidence suggests that favorable environments benefit stakeholders (creditors and/or stockholders), making our findings particularly important to insurance market competitors and national policymakers.

The rest of this paper is organized as follows. Section 2 reviews the relevant literature and focuses on the issue of theoretical prediction and the development of our hypotheses. Section 3 contains the methodological framework and data sources. Section 4 discusses major empirical findings and robustness tests. Section 5 presents the conclusion and policy implications.

## 2. Theoretical predictions and hypotheses' development

### 2.1. Insurance performance and risk-taking

The literature on economic performance and risk-taking is impressive in its depth and breadth. Some studies have focused on banking performance (Ahmed, 2013; John et al., 2008; Kaufmann, Kraay, & Mastruzzi (2009); Laeven & Levine, 2009). Many banking risk studies have attempted to identify and examine the determinants of the global financial crisis to prevent possible failure in the financial sector (Angkinand, Sawanggoenyuang, & Wihlborg, 2010; Cavallo & Cavallo, 2010; Kaminsky & Reinhart, 1999). To establish the insurance industry as a source of systemic risk, it is necessary to know the channel of contagion through which a firm's failure can possibly result in a chain reaction of failures in other firms (Berry-Stolze, Nini, & Wende, 2014). Their study examines access to external financing as a possible source of contagion, creating systemic risk within the life insurance industry, with results indicating that life insurers' ability to restore depleted capital levels by issuing equity does remain constant during different recessionary periods.

For the insurance sector, several studies measure the determinants of insurance performance and risk for life or non-life insurance companies in a single country or across various countries. For instance, Chen and Wong (2004) reveal that size, investment, and liquidity are significant determinants of insurers' profitability. In a similar study of Pakistan's insurance industry, Ahmed, Ahmed, and Usman (2011) claim that size and capital are significantly and positively related to the profitability of insurance firms, while leverage has a strong inverse relationship with profitability and hence greatly decreases insurers' profitability. Fields et al. (2012) use normalized dispersion in companies' capitalization as the risk-taking proxy to measure the difference between the individual firm's capitalization ratio and the mean of the capitalization ratio of the whole sample. This measure allows them to conduct cross-country comparisons when analyzing the variation of risk-taking behavior among insurance companies. In addition, Podder and Skully (2013) examine the relation between incentives and risk-taking for 104 listed U.S. insurance companies over the period 2006–2010. Their results suggest that stock-based compensations for independent directors and the CEO help to align their interests with those of the shareholders.

## 125 2.2. Globalization, political institutions, and financial liberalization

126 The differences in government regulations, government policy, investor protection, and govern-  
127 ment supervision may be responsible for various changes in insurance performance and risk across  
128 countries. In our study, we consider more changes with respect to the environmental conditions of the  
129 life insurance sector, including globalization, political institutions, and financial liberalization, which  
130 possibly influence insurance firm performance and risk-taking.

131 We now discuss the potential influence of each environmental variable. The first environmental  
132 variable is globalization.<sup>3</sup> To locate the channels through which globalization influences insurer per-  
133 formance, we investigate three mediating factors discussed in the literature; economic globalization,  
134 social globalization, and political globalization (Dreher, 2006; Dreher, Gaston, & Martens, 2008). We  
135 first look at economic globalization, because financial intermediation on a global scale has increased  
136 the available capital flow and has enabled investors to allocate capital more efficiently. For example,  
137 Wagner (2004) suggests that operational cost efficiency is an important channel between globaliza-  
138 tion and financial performance. Greene and Segal (2004) decompose life insurance profitability into  
139 two attributors: operating activities and financial activities. From the operating aspect, cost efficiency  
140 plays an essential role in an insurer's profit. They argue that success in the insurance industry depends  
141 on the insurer's ability to control operating costs, among other things. Second, social and political  
142 globalizations also influence insurer performance rather importantly. For instance, a multinational  
143 insurance company has access to more information about consumer demand for insurance and is  
144 more aware of various international insurance products (Held & McGrew, 2000).

145 In the literature there is general agreement that globalization implies countries are becoming more  
146 integrated into the international economy, by increasing people's interactions, information exchanges,  
147 technology transformations, and convergence in cultural activities. In the international business liter-  
148 ature, the foundation of internationalization-performance studies rests on the assumption that greater  
149 transnationality is good for a firm's business performance. The first attempt to verify this relationship in  
150 empirical studies mostly focuses on linear, U-shaped, and inverted-U-shaped relationships (Outreville,  
151 2010). Strands of research on internationalization-performance have found support for a linear rela-  
152 tionship (Tallman & Li, 1996). The positive-linear theory indicates that as firms expand internationally,  
153 thus increasing their degree of internationalization, they experience higher levels of performance.

154 A few researchers have theorized and found evidence for a U-Shaped relationship between multi-  
155 nationality and firm performance. Ruigrok and Warner (2003) highlight that firms initially experience  
156 a negative performance when expanding internationally, but then learn from their international  
157 experience over time, thus turning their performance to be positive. A stream of research states that  
158 there is an inverted U-shaped relationship between multinationality and firm performance, with the  
159 slope initially positive, but then turning negative at high levels of multinationality. Hitt, Hoskisson,  
160 and Kim (1997) argue that the relationship is inverted U-shaped, because greater geographic  
161 dispersion increases the costs of coordinating, integrating, and managing a multinational enterprise's  
162 overall operations.

163 The influence of globalization on insurance performance (or risk-taking) has been less analyzed  
164 in the literature. For example, Cummins and Venard (2008) show that insurance markets are influ-  
165 enced by both global trends and local constraints. They further stress that insurance globalization is  
166 impacted by global insurance products, increasing sophistication in insurance products, and the glob-  
167 alization of risk diversification. The insurance sector is also structurally global through the mechanism  
168 of reinsurance and insurance financing, in which the reinsurance market is basically a concentration  
169 of global reinsurance premiums (Standard & Poor's, 2006). Biener, Eling, and Wirfs (2015) investigate  
170 the internationalization of European life insurers, suggesting that cost efficiency is one of the chan-  
171 nels through which globalization influences returns, and conclude that internationalization positively  
172 correlates with operational cost efficiency. However, they find no significant impact of globalization  
173 on life insurers' risk-taking. In this study, we test for a positive (negative) linear relationship between

<sup>3</sup> In our study, we follow Dreher (2006) to define "globalization" as covering three main dimensions: economic integration, social integration, and political integration.

174 globalization and insurer performance (risk-taking), implying that a greater (lesser) degree of global-  
175 ization leads to a positive (negative) effect on insurer performance (risk-taking).

176 The second environment variable represents political institutions. Previous studies present that  
177 the quality of the legal and regulatory environment has a significant impact on market development.  
178 Venard and Hanaffi (2008) state that political instability and government corruption in many devel-  
179 oping nations hinder the development of the insurance industry. Some influential papers on this topic  
180 in the insurance literature include Fields et al. (2012), John et al. (2008), Klein and Wang (2009),  
181 and Pasiouras and Gaganis (2013). For instance, John et al. (2008) find that better investor protec-  
182 tion could lead corporations to undertake riskier investments through the channel of private benefits,  
183 which lead to excess risk-avoidance and thus a reduction in corporate risk-taking. Klein and Wang  
184 (2009) also discuss how government regulation affects insurers' incentives to use catastrophe risk-  
185 financing devices, as well as how insurers are compelled to consider obtaining "accounting credit" for  
186 risk transfer arrangements. Fields et al. (2012) find that better overall operating environments result  
187 in less risk-taking by insurers. The potential channels for political globalization on insurer perfor-  
188 mance are from the government quality and reduced information asymmetry. Pasiouras and Gaganis  
189 (2013) note that supervisory power and regulations have a significant impact on the soundness of  
190 insurance firms through the channels of insurer assessment and management of exposed risk, as  
191 well as the protection of policyholders' interests. Previous studies have shown that government reg-  
192 ulation and political stability have positive effects on financial market performance (Alesina, Ozler,  
193 Roubini, & Swagel, 1996). We thus expect a positive (negative) effect of political institutions on insurer  
194 performance (risk-taking).

