

What drives the insurance protection gap? Limits to risk sharing in the global insurance market¹

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Abstract

Global insurance still leaves a US\$ 1.8 trn protection gap each year. We test whether the internal architecture of multinational insurers can close part of that shortfall. Using Orbis and S&P data, we reconstruct the 2000–2023 ownership trees of 3,174 groups headquartered in 121 countries and build three scale-free complexity indices capturing business scope, geographic dispersion and regulatory breadth. Exogenous variation comes from each group’s minimum distance to the world’s fifteen long-standing insurance hubs. Linking the instrumented indices to Swiss Re country-level loss data, two-stage least-squares estimates show that a one-standard-deviation rise in regional-jurisdictional complexity lifts the host-country resilience index by 1.8 pp, compresses the protection gap by 0.31 pp of GDP and trims expected losses by 0.8 pp; effects roughly double for reinsurance-centred groups. Complexity also offsets up to 80% of the under-insurance created by regulatory fragmentation and offshore booking. Harmonised, transparent group-level supervision could therefore unlock latent capacity already embedded in complex insurers.

Keywords: Global Insurance Market, Insurers’ Corporate Structure and Complexity, Financial Regulation, Insurance Protection Gap.

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1 Introduction

The increase in the global insurance protection gap poses challenges to economic resilience and financial stability. By 2022, about 76% of global natural catastrophe exposures were uninsured, leaving a protection gap of USD 368 billion (Swiss Re Institute, 2023). Similarly, only 24% of global insurable crop production was covered by insurance, resulting in an estimated crop protection gap of USD 113 billion (Swiss Re Institute, 2023). These shortfalls, aggravated by rising inflation and expanding economic exposures, underscore the urgency of addressing underinsurance across multiple sectors. Additionally, the mortality protection gap climbed to USD 406 billion, reflecting the deepening vulnerability of households when a breadwinner’s income is lost (Swiss Re Institute, 2023).

Major international organizations have emphasized the need to close these gaps before they trigger systemic repercussions. The Financial Stability Board (2020) warns that the growing protection gap, particularly under the pressures of climate change, poses a threat to the stability of the financial system. Likewise, the IAIS (2019) highlights that rising underinsurance heightens the risk of broader economic disruptions. A key element behind this persistent underinsurance is the fragmentation in risk sharing. Regulatory barriers, capital constraints, and home bias hinder the efficient diversification of risks—both across countries and within global financial groups—thus perpetuating coverage shortfalls.

Understanding how the global insurance market transfers and pools risk is crucial for addressing the protection gap. Yet relatively little is known about the internal structures of insurance groups and how those structures might inhibit or enhance global risk sharing. Existing research frequently concentrates on macroeconomic indicators of underinsurance or systemic vulnerability. For instance, Ito and McCauley (2022) demonstrate that catastrophic risks remain sub-optimally shared internationally, largely because countries retain a significant portion of their disaster risk rather than dispersing it globally. Despite ongoing globalization, strong impediments—ranging from regulatory mismatches to cultural preferences—hamper robust international risk distribution.

Building on earlier evidence that the insurance industry can transmit or mitigate systemic shocks (Baluch et al., 2011; Billio et al., 2012; Cummins & Weiss, 2014; Eling & Pankoke, 2016), recent analyses underscore that organizational complexity within large insurance groups may be a double-edged sword. Baluch et al. (2011) show that life insurers were notably susceptible to market turbulence during the 2008 crisis, partly due to intricate liability and credit exposures. Billio et al. (2012) emphasize how the interconnectedness of groups can either buffer or amplify systemic risk, depending on factors such as capital adequacy and risk-management sophistication. Similarly, Cummins and Weiss (2014)

note that large, complex insurers are more likely to be deemed systemically important because their operational links and large exposures can propagate financial contagion. Eling and Pankoke (2016) highlight that while reinsurance helps absorb shocks, it cannot always overcome structural limitations. In line with these findings, our investigation extends the discussion by asking how, in practice, corporate complexity affects global insurance coverage gaps and influences financial performance.

This paper asks whether the organisational complexity of multinational insurance groups helps to surmount that fragmentation and, in turn, reduces observed protection gaps. Multi-line, multi-jurisdiction structures can pool risks internally when external markets are segmented, yet complexity may also create managerial frictions and opacity. Evidence on the net effect—particularly at global scale—remains scarce.

To investigate the question, we compile a panel, following Dobysh and Kartasheva (2025), that reconstructs the complete corporate hierarchies of 3,174 insurance groups headquartered in 121 countries for the years 2000–2023. Ownership chains and financial statements are drawn from S&P Capital IQ Pro, Orbis Insurance Focus and Thomson Reuters M&A records, producing more than two million entity–year observations that cover 117,417 subsidiaries. The sample’s consolidated assets exceed USD 35 trillion, or roughly 85 percent of global industry assets, providing an unprecedented view of insurers’ organisational footprints.

We employ three continuous, scale-free indices to capture distinct facets of organizational complexity. Business complexity measures the dispersion of subsidiaries across six activity lines; jurisdictional complexity records their distribution across nine world regions (a country-level variant is used for robustness); and distance complexity is the mean great-circle distance between every pair of subsidiaries in a group. Each index is instrumented with the minimum great-circle distance from any subsidiary in the group to the fifteen longest-standing insurance hubs identified in the Global Financial Centres Index.

The empirical analysis proceeds in two distinct stages. First, Swiss Re’s country-level data are distilled into three complementary indicators of under-insurance: (i) the protection gap, defined as uninsured losses expressed as a share of GDP; (ii) a resilience index, measuring the proportion of modelled losses already covered; and (iii) total risk exposure, calculated as insured plus uninsured losses relative to GDP. Second, these benchmarks are matched, year by year, to instrumented measures of each group’s organisational complexity—captured through business scope, geographic distance, regional-level jurisdictional diversity, and country-level jurisdictional diversity—and are estimated with two-stage regressions that purge group-specific and global shocks while controlling for balance-sheet strength and macroeconomic conditions.

The regression analysis demonstrates that organisational complexity constitutes a robust counterbalance to under-insurance, whereas regulatory fragmentation exerts the opposite influence. After correcting for endogeneity, a one-standard-deviation increase in regional-level jurisdictional complexity raises the mean host-country resilience index by approximately 1.8 percentage points, narrows the protection gap by roughly 0.31 percentage points of GDP, and reduces expected losses by nearly 0.80 percentage points of GDP. When the group’s primary line of business is reinsurance, the same increment in jurisdictional complexity produces effects that are nearly twice as large, reflecting the superior capacity of globally networked reinsurers to reallocate capital to underserved markets.

By contrast, a one-standard-deviation rise in capital-regime diversity widens the protection gap by about 0.29 percentage points of GDP and increases risk exposure by nearly 0.65 percentage points; extensive offshore booking contributes an additional 0.21 percentage points to the gap. Interaction estimates indicate that an extra standard deviation of organisational complexity offsets between two-thirds and four-fifths of these regulatory headwinds, allowing the most geographically diversified groups largely to neutralise the under-insurance otherwise associated with fragmented capital rules and offshore structures. Taken together, the evidence implies that organisational complexity yields its greatest social benefit when it bridges supervisory silos within a transparent, harmonised group-level oversight framework, rather than when it is employed solely to exploit regulatory arbitrage.

These findings suggest that targeted convergence of solvency standards and enhanced disclosure of intra-group risk transfers could unlock underwriting capacity already embedded in complex insurers, narrowing protection gaps without public subsidy.

The remainder of the paper is organised as follows. Section 2 reviews related literature on insurance-group complexity, protection gap, and fragmentation of risk sharing. Section 3 sets out the dataset and variable construction. Section 4 details the complexity indices and the instrumental-variable design. Section 5 introduces the protection-gap metrics. Section 6 presents the main empirical results linking complexity to protection gap. Section 7 explores how regulatory heterogeneity, capital controls and offshore structures mediate those links. Section 8 concludes.

2 Related Literature

A fundamental question in global risk management is why the insurance protection gap remains stubbornly high in many regions and business lines, despite substantial efforts to promote risk transfer (Elango et al., 2008; Liebenberg & Sommer, 2008). Classical risk-sharing theory Borch (1962) posits that under ideal conditions, insurers can distribute losses across many policyholders, achieving greater risk-bearing capacity and making insurance widely available. Yet, multiple empirical analyses reveal that actual insurance markets often deviate from this ideal, leaving significant uninsured exposures (Cummins & Trainar, 2009; Kojen & Yogo, 2016).

One structural factor behind these shortfalls is the fragmentation of insurance markets (Eling & Schmit, 2012). Insurance regulation typically occurs at the national or sub-national level, producing a patchwork of capital requirements, solvency rules, and tax structures (Haufler & Runkel, 2012). This fragmentation can hinder efficient risk sharing by restricting cross-border capital transfers or by increasing transaction costs for insurers seeking to operate in multiple jurisdictions (Adams et al., 2008; Kojen & Yogo, 2016). As a result, protection gaps remain particularly pronounced in countries with higher regulatory barriers or less developed insurance infrastructures (Fauver et al., 2003).

Another barrier is home bias, where insurers tend to focus largely on domestic risks rather than diversifying internationally. Theoretical work on international business cycle risk, as cited in Obstfeld and Rogoff (2000), suggests that the “law of one price” should hold for large, diversified reinsurers. However, evidence suggests insurers are less globally diversified than theory would predict (Eling & Schmit, 2012). This lack of cross-border risk-pooling capacity contributes to persistent underinsurance in parts of the world where catastrophic exposures—such as natural disasters or agricultural shocks—are frequent but local capacity is insufficient (Cummins & Trainar, 2009).

Against this backdrop, large multinational insurance groups have emerged, offering the possibility of more effective risk diversification and capital deployment across geographically distinct markets (Elango et al., 2008). Organizational complexity—manifested in multiple lines of business, numerous subsidiaries, and internal reinsurance networks—can theoretically mitigate the problems of fragmented markets and capital ring-fencing (W. Kim et al., 1996; Liebenberg & Sommer, 2008).

One strand of literature highlights how geographic and product diversification reduces total earnings volatility, enabling firms to underwrite risks that local insurers find uninsurable (Cummins & Trainar, 2009). A more diversified risk portfolio supports a lower overall cost of capital, allowing insurers to compete effectively in high-risk or underserved

markets (Elango et al., 2008). In the context of the global protection gap, multinational complexity might thus translate into greater willingness to expand into countries with low insurance penetration—where, from a purely standalone perspective, underwriting might otherwise be too hazardous (Mayers & Smith, 1990).

The same diversification argument applies to product scope. Insurers spanning multiple lines (property-casualty, life, health, specialty reinsurance) can shift resources internally to offset losses in one line with profits in another (Cummins & Nini, 2002). For emerging markets, product diversification means complex insurers can offer coverage for a broader range of perils—such as crop or flood risks—rather than focusing solely on standardized, profitable lines. This broad-based approach helps close coverage gaps, particularly in regions where specialty insurance lines remain underdeveloped (Elango et al., 2008).

Organizational complexity can also help insurers circumnavigate regulatory frictions (Koi-jen & Yogo, 2016). Through internal reinsurance, a complex group can effectively pool risks in a subsidiary domiciled in a more favorable regulatory or tax jurisdiction, reducing the cost of capital that local constraints would otherwise impose (Adiel, 1996). If overseen properly, these arrangements may enhance global risk-bearing capacity, thereby plugging protection gaps (Cummins & Weiss, 2014). Critics note that if internal reinsurance is used primarily for regulatory arbitrage rather than genuine risk transfer, it might undermine the solvency benefits envisioned by regulators (Koi-jen & Yogo, 2016). Nonetheless, when used judiciously, such arrangements enable insurance groups to allocate capital flexibly, particularly in emerging or disaster-prone markets where standalone subsidiaries would otherwise face insurmountable capital charges (Adams et al., 2008).

Despite the theoretical advantages of complexity for expanding into underinsured markets, empirical findings on its impact are mixed. Several high-profile studies in finance and insurance point to a diversification discount, meaning that as firms become more complex, firm value and profitability may decline (Laeven & Levine, 2007; Liebenberg & Sommer, 2008). Some researchers attribute this to managerial diseconomies, where coordinating a vast multinational entity with diverse product lines demands sophisticated oversight, and agency problems escalate as corporate hierarchies grow (Liebenberg & Sommer, 2008). Others highlight transparency and monitoring challenges, noting that investors and regulators struggle to evaluate complex insurers, which may potentially inflate the firm’s cost of capital (Cummins & Xie, 2008). A further source of inefficiency arises from regulatory compliance overheads: operating across numerous jurisdictions entails overlapping and sometimes conflicting rules that exacerbate administrative burden (Adams et al., 2008).

Other research supports these findings, demonstrating a nonlinear or conditional rela-

tionship between complexity and performance. Elango et al. (2008) show that product diversification can enhance profitability when accompanied by geographic diversification, and vice versa. If complexity yields genuine scale or scope economies and if managerial challenges remain contained, then complex insurers may outperform more focused peers (Cummins & Nini, 2002). In short, the link between organizational complexity and financial performance is context-dependent. In well-regulated environments with advanced risk-management practices, complexity may confer a net benefit (Eling & Schmit, 2012). In poorly governed settings or when complexity exceeds managerial capacity, insurers risk incurring an organizational penalty (Liebenberg & Sommer, 2008).

There are reasons why complexity may help reduce underinsurance even when it sometimes dampens firm-level profitability. A global insurer that diversifies into multiple lines and countries can lower total volatility, effectively freeing capital to underwrite more or riskier policies (Cummins & Trainar, 2009). By tapping an internal capital market, the group can transfer resources fluidly from low-risk units to higher-risk markets, improving coverage availability (Kim et al., 1996). Put differently, while complexity may impose incremental overhead costs that occasionally lead to lower valuations, it can still deliver risk-sharing benefits to underinsured regions (Elango et al., 2008).

From a regulatory and policy standpoint, these findings underscore two central priorities. One is to encourage cross-border diversification by harmonizing capital standards and tax regimes, which could amplify the diversification benefits of complex insurers and enable them to redeploy capacity to high-gap markets more effectively (Cummins & Weiss, 2014). Another approach is to foster transparency and sound governance, ensuring that complexity reflects genuine risk pooling rather than mere regulatory arbitrage (Koijen & Yogo, 2016). Requiring robust disclosure of intra-group transactions and ensuring adequate group-level capital buffers can mitigate solvency concerns even if a particular subsidiary incurs substantial losses.

Organizational complexity in multinational insurers represents both an opportunity and a challenge for alleviating the global protection gap. On the one hand, complexity provides a viable path to overcoming the fragmentation that hinders cross-border risk sharing; on the other hand, it can heighten management costs, complicate oversight, and dilute profitability. Evidence from studies published in leading finance and insurance journals indicates that, under supportive regulatory conditions and strong corporate governance, complexity can improve insurers' capacity to diversify risk and offer coverage in traditionally underserved or catastrophically exposed markets (Elango et al., 2008; Koijen & Yogo, 2016). Yet where fragmentation persists and managerial inefficiencies are not addressed, the diversification discount may undermine firm value (Laeven & Levine, 2007; Liebenberg & Sommer, 2008). The remainder of this paper examines these dynamics em-

pirically, shedding light on whether and under what conditions complex insurance groups can manage to reduce the protection gap while maintaining long-term financial viability.

3 Data

We build a comprehensive sample of the major insurance groups that enables us to explore the internal organization of groups and their international presence. The unique feature of our dataset, which sets it apart from earlier studies of the international insurance market (e.g., Altuntas et al. (2015), Berry-Stölzle et al. (2013), Cole et al. (2012), and Outreville (2008)), is that it includes information on the corporate structure of insurance groups. These data enable us to analyze the global insurance market through the lens of internal organization and interaction among various entities that form part of an insurance group.

3.1 Sample Description

This study unifies data from three principal providers—S&P Capital IQ Pro, ORBIS (Insurance Focus), and Reuters (via WRDS)—to form a comprehensive record of global insurance ownership and M&A transactions spanning 45 years (1980–2024). Two main sources underpin the ownership dimension: S&P Capital IQ Pro, which captures more than 4 million entity-year observations, and ORBIS’s Insurance Focus, which adds another 1.25 million entity-year observations with deeper sector-specific detail. After filtering for majority shareholdings (exceeding 50%), the consolidated dataset reflects controlling interests in thousands of insurance groups (life and health, property and casualty, reinsurance, and allied financial subsidiaries).

In parallel, more than 62,001 M&A deals have been gathered and reconciled. S&P M&A data shed light on medium-to-large transactions, while supplementary records from Reuters—accessed through WRDS—expand coverage to smaller or less frequently reported deals, dating back to the early 1980s. Each acquisition links the “target” firm to its previous owner (the “seller”), reconstructing historical ownership for all years preceding the transaction.