195 The third environment variable is financial liberalization. The empirical evidence from the large  
196 amount of related literature shows that the effect of financial liberalization on growth and/or finan-  
197 cial market performance is still inconclusive due to different methodologies and measures. One strand  
198 shows that financial liberalization has a positive (negative) effect on economic and/or financial mar-  
199 ket performance (risk-taking) (Kaminsky & Reinhart, 1999; Pasiouras & Gaganis, 2013), while another  
200 strand concludes that financial liberalization has a negative (positive) impact associated with eco-  
201 nomic and/or financial market performance (risk-taking). Within the above studies, the influence of  
202 financial liberalization on insurer performance or risk-taking in the insurance sector is less analyzed,  
203 and the theoretical prediction is still unclear. For instance, Pope and Ma (2008) reveal that market lib-  
204 eralization and market concentration share a complex relationship with non-life insurer profitability.  
205 However, for markets that are highly liberalized, the presence of foreign insurers significantly alters  
206 the dynamics of non-life insurance markets. Pasiouras and Gaganis (2013) note that the effect of eco-  
207 nomic freedom is positive and statistically significant on the soundness of insurance firms through  
208 the channels of business, international trade, fiscal, labor, and property rights freedom.

209 The precise channels through which financial liberalization affects insurer performance (risk-  
210 taking) are not well understood empirically, and, to our knowledge, there is no clear direct evidence  
211 on the channels through which financial liberalization may have an influence. The channel through  
212 which it is conducted is unclear due to several reasons. First, some studies explain a potential influ-  
213 ence of financial liberalization on insurers' profitability through increases in insurer diversification  
214 and conclude that a higher level of diversification leads to higher returns and risk for insurance com-  
215 panies. As such, there is ongoing debate on the empirical relation between insurer financial reform  
216 and insurer performance (Fields et al., 2012; Weiss, Tennyson, & Regan, 2010).

217 Previous studies concentrate on the effects of financial reform deregulation on insurer performance  
218 (risk-taking). Deregulation has had major implications for insurance products, market participation,  
219 distribution systems, and changes in supervisory systems. The "regulatory-fragility" view suggests that  
220 higher values of regulation quality following liberalization have resulted in inefficient sales techniques,  
221 supply shortages, and higher loss ratios, thus reducing insurer profitability since higher values of  
222 regulation quality imply greater economic freedoms (or lower price regulations) (Fields et al., 2012;  
223 Weiss et al., 2010). According to this view, increases in insurer regulation would be a channel through  
224 which financial liberalization may even reduce insurer performance. Another positive association has  
225 been challenged by a "regulator-stability view". Under this view, regulation leads to a reduced unit  
226 price, a moderate drop in the size of the involuntary market, and increased production, thus enhancing  
227 insurer performance (i.e., Grabowski, Viscusi, & Evans, 1989; McShane, Cox, & Butler, 2010).

228 Second, financial liberalization might affect insurer performance and/or risk-taking through dif-  
 229 ferent channels apart from changes in insurance regulation. For instance, financial liberalization  
 230 may encourage insurer risk-taking by expanding investment opportunities and taking risk in foreign  
 231 financial markets or getting involved in non-traditional activities. For example, insurance compa-  
 232 nies' international investment portfolios in foreign stocks and bonds may potentially affect their  
 233 performance. Cubillas and Gonzalez (2014) analyze the channels through which financial liberal-  
 234 ization affects bank risk-taking, and their results indicate that financial liberalization increases bank  
 235 risk-taking in both developed and developing countries. As for hypotheses of the effect of financial  
 236 liberalization, previous studies show an ambiguous effect and inconclusive empirical evidence, for  
 237 which we therefore treat it as an empirical issue in our study.

### 238 3. Model and data

#### 239 3.1. Sources of data

240 We first obtain financial data for life insurance companies in OECD countries from Bureau van Dijk's  
 241 ISIS (global information on insurance companies) database for the period 2004–2011. This database  
 242 is very reliable. We drop those sample insurers that do not exceed 4 years of business life and drop  
 243 3 OECD members from the samples due to data non-availability. The final filtered sample consists of  
 244 1324 life insurance companies across 30 OECD members over the period 2004–2011. All firm-level  
 245 characteristics are converted into thousands of US dollars.

246 Table 1 shows the numbers of insurance companies in our ISIS sample by life insurers from each  
 247 OECD country. The United States contributes 567 firms, Germany has 244 firms, and the United  
 248 Kingdom has 96 firms.

249 From Bureau van Dijk's ISIS database, to enable us to study insurer efficiency we use three firm-level  
 250 proxies to measure insurance performance as dependent variables: net premiums written, expense  
 251 ratio, and profit margin. The term for net premiums written ( $\text{Ln}ta$ ) is the logarithm of total net pre-  
 252 miums written in thousands of US dollars. The expense ratio is the ratio of underwriting expenses  
 253 to net premiums written. Profit margin ( $\text{Ln}pro\_margin$ ) is the logarithm of the ratio of profitability  
 254 to revenue. These three variables used as performance measures are consistent with an efficiency  
 255 method (Chen & Wong, 2004; Pope & Ma, 2008).

256 We set both the solvency ratio and leverage ratio proxies as two dependent variables to mea-  
 257 sure insurance risk-taking and use insurers' capitalization to construct the risk measure. Utilizing  
 258 the former two ratios to measure firm-level risk enables us to compare risk-taking across firms in

**Table 1**  
Distribution of life insurance firms in the sample.

Country	Firms	Country	Firms
Australia	8	Italy	54
Austria	8	Japan	41
Belgium	8	Luxembourg	25
Canada	3	Mexico	17
Chile	27	Netherlands	26
Czech Republic	4	New Zealand	3
Denmark	29	Norway	2
Estonia	3	Poland	6
Finland	14	Portugal	8
France	54	Slovenia	1
Germany	244	Sweden	15
Greece	2	Switzerland	19
Hungary	4	Turkey	1
Iceland	2	United Kingdom	96
Ireland	33	United States	567
		Grand total	1324

Notes: This table displays the traded life insurers included in the sample by their country. The data are sorted from the ISIS database and are composed of 1324 firms from 30 OECD countries.

different countries. We thus calculate the firm-level CVs of the solvency ratio and leverage ratio and take the natural logarithm of the two CVs' ratios as the risk-taking measures (Fields et al., 2012), but the only difference from the CV ratios of Fields et al. (2012) is that we calculate the average value under a three-year rolling time window.<sup>4</sup> The coefficients of variation of the solvency ratio and leverage ratio make our risk measures more precise and reliable.

The set of firm-level control variables in the model includes: (1) firm-level characteristics such as firm total assets (Lnta) and net investments (Lnni); and (2) factors known to explain volatility in earnings, such as insurance firm debtors (Lnid), underwriting expenses (Lnnde), and net technical reserves (Lntr) (Ahmed et al., 2011; Fields et al., 2012). The firm-level independent and/or control variables across countries are all converted into thousands of US dollars and transformed into natural logarithmic form. As for controlling for macroeconomic situations that may influence insurance firm performance and risk-taking found in existing studies (Beck & Webb, 2003; Fields et al., 2012; John et al., 2008; Laeven & Levine, 2009), we include: (1) annual population growth ratio (Popu\_gwt); (2) logarithm of real GDP per capita (Lngdp) in constant 2000 US dollars; and (3) annual rate of CPI (Inflation) change. The above control macroeconomic variables are from World Development Indicators (WDI, 2012) published by the World Bank.

Aside from the ISIS database, for the political institution variables we use three economic freedom indices from the Fraser Institute: size of government, legal structure, and freedom to trade internationally (Gwartney, Hall, & Lawson, 2010). The scale of economic freedom ranges from 0 to 100; a higher level indicates a larger degree of economic freedom, indicating that government policies are more conducive to competition and economic freedom to the extent that freedom allows financial institutions to improve their own efficiency, to engage in different activities, and to diversify their risks. In addition, the variable of political stability and absence of violence is borrowed from the database of Worldwide Governance Indicators (WGI), proposed by Kaufmann et al. (2009)<sup>5</sup> and updated to 2011 (Fields et al., 2012; Pasiouras & Gaganis, 2013). In our study the index contains the period 2004–2011. The index ranges are ranked from 0 to 100 and are divided into six categories, whereby higher index values mean a stronger governance index. The Herfindah government index (Herfgov) is from the database of political institutions (DPI; Keefer, 2010) and helps evaluate the effects of national political institutions on the life insurance sector. The Herfindah index is the sum of the squared seat shares of all parties in the Congress.