Our sample is representative of the global insurance market. The total assets of insurance companies in the sample exceed USD 35 trillion. The total consolidated assets of the global insurance market exceeded USD 40 trillion in 2021. The discrepancy arises due to different methods of insurance consolidation.

The corporate structure and financial information are obtained from the S&P Global

Market Intelligence platform and ORBIS Insurance Focus. In (rare) cases of S&P MI gaps, the complementary information on total assets was obtained from the annual reports of the companies. Ultimately, these combined sources offer an unparalleled longitudinal perspective on how global insurance networks have evolved, consolidated, and diversified over nearly half a century. As financial information is lacking across databases for years earlier than 2000, we restrict our dataset to the timeframe from 2000 to 2023, which spans over 20 years. In total, these ownership files comprise more than 2 million entity-year observations, each linked to standardized identifiers to ensure consistent tracking across sources.

S&P Global Market Intelligence platform (S&P MI) and ORBIS Insurance Focus reports the group’s organizational chart and its major subsidiaries and/or major investments. Using this data, we construct corporate hierarchies (corporate trees) for each insurance group (or subgroup when the parent company is non-insurance). A hierarchy is a vertical ownership and affiliate structure where the ultimate parent of a group, i.e., its HQ, has either a direct or indirect connection with its subsidiaries. In the direct connection, the HQ directly owns the company. In the indirect connection, a company is owned by an entity located at a level below HQ, which in turn can be either directly owned by the HQ or can have another immediate parent.

In the corporate structure, the *nodes* of the tree are individual companies, and the *direct connections* are the ownership links between the two companies. We also define a company *level* as its distance, measured by the number of connections, from the HQ. The companies directly owned by the headquarters are on the first level; the companies owned by them are on the second level, and so on.

To illustrate the nature of the dataset, we present one sample observation, a group corporate tree of Royal London Mutual Insurance Society Ltd, in Figure 1. Each of the groups in our sample is recorded in a similar format. The Royal London Mutual group consists of HQ and 14 subsidiaries. It has 6 subsidiaries reporting directly to HQ, which we label Level I subsidiaries. Three of them have subsidiaries down the corporate tree, with 5 subsidiaries located on Level II, 2 located on Level III, and one located on Level IV. As we discuss further in Section 3.2, this example represents one of the simpler trees.

For each company in a corporate tree, we collect information about its country of residence, industry and identification number, type of ownership (i.e. majority subsidiary or majority investment), and ownership by the immediate parent (in percent). In addition, where possible, we collect the company’s balance sheet and income statement information, and a ticker if it is publicly traded. Whenever possible, we record a Legal

Entity Identifier (LEI) of a company.²At the group-headquarters (HQ) level, we collect balance-sheet and income-statement information as presented in the insurance groups' annual reports.

There is substantial jurisdictional and business diversity among the subsidiaries of the top insurance groups. Collectively, the subsidiaries operate in 208 countries and engage in a variety of insurance and non-insurance businesses. To build the indices of business and jurisdictional complexity of a group, we condense the information in broad yet meaningful categories. We apply the geography and industry classification for S&P Capital IQ and ORBIS datasets presented in Tables 17, 18 and 19.³

3.2 Summary Statistics

Our sample provides a comprehensive overview of the global insurance industry. The headquarters of more than 3'174 groups in the sample are located in 121 different countries. As illustrated in Figure 5, the majority of global insurance group headquarters are concentrated in advanced markets in Asia, Europe, and North America. In fact, around 77% of all HQs are located in developed economies. This distribution highlights the ongoing importance of well-established financial centers for international insurance activities. In contrast, emerging markets—though encompassing 23% of HQs—still represent a relatively smaller share of total market presence.

Figures 6 and 7 illustrate comparable patterns for subsidiary counts and total consolidated assets, respectively. Of the 117'417 subsidiaries in our sample, approximately 84% belong to groups headquartered in advanced economies. These same advanced-market groups collectively control about 79% of the industry's total consolidated assets, underscoring their outsize influence on the global insurance landscape. While emerging markets account for a significant minority of overall headquarters, their share of assets and subsidiaries remains distinctly lower, though more dispersed, reflecting the continued dominance of developed financial hubs in shaping industry scale and structure, and fragmentation of the global insurance market.

As we will discuss in detail below, there is a lot of diversity in the structure, business focus, and the internationalization of the insurance group. Table 1 reports that, on average, the insurance group corporate tree consists of three levels though its depth can

² We refer to the Financial Stability Board for further information on LEI, <https://www.fsb.org/work-of-the-fsb/policy-development/additional-policy-areas/legalentityidentifier/>

³ In geography classification in Table 17, we list only those countries in which the sampled insurance groups have active subsidiaries.

reach up to 19 levels. However, as Figure 8 reveals, for 88% of groups, the structure does not exceed five levels. In terms of the number of subsidiaries in the group, there is a significant degree of variation around the average of 50 subsidiaries. As for the level of internationalization, foreign subsidiaries average at 14, which is slightly lower than one-third of the total number of subsidiaries. Groups are also very diverse in terms of their business focus, measured by the number of non-insurance subsidiaries, reaching on average 21 subsidiaries in non-insurance business.

4 Measures of Complexity & Instrumental Variable Approach

The complexity of an insurance group has multiple dimensions. We use several metrics which aim to capture different aspects of the group structure. The total number of subsidiaries, the number of levels in the corporate tree of a group, and the variety of activities across businesses and locations are all relevant features of the group complexity. Often, a financial institution’s complexity is associated with its size, particularly in the context of too-big-to-fail (TBTF) debates.

To quantify the groups’ jurisdictional and business complexity, we use indices that measure the dispersion of the group’s subsidiaries across different categories. Our approach follows Cetorelli and Goldberg (2014), who analyze the jurisdictional and business focus dimensions for banking groups operating in the US.

This chapter describes the construction of four complementary measures of complexity for global insurance groups. Each measure is calculated annually from 2000 to 2023, allowing for a detailed assessment of how group structures evolve over time. The methods presented here focus on three core dimensions of organizational dispersion: jurisdictional complexity, business complexity, and distance complexity. Together, they offer a multi-faceted lens through which to evaluate the breadth and depth of an insurance group’s operations.

4.1 Jurisdictional Complexity

Jurisdictional complexity gauges how extensively a group’s subsidiaries are spread across different geographical regions. To ensure comparability, a standardized set of nine regions (see Table 17) is applied consistently throughout the entire sample period, thereby accommodating any shifts in political boundaries by assigning historical subsidiaries to

their corresponding contemporary regions. For a given group j in year t , let $\text{count}_{j,t}^r$ be the number of subsidiaries in region r , and let $\text{totalcount}_{j,t}$ denote the total number of subsidiaries belonging to group j . If $R = 9$ is the total number of regions, the jurisdictional complexity index is defined as

$$\text{Jurisdictional Complexity}_{j,t} = \frac{R}{R-1} \left(1 - \sum_{r=1}^R \left(\frac{\text{count}_{j,t}^r}{\text{totalcount}_{j,t}} \right)^2 \right).$$

The factor $\frac{R}{R-1}$ ensures that the index takes values in $[0, 1]$, where higher values reflect a more uniform distribution of subsidiaries across the nine regions. By recalculating jurisdictional complexity annually, changes in a group's global footprint become visible. If acquisitions or reorganizations shift substantial parts of the business to new parts of the world, the index will capture the resulting increase in geographic spread. Conversely, divestitures or strategic focus on fewer regions will drive the index downward.

The same index can be calculated at the country level. In that case, $R = 208$ corresponds to the total number of unique countries in the dataset. The formula remains, but with $R = 208$ instead of 9, thereby measuring the geographical spread based on individual countries. Therefore, in the empirical analysis that follows, we differentiate between jurisdictional complexity and jurisdictional complexity derived at the country level.

Any missing geographical information is handled in a systematic manner. If no region (or country) is ultimately ascribed, that subsidiary is excluded from both the numerator and the denominator in the annual calculations, preventing artificial distortions in the distribution of other subsidiaries.

4.2 Business Complexity

Business complexity measures how subsidiaries are distributed across different lines of activity. Although the insurance and financial-services industry includes many specialized sectors, in this study each subsidiary is assigned to one of six business categories: life and health; property and casualty; reinsurance; banking; other financial; and non-financial.

These six categories are defined for the S&P dataset in Table 18 and for the Orbis dataset in Table 19, ensuring a consistent approach over multiple decades despite different underlying industry codes (e.g., NACE in Orbis and S&P-industry identifiers in Capital IQ Pro).

Let $\text{count}_{j,t}^i$ represent the number of subsidiaries of group j operating in business line i in year t , and let $T = 6$ denote the total number of lines. The business complexity index

is computed via a Herfindahl-based formula:

$$\text{Business Complexity}_{j,t} = \frac{T}{T-1} \left(1 - \sum_{i=1}^T \left(\frac{\text{count}_{j,t}^i}{\text{totalcount}_{j,t}} \right)^2 \right).$$

Values of business complexity lie between 0 and 1, with higher values indicating that a group's subsidiaries are distributed more evenly among the six business lines. By examining this index each year, one can capture strategic reorganizations and expansions into new segments. An increase in business complexity may signal diversification into lines that were previously underrepresented, while a decrease could imply a return to a more focused or specialized business model.

Ensuring accurate classification for historical data is integral to the reliability of $BC_{j,t}$. Industry databases are consulted to determine the principal activities of each subsidiary where possible. If a subsidiary's line of business is unconfirmed for certain years, it is excluded from the calculation in those years, thereby preventing misclassification from distorting the reported level of diversification.

4.3 Distance Complexity

Distance complexity offers an additional perspective by focusing on the physical dispersion of subsidiaries within a group. While jurisdictional complexity measures how subsidiaries cluster among predefined regions or countries, distance complexity evaluates how far apart subsidiaries lie in terms of geodesic distance. The procedure begins by identifying every pair of subsidiaries i and k in group j in year t . Each subsidiary is assigned geographical coordinates (latitude and longitude), which are retrieved from Google Places API. The distance $d_{i,k}$ is then determined using the Haversine formula,

$$d_{i,k} = 2R \arcsin \left(\sqrt{\sin^2 \left(\frac{\phi_k - \phi_i}{2} \right) + \cos(\phi_i) \cos(\phi_k) \sin^2 \left(\frac{\lambda_k - \lambda_i}{2} \right)} \right),$$

where R denotes the Earth's radius, and ϕ and λ stand for latitude and longitude, respectively. After computing $d_{i,k}$ for all pairs, the mean pairwise distance $\bar{d}_{j,t}$ is

$$\bar{d}_{j,t} = \frac{2}{N_{j,t}(N_{j,t}-1)} \sum_{i=1}^{N_{j,t}-1} \sum_{k=i+1}^{N_{j,t}} d_{i,k},$$

where $N_{j,t}$ is the total number of subsidiaries in group j in year t . To standardize these mean distances across groups and years, let $\bar{d}_{\min,t}$ be the smallest average distance among all groups in year t and $\bar{d}_{\max,t}$ the largest. The normalized distance complexity is defined

as

$$\text{Distance Complexity}_{j,t} = \frac{\bar{d}_{j,t} - \bar{d}_{\min,t}}{\bar{d}_{\max,t} - \bar{d}_{\min,t}},$$

yielding a value in $[0, 1]$. A value near 1 indicates that group j in year t is among the most spatially dispersed compared to its peers, while a value near 0 suggests closer clustering of its subsidiaries.

As with the other two indices, careful preparation of location data is critical. When exact coordinates are unavailable for certain historical entries, approximations—such as the city center—are used, supplemented by additional verification where possible. This methodological consistency ensures that the measured distances reflect genuine spatial patterns, rather than artifacts of data availability.

4.4 Instrumental Variable for Complexity Measures

This study employs a distance-based instrumental variable to address potential endogeneity in insurers' organizational complexity. By focusing on long-standing locational considerations that tend not to shift with short-term profit changes, the instrument provides exogenous variation. In particular, the distance to global insurance hubs represents how geography interacts with agglomeration forces to shape the multinational structure of insurance groups.

The chosen instrument is the minimum great-circle distance between any of an insurer's subsidiaries and the fifteen leading insurance centers identified in the Global Financial Centres Index (GFCI) (Wardle & Mainelli, 2025), such as London, New York, or Hong Kong. Subsidiary location decisions often reflect strategic or regulatory legacies and tend to be sticky in the short run because reorganizing, merging, or liquidating entities entails high sunk costs (Dixit & Pindyck, 1994). Proximity to major hubs offers significant agglomeration benefits (Krugman, 1991; Porter, 1998), including access to capital markets, underwriting expertise, and an extensive network of brokers. Insurers whose proximity is closer to these shall employ agglomeration benefits by creating broader, more dispersed networks, thereby increasing their complexity. Because subsidiary-level relocations rarely occur as a consequence of short-term shifts, the minimum distance to global insurance hubs stands as a stable, exogenous driver of organizational complexity.

Distances are computed with the Haversine formula, which gives the great-circle distance between two points (ϕ_1, λ_1) and (ϕ_2, λ_2) on the Earth's surface. With $R \approx 6,371$ km

denoting mean Earth radius and $\Delta\phi = \phi_2 - \phi_1$, $\Delta\lambda = \lambda_2 - \lambda_1$,

$$d = 2R \arcsin\left(\sqrt{\sin^2\left(\frac{\Delta\phi}{2}\right) + \cos\phi_1 \cos\phi_2 \sin^2\left(\frac{\Delta\lambda}{2}\right)}\right).$$

The semi-annual GFCI provides separate insurance-sector rankings for more than 130 cities worldwide (Wardle & Mainelli, 2025). Averaging those scores over 2007–2024 and selecting the top fifteen yields the hub set:

$$\mathcal{H}_{\text{GFCI}} = \left\{ \begin{array}{ccccc} \text{Hong Kong,} & \text{New York,} & \text{London,} & \text{Singapore,} & \text{Shenzhen,} \\ \text{Beijing,} & \text{San Francisco,} & \text{Chicago,} & \text{Tokyo,} & \text{Los Angeles,} \\ \text{Shanghai,} & \text{Frankfurt,} & \text{Boston,} & \text{Zurich,} & \text{Geneva} \end{array} \right\}.$$

For each group j in year t with subsidiaries $\text{Entity}_1, \dots, \text{Entity}_{N_{j,t}}$, the instrument is

$$\text{IV}_{j,t} = \min_{i=1, \dots, N_{j,t}} \min_{h \in \mathcal{H}_{\text{GFCI}}} d(\text{Entity}_i, h),$$

that is, the distance (in 1,000 kilometres) from the closest subsidiary to the nearest GFCI insurance hub.

The relevance and validity of this instrument stem from its basis in structural or historical location decisions rather than short-term managerial adjustments. While large insurers occasionally reorganize or acquire subsidiaries, the essential geographic footprint of long-standing entities typically persists. In a two-stage least-squares setting, this distance variable acts as an exogenous predictor of each complexity measure, alleviating concerns about reverse causality when analyzing how geographic or organizational dispersion affects outcomes like financial performance, risk-taking, or supervisory compliance. The empirical sections that follow rely on this instrument in first-stage regressions to isolate the causal effects of complexity from confounding group-specific shocks.

4.5 First-Stage Regressions for Complexity Measures

We run separate first-stage regressions with ordinary least squares (OLS) for each of our four complexity measures: business complexity, distance complexity, jurisdictional complexity, and a country-level robustness version of jurisdictional complexity. Because distance, jurisdictional, and business complexity capture intertwined facets of the same construct, a single strong instrument suffices for the second-stage analysis. Specifically, each complexity index (bounded between 0 and 1) is regressed on a distance-based in-

strument $IV_{j,t}$ —the minimum group distance to insurance hub, measured in kilometres:

$$\text{Complexity}_{j,t} = \alpha_0 + \beta_1 IV_{j,t} + \sum_{\ell=1}^L \beta_{2,\ell} \text{Controls}_{j,t}^{\ell} + \eta_j + \gamma_t + \varepsilon_{j,t},$$

where $\text{Controls}_{j,t}^{\ell}$ comprises firm characteristics ($\ln(\text{Assets})$, cash flow, current ratio, number of employees, market share) and macro-financial indicators (financial-development index, short-term interest rate, bond yield, GDP deflator, GDP per capita, and real GDP growth). Entity fixed effects (η_j) control for time-invariant heterogeneity across insurers, while γ_t absorbs common temporal shocks. The coefficient β_1 , therefore, captures how proximity to a global insurance center shapes organizational complexity.

Table 4 reports the first-stage estimates. Across all four specifications, the coefficient on the distance instrument is negative and highly significant—consistent with the evidence in Saunders and Steffen (2011) that firms located farther from London adopt less capital-market-oriented structures. Instrument relevance is confirmed: the partial- F statistics lie between 18.6 and 71.9, well above the Stock–Yogo rule-of-thumb value of 10 (Stock & Yogo, 2005).⁴

Economically, the effects are sizeable. Because insurer–hub distances often exceed a thousand kilometres, a 1,000-km decrease in distance raises predicted complexity by roughly 0.005–0.007 on a 0 – 1 scale. Comparable magnitudes appear when reduced travel time between headquarters and plants boosts investment and productivity (Giroud, 2013) and when information advantages decay sharply within dense clusters (Arzaghi & Henderson, 2008; Malloy, 2005). These patterns underscore agglomeration benefits: specialised services and deep labour markets lower coordination costs for nearby insurers, whereas remoteness constrains organisational complexity.