The measure for globalization takes the KOF database developed by the Swiss Economic Institute ("Konjunkturforschungsstelle"), proposed by Dreher (2006) and updated in Dreher et al. (2008). The previous literature has studied the KOF index, which measures globalization in the broad sense. The index covers 123 countries through 23 variables and consists of the economic, social, and political dimensions of globalization. Economic globalization is measured by indicators of actual flows and restrictions, social globalization is measured by indicators of personal contacts, information flows, and culture proximity, and political globalization depends on the index of a country's embassies, membership in international organizations, and participation in U.N. Security Council missions (Dreher et al., 2008). This study uses the updated 2010 KOF index of globalization covering the period between 2004 and 2009, which measures globalization over the range of 1–100, where higher values represent higher levels of globalization.

We then use the Chinn-Ito index series (updated to 2012), which measures financial openness, as a proxy based on IMF reports. The Chinn-Ito index, initially introduced in Chinn and Ito (2006), measures the country-level degree of capital account openness at a certain time period. It is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). Yalta and Yalta (2012) and Ahmed (2013) employ the Chinn-Ito index (KO) as an essential

<sup>4</sup> We use data in the period 2004–2006 to calculate the 2005 CVs; 2004 CVs are replaced by 2005 CVs; from the period 2005–2007 to calculate the 2006 CVs, . . . . . from the period 2009–2011 to calculate the 2010 CVs, and 2011 CVs are also used by 2010 CVs.

<sup>5</sup> The Worldwide Governance Indicators are aggregate indicators and are based on 30 underlying data sources that report the perceptions of governance from a large number of survey respondents, non-governmental organizations, international organizations, and private sector firms' assessments worldwide.

306 measure of a liberal financial environment. In addition, the proxy of freedom to trade internationally  
 307 is represented by an economic freedom index from the Fraser Institute. We set the two proxies as  
 308 financial liberalization variables herein, because financial sector reforms are often part of a broad eco-  
 309 nomic reform program. Table 2 lists complete accounts of our variable definitions and full information  
 310 of the data sources.

**Table 2**  
Variable definitions and data sources.

Variable	Definition	Sources
<b>Dependent var.</b>		
<b>Lnnpw</b>	Natural logarithm of annual total net premiums written (US dollars)	Bureau van Dijk's ISIS database
<b>Expense_ratio</b>	Ratio of all underwriting expenses to net premiums written	Bureau van Dijk's ISIS database
<b>Lnpro_maign</b>	Natural logarithm of the ratio of probability to revenue	Bureau van Dijk's ISIS database
<b>CV [ln(solvency ratio)]</b>	Coefficients' variation in the natural logarithm of the solvency ratio	Authors' calculation using Bureau van Dijk's ISIS database
<b>CV [ln(leverage ratio)]</b>	Coefficients' variation in the natural logarithm of the leverage ratio	Authors' calculation using Bureau van Dijk's ISIS database
<b>Independent var.</b>		
<b>Economic—global</b>	Measured by actual flows and restriction indicators	KOF index of globalization (Dreher et al., 2008; updated 2010)
<b>Social—global</b>	Measured by personal contacts, information flows, and culture proximity indicators	KOF index of globalization (Dreher et al., 2008; updated 2010)
<b>Political—global</b>	Measured by a country's embassies, membership in international organizations, and participation in U.N. Security Council mission indicators	KOF index of globalization (Dreher et al., 2008; updated 2010)
<b>Government size</b>	Measures the degree of government spending, enterprise, investment, and marginal tax rate	Fraser Institute (Gwartney et al., 2010)
<b>Political stability</b>	Captures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means	WGI (worldwide governance indicators) (Kaufmann et al., 2009; updated 2013)
<b>Herfgov</b>	Sum of the square of the seat shares of all parties in the Congress	DPI (database of political institutions) (Beck, Clarke, Groff, Keefer, & Walsh, 2001; update Keefer, 2010)
<b>Legal system</b>	Measures how well the protective function of the government is	Fraser Institute (Gwartney et al., 2010)
<b>Chinn-Ito index</b>	Measures financial openness and progress of financial liberalization	Chinn-Ito index series (updated to 2010)
<b>Freedom to trade internationally</b>	Measures a wide variety of restraints that affect international exchange: tariffs, quotas, hidden administrative restraints, and controls on exchange rates and capital	Fraser Institute (Gwartney et al., 2010)
<b>Lnta</b>	Natural logarithm of total assets (thousands of US dollars)	Bureau van Dijk's ISIS database
<b>Lnni</b>	Natural logarithm of net investments (thousands of US dollars)	Bureau van Dijk's ISIS database
<b>Lnid</b>	Natural logarithm of insurance debtors (thousands of US dollars)	Bureau van Dijk's ISIS database
<b>Lnude</b>	Natural logarithm of underwriting expenses (thousands of US dollars)	Bureau van Dijk's ISIS database
<b>Lnntr</b>	Natural logarithm of net technical reserves (thousands of US dollars)	Bureau van Dijk's ISIS database
<b>Lngdp</b>	Natural logarithm of real GDP per capita (constant 2000 US dollars)	World Development Indicators, 2012, The World Bank
<b>Popu.gtwt</b>	Population growth ratio (%)	World Development Indicators, 2012, The World Bank
<b>Inflation</b>	Annual change rate in CPI	World Development Indicators, 2012, The World Bank



**Table 3**  
Summary statistics of variables.

Variable	Mean	Std. Dev.	Min.	Max.	N
<b>Firm-level variables dependent</b>					
Ln(net premium written)	12.048	2.331	1.098	18.504	9376
Expense-ratio	1.242	1.186	−0.039	9.726	9114
Ln(Profit margin)	1.814	1.597	−4.605	6.846	7166
CV Ln(solvency ratio)	0.123	0.206	−0.088	1.246	9232
CV Ln(leverage ratio)	0.110	0.637	−3.087	3.003	9007
<b>Country-level variables independent</b>					
<b>Globalization</b>					
Economic–global index	72.253	9.898	45.837	98.875	7944
Social–global index	78.539	7.190	46.674	91.434	7944
Political–global index	92.366	4.998	51.394	98.431	7944
<b>Political institutions</b>					
Government size	6.097	1.027	3.2	8.3	9268
Political stability	65.25	15.47	15	100	10592
Herfgov	0.832	0.223	0.217	1	9268
Legal system	7.677	0.774	4.5	9.2	9268
<b>Financial liberalization</b>					
Chinn-Ito index	2.407	0.280	−1.159	2.455	9093
Freedom to trade internally	8.206	0.422	6.4	9.3	9268
<b>Firm-level variables independent</b>					
Ln(total assets)	14.161	2.329	7.239	21.377	9775
Ln(net investments)	13.995	2.327	6.401	21.289	9763
Ln(net techn. Reserves)	13.815	2.598	0.332	20.833	9682
Ln(insurance debtors)	9.598	2.444	0.172	19.925	9000
Ln(total liability)	14.161	2.329	7.239	21.377	9775
<b>Other controls</b>					
Ln(GDP)	10.602	0.363	8.671	11.680	10589
Population growth	0.632	0.487	−0.315	2.530	10592
Inflation	2.050	1.692	−6.381	13.305	10589

Notes: This table shows the summary statistics of the sample of publicly traded life insurance firms with data available from the ISIS database for 30 countries.

Table 3 presents the summary statistics for our sample firms regarding insurance performance and risk measures under firm-level variables, as well as under variables for globalization, political institutions, and financial liberalization. We follow Laeven and Levine (2009) to take the natural logarithm of the capitalization ratios and introduce their CV (coefficient of variation) as two measures of risk-taking in the study. We truncate the CVs of the capitalization ratio at the 2nd and 98th percentile values. From Table 3, the firm levels of the risk-taking dependent variables with variations in both the solvency ratio and in the leverage ratio range from −0.088 to 1.246 and from −3.087 to 3.003, respectively. Under the three insurance firm performance variables, net premiums written is the logarithm of total net premiums written in thousands of US dollars and ranges from 1.098 to 18.504, the expense ratio ranges from −0.039 to 9.726, and the profit margins are from −4.605 to 6.846.

### 3.2. Dynamic panel GMM model

Our panel data consist of 1324 individual insurance firms across 30 selected OECD countries in the period 2004–2011. This study considers the dynamic panel data equation with a lagged dependent variable included in the regression as follows:

$$y_{ij,t} - y_{ij,t-1} = (\alpha - 1)y_{ij,t-1} + \beta \text{Environment}_{i,t} + \lambda F_{ij,t} + \delta' X_{i,t} + \eta_i + \phi_t + \varepsilon_{ij,t} \quad (1)$$

In Eq. (1),  $i (= 1, \dots, N)$  refers to the country number;  $j (= 1, \dots, J)$  represents the individual firm number;  $t (= 1, \dots, T)$  indicates time; and  $y_{ij,t}$  is the dependent variable reflecting the individual insurance firm's performance and risk-taking variables as follows: (a) three performance variables—Net

premiums written, Expense ratio, and Profit margin—and (b) two risk-taking variables—solvency ratio and leverage ratio.

Environment is a set of three types of country-level independent variables, including those covering political institutions, globalization, and financial liberalization. We note that  $F_{ij,t}$  and  $X_{i,t}$  are a set of firm-specific and country-specific control variables, respectively, including firm-level variables and country-level macroeconomic variables. Moreover,  $\eta_i$  is an unobserved country-specific effect,  $\phi_t$  is an unobserved time-specific effect, and  $\varepsilon_{i,t}$  is the error term. The specifications of equations as a set of projected equations imply that the error terms are orthogonal to the unobserved county-specific effect, time-specific effect, and the lag values of the endogenous variables.

We take the first-differences of Eq. (1) and eliminate the unobserved country-specific effect  $\eta_i$ , from which we have following equation:

$$\Delta y_{ij,t} = \alpha \Delta y_{ij,t-1} + \beta \Delta \text{Environment}_{i,t} + \lambda \Delta F_{ij,t} + \delta' \Delta X_{i,t} + \Delta \phi_t + \Delta \varepsilon_{ij,t} \quad (2)$$

Here,  $\Delta$  presents one lag operator, and  $\alpha$  is the estimated persistence coefficient for insurance performance and risk-taking. A significantly positive  $\alpha$  implies that both insurance firm-level performance and risk-taking exhibit persistence from the previous year to the next year, indicating the speed of a firm's performance/risk-taking toward the long-run average. The parameter  $\beta$  captures the impact of a set of Environment variables on the performance and insurance firms' risk-taking. We expect that  $\beta$  has a positive (negative) sign with the proxies of globalization, political institutions, and financial liberalization for insurance performance (risk-taking). The parameter  $\lambda$  captures the internal effect on firm performance and risk-taking.

We also employ a two-step system GMM procedure to robustly generate consistent and efficient parameter estimates and use instruments with lagged years as independent variables to deal with these estimates: (i) the endogeneity of the explanatory variables; and (ii) the autocorrelation problem with error term  $\Delta \varepsilon_{ij,t}$  correlated with the lagged dependent variable  $\Delta y_{ij,t-1}$ . The assumptions of the dynamic GMM panel estimation show that not only is the error term not serially correlated, but also that the explanatory variables are weakly exogenous.

Our study applies the two-step dynamic panel GMM approach of Arellano and Bover (1995) and Blundell and Bond (1998). Roodman (2009) asserts that the GMM estimators used for dynamic panel data models are designed for a few time periods and many individuals, with independent variables that do not have strict exogeneity, heteroskedasticity, and autocorrelation within individuals. It is rather convenient that the dynamic GMM technique at the same time allows us to control for the endogeneity bias induced by reverse causality running from firm performance (or risk-taking) to the environment conditions and other explanatory variables.<sup>6</sup>

## 4. Empirical results

### 4.1. Globalization and insurance performance

We measure the performances of insurance companies using the net premiums written, expense ratio, and profit margin as three proxies. The net premiums written and profit margin are directly related to insurance performance, whereas the expense ratio is inversely related to it. Table 4 shows the empirical results of the effects of the three sub-dimensions of globalization on insurance firm performance across OECD countries. The results in columns 1–3 are for a net premium written model; those in columns 4–6 are for an expense ratio model; and those in columns 7–9 are for a profit margin model. From Table 4, the insignificant estimate of the lagged performance proxy indicates that an

<sup>6</sup> We also consider two specified tests suggested by Blundell and Bond (1998), using Stata's xtabond2 command to specify the instruments' validity. The first test is the Hansen J test of over-identifying restrictions; it examines the overall validity of the instruments by analyzing the sample analogue of the moment conditions. Under the null of joint validity of the full instrument set, the Hansen J test statistics are asymptotical to the Chi-square distribution. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The second concern is to test the hypothesis that the error term is not serially correlated. In the system difference-level regression we test that the differenced error terms are not second-order serially correlated.

**Table 4**  
Empirical results of globalization on insurance performance.

Dependent variable	Net premiums written (Lnnpw)			Expense ratio			Profit margin (Lnpro_margin)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep(-1)	0.093 (0.415)	0.101 (0.413)	0.047 (0.602)	0.015 (0.126)	0.051 (0.132)	0.158 (0.127)	0.051 (0.082)	0.300 (0.300)	0.214 (0.213)
Econo-global	0.001 (0.023)			-0.013* (0.006)			0.048* (0.021)		
Social-global		-0.0389 (0.061)			0.003 (0.004)			-0.170** (0.068)	
Political-global			0.052 (0.123)			0.011 (0.013)			0.087** (0.041)
Lnta	-1.647 (2.292)	-1.584 (1.953)	-1.962 (2.189)	1.041 (0.786)	-0.016 (0.579)	-0.110 (0.646)	-0.588 (1.243)	-0.473 (1.045)	-0.071 (3.016)
Lnni	1.148 (2.748)	1.081 (2.429)	1.024 (2.690)	-0.985*** (0.594)	-0.126 (0.517)	-0.049 (0.593)	0.143 (0.522)	0.326 (0.757)	1.261 (3.102)
Lnid	-0.022 (0.261)	-0.068 (0.209)	-0.033 (0.271)	-0.051 (0.043)	-0.110*** (0.058)	-0.111 (0.075)	-0.264 (0.210)	-0.292 (0.281)	-0.523 (0.333)
Lnude	0.558 (0.449)	0.738*** (0.417)	0.475 (0.556)	0.82* (0.162)	0.80* (0.185)	0.72* (0.152)	-0.120 (0.338)	0.849** (0.406)	-0.167 (0.797)
Lnntr	0.735 (0.679)	0.627 (0.635)	1.125 (1.326)	-0.475*** (0.267)	-0.354 (0.304)	-0.351 (0.260)	0.897 (0.890)	-0.001 (0.492)	-0.242 (1.006)
popu.gwt	-1.321 (1.701)	-1.670 (1.539)	-0.715 (2.438)	0.294 (0.392)	-0.200 (0.148)	-0.312 (0.214)	-4.67* (1.369)	-6.68* (2.139)	-1.4433 (0.995)
Lngdp	-0.073 (0.487)	-0.002 (0.478)	-0.291 (0.653)	0.011 (0.142)	0.071 (0.129)	0.063 (0.118)	-1.253* (0.583)	-0.499 (0.913)	-2.06* (0.563)
Inflation	0.092 (0.142)	0.118 (0.116)	0.046 (0.190)	0.018** (0.010)	0.005 (0.006)	0.009 (0.007)	0.087*** (0.049)	0.42* (0.108)	0.104*** (0.061)
AR(2) (P value)	0.108	0.087	0.115	0.308	0.336	0.540	0.879	0.289	0.339
Hansen test (P value)	0.989	0.999	0.987	0.382	0.249	0.326	0.252	0.965	0.255
# of instruments	17	17	17	47	67	57	49	35	29
Difference-in Sargan/ Hansen test (P value)	0.937	0.987	0.929	0.579	0.593	0.546	0.493	0.848	0.132
Sample	4097	4097	4097	3970	3970	3970	2743	2743	2743

Notes: Dep(-1) indicates the lagged one period of the dependent variable. Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The index of globalization covers the period between 2004 and 2009.