Geography-based instruments are commonly used in causal identification. Classic country-level studies exploit exogenous geography to identify trade’s impact on growth (Frankel & Romer, 1999) and the stabilising role of proximity to financial centres (Rose & Spiegel, 2009). Relocating cross-border insurance subsidiaries is likewise slow and costly, so minimum hub distance is plausibly orthogonal to short-run shocks that might also affect complexity. Conditional on a rich set of firm- and macro-level controls, the first stage therefore isolates the exogenous component of organisational complexity attributable solely to proximity.

⁴ See Stock and Yogo (2005) for weak-instrument critical values.

5 Measures of Protection Gap

Swiss Re Institute quantifies insurance shortfalls for natural-catastrophe, mortality, health, and crop risks across 58 countries (Swiss Re Institute, 2023). From these data I construct three annual indicators—*protection gap*, *resilience index*, and *risk exposure*—for the period 2000–2023. The indicators are algebraically linked, yet each emphasises a distinct facet of (un)insured risk.

The protection gap expresses the dollar amount of losses not covered by insurance relative to economic size. For country c in year t ,

$$\text{Protection Gap}_{c,t} = \frac{\text{Protection Gap (USD)}_{c,t}}{\text{GDP}_{c,t}} \times 100,$$

yielding a percentage of current GDP. Higher values imply that a greater share of potential losses would fall on households or governments.

Coverage already in place is summarised by the resilience index,

$$\text{Resilience Index}_{c,t} = 1 - \frac{\text{Protection Gap (USD)}_{c,t}}{\text{Risk Exposure (USD)}_{c,t}},$$

which ranges from 0 (no risk insured) to 100 (full insurance cover). The index translates the absolute shortfall into the share of total modelled risk that remains uninsured.

Risk exposure itself combines insured and uninsured components. Scaling by GDP gives

$$\text{Risk Exposure}_{c,t} = \frac{\text{Protection Gap}_{c,t}}{1 - \text{Resilience Index}_{c,t}/100},$$

so that risk exposure, like the protection gap, is expressed as a percentage of GDP. Because the three measures are internally consistent, any two determine the third, allowing one to track both the depth of insurance markets and the underlying scale of hazards within a unified empirical framework.

6 Complexity and Protection Gap

The protection gap is the difference between full insurance coverage and the coverage that is actually in place. This gap has become a critical issue in recent years. Swiss Re Institute (2023) estimates that the global protection gap reached an unprecedented \$1.8 trillion in premium equivalent by 2022, reflecting a 20% increase since 2018. This

alarming trend is largely driven by inflation, economic pressures, and the increasing frequency of natural catastrophes. Additionally, underinsurance in areas such as health, mortality, and crop production continues to exacerbate financial vulnerabilities globally (Swiss Re Institute, 2023). Given these challenges, this study will explore whether the organizational complexity of insurance groups can contribute to reducing the protection gap. Figure 21 depicts that the protection gap has more than tripled since the year 2000. The main reasons for this change are the climate change and the aging population. This section aims to assess whether insurance groups’ organizational complexity helps resolve the protection gap.

This section employs the two-stage least squares (2SLS) methodology introduced earlier to investigate whether organisational breadth helps insurance groups narrow the protection gap in the markets where they operate. We analyse three dependent variables that capture complementary facets of under-insurance: (i) a resilience index that rises when claim-paying capacity keeps pace with large losses, (ii) the protection gap—uninsured losses as a percentage of host-country GDP, and (iii) risk exposure—the gross loss potential that could materialise relative to GDP. A long tradition in disaster-finance research predicts that diversified networks can channel capital to hard-hit regions and products, thereby cushioning real-economy shocks (Swiss Re Institute, 2018). Whether greater complexity achieves this outcome, however, remains an empirical question.

We merge firm-level accounts from the Orbis Insurance Focus and S&P Capital IQ databases. Consistent data availability restricts the window to 2000–2023. After excluding observations with missing instruments or controls, the working file contains 2,755,565 firm-year observations (64,748 group-years) for the business- and distance-complexity specifications, and 2,818,012 firm-years (64,798 group-years) for the two jurisdictional measures.

Endogeneity is a concern because insurers choose their own level of complexity. We therefore construct a distance-based instrument that captures each group’s minimum distance to insurance hubs. All specifications include group and year fixed effects, and standard errors are Driscoll–Kraay to allow for heteroskedasticity, serial correlation, and cross-sectional dependence.

In the second stage, for insurance group i in year t , we estimate

$$\text{Outcome}_{i,t} = \alpha_0 + \alpha_1 \widehat{\text{Complexity}}_{i,t} + \sum_{k=1}^K \delta_k \text{Controls}_{i,t}^k + \mu_i + \theta_t + \varepsilon_{i,t},$$

where $\text{Outcome}_{i,t}$ equals the resilience index, the protection gap, or risk exposure. The fitted term $\widehat{\text{Complexity}}_{i,t}$ is the predicted value of business complexity, distance complex-

ity, jurisdictional complexity, or jurisdictional complexity by country, each introduced in a separate regression from the first stage. The control vector matches the earlier specifications: cash flow, current ratio, number of employees, $\ln(\text{Assets})$, market share, financial development index, short-term interest rate, ten-year bond yield, GDP deflator, and real GDP growth.

Panels A–C of Table 5 report second-stage estimates. After instrumenting for endogeneity, every complexity coefficient in Panel A remains positive, and three of the four—distance complexity as well as the two jurisdictional measures—are significant at the one-per-cent level; the business-complexity coefficient is now significant at the five-per-cent level. Rescaling the coefficients by the cross-sectional standard deviations of the underlying indices (0.233 for business complexity, 0.144 for distance complexity, 0.310 for jurisdictional complexity, and 0.331 for jurisdictional complexity by country) shows that a one-standard-deviation increase in business complexity lifts the *resilience index* by roughly 0.45 points, while comparable shifts in distance, jurisdictional, and country-level jurisdictional complexity raise the index by about 0.39, 1.79, and 1.45 points, respectively.

Panel B confirms the negative relationship between complexity and the *protection gap*. Distance, jurisdictional, and country-level jurisdictional complexity retain strong statistical significance at the one-per-cent level, whereas the business-complexity coefficient, although economically similar to the original estimate, is no longer statistically distinguishable from zero. Expressed in standard-deviation units, a one-standard-deviation rise in business complexity narrows the gap by roughly 0.05 percentage points of GDP, and equivalent movements in distance, jurisdictional, and country-level jurisdictional complexity close the gap by about 0.06, 0.31, and 0.25 points, respectively.

Panel C displays a parallel pattern for risk exposure. The negative association between complexity and expected loss potential persists, with distance and both jurisdictional measures highly significant; business complexity remains significant only at the ten-per-cent level. A one-standard-deviation increase in business complexity lowers expected losses by roughly 0.13 percentage points of GDP, while analogous increases in distance, jurisdictional, and country-level jurisdictional complexity reduce expected losses by approximately 0.16, 0.79, and 0.64 points. At the sample-mean host-country GDP of 58 billion US dollars, the fall in expected losses associated with a one-standard-deviation rise in jurisdictional complexity exceeds 460 million dollars per year.

Taken together, the estimates reinforce the conclusion: broader organisational footprints—especially those that span multiple legal regimes—are systematically linked to higher resilience and smaller insurance shortfalls in the countries where groups operate. Even after accounting for an extensive set of financial and macro-economic controls and

correcting for potential endogeneity in the choice of organisational complexity, networked, multi-entity insurers appear to play a constructive role in narrowing national protection gaps and mitigating aggregate risk exposure.

6.1 Reinsurance Effects

Table 6 augments the baseline two-stage specification with the dummy variable $\text{Reinsurance}_{i,t}$, which equals one when the group’s primary business focus is reinsurance, and the interaction term $\widehat{\text{Complexity}}_{i,t} \times \text{Reinsurance}_{i,t}$. The added terms capture whether the benefits of organisational complexity of reinsurers, such as global risk-pooling, translate into greater resilience and coverage.

Panel A of Table 6 reports the results for the resilience index —the share of potential losses that would be covered given existing capacity. All four complexity coefficients remain positive and highly significant. Rescaling them by the cross-sectional standard deviations of their respective indices (0.233 for business complexity, 0.144 for distance complexity, 0.310 for jurisdictional complexity and 0.331 for jurisdictional complexity by country) indicates that a one-standard-deviation rise in business, distance, regional-level jurisdictional and country-level jurisdictional complexity lifts the index by roughly 0.5, 0.4, 1.9 and 1.5 points, respectively. The standalone reinsurance coefficient is small and statistically indistinguishable from zero, suggesting that reinsurers do not, on average, locate in countries that are intrinsically more or less resilient once fundamentals are held constant. Interaction estimates are positive but imprecise, so the data provide no evidence that the incremental resilience contributed by additional complexity differs between reinsurers and primary insurers. In short, organisational breadth enhances the proportion of losses likely to be insured, and it does so to a similar extent regardless of the group’s business focus.

Panel B shifts the focus to the protection gap. The reinsurance dummy is positive and highly significant, confirming that reinsurers tend to operate in markets where uninsured losses are larger—about 0.62 percentage points of GDP above the sample average. Crucially, the interaction term is large, negative and strongly significant for business complexity, distance complexity and the country-level jurisdictional index. For a primary group, a one-standard-deviation increase in business complexity narrows the protection gap by roughly 0.03 points of GDP; the corresponding reduction for a reinsurance group is about 0.30 points. Distance complexity produces a comparable contrast—approximately 0.04 versus 0.35 points—and the country-level jurisdictional measure shows a similarly pronounced incremental effect, whereas the regional version is weaker and imprecisely estimated. Reinsurers therefore enter high-gap countries but, once present, close those

gaps far more decisively when their corporate structures become broader.

Panel C delivers parallel evidence for risk exposure. Countries hosting reinsurance groups face gross loss potentials roughly 1.7 percentage points of GDP higher than those dominated by primary insurers, yet complexity equips reinsurers to shrink that exposure markedly. Increasing distance complexity by one standard deviation lowers expected losses by about 0.09 points of GDP in a primary group and by nearly 0.99 points in a reinsurance group; business and country-level jurisdictional complexity display similarly large incremental reductions, whereas the regional jurisdictional coefficient is negative but statistically imprecise.

Taken together, the results portray organisational complexity as a conditional asset. Complexity raises the resilience index by expanding the share of losses likely to be covered, yet its capacity to reduce the protection gap and dampen risk exposure is markedly greater when the group’s core activity is reinsurance. A plausible interpretation is that reinsurers exploit network advantages—global risk pools, long-term facultative relationships and internal retrocession mechanisms—that allow complex structures to mobilise capital swiftly and channel it to under-insured, high-risk jurisdictions (Cummins & Weiss, 2014; Swiss Re Institute, 2018). Complexity thus delivers steady gains in host-country resilience for all insurers, but becomes a powerful tool for closing coverage deficits and absorbing extreme losses once deployed within reinsurance-centred groups.

7 Protection Gap and Risk-Sharing

Internal-capital-market theory argues that once a group’s organisational chart becomes sufficiently complex, new affiliates yield diminishing diversification benefits because transfers within groups already recycle surpluses across business lines and jurisdictions (Stein, 1997). By contrast, institutional-arbitrage models predict that cross-border gaps in solvency rules and capital controls encourage insurers to incorporate subsidiaries in the most accommodating regimes, especially recognised offshore financial centres (Palan et al., 2010). This section tests how these opposing forces jointly shape three host-country outcomes—the resilience index, the protection gap, and risk exposure—by introducing regulatory diversity, offshore intensity, and the share of high-capital-control (HCC) jurisdictions into the two-stage least-squares framework.

We retain the 2000–2023 window and the merged Orbis and S&P Capital IQ dataset. After filtering for complete instruments and covariates, the estimation file comprises 2,818,012 firm–year observations or 64,754 group-years.

As before, endogeneity in every complexity index is addressed with the minimum distance to global insurance hubs. For group i in year t the second-stage equation is

$$\begin{aligned} \text{Outcome}_{i,t} = & \beta_0 + \beta_1 \widehat{\text{Complexity}}_{i,t} + \sum_{m=1}^M (\gamma_m Z_{i,t}^m + \delta_m \widehat{\text{Complexity}}_{i,t} Z_{i,t}^m) \\ & + \sum_{k=1}^K \beta_k \text{Controls}_{i,t}^k + \mu_i + \theta_t + \varepsilon_{i,t}, \end{aligned}$$

where $M = 3$ and $\mathbf{Z}_{i,t} = (Z_{i,t}^1, Z_{i,t}^2, Z_{i,t}^3)'$ stacks the three macro-institutional variables: diversity of capital regime, share of offshore subsidiaries, and share of high-capital-control (HCC) jurisdictions. The term $\widehat{\text{Complexity}}_{i,t}$ is the fitted value of business, distance, jurisdictional, or country-level jurisdictional complexity, each obtained from its own first-stage regression, and $\text{Outcome}_{i,t}$ includes protection gap measures, as we discussed previously; the resilience index, the protection gap, and risk exposure.

The control vector matches previous sections and includes cash flow, current ratio, number of employees, $\ln(\text{Assets})$, market share, financial-development index, short-term interest rate, ten-year bond yield, GDP deflator, GDP per capita, and real GDP growth. Group fixed effects μ_i absorb time-invariant heterogeneity; year effects θ_t capture common shocks; and standard errors are Driscoll–Kraay robust to heteroskedasticity, serial correlation, and cross-sectional dependence.

Panels A–C of Table 7 test how three macro-institutional factors—capital-regime diversity, offshore intensity, and exposure to high-capital-control (HCC) jurisdictions—affect the protection gap, and whether a group’s organisational complexity amplifies or offsets those effects. Panel A confirms that complexity still strengthens loss-absorbing capacity. A one-standard-deviation increase in business complexity raises the resilience index by about 0.35 points; the corresponding gains for distance and regional-level jurisdictional complexity are roughly 0.25 and 0.57 points, while the country-level measure is negligible. Diversity of capital regime is strongly negative: depending on the column it subtracts between 1.5 and 4.5 points per standard deviation, and offshore booking knocks roughly 0.3 points off the index in the models where its coefficient is negative and significant. Yet interaction terms show that a broad organisational chart more than compensates for those drags. Combining a one-standard-deviation rise in regional-level jurisdictional complexity with a one-standard-deviation rise in diversity adds about 3.6 extra index points; taken together with the direct effects, the net change is a gain of roughly 0.45 points instead of a loss of 3.1 points. A similar calculation with offshore booking turns a potential loss of 1.0 point into a net rise of nearly one point. HCC-heavy portfolios add about three index points per standard deviation, and complexity amplifies that benefit,

lifting resilience by as much as five additional points in the two jurisdictional models.

Panel B shows that complexity continues to compress the protection gap. Per standard deviation, the reductions amount to about 0.03 percentage points of GDP for business complexity, 0.02 for distance complexity, 0.14 for regional-level jurisdictional complexity and 0.05 for the country-level index. Regulatory fragmentation moves in the opposite direction. A one-standard-deviation rise in diversity widens the gap by roughly 0.29 percentage points of GDP—about 170 million US dollars for a country with the sample-average GDP of 58 billion—while an equally sized rise in offshore share adds around 0.21 points, or 120 million dollars. Raising the HCC share by one standard deviation narrows the gap by nearly 0.47 points, a reduction of about 270 million dollars. Interaction terms reveal that organisational breadth largely offsets the extra gap opened by diversity and offshore activity. For example, when diversity is one standard deviation above its mean, the marginal impact of regional-level jurisdictional complexity strengthens from -0.14 to -0.49 percentage points of GDP; the associated saving rises from about 80 million to 285 million dollars. A similar calculation with offshore booking deepens the complexity-related improvement to roughly 0.21 percentage points, or 120 million dollars. Interactions with the HCC share are small for business and distance complexity but turn strongly negative for the two jurisdictional measures, further magnifying the gap-narrowing role of HCC-heavy portfolios.