- \* Indicates statistical significance at the 1% level.
- \*\* Indicate statistical significance at the 5% level.
- \*\*\* Indicate statistical significance at the 10% level.

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OECD life insurance firm's performance is not persistent—i.e., a current period firm's performance does not continue into the next year. Moreover, we find that in the net premiums written model, the three globalization variables do not significantly affect life insurance performance. However, in the expense ratio model, only a high economic globalization index (column 4) results in significantly better insurance performance, whereas social globalization and political globalization do not significantly impact insurance performance.

In the profit margin model, economic globalization and political globalization positively influence insurance performance, which is a finding similar to Cummins and Venard (2008), Lee and Chang (2012), and Pasiouras and Gaganis (2013), in which higher globalization improves insurer performance. The result also supports the positive-linear theory on the international-performance nexus (Tallman & Li, 1996), indicating that as firms expand internationally, they experience higher levels of performance. However, social globalization is inversely related to insurance performance. In other control variables of the profit margin model, inflation has a significantly positive impact on insurance performance, but the effects of GDP and population growth rate are negatively associated with insurance performance. In other words, macroeconomic performance is a key determinant of profit margin.

#### 4.2. Political institutions and insurance performance

We next turn to examine the effect of political institutions on life insurance performance. Table 5 presents the results of the three sub-indices for the variable of political institutions. The coefficients of the three lagged performance persistence are significantly positive, showing that life insurance firms in OECD countries have higher performance persistence under proxies for political institutions. Firms with good performance in the previous period appear to significantly experience good performance in the next period. In addition, the results show that in the model of net premiums written (columns 1–3), the three political proxies have a positive impact on insurance performance, which implies that a stable political institution (or system) is highly correlated with life insurance performance. This finding is in line with Alesina et al. (1996) and Pasiouras and Gaganis (2013), who claim that political stability is an important factor for the insurance sector.

There is only one piece of significant evidence showing that the *legal system* indicator has a significantly positive impact on insurance performance in the expense ratio model (column 6). In the profit margin model, *legal system* (column 9) also has a significantly positive impact on insurance performance, whereas the other two political proxies (columns 7 and 8) show a positive influence on firm performance in which the effects are insignificant. This result also indicates that political institutions or political stability in conjunction with national characteristics have a positive impact on life insurance firms. In addition, for firm-level control variables, in the two models for net premiums written and expense ratio we find that underwriting expense (*Lnude*) is significantly and positively correlated with firm performance, indicating insurance firms with more underwriting expenses lead to better firm performance. Moreover, for the other macroeconomic control variables in the two models of net premiums written and profit margin, *inflation* has an insignificantly positive impact on insurance performance, while the effect of GDP has a significantly negative impact on insurance performance after considering political institutions in the net premium and profit margin models. The results are very much consistent with the findings of Table 4, which spells out that good economic performance tends to harm life insurance firm performance.

#### 4.3. Financial liberalization, insurance performance, and risk-taking

Tables 6 and 7 present the results with respect to the effect of financial liberalization on insurance performance and risk-taking, respectively. In both tables the coefficients of both lagged performance and lagged risk-taking persistence are significant and positive. Put differently, life insurance firms have higher performance and greater risk-taking persistence under financial liberalization proxies from the previous year to the next year. In Table 6 the results show that in the net premium written model, *chinn-ito index* and *freedom trade internationally* significantly and negatively impact insurance performance, while they have a significantly positive impact in the expense ratio model—both results mean a higher financial liberalization index can lead to worse firm performance in the life insurance

**Table 5**  
Empirical results of political institutions on insurance performance.

Dependent variable	Net premiums written (Lnnpw)			Expense ratio			Profit margin (Lnpro_margin)		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep(-1)	0.200 <sup>**</sup> (0.094)	0.252 <sup>**</sup> (0.109)	0.246 <sup>*</sup> (0.079)	0.161 <sup>*</sup> (0.048)	0.176 <sup>***</sup> (0.101)	0.169 <sup>*</sup> (0.048)	0.179 <sup>***</sup> (0.106)	0.258 <sup>**</sup> (0.114)	0.128 (0.104)
Government-size	0.177 <sup>*</sup> (0.052)			-0.0686 (0.043)			0.129 (0.086)		
Political stability		0.004 <sup>**</sup> (0.002)			-0.0016 (0.002)			0.0017 (0.003)	
Legal system			0.254 <sup>*</sup> (0.074)			-0.177 <sup>**</sup> (0.07)			0.464 <sup>**</sup> (0.209)
Lnta	-1.235 <sup>***</sup> (0.694)	-0.627 (0.773)	0.0444 (0.282)	-0.0183 (0.257)	-0.0566 (0.293)	1.198 <sup>*</sup> (0.547)	-0.0488 (0.623)	0.911 (2.587)	-2.963 <sup>***</sup> (1.711)
Lnni	1.290 <sup>***</sup> (0.730)	0.509 (0.790)	-0.0253 (0.143)	-0.0881 (0.181)	0.227 (0.231)	-1.484 <sup>*</sup> (0.548)	1.590 <sup>*</sup> (0.593)	-1.180 (1.619)	1.515 <sup>*</sup> (0.521)
Lnid	0.123 (0.096)	0.164 <sup>***</sup> (0.099)	0.106 (0.073)	-0.114 <sup>***</sup> (0.066)	-0.123 (0.086)	-0.0918 (0.057)	0.120 (0.235)	-0.0193 (0.236)	0.101 (0.166)
Lnude	0.418 <sup>*</sup> (0.156)	0.268 <sup>***</sup> (0.157)	0.595 <sup>*</sup> (0.173)	0.803 <sup>*</sup> (0.175)	0.605 <sup>*</sup> (0.186)	0.891 <sup>*</sup> (0.142)	-0.0176 (0.398)	-0.290 (0.308)	-0.654 <sup>***</sup> (0.334)
Lnnt	0.318 (0.260)	0.544 <sup>***</sup> (0.314)	0.167 (0.216)	-0.264 (0.189)	-0.450 <sup>*</sup> (0.207)	-0.366 <sup>*</sup> (0.1624)	-0.246 (0.219)	1.396 (1.681)	2.889 <sup>***</sup> (1.481)
popu_gwt	-0.153 <sup>***</sup> (0.087)	0.686 <sup>*</sup> (0.226)	0.0499 (0.088)	-0.0886 (0.132)	-0.00287 (0.117)	-0.163 (0.136)	0.00682 (0.212)	0.537 <sup>***</sup> (0.278)	-0.974 <sup>***</sup> (0.498)
Lngdp	-0.625 <sup>*</sup> (0.224)	-0.740 (0.198)	-0.279 (0.173)	-0.287 <sup>***</sup> (0.154)	0.123 (0.124)	-0.147 (0.124)	-2.838 <sup>*</sup> (0.387)	-2.358 <sup>*</sup> (0.379)	-1.867 <sup>*</sup> (0.365)
Inflation	0.0159 <sup>*</sup> (0.007)	0.0122 (0.015)	-0.00767 (0.006)	0.0111 (0.006)	0.00886 (0.009)	0.00289 (0.006)	0.0200 (0.015)	-0.0275 (0.027)	-0.00473 (0.031)
AR(2) (P value)	0.108	0.273	0.124	0.612	0.998	0.536	0.798	0.492	0.414
Hansen test (P value)	0.904	0.556	0.165	0.272	0.096	0.111	0.307	0.065	0.070
# of instruments	33	42	48	68	84	67	63	43	61
Difference-in Sargan/ Hansen test (P value)	0.886	0.614	0.416	0.466	0.660	0.702	0.122	0.170	0.092
Sample	5175	6118	5175	5003	5929	5003	3520	4216	3520

Notes: Dep(-1) indicates the lagged one period of the dependent variable. Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The sample period for political stability is from 2004–2011; government size and legal system cover the period between 2004 and 2010.

\* Indicates statistical significance at the 1% level.

\*\* Indicate statistical significance at the 5% level.

\*\*\* Indicate statistical significance at the 10% level.

**Table 6**  
 Empirical results of financial liberalization on insurance performance.

Dependent variable	Net premiums written (Lnnpw)		Expense ratio		Profit margin (Lnpro.margin)	
	(1)	(2)	(3)	(4)	(5)	(6)
Dep(-1)	0.130*** (0.067)	0.319* (0.089)	0.203*** (0.115)	0.172* (0.047)	0.298* (0.099)	0.231** (0.099)
Chinn-Ito index	-0.447** (0.217)		0.273** (0.139)		-0.532*** (0.316)	
Freedom to trade internationally		-0.0914* (0.027)		0.0481*** (0.026)		0.0161 (0.065)
Lnta	-0.429 (0.331)	0.0664 (0.271)	0.007 (0.095)	-0.128 (0.258)	1.308 (1.552)	-0.0421 (0.729)
Lnni	0.082 (0.145)	-0.0905 (0.151)	-0.100 (0.865)	-0.0538 (0.161)	0.791 (1.35)	1.482** (0.596)
Lnid	0.066 (0.064)	0.0856 (0.072)	-0.731 (0.142)	-0.0517 (0.054)	0.057 (0.155)	0.0530 (0.182)
Lnude	0.399** (0.183)	0.548* (0.175)	1.015* (0.249)	0.626* (0.147)	0.242 (0.319)	-0.113 (0.315)
Lnntr	0.643** (0.268)	0.105 (0.212)	-0.313 (0.497)	-0.194 (0.231)	-0.839 (0.879)	-0.286 (0.3)
Popu.gwt	0.600** (0.253)	0.103 (0.079)	-0.283 (0.189)	-0.103 (0.132)	0.594 (0.52)	0.350 (0.362)
Lngdp	-0.228 (0.158)	-0.220 (0.164)	0.011 (0.154)	-0.196 (0.106)	-3.363* (0.509)	-2.415* (0.434)
Inflation	-0.007 (0.012)	-0.0103 (0.006)	0.003 (0.009)	0.00645 (0.005)	0.051*** (0.031)	0.0213 (0.017)
AR(2) (P value)	0.096	0.134	0.268	0.670	0.778	0.889
Hansen test (P value)	0.154	0.162	0.281	0.056	0.542	0.905
# of instruments	59	48	40	68	55	77
Diff.-in Sargan/ Hansen test (P value)	0.210	0.199	0.987	0.655	0.130	0.051
Sample	5099	5175	4932	5003	3462	3520

Notes: Dep(-1) indicates the lagged one period of the dependent variable. Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The sample period is from 2004 to 2010.

- \* Indicates statistical significance at the 1% level.
- \*\* Indicate statistical significance at the 5% level.
- \*\*\* Indicate statistical significance at the 10% level.

**Table 7**

Empirical results of financial liberalization on CV In(solvency ratio) and CV In(leverage ratio).

Dependent variable	CV In(solvency ratio)		CV In(leverage ratio)	
	(1)	(2)	(1)	(2)
Dep(-1)	0.377*** (0.191)	0.649* (0.029)	0.477** (0.182)	0.567* (0.087)
Chinn-Ito index	3.269** (1.572)		1.910 (1.963)	
Freedom to trade internationally		0.0161 <sup>+</sup> (0.006)		-0.0236 (0.026)
Lnta	0.778*** (0.422)	-0.00701 (0.024)	0.222 (1.187)	-0.309** (0.149)
Lnni	-0.461 (0.348)	0.00657 (0.021)	0.071 (1.222)	0.207*** (0.116)
Lnid	0.0650 (0.059)	-0.000305 (0.004)	-0.019 (0.130)	0.0433*** (0.025)
Lnude	0.239** (0.105)	-0.00615 (0.005)	0.150 (0.233)	0.0482 (0.047)
Lnntr	-0.334 (0.267)	0.0225 (0.014)	-0.252 (0.316)	0.126 (0.078)
Popu.gwt	-0.132 (0.267)	-0.0381** (0.018)	0.363 (0.375)	0.00381 (0.039)
Lngdp	-0.317** (0.15)	0.0436** (0.021)	-0.012 (0.282)	-0.0271 (0.088)
Inflation	-0.0587** (0.016)	-0.00103 (0.001)	-0.055*** (0.033)	0.00426 (0.004)
AR(2) (P value)	0.114	0.172	0.090	0.072
Hansen test (P value)	0.251	0.070	0.063	0.042
# of instruments	30	56	30	53
Diff.-in Sargan/ Hansen test (P value)	0.165	0.043	0.078	0.119
Sample	4965	5035	4747	4824

Notes: Dep(-1) indicates the lagged one period of the dependent variable. Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The sample period is from 2004 to 2010.

<sup>+</sup> Indicates statistical significance at the 1% level.

\*\* Indicate statistical significance at the 5% level.

\*\*\* Indicate statistical significance at the 10% level.

industry. It also implies that a higher degree of capital account openness and a higher freedom of international trade result in a lower life insurance performance. These findings are consistent with Weiss et al. (2010) and Fields et al. (2012), who suggest that insurance deregulation results in the use of inefficient sales techniques, supply shortages, and a greater loss ratio, which then reduce insurer profitability. Therefore, the “regulatory-fragility” view is supportive in this case.

When insurance risk-taking is considered in Table 7, the estimated coefficients of *chinn-ito index* and *freedom trade internationally* are positively and significantly related to the CVs of a solvency model, but there is no significant impact in the CVs of the leverage ratio model. Although the evidence is not statistically significant in the CVs of the leverage ratio model, we still find that high financial openness and high freedom to trade internationally can lead to increasing risk-taking in the life insurance sector in a solvency ratio model. This is similar to the findings of Ahmed (2013), Pasiouras and Gaganis (2013), and Cubillas and Gonzalez (2014), for which liberalization raises the risk of financial fragility in financial markets. In Table 6 we do not find strong evidence for the importance of macroeconomic variables to firm performance, but the inflation rate, as shown in Table 7, suggests a significant and inverse association with a firm’s risk-taking, which implies that a low inflation rate tends to increase a firm’s risk-taking.

#### 4.4. Globalization and insurance risk-taking

Table 8 presents the results for the relationship between globalization and insurance company risk-taking. We find that *economic globalization* is significantly and negatively related to the CV of the solvency ratio in column (1), but the other two globalization proxies, *social and political globalizations*, are insignificantly but negatively associated with the CV of the solvency ratio. One potential reason for the negative effect of economic globalization on life insurer risk-taking is that it is clear that financial intermediation on a global scale has increased the available capital flow and has enabled investors to allocate capital more efficiently at the world level. The continuous improvements in

**Table 8**  
Empirical results of globalizations on CV In(solveny ratio) and CV In(leverage ratio).

Dependent var.	CV In(solveny ratio)			CV In(leverage ratio)		
	(1)	(2)	(3)	(4)	(5)	(6)
Dep(-1)	0.569** (0.256)	2.136** (0.978)	0.477*** (0.254)	0.101 (0.211)	0.431** (0.218)	0.234 (0.182)
Econo–global	–0.011** (0.005)			–0.019* (0.006)		
Social–global		–0.325 (0.242)			–0.048* (0.017)	
Political–global			–0.005 (0.013)			–0.045** (0.020)
Lnta	0.400 (0.445)	–0.752 (3.016)	–0.053 (0.398)	–0.034 (0.424)	–3.209* (1.167)	–0.849 (0.644)
Lnni	0.091 (0.484)	–0.328 (2.100)	0.337 (0.428)	0.395*** (0.229)	2.680** (1.108)	1.339** (0.640)
Lnid	0.011 (0.085)	–0.246 (0.270)	0.017 (0.083)	–0.043 (0.134)	0.293** (0.147)	–0.070 (0.117)
Lnude	–0.245 (0.231)	–0.187 (0.899)	–0.160 (0.191)	0.322*** (0.168)	0.704* (0.271)	0.101 (0.131)
Lntr	0.077 (0.411)	1.100 (2.834)	0.115 (0.488)	–0.289 (0.347)	0.152 (0.314)	–0.133 (0.285)
Popu.gwt	0.520 (0.363)	–0.719 (2.010)	0.007 (0.231)	0.377 (0.386)	0.199 (0.229)	0.014 (0.269)
Lngdp	–0.283 (0.195)	0.304 (0.605)	–0.197 (0.139)	–0.099 (0.242)	–0.582* (0.256)	0.148 (0.151)
Inflation	–0.006 (0.006)	0.285 (0.199)	–0.011*** (0.006)	–0.002 (0.012)	0.017 (0.015)	–0.004 (0.008)
AR(2) (P value)	0.828	0.262	0.971	0.714	0.640	0.576
Hansen test(P value)	0.971	0.380	0.419	0.330	0.354	0.067
# of instruments	27	20	27	44	34	44
Diff.-in Sargan/Hansen test (p)	0.868	0.093	0.971	0.209	0.201	0.166
Sample	3966	3966	3966	3784	3784	3784

Notes: Dep(-1) indicates the lagged one period of the dependent variable. Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The index of globalization covers the period between 2004 and 2009.