Panel C presents the same exercise for risk exposure. A one-standard-deviation increase in business and distance complexity lowers expected losses by about 0.07 percentage points of GDP, while regional- and country-level jurisdictional complexity cut losses by roughly 0.49 and 0.29 points, respectively. Diversity of capital regime raises exposure by about 0.64 points per standard deviation—nearly 370 million dollars—and offshore booking lifts it by 0.53 points, around 310 million dollars. Interaction effects are again strongly negative. When diversity is one standard deviation above its mean, the saving delivered by a one-standard-deviation rise in regional-level jurisdictional complexity doubles from 0.49 to roughly 1.05 percentage points of GDP, worth about 610 million dollars. With offshore booking at the same distance from its mean, the saving triples: the marginal effect of regional-level jurisdictional complexity moves from -0.49 to about -2.66 percentage points, a reduction of roughly 1.26 billion dollars. A higher HCC share on its own lowers exposure by about 1.09 points, or 630 million dollars, and the associated complexity interactions are small and statistically weak, leaving that benefit intact.

Taken together, the results reconcile the two theoretical perspectives. Internal-capital-market mechanisms provide direct diversification gains, whereas institutional-arbitrage incentives introduce vulnerabilities through fragmented capital rules and offshore booking. Expanding the organisational footprint offsets those vulnerabilities: complexity

transforms regulatory diversity and offshore intensity from sources of uninsured losses and heightened exposure into environments where coverage is restored and expected losses fall, yielding host-country savings that range from hundreds of millions to well over a billion US dollars per year.

8 Conclusion

This investigation set out to determine whether the organisational complexity of multinational insurance groups meaningfully mitigates the global protection gap. Drawing on a newly assembled panel that links more than two million subsidiary-year observations covering 3,174 groups in 121 headquarters jurisdictions (2000–2023) to Swiss Re’s annual measures of catastrophe, mortality, health and crop under-insurance, the study constructed four complementary indicators of complexity: diversification across business lines, spatial dispersion, regional fragmentation and country-level fragmentation. A distance-based instrument—each group’s minimum great-circle distance to the world’s fifteen most enduring insurance hubs—addresses endogeneity by exploiting historically rooted location choices that shape corporate structure but are orthogonal to short-run underwriting shocks.

Three principal findings emerge. First, complexity enhances risk-bearing capacity. After instrumenting, a one-standard-deviation increase in regional-level jurisdictional complexity raises the host-country resilience index by nearly two percentage points and lowers uninsured losses by 0.3 per cent of GDP, an effect that corresponds to roughly USD 170 million of additional protection in the sample-median economy. Second, the benefits are concentrated in the reinsurance segment. When a group’s core activity is reinsurance, the same increment in complexity narrows the protection gap by close to USD 500 million—an order of magnitude larger than the average effect for primary insurers, indicating that global internal capital markets and facultative networks allow complex reinsurers to deploy capacity more effectively in high-risk jurisdictions. Third, regulatory fragmentation and offshore booking widen coverage shortfalls: each factor increases the gap by about USD 150 million for every standard-deviation rise. Nonetheless, the adverse impact is more than offset when groups possess broad, multi-jurisdictional structures, demonstrating that complexity can convert potential vulnerabilities into channels for additional risk sharing.

These results carry several policy implications. Harmonised solvency standards, mutual recognition of capital requirements, and coordinated tax rules would preserve the diversification gains that complexity affords while constraining pure regulatory arbitrage.

Transparent group-wide supervision, including mandatory disclosure of intra-group reinsurance and collateral flows, is essential to ensure that organisational breadth reflects genuine risk transfer rather than opacity. Strengthened supervisory colleges and data-driven monitoring of internal capital movements would further align private incentives with societal objectives, enabling complex insurers to mobilise resources swiftly where protection gaps are widest.

Limitations of the present analysis point to avenues for future research. First, subsidiary location decisions evolve only gradually; identification could be sharpened by exploiting discrete policy shocks such as abrupt solvency-rule reforms or post-disaster regulatory relaxations. Second, the premium-equivalent measures employed here omit other welfare-relevant dimensions—claim-settlement speed, policyholder liquidity, and macroeconomic recovery pathways—that warrant empirical scrutiny. Third, greater access to granular data on cross-border collateral and retrocession would permit finer distinctions between productive diversification and balance-sheet window-dressing. Finally, emerging organisational forms—insurer–insurtech partnerships, collateralised reinsurance platforms, and parametric risk pools—should be examined to assess whether they magnify or attenuate the complexities documented.

Taken together, the evidence demonstrates that organisational complexity, when embedded in sound governance and transparent regulation, is not a liability but a potent mechanism for pooling extreme risks across borders and market segments. By mobilising capital more efficiently and distributing losses more broadly, complex insurance groups—particularly those centred on reinsurance—deliver tangible reductions in underinsurance and strengthen economic resilience in an era of escalating climatic and demographic pressures.

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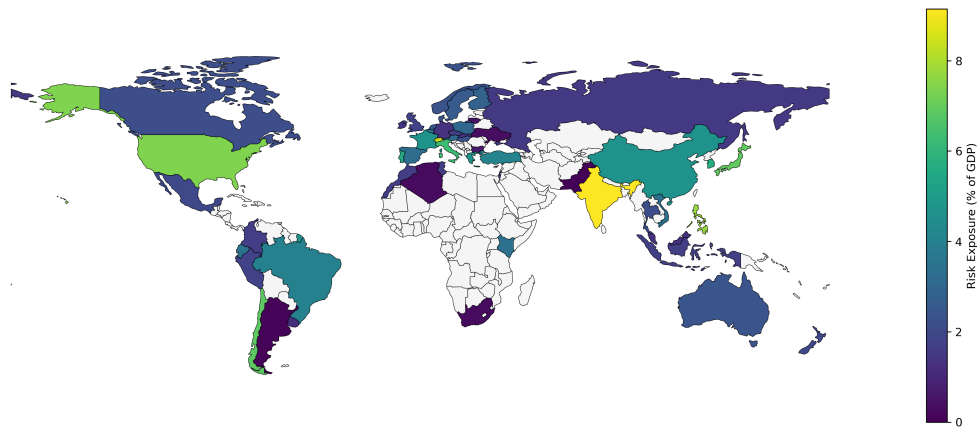


Figure 3: Average Risk Exposure (% of GDP) by Country (2000-2023)

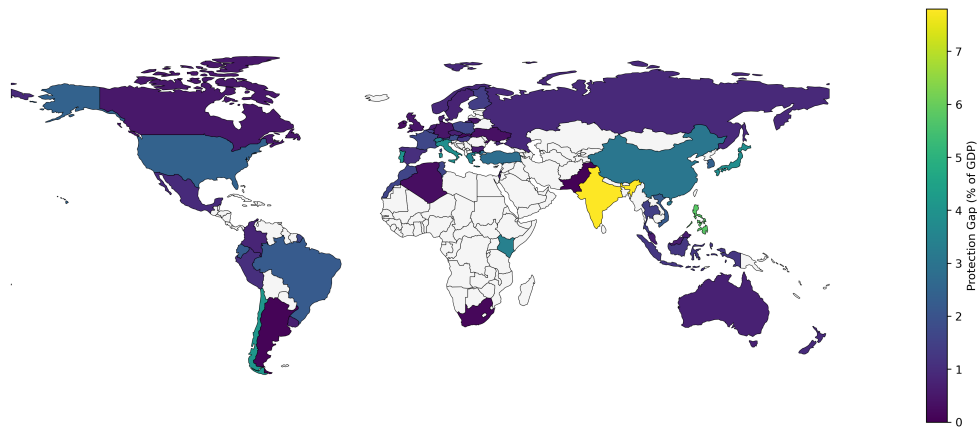


Figure 4: Average Protection Gap (% of GDP) by Country (2000-2023)

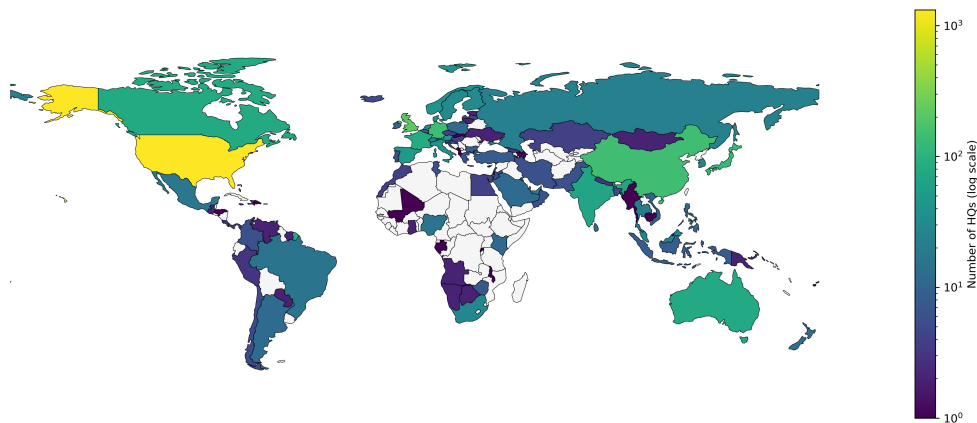


Figure 5: *Global distribution of insurance groups' headquarters per country.*

This figure shows the distribution of insurance group headquarters across different countries, measured from 2000 to 2023. The map is presented on a log scale to reflect varying intensities of headquarters concentration. Data derived from ORBIS and S&P Capital IQ Market Intelligence.

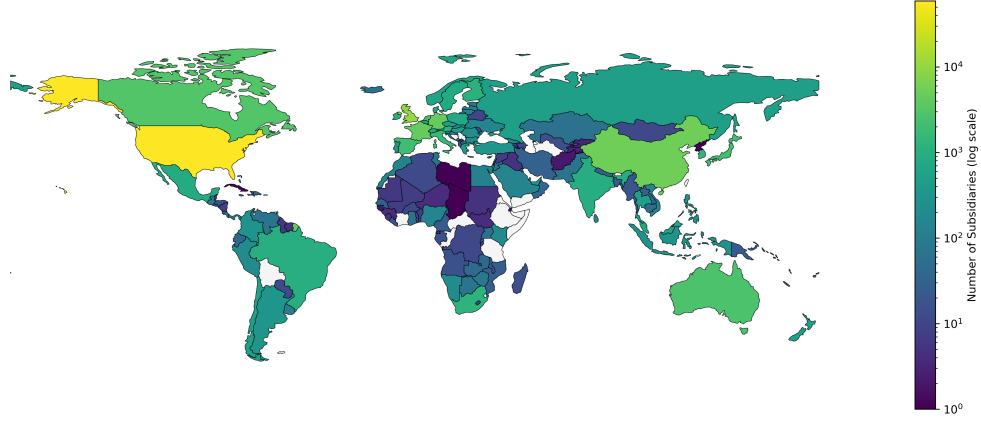


Figure 6: *Global distribution of insurance groups' subsidiaries per country.*

This figure shows the concentration of subsidiaries globally for the sampled insurance groups, based on data from 2000 to 2023. A log scale is used to highlight differences in subsidiary counts across countries. Data derived from ORBIS and S&P Capital IQ Market Intelligence.

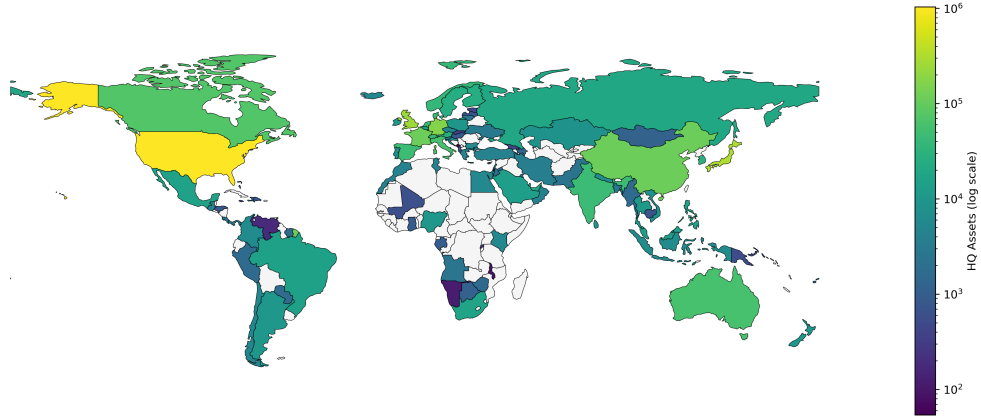


Figure 7: *Global distribution of total assets of insurance groups by their headquarters' location.*

This figure shows the total assets (in millions of USD) held by insurance groups headquartered in different countries, covering the period 2000 to 2023. A log scale is used to illustrate variations in asset size across regions. Data derived from ORBIS and S&P Capital IQ Market Intelligence.

	Average	Standard Deviation	Minimum	Maximum
Levels	3.46	1.92	2.00	19.00
No. of subsidiaries	47.18	148.08	1.00	2,456.00
No. of subsidiaries outside home country	14.26	69.09	0.00	1,454.00
No. of subsidiaries in non-insurance business	21.06	72.91	0.00	1,514.00

Table 1: *Summary Statistics on Group Tree Structure.*

This table provides summary statistics on the structure of insurance groups from 2000 to 2023. The table focuses on the analysis of mean, standard deviation, minimum, and maximum for levels, number of subsidiaries, number of subsidiaries outside of the home country, and number of subsidiaries in the non-insurance business.

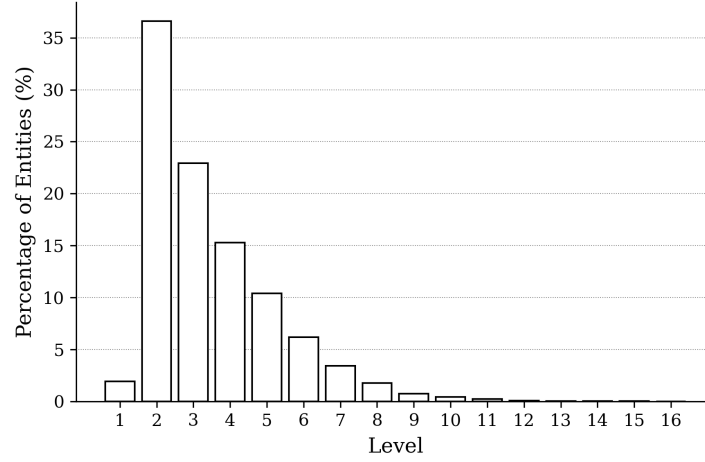


Figure 8: *Distribution of Majority Subsidiaries/Investments Across Levels.*

This figure presents the distribution of density for the levels within insurance groups from 2000 to 2023. Additionally, this figure helps to explore the hierarchical organization of subsidiaries within insurance groups and provides information about the prevalence of different levels across the sampled insurance entities.

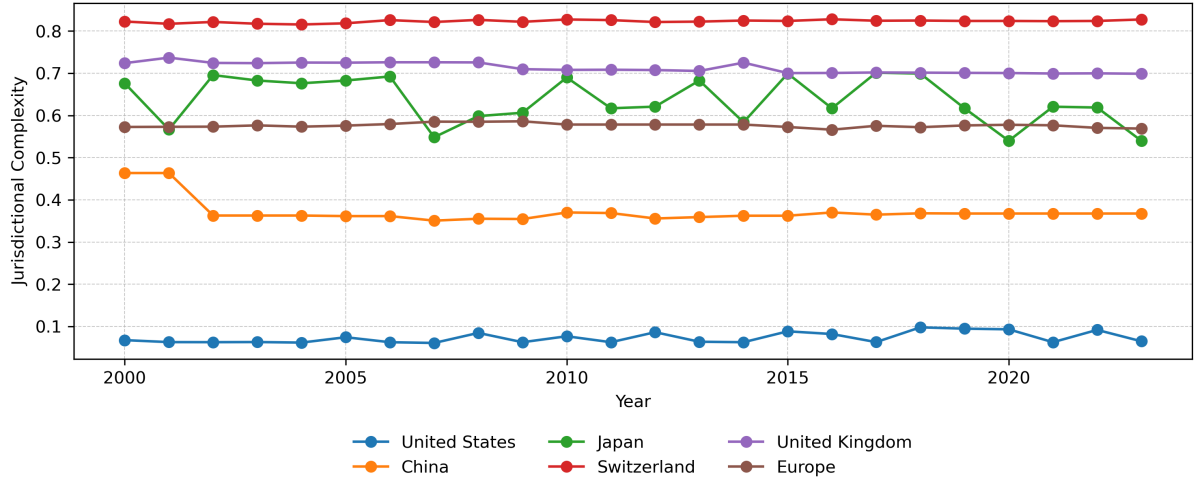


Figure 9: *Annual jurisdictional complexity by headquarters region.*

This figure shows the average annual jurisdictional complexity from 2000 to 2023. Jurisdictional complexity measures how subsidiaries of an insurance group are distributed across a set of predefined global regions, with higher values indicating a broader geographic spread. Data are drawn from Orbis and S&P Capital IQ Market Intelligence, and the index ranges from 0 to 1.