\* Indicates statistical significance at the 1% level.

\*\* Indicate statistical significance at the 5% level.

\*\*\* Indicate statistical significance at the 10% level.



financial technologies and widespread deregulation have driven insurer products to become increasingly internationalized, thus allowing for the sharing of insurer systemic risk (Litan, 2001). One possible reason for the negative result of social globalization is that in today's society, multinational insurance companies have access to more information about consumer demand for insurance and are more aware of various international insurance products around the world. Insurers could easily observe consumer choices to improve product efficiency and to reduce price diversity, leading to decreased systemic risk (Held & McGrew, 2000).

A potential reason for the negative effect of political globalization on life insurer risk-taking is that global insurance markets exude some political risks that are global in scale. For example, the internationalization of European insurers increased in the mid-1980s and accelerated in the 1990s. Some insurance companies re-oriented their international risk exposure from their historical roots (e.g., in Africa) to become more European-based. Inter-regional cooperation also includes the set-up of economic international organizations, such as the North America Free Trade Agreement (NAFTA). Such economic-based integration makes the North America region more stable and reduces international risk exposure in the insurance industry. Furthermore, in the CV of the solvency ratio panel, the coefficients of risk-taking persistence are significantly positive—i.e., the life insurance industry in OECD countries has higher risk persistence under globalization proxies from the previous year to the next year. Other firm-level and macroeconomic controls do not show evidence for a firm's risk-taking as it relates to globalization.

The three measures of globalization in the CV of the leverage ratio panel (columns 4–6) exhibit significant and negative relations with insurer risk-taking, implying that a higher degree of globalization can reduce insurer risk. This finding is consistent with those in Dreher (2006) and Lee and Chang (2012). In addition, from Table 8, in the CV of the solvency ratio panel, the significant estimate of the lagged CV of the solvency ratio shows that a firm's solvency ratio does persist, indicating that a firm's risk in the current year repeats into the next year.

#### 4.5. Political institutions and insurance risk-taking

We employ three proxies to examine the effect of political institutions on insurance firm risk-taking. In the CV of the solvency ratio panel of Table 9, only government size reveals a weak, negative, and significant relation (column 1) with risk-taking for life insurance firms. However, in the CV of the leverage ratio panel, *government size* and *political stability* (columns 4 and 5) are significantly and negatively related to the CV of the leverage ratio, denoting that countries with stable political institutions are more likely to have a lower insurer risk. Moreover, *Herfgov* insignificantly impacts life insurance firms' risk-taking. For the other controls, in the CV of the solvency ratio panel, the significant coefficient of the GDP variable implies that countries with a higher GDP level can decrease insurer risk-taking. In unreported regression results, we also run the estimation model jointly with three environmental factors to further investigate the joint effects on insurance firm performance and risk-taking. After considering many combinations and checking for any multicollinearity, we simply report one batch of joint estimation results by selecting economic globalization, government size, and the Chinn-Ito index as control variables for globalization, political institutions, and financial liberalization, respectively. The results are mostly consistent with our earlier finding of separate estimates.<sup>7</sup> The joint investigation suggests that these three environmental variables are important determinants of insurer performance and risk-taking.

#### 4.6. Robustness of results

In this section we conduct two robustness checks on our main findings in the previous section. First, we drop countries with less than 10 firms from the sampling and re-examine the three environmental effects using the dynamic GMM estimation technique. Table 10 presents the results of the estimations.<sup>8</sup>

<sup>7</sup> The joint estimation results can be obtained upon request.

<sup>8</sup> For simplicity, we only report the main estimation results of independent environmental proxies in the robust tables.

**Table 9**  
Empirical results of political institutions on CV In(solvency ratio) and CV In(leverage ratio).

Dependent var.	CV In(solvency ratio)			CV In(leverage ratio)		
	(1)	(2)	(3)	(4)	(5)	(6)
Dep(-1)	0.128*** (0.067)	0.521* (0.101)	-0.034 (0.179)	0.493** (0.199)	0.478** (0.175)	0.557* (0.190)
Government-size	-0.0340*** (0.018)			-0.486** (0.242)		
Political stability		-0.001 (0.002)			-0.390** (0.133)	
Herfgov			0.453 (0.392)			0.719 (0.981)
Lnta	0.120 (0.223)	-1.646 (1.203)	1.155* (0.402)	1.176 (1.43)	-0.733 (1.165)	0.619 (0.984)
Lnni	0.114 (0.194)	0.929*** (0.516)	-0.613*** (0.344)	-0.874 (1.472)	1.251 (1.591)	-0.350 (0.988)
Lnid	0.0500** (0.025)	0.0661 (0.178)	0.139 (0.114)	-0.0386 (0.14)	-0.0101 (0.143)	0.033 (0.106)
Lnude	0.0736 (0.053)	0.396** (0.196)	0.259 (0.178)	0.529** (0.259)	0.334 (0.221)	0.302 (0.327)
Lnntr	-0.152 (0.102)	0.678 (1.217)	-0.546** (0.254)	-0.330 (0.482)	-0.638 (1.122)	-0.278 (0.389)
Popu_gwt	-0.0180 (0.05)	-0.0278 (0.084)	-0.151 (0.405)	1.800*** (0.975)	-0.0189 (0.098)	0.576 (0.419)
Lngdp	-0.204* (0.071)	-0.549* (0.175)	-0.304*** (0.165)	-0.280 (0.408)	0.108 (0.253)	-0.195 (0.344)
Inflation	0.00121 (0.002)	0.00127 (0.004)	-0.038* (0.015)	0.0696 (0.067)	0.010 (0.009)	-0.048*** (0.029)
AR(2) (P value)	0.081	0.063	0.361	0.177	0.159	0.066
Hansen test (P value)	0.054	0.108	0.584	0.617	0.127	0.118
# of instruments	48	24	33	30	24	33
Diff.-in Sargan/Hansen test (p)	0.021	0.046	0.442	0.142	0.080	0.097
Sample	5035	5975	5037	4824	5739	4826

Notes: Dep(-1) indicates the lagged one period of the dependent variable. Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. The sample period for political stability is from 2004 to 2011; government size and the Herfgov variable cover the period between 2004 and 2010.

\* Indicates statistical significance at the 1% level.

\*\* Indicate statistical significance at the 5% level.

\*\*\* Indicate statistical significance at the 10% level.