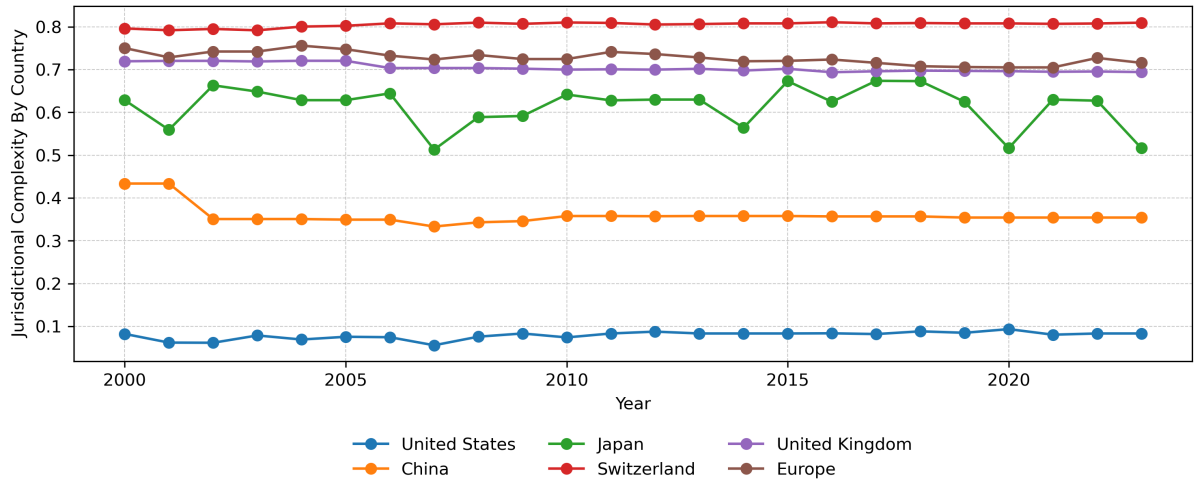


Figure 10: *Annual jurisdictional complexity (by country) by headquarters region.*

This figure shows the average annual jurisdictional complexity from 2000 to 2023. Jurisdictional complexity measures how subsidiaries of an insurance group are distributed across countries, with higher values indicating a broader geographic spread. Data are drawn from Orbis and S&P Capital IQ Market Intelligence, and the index ranges from 0 to 1.

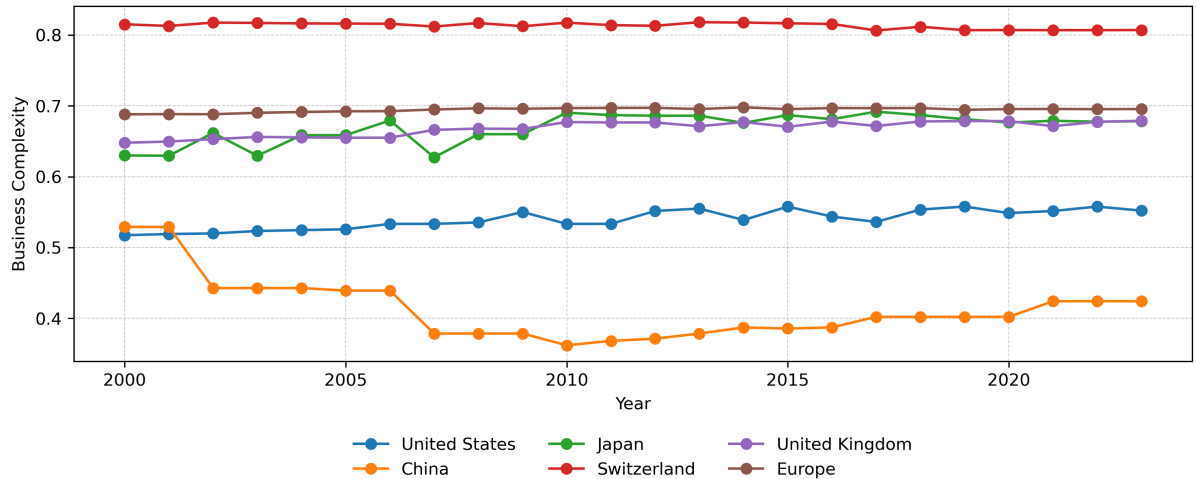


Figure 11: *Annual business complexity by headquarters region.*

This figure shows the average annual business complexity from 2000 to 2023. Business complexity indicates how a group's subsidiaries are spread among major lines of activity (e.g., life, nonlife, reinsurance, banking, etc.), with higher values reflecting greater diversification. Data are taken from Orbis and S&P Capital IQ Market Intelligence, and the index is scaled from 0 to 1.

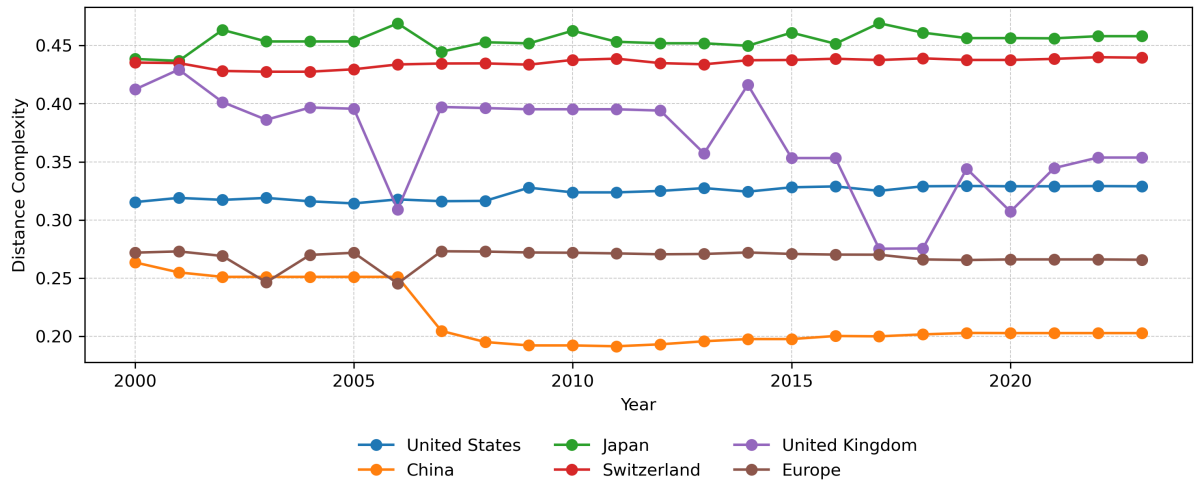


Figure 12: *Annual distance complexity by headquarters region.*

This figure shows the average annual distance complexity from 2000 to 2023. Distance complexity measures the physical dispersion of an insurance group’s subsidiaries (based on their geographical coordinates), normalized from 0 to 1 to facilitate comparisons. Data come from Orbis and S&P Capital IQ Market Intelligence.

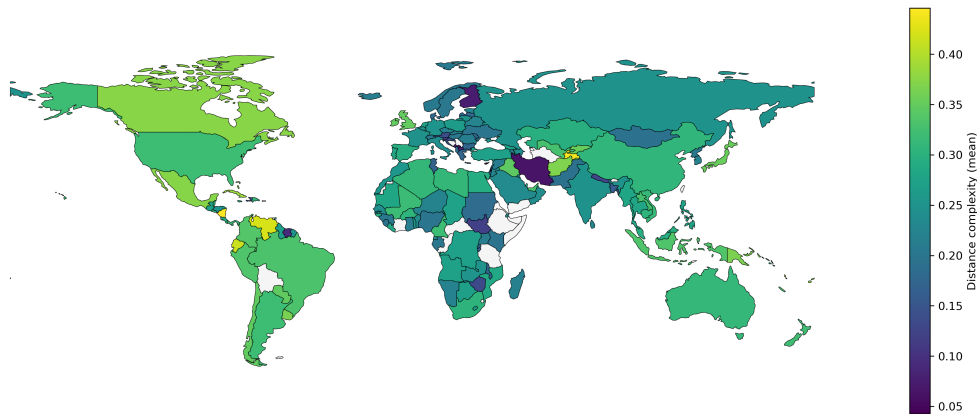


Figure 13: *Global distribution of distance complexity*

This figure displays the average distance complexity (on a 0–1 scale) for insurers, covering the 2000–2023 period. Higher values suggest that insurers in a particular country tend to maintain subsidiaries across more diverse and geographically distant locations. Each insurer’s annual scores are aggregated to obtain a country-level mean over the entire sample. Data are drawn from Orbis and S&P Capital IQ Market Intelligence.

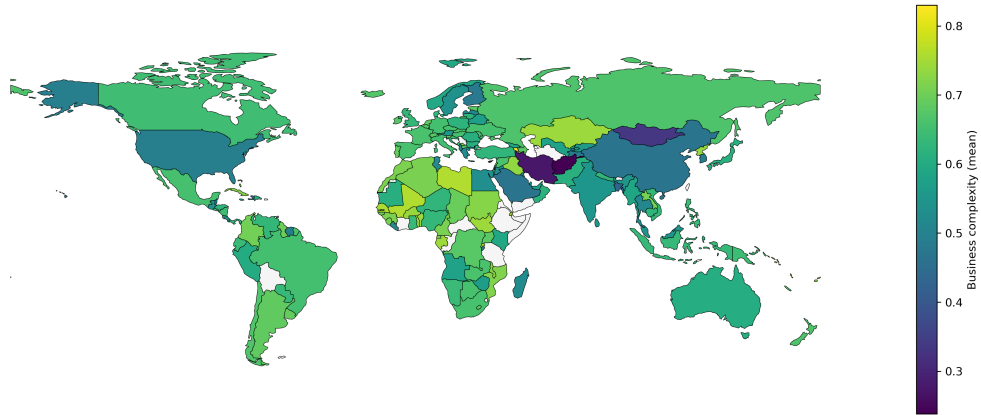


Figure 14: *Global distribution of business complexity*

This figure shows the average business complexity (on a 0–1 scale) of insurers between 2000 and 2023. Business complexity measures how broadly groups diversify across different lines of insurance and related operations. For each insurer, an annual complexity score is computed and then averaged across all available years to yield a country-level mean. Source: Orbis and S&P Capital IQ Market Intelligence.

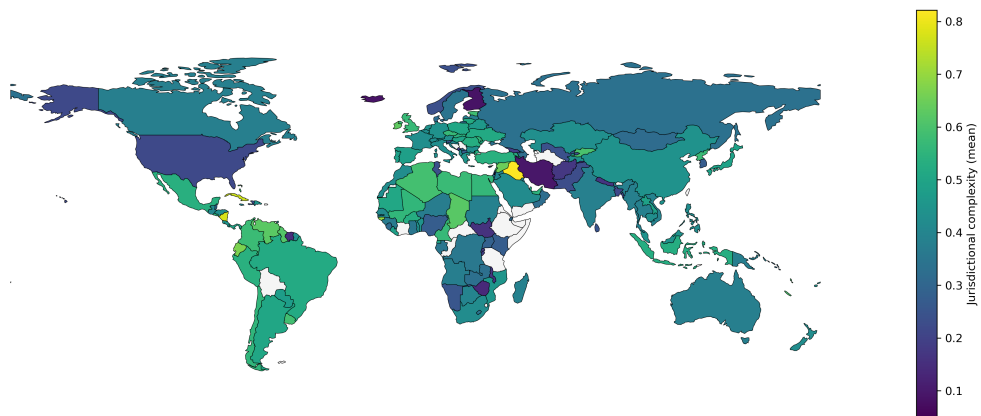


Figure 15: *Global distribution of jurisdictional complexity*

This figure depicts the average jurisdictional complexity (on a 0–1 scale) of insurers, spanning the 2000–2023 timeframe. Jurisdictional complexity reflects the number of regulatory regimes in which a group operates. Each insurer’s annual scores are aggregated to produce a country-level mean over the sample period. Data are obtained from Orbis and S&P Capital IQ Market Intelligence.

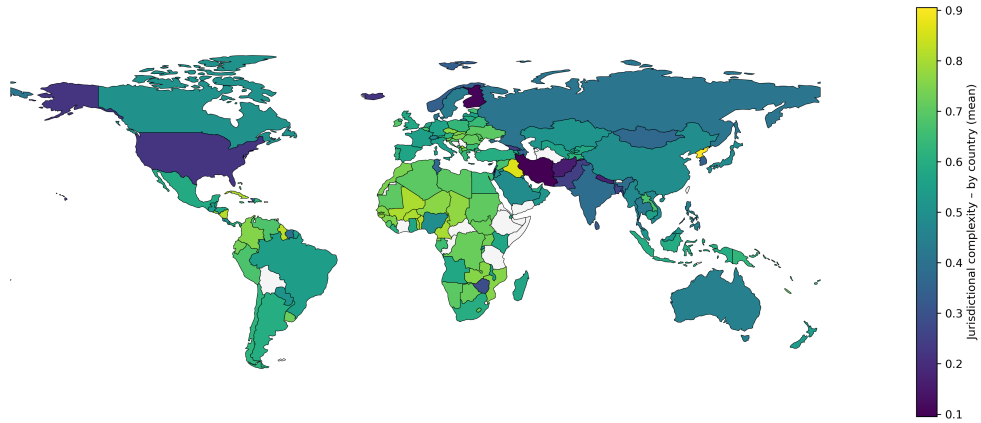


Figure 16: *Global distribution of jurisdictional complexity by country*

This figure depicts the average jurisdictional complexity by country (on a 0–1 scale) of insurers, spanning the 2000–2023 timeframe. Jurisdictional complexity reflects the number of countries in which a group operates. Each insurer’s annual scores are aggregated to produce a country-level mean over the sample period. Data are obtained from Orbis and S&P Capital IQ Market Intelligence.

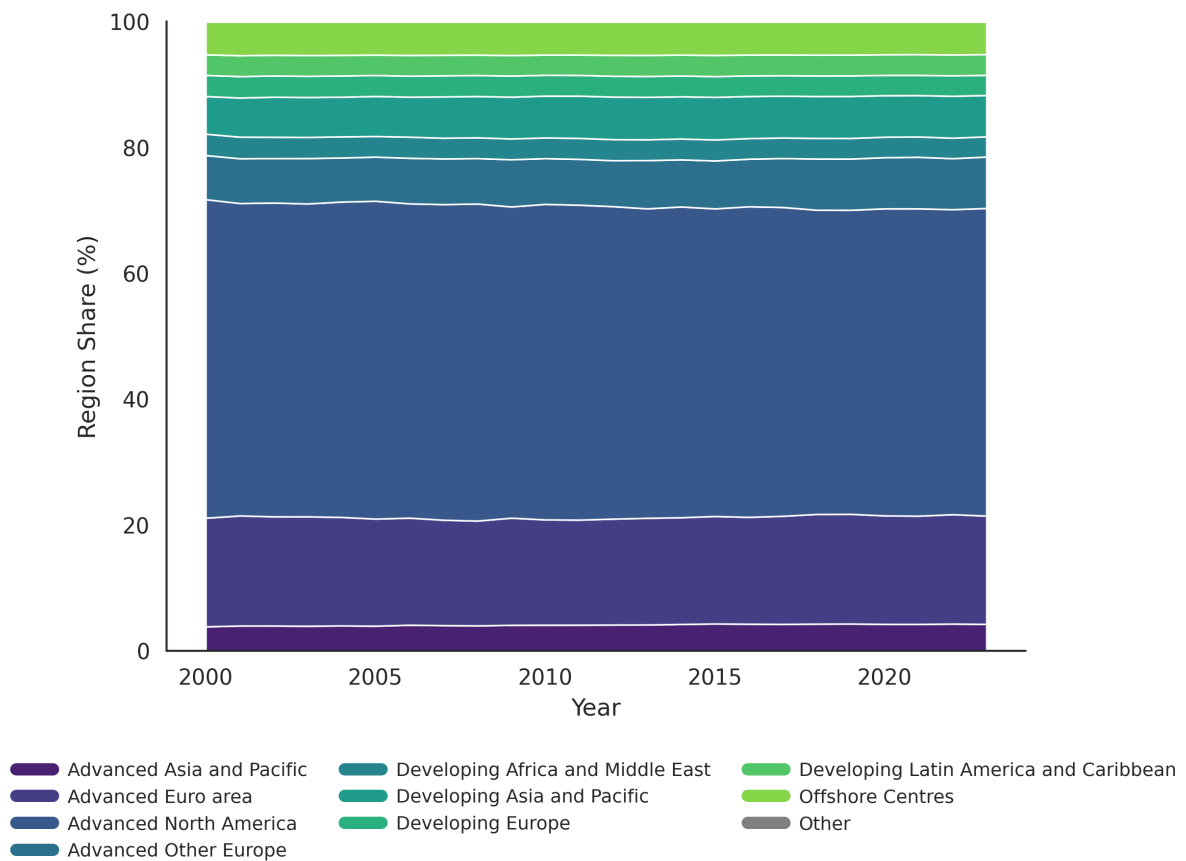


Figure 17: *Shares of ultimate ownership by geographical region.*

This figure displays how global ultimate ownership is distributed across various geographical regions, shown as stacked areas over the 2000–2023 period. Each segment reflects the relative share of insurers’ headquarters located in a particular region. The data reveal long-term trends in cross-border expansions and shifting centers of financial activity. Source: Orbis and S&P Capital IQ Market Intelligence.

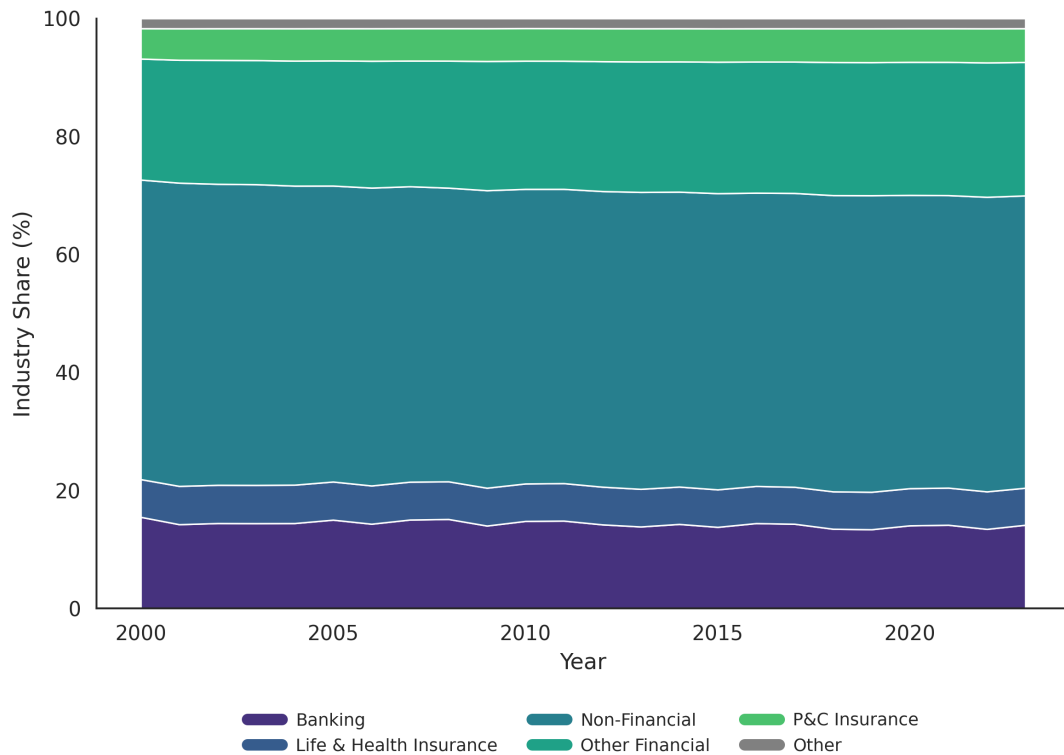


Figure 18: *Shares of ultimate ownership by industry category.*

This figure shows the evolving breakdown of global ultimate ownership by major industry categories over the 1980–2024 period. The stacked format highlights how different sectors—such as non-financial, banking, and insurance—contribute to the overall ownership landscape. The data provide insight into industry-level shifts and the role of financial institutions in corporate structures. Source: Orbis and S&P Capital IQ Market Intelligence.

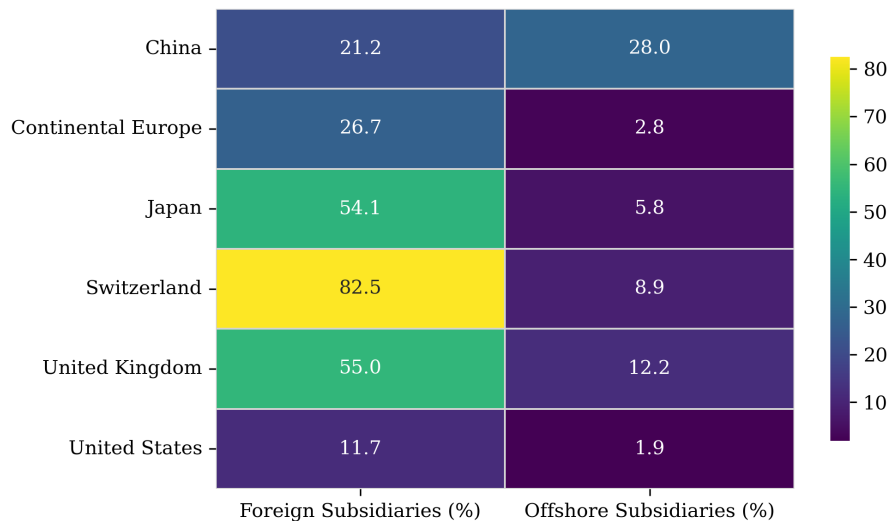


Figure 19: *Foreign and Offshore Subsidiaries Distribution*

This figure displays the percentage of foreign and offshore subsidiaries by headquarters region (China, Continental Europe, Japan, Switzerland, United Kingdom, and United States). The data are drawn from ORBIS and S&P Capital Market Intelligence for the period 2000–2023, capturing majority-owned subsidiaries of insurance groups. The y-axis shows HQ regions, while the x-axis indicates the distribution of foreign and offshore subsidiaries for groups headquartered in the corresponding regions. Values are in percentages, and shading intensities reflect relative magnitude.

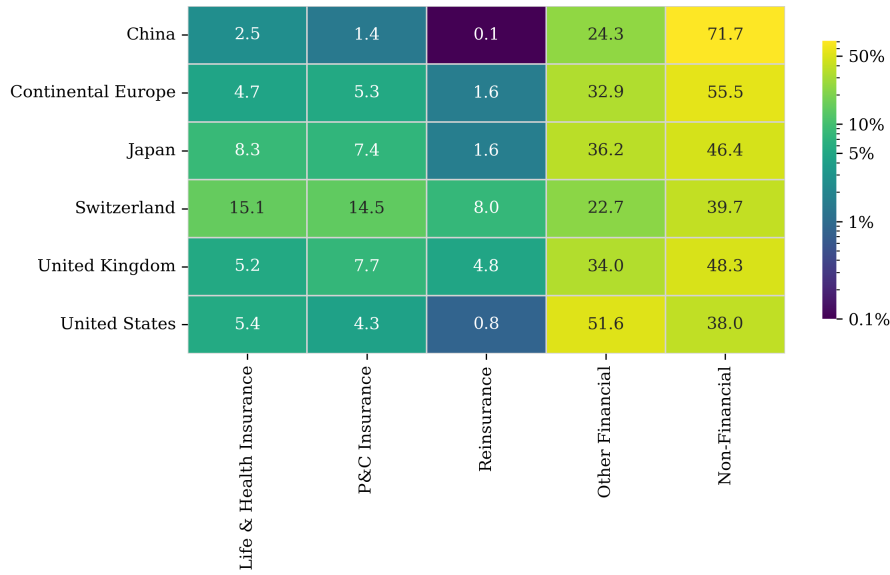


Figure 20: *Distribution of Subsidiaries by Business Category.*

This figure presents the percentage share of subsidiaries across five main business categories: Life & Health Insurance, P&C Insurance, Reinsurance, Other Financial (including Banking), and Non-Financial. A logarithmic color scale is applied to highlight smaller values with clearer shading. Data are from ORBIS and S&P Capital Market Intelligence spanning 2000–2023. Observations reflect majority-owned entities within insurance groups headquartered in the six focal regions.

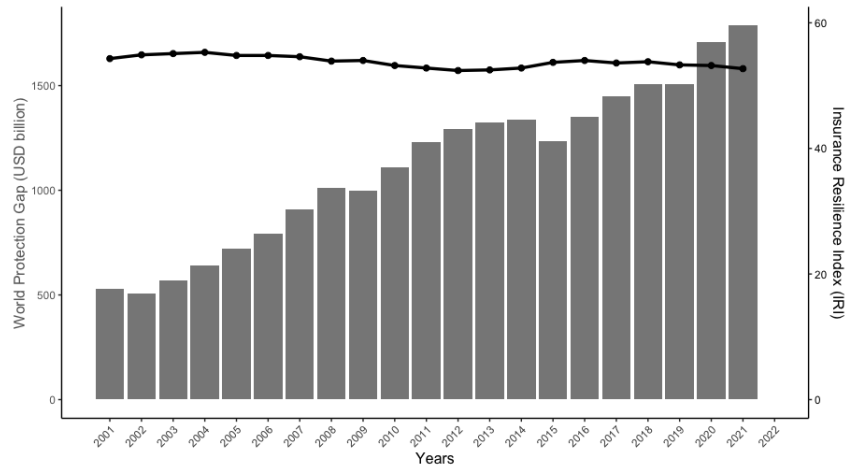


Figure 21: *World Protection Gap and Resilience Index Change Over Time.*

This figure depicts the world protection gap and resilience index change from 2001 until 2022. The bars correspond to the protection gap, whereas the lines correspond to the resilience index. The source for the figure is Swiss Re Institute (2023).

Variable	Count	Mean	Std. Dev.	Min	Median	Max
Organizational Complexity Measures & Instrumental Variable						
Distance complexity	2 755 565	0.3007	0.1438	0.0000	0.3040	1.0000
Business complexity	2 755 565	0.5567	0.2326	0.0000	0.6277	0.9408
Jurisdictional complexity	2 818 012	0.3413	0.3104	0.0000	0.2761	0.9712
Jurisdictional complexity (country)	2 818 012	0.3909	0.3313	0.0000	0.3601	0.9802
Minimum distance to insurance hub (km)	2 818 012	764.03	1 864.22	0.0013	11.50	11 703.30
Protection Gap Measures						
Resilience index	2,615,695	62.759	13.074	0.135	67.312	85.230
Protection gap (% of GDP)	2,615,695	1.980	1.229	0.057	2.413	7.798
Risk exposure (% of GDP)	2,615,695	5.313	2.617	0.060	7.381	9.145
Financial Variables						
Total assets (USD m)	2 818 012	1 279.12	7 091.40	0.01	914.10	1 696 450.39
Number of employees	2 818 012	290.05	213.41	0	272.36	2 415
Return on assets (ROA)	2 818 012	0.0286	0.0121	-0.0860	0.0272	0.1467
Return on equity (ROE)	2 818 012	0.1002	0.0436	-0.3854	0.0956	0.6487
Tobin's Q	2 818 012	0.4246	0.1523	0.0480	0.4247	1.5001
Cash flow (USD m)	2 818 012	30.90	68.81	-277.00	33.03	571.65
Current ratio	2 818 012	5.6171	2.8538	0.0000	5.9660	27.6815
Offshore and Capital-Control Measures						
Number of offshore subsidiaries	2 818 012	17.094	33.095	0.000	3.000	238.000
Diversity of capital regime	2 817 968	0.212	0.181	0.000	0.218	0.707
Share of offshore subsidiaries	2 818 012	0.053	0.112	0.000	0.018	1.000
Share of reinsurance	2 818 012	0.017	0.058	0.000	0.000	1.000
Share of high capital control	2 818 012	0.277	0.351	0.000	0.083	1.000
Macro Variables						
Financial development index	2 818 012	0.7915	0.1839	0.0000	0.8900	0.9200
Short-term interest rate (%)	2 818 012	0.0215	0.0221	-0.0026	0.0139	0.0742
Bond yield (%)	2 818 012	3.4357	1.8916	0.4600	3.2100	7.8400
GDP deflator	2 818 012	92.76	15.35	65.38	91.99	123.24
GDP per capita (USD)	2 818 012	43 730.48	20 121.35	4 083.53	46 162.48	81 923.04
Real GDP growth (%)	2 818 012	2.3869	2.2484	-2.5800	2.5100	6.9200

Table 2: Summary Statistics

Notes: The table pools approximately 2.8 million firm-year observations spanning 2000–2023 and 208 jurisdictions. Firm-level balance-sheet and income-statement items (e.g. total assets, ROA, ROE, Tobin's Q , cash flow, current ratio, number of employees) are taken from *Bureau van Dijk Orbis* and S&P Capital IQ Pro Market Intelligence. Macro-financial controls combine S&P Capital IQ Pro Market Intelligence (money-market rates, bond yields, GDP deflator, GDP per capita, real GDP growth) and the IMF Financial Development Index Database (financial-development index). The protection gap measures are sourced from Swiss Re. All interest-rate and growth figures are expressed in percentage points; index variables such as the GDP deflator (2015 = 100) and the financial-development index (0–1) are unit-free.

Supervisory regime	Rank	Definition
No requirements	1	No framework
Minimum capital	2	The supervisor requires minimum capital to establish and operate an insurance company
Size-based Formula, no risk weight	3	The supervisor uses a formula aggregating assets and liabilities to establish capital requirements, but there are no risk weights
Risk-based capital	4	The supervisor uses a risk-based assessment of capital needs
Economic capital US	5	US and Canada style - The capital requirement is based on a comprehensive risk-based assessment of the balance sheet and includes stress-test-based capital requirements
Economic capital SII	6	Solvency II style - The capital requirement is based on a comprehensive risk-based assessment of the balance sheet and includes stress-test-based capital requirements

Table 3: Supervisory Regimes Classifications.

The table provides classifications of supervisory regimes based on a simple index constructed for the complete sample of 208 countries. The index is created using characteristics of regulatory regimes reported by national supervisors, the International Association of Insurance Supervisors, and the International Monetary Fund assessments. The ranking is based on specific criteria, as outlined in Table 1. The supervisory regimes are categorized into six ranks, ranging from "No requirements" (Rank 1) to "Economic capital SII" (Rank 6) based on the level of regulatory requirements and risk-based assessment of capital needs. These classifications offer insights into the significant variations in insurance regulatory frameworks across different countries and regions.

	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity (By Country)
Min. group distance to hub (1000 km)	-0.00517*** (-6.05)	-0.00649*** (-8.08)	-0.00509*** (-3.41)	-0.00676*** (-4.65)
ln(Assets)	2.62×10^{-7} ** (2.32)	7.51×10^{-8} * (1.68)	-8.58×10^{-8} ** (-2.04)	-6.01×10^{-8} (-1.63)
Market share (%)	0.0746 (1.49)	0.0600** (2.40)	1.1547*** (4.51)	1.1690*** (4.57)
Cash flow	0.0003*** (5.62)	0.0002*** (7.18)	-7.07×10^{-5} (-1.19)	3.58×10^{-5} (0.58)
Current ratio	0.0039*** (6.57)	-0.0002 (-1.26)	0.0010** (2.45)	0.0007* (1.68)
Number of employees	-5.26×10^{-6} ** (-2.29)	2.30×10^{-6} (1.22)	7.79×10^{-6} ** (3.81)	2.76×10^{-6} (1.37)
Financial-development index	-0.0607*** (-4.16)	-0.0495*** (-5.85)	0.0147 (0.98)	-0.0107 (-0.73)
Short-term interest rate (%)	-0.1030*** (-3.49)	0.1006*** (3.79)	-0.0746* (-1.77)	-0.0186 (-0.47)
Bond yield (%)	0.0009** (2.11)	-0.0012*** (-3.50)	0.0007 (1.18)	1.91×10^{-5} (0.03)
GDP deflator (index)	4.02×10^{-5} (1.12)	-2.03×10^{-5} (-0.74)	-7.95×10^{-5} (-0.97)	-6.56×10^{-5} (-0.75)
Real-GDP growth	-0.0007*** (-5.21)	-0.0002 (-1.40)	0.0002 (1.61)	-5.45×10^{-5} (-0.49)
Intercept	0.5740*** (55.52)	0.3406*** (47.94)	0.2994*** (18.72)	0.3706*** (23.40)
Observations Groups	68 604	68 604	68 604	68 604
Observations Entities	2 755 565	2 755 565	2 818 012	2 818 012
R^2	0.0884	0.1096	0.0217	0.0213
Partial F (instrument) [†]	36.60	65.29	11.63	21.62
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 4: First-stage regressions for complexity measures

OLS regressions instrumenting each complexity measure with the minimum group distance to a major global insurance hub. Controls include firm characteristics (ln(Assets), cash flow, current ratio, number of employees) and macro-financial variables (financial-development index, short-term interest rate, bond yield, GDP deflator, real GDP growth). Entity and time fixed effects are included. Standard errors are clustered at insurance group and year level; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Panel A: Resilience Index				
Complexity	1.9386** (2.341)	2.6817*** (2.930)	5.7884*** (4.182)	4.3678*** (4.195)
R^2	0.0236	0.0238	0.0244	0.0244
Panel B: Protection Gap (% GDP)				
Complexity	-0.2031 (-1.606)	-0.4104*** (-2.983)	-1.0052*** (-4.939)	-0.7591*** (-4.950)
R^2	0.0016	0.0022	0.0036	0.0036
Panel C: Risk Exposure (% GDP)				
Complexity	-0.5523* (-1.780)	-1.0915*** (-3.272)	-2.5502*** (-5.213)	-1.9244*** (-5.218)
R^2	0.0115	0.0126	0.0147	0.0147
Observations Groups	64 748	64 748	64 798	64 798
Observations Entities	2 755 565	2 755 565	2 818 012	2 818 012
Controls	Yes	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 5: Second-stage regressions for the Resilience Index, Protection Gap, and Risk Exposure