**Table 10**  
Robustness results of dropping countries with less than 10 firms from the sample.

Dependent variable	Profit margin (lnpro_margin)			CV ln(leverage ratio)		
Globalization						
Econo-global	0.043*** (0.026)			-0.018* (0.006)		
Social-global				-0.043* (0.016)		
Political-global	-0.923** (0.367)			-0.035*** (0.020)		
AR(2) (P value)	0.861	0.569	0.839	0.960	0.332	0.640
Hansen test (P value)	0.483	0.236	0.366	0.285	0.154	0.059
Dependent variable	Net premiums written (lnnpw)			CV ln(solveny ratio)		
Political institutions				Financial liber.		
Government size	0.225** (0.101)			Chinn-Ito		
Political stability	0.004*** (0.002)			Freedom to trade internationally		
Legal system				0.253* (0.078)		
AR(2) (P value)	0.105	0.291	0.127	0.230	0.212	0.212
Hansen test (P value)	0.928	0.725	0.163	0.158	0.086	0.086
Dependent variable	Net premiums written			Expense ratio		
Financial liberalization				Profit margin (lnpro_margin)		
Chinn-Ito-index	-0.468** (0.210)			0.286** (0.131)		
Freedom to trade internationally	-0.088* (0.029)			0.048*** (0.025)		
AR(2) (P value)	0.101	0.138	0.313	0.742	0.907	-0.007 (0.068)
Hansen test(p value)	0.202	0.140	0.294	0.061	0.312	0.088
Dependent variable	CV ln(solveny ratio)			CV ln(leverage ratio)		
Political institutions						
Government size	-0.025 (0.016)			-0.431*** (0.257)		
Political stability	-0.001 (0.002)			-0.493* (0.122)		
AR(2) (P value)	0.051	0.091	0.194	0.180		
Hansen test (P value)	0.043	0.213	0.617	0.261		

Notes: Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. We report the main estimation results of independent environmental proxies in the table to save space. The sample period for the proxies of political institutions and financial liberalization is from 2004 to 2010; the index of globalization covers the period between 2004 and 2009.

The sample period for government size and political stability is 2004–2010 and 2004–2011, respectively.

\* Indicates statistical significance at the 1% level.

\*\* Indicate statistical significance at the 5% level.

\*\*\* Indicate statistical significance at the 10% level.

All of the estimation results support our earlier findings that globalization has a significantly positive effect on firm performance in the profit margin panel and has a significantly negative impact on a firm's risk-taking in the CV of the leverage ratio panel. The robust empirical results of the three sub-indices for the proxy of political institutions further show a positive and statistically significant impact on insurance firm performance. The findings are much similar to the results in Table 5. Lastly, the financial liberalization model shows negative results that are similar to those reported in Table 6 previously, whereas the positive results are similar to those reported in Table 7 for the CVs of the solvency ratio model.

Second, the 2008–2009 global financial crisis caused a dramatic recession that spilled over into many large and small economies. In the second robustness test, we eliminate the year data covering the global financial crisis period of 2008–2009 to test the robustness of insurance firm stability across OECD countries in order to avoid estimation bias resulting possibly from this big economic shock. The previous literature points out that financial reforms and government regulations are important determinants of a banking crisis in a financial market (Beck, Demirgüç-Kunt, & Levine, 2006). We therefore expect our three environmental proxies to have a real impact on firm performance and risk-taking in the life insurance industry without considering this recent economic shock. If this is the case, then our robust empirical results indicate that the effects of globalization, political institutions, and financial liberalization on life insurance firm performance or risk-taking should remain unchanged after dropping out the data covering the global financial crisis.

Table 11 summarizes the estimation results. Surprisingly, we find the results of globalization in the profit margin panel now turn to be significantly weak or insignificant compared to Table 4, and in the CV of the leverage ratio panel the 3 sub-indices' coefficients of globalization are insignificant compared to Table 8. We thus find evidence that globalization does not play an essential role on insurance firm performance and risk-taking when one does not take into account a large economic shock. In other words, globalization does dominate and affect insurance company performance and risk-taking during the recent financial crisis period. However, the results of the three proxies for the political institutions still show a positive, weak, and statistically significant impact on insurance firm performance—i.e., the effect of political institutions on the life insurance sector was not very much during the financial crisis period. It also implies that countries with greater stable political institutions do not see their life insurance sector suffer during a financial crisis. Finally, our financial liberalization indicators of the Chinn-Ito index and freedom to trade internationally turn to an insignificant impact on insurer performance and risk-taking. Obviously, insurance firm performance and risk-taking are not affected by financial liberalization when we drop out the data containing the global financial crisis period.

## 5. Conclusion and implications

This paper collects a large panel of data from the ISIS database covering 1324 insurance firms across 30 selected OECD countries in the period 2004–2011 and includes proxies for globalization, political institutions, and financial liberalization. We investigate the effects of globalization, political institutions, and financial liberalization on the performance and risk-taking of life insurance firms. We apply the dynamic panel GMM estimation by regressing firm-level and country-level variables. Overall, our results point out that first, globalization and political institutions are positively associated with insurer performance, implying that a higher degree of globalization and a stable political country benefit the life insurance sector in OECD countries. Second, financial liberalization has a significantly negative impact on insurer performance. Third, in regards to insurers' risk-taking, we find that globalization and political institutions have an inverse and significant impact. Finally, in the robustness test we find evidence that insurance firm performance and risk-taking were affected by the recent global financial crisis, while at the same time the effect of political institutions on the life insurance sector was not much.

We also find evidence that these environmental factors influence firm performance and/or risk-taking. The section of robustness tests present two robustness checks. First, after we drop countries with less than 10 firms from the sampling, the estimation results all still support our earlier findings. Second, we eliminate data that overlap the 2008–2009 global financial crisis and find that the

**Table 11**

Robustness results of dropping yearly data for 2008 and 2009 from the sample.

Dependent variable	Profit margin (Lnpro_margin)			CV ln(leverage ratio)		
Globalization						
Econo-global	-0.030 (0.026)			-0.029 (0.030)		
Social-global		-0.078 (0.048)			-0.012 (0.013)	
Political-global			0.095*** (0.057)			-0.010 (0.014)
AR(2) (p value)	0.445	0.179	0.576	0.267	0.313	0.262
Hansen test (p value)	0.348	0.195	0.970	0.160	0.090	0.247
Dependent variable	Net premiums written (Lnpnw)			CV ln(solvency ratio)		
Political Institutions						
Government size	0.315*** (0.184)			Chinn-Ito index	0.601 (0.374)	
Political stability		0.0051*** (0.003)		Freedom to trade internationally		0.031 (0.021)
Legal system			-0.088 (0.306)			
AR(2) (p value)	0.991	0.204	0.770		0.613	0.640
Hansen test (p value)	0.888	0.301	0.693		0.306	0.778
Dependent variable	Net premiums written (Lnpnw)		Expense ratio	Profit margin (Lnpro_margin)		
Chinn-Ito-index	-0.500 (0.340)		0.234 (0.168)	-0.413 (0.376)		
Freedom to trade internationally	0.032 (0.081)			-0.120 (0.069)		
AR(2) (P value)	0.301	0.356	0.057	0.889	0.553	0.166
Hansen test (P value)	0.176	0.199	0.773	0.756	0.133	0.165

Notes: Standard deviation is in parentheses. The Hansen test: The null hypothesis is defined as the instruments used that are not correlated with the residuals. AR(2) denotes the Arellano-Bond test for the second-order autocorrelation in first differences. If the null hypothesis of the Hansen test is not rejected, then the instrumental variables are valid. We report the main estimation results of independent environmental proxies in the table to save space. The sample period excludes 2008 and 2009.

\* Indicates statistical significance at the 1% level.

\*\* Indicate statistical significance at the 5% level.

\*\*\* Indicate statistical significance at the 10% level.

globalization and financial liberalization proxies have a real financial crisis impact on firm performance or risk-taking in the life insurance industry. We therefore conclude that a greater operating environment can result in better insurer performance.

When restricting the data to the sampling period 2004–2011, our results provide valuable insight to insurers among the OECD countries. The findings for operational environment effects provide the insurance industry with some important implications and policy decisions in terms of governance planning. At the country level, the results can be used to predict both insurance sector and financial market development, which benefits policymakers and international investors. For policymakers, globalization, political institutions, and financial liberalization are associated with life insurance development; thus, any policy settings related to environment characteristic changes may influence the life insurance sector significantly if they are important determinants of insurance performance. For international investors, knowledge of the relationship between environment characteristics and global/local life insurance performance is of great benefit for risk management purposes. A better investment environment will help attract investors' attention and provide investors with effective risk protection. At the individual firm level, our findings can also be applied to effectively predict insurers' performance (risk-taking) and to help firm managers make better decisions following changes in the international environment. In other words, for insurers, a manager who pursues self-interested objectives, such as profitability, market power, and benefits, could place more weight on increasing firm growth or reducing the firm's risk-taking.

## Uncited references

Aghion, Alesina, and Trebbi (2004) and American Council of Life Insurers (2006).

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