Notes: 2SLS regressions with Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Panel A: Resilience Index				
Complexity	2.0889** (2.444)	2.8440*** (3.140)	6.1401*** (4.632)	4.6546*** (4.662)
Reinsurance	0.0817 (0.063)	-0.2588 (-0.269)	-0.0006 (-0.002)	0.1093 (0.391)
Complexity $\times$ Reinsurance	-0.4917 (-0.196)	0.1923 (0.053)	-0.6484 (-0.933)	-0.8541 (-1.125)
R^2	0.0240	0.0243	0.0250	0.0250
Panel B: Protection Gap (% GDP)				
Complexity	-0.1263 (-1.267)	-0.2667*** (-2.860)	-0.9471*** (-5.216)	-0.7071*** (-5.253)
Reinsurance	0.6178*** (2.854)	0.6178*** (3.876)	-0.0324 (-0.556)	0.0296 (0.555)
Complexity $\times$ Reinsurance	-1.1700*** (-2.802)	-2.1926*** (-3.725)	-0.0157 (-0.117)	-0.1781 (-1.507)
R^2	0.0045	0.0072	0.0047	0.0048
Panel C: Risk Exposure (% GDP)				
Complexity	-0.3105 (-1.316)	-0.6545*** (-2.891)	-2.3142*** (-5.293)	-1.7162*** (-5.300)
Reinsurance	1.7397*** (3.715)	1.7191*** (5.270)	0.0100 (0.078)	0.2042* (1.662)
Complexity $\times$ Reinsurance	-3.3566*** (-3.713)	-6.2232*** (-5.172)	-0.4647* (-1.646)	-0.9179*** (-3.523)
R^2	0.0191	0.0240	0.0186	0.0191
Observations Groups	64 748	64 748	64 798	64 798
Observations Entities	2 755 565	2 755 565	2 818 012	2 818 012
Controls	Yes	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 6: Second-stage regressions for the Resilience Index, Protection Gap and Risk Exposure — Reinsurance Analysis

Notes: 2SLS regressions with Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Panel A: Resilience Index				
Complexity	1.5232*** (3.576)	1.7221*** (3.234)	1.8411* (1.848)	-0.0341 (-0.058)
Diversity of capital regime	-14.058*** (-13.801)	-8.066*** (-7.789)	-20.520*** (-6.526)	-25.046*** (-7.596)
Share offshore (%)	1.006 (0.497)	-2.955* (-1.819)	-11.449* (-1.938)	-6.340 (-1.067)
Share HCC (%)	8.763*** (10.749)	8.421*** (13.608)	-4.359*** (-3.694)	-3.556*** (-3.265)
Complexity× Diversity	24.218*** (15.306)	24.454*** (8.693)	64.222*** (6.825)	67.276*** (7.967)
Complexity× Offshore share	1.826 (0.514)	18.309*** (2.844)	46.931** (2.365)	27.094 (1.551)
Complexity× HCC share	2.533* (1.818)	6.410*** (3.323)	45.451*** (15.893)	37.692*** (15.424)
R^2	0.1444	0.1453	0.1729	0.1749
Panel B: Protection Gap (% GDP)				
Complexity	-0.1109 (-1.319)	-0.1560** (-2.144)	-0.4419*** (-3.247)	-0.1610* (-1.852)
Diversity of capital regime	1.5929*** (8.071)	1.2348*** (5.555)	1.9292*** (5.726)	2.1999*** (6.736)
Share offshore (%)	1.9047*** (4.842)	2.4709*** (6.324)	7.2037*** (11.701)	7.6503*** (14.947)
Share HCC (%)	-1.3434*** (-20.770)	-1.3682*** (-29.372)	-0.5107*** (-2.979)	-0.7843*** (-5.596)
Complexity× Diversity	-2.9590*** (-9.777)	-4.2488*** (-7.478)	-6.3232*** (-6.560)	-6.1595*** (-7.681)
Complexity× Offshore share	-4.4351*** (-6.819)	-10.701*** (-7.282)	-25.419*** (-13.278)	-23.548*** (-17.061)
Complexity× HCC share	0.1397 (0.887)	0.2516 (0.980)	-2.3940*** (-5.358)	-1.3882*** (-4.108)
R^2	0.1418	0.1602	0.1912	0.2047

Table 7: Second-stage regressions for Resilience Index and Protection Gap — Risk-Sharing Analysis

	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Panel C: Risk Exposure (% GDP)				
Complexity	-0.3196* (-1.691)	-0.4921*** (-3.040)	-1.5654*** (-5.013)	-0.8689*** (-4.156)
Diversity of capital regime	3.5351*** (7.532)	2.9879*** (5.607)	3.0917*** (3.815)	3.6232*** (4.581)
Share offshore (%)	4.7340*** (3.990)	6.0761*** (6.185)	18.451*** (11.042)	19.653*** (13.961)
Share HCC (%)	-3.1121*** (-18.091)	-3.2646*** (-27.736)	-2.9140*** (-6.391)	-3.3824*** (-9.012)
Complexity× Diversity	-6.5262*** (-8.791)	-10.196*** (-7.548)	-10.075*** (-4.434)	-10.130*** (-5.187)
Complexity× Offshore share	-9.890*** (-4.914)	-24.168*** (-6.752)	-62.646*** (-12.636)	-58.290*** (-15.956)
Complexity× HCC share	0.405 (0.911)	1.079 (1.729)	0.005 (0.005)	1.195 (1.561)
R^2	0.1748	0.1995	0.2310	0.2496
Observations Groups	64 706	64 706	64 754	64 754
Observations Entities	2 755 565	2 755 565	2 818 012	2 818 012
Controls	Yes	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 7: Second-stage regressions for Risk Exposure — Risk-Sharing Analysis

Notes: 2SLS regressions with Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Regressions with Complexity				
Panel A: Resilience Index	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	1.9386** (2.341)	2.6817*** (2.930)	5.7884*** (4.182)	4.3678*** (4.195)
Cash flow	-1.20e-03*** (-7.747)	-1.20e-03*** (-7.979)	-1.00e-04 (-0.441)	-7.00e-04*** (-3.705)
Current ratio	-4.60e-03 (-1.031)	3.00e-03 (1.163)	-3.50e-03 (-0.990)	-6.00e-04 (-0.201)
Number of employees	-3.15e-05 (-0.899)	-4.52e-05 (-1.280)	-7.63e-05** (-2.093)	-4.37e-05 (-1.227)
ln(Assets)	7.10e-03 (1.632)	7.40e-03* (1.708)	7.40e-03* (1.760)	7.40e-03* (1.749)
Market share (%)	-42.272*** (-17.991)	-42.204*** (-18.045)	-48.515*** (-17.869)	-46.938*** (-18.467)
Financial development index	0.9576*** (4.368)	0.9731*** (4.704)	0.7297*** (3.594)	0.8609*** (4.376)
Short-term interest rate (%)	-0.4733 (-0.737)	-0.9144 (-1.397)	-0.1664 (-0.243)	-0.5166 (-0.779)
Bond yield (%)	-9.10e-03 (-1.494)	-4.30e-03 (-0.720)	-1.25e-02* (-1.876)	-8.30e-03 (-1.340)
GDP deflator (index)	-6.00e-04 (-1.227)	-5.00e-04 (-0.984)	-6.86e-05 (-0.131)	-2.00e-04 (-0.478)
Real GDP growth (%)	-1.00e-04 (-0.040)	-1.10e-03 (-0.353)	-2.60e-03 (-0.846)	-1.40e-03 (-0.448)
Observations	64 748	64 748	64 798	64 798
Groups	64 748	64 748	64 798	64 798
R^2	0.0236	0.0238	0.0244	0.0244
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 8: Second-stage regressions for the Resilience Index

Notes: 2SLS regressions for the Resilience Index across four instrumented complexity measures. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Regressions with Complexity				
Panel B: Protection Gap (% GDP)	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	-0.2031 (-1.606)	-0.4104*** (-2.983)	-1.0052*** (-4.939)	-0.7591*** (-4.950)
Cash flow	7.30e-05 (1.508)	1.00e-04** (2.606)	-7.32e-05*** (-3.046)	2.49e-05 (1.194)
Current ratio	-7.00e-04** (-2.549)	-1.50e-03*** (-4.438)	-4.00e-04 (-1.523)	-9.00e-04*** (-3.271)
Number of employees	1.88e-06 (0.580)	3.25e-06 (0.989)	8.63e-06** (2.581)	2.98e-06 (0.907)
ln(Assets)	-1.00e-04 (-0.197)	-1.00e-04 (-0.168)	-1.00e-04 (-0.157)	-9.68e-05 (-0.148)
Market share (%)	-0.0879 (-0.126)	-0.0941 (-0.133)	1.0022* (1.883)	0.7291 (1.271)
Financial development index	0.0188 (1.210)	0.0096 (0.690)	0.0486*** (3.544)	0.0258** (2.155)
Short-term interest rate (%)	0.0194 (0.330)	0.0774 (1.320)	-0.0473 (-0.778)	0.0135 (0.231)
Bond yield (%)	6.00e-04 (1.055)	-9.00e-05 (-0.148)	1.30e-03** (2.198)	5.00e-04 (0.954)
GDP deflator (index)	2.00e-04*** (3.234)	2.00e-04*** (3.095)	1.00e-04** (1.990)	2.00e-04*** (2.465)
Real GDP growth (%)	-1.00e-04 (-0.493)	-3.18e-05 (-0.132)	2.00e-04 (0.812)	7.07e-06 (0.029)
Observations	64 748	64 748	64 798	64 798
Groups	64 748	64 748	64 798	64 798
R^2	0.0016	0.0022	0.0036	0.0036
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 9: Second-stage regressions for the Protection Gap

Notes: 2SLS regressions for the Protection Gap across four instrumented complexity measures. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Regressions with Complexity				
Panel C: Risk Exposure (% GDP)	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	-0.5523* (-1.780)	-1.0915*** (-3.272)	-2.5502*** (-5.213)	-1.9244*** (-5.218)
Cash flow	3.13e-05 (0.290)	1.00e-04 (1.335)	-4.00e-04*** (-5.855)	-1.00e-04** (-2.443)
Current ratio	-1.30e-03** (-2.162)	-3.40e-03*** (-3.269)	-5.00e-04 (-0.694)	-1.80e-03** (-2.121)
Number of employees	1.99e-05** (2.021)	2.36e-05** (2.430)	3.73e-05*** (3.888)	2.29e-05** (2.428)
ln(Assets)	2.40e-03* (1.660)	2.50e-03* (1.818)	2.50e-03* (1.934)	2.50e-03* (1.942)
Market share (%)	-6.1137*** (-3.741)	-6.1309*** (-3.715)	-3.3499*** (-2.668)	-4.0444*** (-3.003)
Financial development index	0.1857*** (2.910)	0.1620** (2.626)	0.2639*** (4.609)	0.2061*** (3.670)
Short-term interest rate (%)	-0.1736* (-1.686)	-0.0180 (-0.157)	-0.3391*** (-3.231)	-0.1847* (-1.820)
Bond yield (%)	1.10e-03 (0.749)	-7.00e-04 (-0.422)	2.80e-03** (1.982)	9.00e-04 (0.644)
GDP deflator (index)	7.00e-04*** (5.776)	7.00e-04*** (5.653)	5.00e-04*** (3.977)	6.00e-04*** (4.725)
Real GDP growth (%)	-5.00e-04 (-0.995)	-2.00e-04 (-0.441)	4.00e-04 (0.592)	-1.00e-04 (-0.235)
Observations	64 748	64 748	64 798	64 798
Groups	0.0115	0.0126	0.0147	0.0147
R^2	Yes	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 10: Second-stage regressions for Risk Exposure

Notes: 2SLS regressions for Risk Exposure across four instrumented complexity measures. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Reinsurance Regressions with Complexity				
Panel A: Resilience Index	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	2.0889** (2.444)	2.8440*** (3.140)	6.1401*** (4.632)	4.6546*** (4.662)
Reinsurance	0.0817 (0.063)	-0.2588 (-0.269)	-0.0006 (-0.002)	0.1093 (0.391)
Complexity $\times$ Reinsurance	-0.4917 (-0.196)	0.1923 (0.053)	-0.6484 (-0.933)	-0.8541 (-1.125)
Cash flow	-1.20e-03*** (-8.025)	-1.30e-03*** (-8.795)	-8.28e-05 (-0.322)	-7.00e-04*** (-3.713)
Current ratio	-3.90e-03 (-0.857)	4.10e-03 (1.408)	-2.70e-03 (-0.690)	4.00e-04 (0.105)
Number of employees	-3.28e-05 (-0.948)	-4.73e-05 (-1.368)	-7.99e-05** (-2.258)	-4.56e-05 (-1.306)
ln(Assets)	7.50e-03* (1.684)	7.80e-03* (1.774)	7.80e-03* (1.787)	7.70e-03* (1.772)
Market share (%)	-42.396*** (-17.490)	-42.299*** (-16.968)	-48.832*** (-18.323)	-47.144*** (-18.906)
Financial-development index	0.9589*** (4.353)	0.9744*** (4.672)	0.7172*** (3.613)	0.8556*** (4.384)
Short-term interest rate (%)	-0.5236 (-0.794)	-0.9923 (-1.464)	-0.2038 (-0.290)	-0.5730 (-0.840)
Bond yield (%)	-8.60e-03 (-1.345)	-3.60e-03 (-0.559)	-1.23e-02* (-1.796)	-7.80e-03 (-1.220)
GDP deflator (index)	-6.00e-04 (-1.218)	-5.00e-04 (-0.948)	-5.35e-05 (-0.103)	-2.00e-04 (-0.472)
Real GDP growth (%)	-8.43e-05 (-0.026)	-1.10e-03 (-0.352)	-2.70e-03 (-0.869)	-1.40e-03 (-0.460)
Observations	64 748	64 748	64 798	64 798
Groups				
R^2	0.0240	0.0243	0.0250	0.0250
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 11: Second-stage regressions for the Resilience Index – Reinsurance Analysis

Notes: 2SLS regressions across four instrumented complexity measures, including Reinsurance and its interaction with complexity. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Reinsurance Regressions with Complexity				
Panel B: Protection Gap (% GDP)	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	-0.1263 (-1.267)	-0.2667*** (-2.860)	-0.9471*** (-5.216)	-0.7071*** (-5.253)
Reinsurance	0.6178*** (2.854)	0.6178*** (3.876)	-0.0324 (-0.556)	0.0296 (0.555)
Complexity $\times$ Reinsurance	-1.1700*** (-2.802)	-2.1926*** (-3.725)	-0.0157 (-0.117)	-0.1781 (-1.507)
Cash flow	6.77e-05 (1.491)	9.44e-05*** (2.599)	-6.69e-05*** (-2.760)	2.49e-05 (1.161)
Current ratio	-5.00e-04 (-1.461)	-1.30e-03*** (-4.891)	-2.00e-04 (-0.964)	-7.00e-04*** (-2.927)
Number of employees	1.38e-06 (0.405)	3.05e-06 (0.915)	7.93e-06** (2.289)	2.67e-06 (0.781)
ln(Assets)	-1.00e-04 (-0.154)	-8.30e-05 (-0.124)	-2.52e-05 (-0.036)	-3.54e-05 (-0.051)
Market share (%)	-0.1475 (-0.203)	-0.2501 (-0.333)	0.9233 (1.556)	0.6983 (1.140)
Financial-development index	0.0197 (1.264)	0.0118 (0.839)	0.0461*** (3.366)	0.0249** (2.028)
Short-term interest rate (%)	0.0030 (0.049)	0.0560 (0.928)	-0.0540 (-0.876)	0.0036 (0.060)
Bond yield (%)	8.00e-04 (1.409)	2.00e-04 (0.335)	1.30e-03** (2.312)	6.00e-04 (1.140)
GDP deflator (index)	2.00e-04*** (3.129)	2.00e-04*** (2.819)	1.00e-04** (2.018)	2.00e-04** (2.408)
Real GDP growth (%)	-1.00e-04 (-0.639)	-5.23e-05 (-0.213)	2.00e-04 (0.750)	-2.29e-06 (-0.009)
Observations	64 748	64 748	64 798	64 798
Groups				
R^2	0.0045	0.0072	0.0047	0.0048
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 12: Second-stage regressions for the Protection Gap – Reinsurance Analysis

Notes: 2SLS regressions across four instrumented complexity measures, including Reinsurance and its interaction with complexity. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Reinsurance Regressions with Complexity				
Panel C: Risk Exposure (% GDP)	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	-0.3105 (-1.316)	-0.6545*** (-2.891)	-2.3142*** (-5.293)	-1.7162*** (-5.300)
Reinsurance	1.7397*** (3.715)	1.7191*** (5.270)	0.0100 (0.078)	0.2042* (1.662)
Complexity $\times$ Reinsurance	-3.3566*** (-3.713)	-6.2232*** (-5.172)	-0.4647* (-1.646)	-0.9179*** (-3.523)
Cash flow	1.07e-05 (0.107)	7.67e-05 (0.982)	-3.00e-04*** (-5.636)	-1.00e-04** (-2.423)
Current ratio	-5.00e-04 (-0.722)	-2.50e-03*** (-3.087)	1.30e-05 (0.018)	-1.20e-03 (-1.538)
Number of employees	1.82e-05* (1.820)	2.27e-05** (2.284)	3.49e-05*** (3.471)	2.19e-05** (2.226)
ln(Assets)	0.0026* (1.795)	0.0026** (2.005)	0.0028** (1.962)	0.0027* (1.956)
Market share (%)	-6.3029*** (-3.720)	-6.5917*** (-3.780)	-3.5545** (-2.555)	-4.1112*** (-2.862)
Financial-development index	0.1885*** (2.931)	0.1687*** (2.685)	0.2556*** (4.371)	0.2032*** (3.544)
Short-term interest rate (%)	-0.2286** (-2.211)	-0.0922 (-0.870)	-0.3640*** (-3.482)	-0.2218** (-2.233)
Bond yield (%)	1.80e-03 (0.749)	2.00e-04 (0.164)	3.00e-03** (2.194)	1.30e-03 (0.932)
GDP deflator (index)	7.00e-04*** (5.604)	6.00e-04*** (5.102)	5.00e-04*** (4.035)	6.00e-04*** (4.604)
Real GDP growth (%)	-6.00e-04 (-1.169)	-3.00e-04 (-0.551)	3.00e-04 (0.496)	-2.00e-04 (-0.305)
Observations	64 748	64 748	64 798	64 798
Groups				
R^2	0.0191	0.0240	0.0186	0.0191
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 13: Second-stage regressions for Risk Exposure – Reinsurance Analysis

Notes: 2SLS regressions across four instrumented complexity measures, including Reinsurance and its interaction with complexity. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Risk-Sharing Regressions with Complexity				
Panel A: Resilience Index	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	1.5232*** (3.576)	1.7221*** (3.234)	1.8411* (1.848)	-0.0341 (-0.058)
Diversity of capital regime	-14.058*** (-13.801)	-8.066*** (-7.789)	-20.520*** (-6.526)	-25.046*** (-7.596)
Share offshore (%)	1.006 (0.497)	-2.955* (-1.819)	-11.449* (-1.938)	-6.340 (-1.067)
Share HCC (%)	8.763*** (10.749)	8.421*** (13.608)	-4.359*** (-3.694)	-3.556*** (-3.265)
Complexity× Diversity of capital regime	24.218*** (15.306)	24.454*** (8.693)	64.222*** (6.825)	67.276*** (7.967)
Complexity× Share offshore (%)	1.826 (0.514)	18.309*** (2.844)	46.931** (2.365)	27.094 (1.551)
Complexity× Share HCC (%)	2.533* (1.818)	6.410*** (3.323)	45.451*** (15.893)	37.692*** (15.424)
Cash flow	-1.40e-03*** (-12.359)	-1.60e-03*** (-10.474)	1.10e-03*** (4.721)	-7.00e-04*** (-3.800)
Current ratio	-1.41e-02*** (-2.628)	8.00e-04 (0.203)	-2.19e-02*** (-4.302)	-1.41e-02*** (-3.445)
Number of employees	-9.15e-06 (-0.347)	-3.76e-05 (-1.418)	-2.00e-04** (-4.006)	-4.99e-05 (-1.670)
ln(Assets)	8.00e-04 (0.152)	9.00e-04 (0.193)	2.00e-04 (0.044)	-5.00e-04 (-0.122)
Market share (%)	-46.755*** (-14.331)	-46.735*** (-14.155)	-81.330*** (-9.582)	-76.197*** (-10.192)
Financial-development index	1.0544*** (4.411)	1.1175*** (4.860)	0.5715*** (4.077)	0.9735*** (5.352)
Short-term interest rate (%)	-0.6014 (-0.920)	-1.4972** (-2.608)	0.4655 (0.795)	-0.6542 (-1.143)
Bond yield (%)	-3.90e-03 (-0.541)	6.20e-03 (1.018)	-1.31e-02 (-1.533)	-9.00e-04 (-0.131)
GDP deflator (index)	-6.00e-05 (-0.309)	-7.74e-05 (-0.173)	1.20e-03** (2.545)	3.50e-04 (0.849)
Real GDP growth (%)	2.60e-03 (0.901)	-4.00e-04 (-0.142)	-3.70e-03 (-1.253)	-9.65e-05 (-0.034)
Observations	64 706	64 706	64 754	64 754
R^2	0.1444	0.1453	0.1729	0.1749
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 14: Second-stage regressions for the Resilience Index – Risk-Sharing Analysis

Notes: 2SLS regressions across four instrumented complexity measures, including diversity of capital regime, offshore share and HCC share and their interactions. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Risk-Sharing Regressions with Complexity				
Panel B: Protection Gap (% GDP)	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	-0.1109 (-1.319)	-0.1560** (-2.144)	-0.4419*** (-3.247)	-0.1610* (-1.852)
Diversity of capital regime	1.5929*** (8.071)	1.2348*** (5.555)	1.9292*** (5.726)	2.1999*** (6.736)
Share offshore (%)	1.9047*** (4.842)	2.4709*** (6.324)	7.2037*** (11.701)	7.6503*** (14.947)
Share HCC (%)	-1.3434*** (-20.770)	-1.3682*** (-29.372)	-0.5107*** (-2.979)	-0.7843*** (-5.596)
Complexity× Diversity of capital regime	-2.9590*** (-9.777)	-4.2488*** (-7.478)	-6.3232*** (-6.560)	-6.1595*** (-7.681)
Complexity× Share offshore (%)	-4.4351*** (-6.819)	-10.701*** (-7.282)	-25.419*** (-13.278)	-23.548*** (-17.061)
Complexity× Share HCC (%)	0.1397 (0.887)	0.2516 (0.980)	-2.3940*** (-5.358)	-1.3882*** (-4.108)
Cash flow	1.07e-04*** (2.526)	2.00e-04*** (3.864)	-2.00e-04*** (-9.830)	3.66e-05 (1.483)
Current ratio	4.00e-04 (0.851)	-1.00e-03*** (-5.201)	1.60e-03*** (5.251)	9.00e-04*** (3.500)
Number of employees	1.38e-06 (0.405)	3.30e-06 (1.232)	1.77e-05*** (3.879)	4.28e-06 (1.361)
ln(Assets)	8.00e-04 (0.959)	9.00e-04 (1.194)	1.00e-03 (1.528)	1.10e-03 (1.673)
Market share (%)	0.2950 (0.774)	0.2114 (0.542)	4.0565*** (9.030)	3.2117*** (8.093)
Financial-development index	-0.0025 (-0.228)	-0.0201** (-1.974)	0.0517*** (5.110)	-0.0020 (-0.280)
Short-term interest rate (%)	0.0371 (0.808)	0.1334*** (3.833)	-0.1182*** (-3.039)	-0.0042 (-0.131)
Bond yield (%)	-5.00e-04 (-1.127)	-1.70e-03*** (-3.751)	1.00e-03** (2.470)	-6.00e-04 (-1.319)
GDP deflator (index)	2.00e-04*** (2.805)	2.00e-04*** (2.869)	-0.00 (-0.020)	9.75e-05* (1.866)
Real GDP growth (%)	-4.00e-04 (-1.644)	-5.68e-07 (-0.003)	5.00e-04** (2.148)	1.00e-04 (0.545)
Observations	64 706	64 706	64 754	64 754
Groups	0.1418	0.1602	0.1912	0.2047
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 15: Second-stage regressions for the Protection Gap – Risk-Sharing Analysis

Notes: 2SLS regressions across four instrumented complexity measures, including diversity of capital regime, offshore share and HCC share and their interactions. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; t -statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Second-Stage Risk-Sharing Regressions with Complexity				
Panel C: Risk Exposure (% GDP)	Business Complexity	Distance Complexity	Jurisdictional Complexity	Jurisdictional Complexity By Country
Complexity	-0.3196* (-1.691)	-0.4921*** (-3.040)	-1.5654*** (-5.013)	-0.8689*** (-4.156)
Diversity of capital regime	3.5351*** (7.532)	2.9879*** (5.607)	3.0917*** (3.815)	3.6232*** (4.581)
Share offshore (%)	4.7340*** (3.990)	6.0761*** (6.185)	18.451*** (11.042)	19.653*** (13.961)
Share HCC (%)	-3.1121*** (-18.091)	-3.2646*** (-27.736)	-2.9140*** (-6.391)	-3.3824*** (-9.012)
Complexity× Diversity of capital regime	-6.5262*** (-8.791)	-10.196*** (-7.548)	-10.075*** (-4.434)	-10.130*** (-5.187)
Complexity× Share offshore (%)	-9.890*** (-4.914)	-24.168*** (-6.752)	-62.646*** (-12.636)	-58.290*** (-15.956)
Complexity× Share HCC (%)	0.405 (0.911)	1.079 (1.729)	0.005 (0.005)	1.195 (1.561)
Cash flow	1.07e-05 (0.104)	7.67e-05** (2.527)	-5.00e-04*** (-11.394)	-1.00e-04** (-2.017)
Current ratio	1.10e-03 (1.260)	-2.10e-03*** (-3.928)	2.90e-03*** (5.062)	1.50e-03*** (3.077)
Number of employees	1.33e-05 (1.433)	2.08e-05** (2.266)	4.59e-05*** (4.081)	2.13e-05** (2.282)
ln(Assets)	4.40e-03** (2.483)	4.60e-03*** (2.900)	4.60e-03*** (3.491)	4.80e-03*** (3.585)
Market share (%)	-5.2018*** (-5.938)	-5.4162*** (-5.978)	1.3892 (1.653)	-0.1164 (-0.145)
Financial-development index	0.1409** (2.570)	0.0992* (1.915)	0.2591*** (5.101)	0.1519*** (3.210)
Short-term interest rate (%)	-0.1379 (-1.493)	0.0915 (0.845)	-0.4493*** (-4.400)	-0.2449** (-2.287)
Bond yield (%)	-9.00e-04 (-0.738)	-3.80e-03** (-2.639)	2.20e-03 (1.760)	-1.00e-03 (-0.658)
GDP deflator (index)	6.00e-04*** (5.558)	5.00e-04*** (6.392)	2.00e-04*** (2.629)	4.00e-04*** (5.579)
Real GDP growth (%)	-1.00e-03** (-2.205)	-2.00e-04 (-0.365)	1.00e-03 (1.668)	2.00e-04 (0.340)
Observations	64 706	64 706	64 754	64 754
Groups	0.1748	0.1995	0.2310	0.2496
R ²	Yes	Yes	Yes	Yes
Entity FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Table 16: Second-stage regressions for Risk Exposure – Risk-Sharing Analysis

Notes: 2SLS regressions across four instrumented complexity measures, including diversity of capital regime, offshore share and HCC share and their interactions. Entity and time fixed effects included. Driscoll–Kraay robust standard errors; *t*-statistics in parentheses. Significance levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Advanced Asia and Pacific	Australia, Japan, New Zealand
Advanced Euro area	Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal, Spain, Cyprus, New Caledonia, French Polynesia, Reunion, Guadeloupe, French Guiana, Vatican City
Advanced Other Europe	Denmark, Norway, Sweden, Switzerland, United Kingdom, Iceland, Faroe Islands
Advanced North America	Canada, United States
Developing Africa and Middle East	Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Cabo Verde, Central African Rep., Chad, Comoros, Cote d'Ivoire, Democratic Republic of the Congo, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Iran, Iraq, Israel, Jordan, Kenya, Kuwait, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Morocco, Mozambique, Namibia, Niger, Nigeria, Oman, Palestine, Qatar, Republic of the Congo, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Syria, Tanzania, Togo, Tunisia, Uganda, United Arab Emirates, Yemen, Zambia, Zimbabwe, Sao Tome & Principe
Developing Asia and Pacific	Afghanistan, Armenia, Azerbaijan, Bangladesh, Bhutan, Brunei, Cambodia, China, Fiji, Georgia, India, Indonesia, Kazakhstan, Kyrgyzstan, Laos, Malaysia, Maldives, Mongolia, Myanmar, Nepal, North Korea, Pakistan, Papua New Guinea, Philippines, Samoa, Solomon Islands, South Korea, Sri Lanka, Taiwan, Tajikistan, Thailand, Timor-Leste, Tonga, Turkmenistan, Tuvalu, Uzbekistan, Vanuatu, Vietnam
Developing Europe	Albania, Belarus, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Kosovo, Latvia, Lithuania, Moldova, Montenegro, North Macedonia, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, Ukraine
Developing Latin America and Caribbean	Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Bonaire, Brazil, Chile, Colombia, Costa Rica, Cuba, Curacao, Curacao, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Nicaragua, Paraguay, Peru, Puerto Rico, Saint Lucia, Saint Vincent, St. Kitts and Nevis, Suriname, Trinidad and Tobago, Uruguay, Venezuela, Montserrat
Offshore Centres	Andorra, Anguilla, Bahrain, Bermuda, British Virgin Islands, Cayman Islands, Cook Islands, Gibraltar, Guernsey, Hong Kong, Hong Kong SAR, Isle of Man, Jersey, Lebanon, Liechtenstein, Macau, Macau SAR, Marshall Islands, Mauritius, Monaco, Netherlands Antilles, Panama, Seychelles, Singapore, Turks and Caicos

Table 17: *Geography Classification*

Life & Health Insurance	Life and Health, Managed Care, Managed Health Care
P&C Insurance	Property and Casualty, Multiline
Reinsurance	Reinsurance, Lloyd's Syndicate
Banking	Bank, Central Banks, Credit Unions and Mutuals, Development Bank
Other Financial	Asset Management, Banking Technology, Credit Rating and Reporting, Data Processing and Outsourced Services, Digital Lending, Financial Exchanges, Financial Guaranty, Financial Media and Data Solutions, Holding Companies, Patent Owners, and Trusts or Estates, Insurance Broker, Insurance Technology, Investment Banks, Brokers and Capital Markets, Investment and Business Development Companies, Investment and Capital Markets Technology, Mobile Wallets, Money Transfer and Remittance, Mortgage Banks and Brokers, Mortgage Guaranty, Mortgage REIT, Payment Processors, Payment Service Providers and Gateways, Payments Infrastructure, Specialty Finance: Commercial Focused, Specialty Finance: Consumer-Focused, Diversified REIT, Diversified Real Estate Activities, Health Care REIT, Hotel and Resort REIT, Office REIT, Other Specialized REIT, Retail REIT, Self-Storage REIT, Multi-Family Residential REIT
Non-Financial	Advertising, Air Freight and Logistics, Application Software, Biotechnology, Cargo Ground Transportation, Casinos and Gaming, Computer and Electronics Retail, Education Services, Electric Utilities, Food Distributors, Forest Products, Health Care Distributors, Health Care Facilities, Health Care Services, Health Care Technology, Homebuilding Producers, Hotels, Resorts and Cruise Lines, IT Consulting and Other Services, Industrial Conglomerates, Internet Services and Infrastructure, Machinery and Equipment: Construction and Heavy Transportation, Other Distributors, Other Specialty Retail, Publishing, Real Estate Development, Real Estate Operating and Management, Real Estate Services, Research and Consulting Services, Systems Software, Title, Unclassified, and any other industry label not explicitly listed above.

Table 18: Full assignment of the 76 unique S&P industry labels to the six overarching categories. Labels not explicitly placed in one of the five financial categories default to Non-Financial.

Life & Health Insurance	Life insurance
P&C Insurance	Insurance, Non-life insurance
Reinsurance	Reinsurance, Insurance, reinsurance and pension funding, except compulsory social security
Banking	Central banking, Other monetary intermediation
Other Financial	Activities of collection agencies and credit bureaus, Activities of head offices, Activities of holding companies, Activities of insurance agents and brokers, Activities auxiliary to financial services and insurance activities, Activities auxiliary to financial services, except insurance and pension funding, Activities auxiliary to insurance and pension funding, Administration of financial markets, Financial leasing, Financial service activities, except insurance and pension funding, Fund management activities, Leasing of intellectual property and similar products, except copyrighted works, Other activities auxiliary to financial services, except insurance and pension funding, Other activities auxiliary to insurance and pension funding, Other credit granting, Other financial service activities, except insurance and pension funding nec, Pension funding, Rental and leasing activities, Renting and leasing of air transport equipment, Renting and leasing of cars and light motor vehicles, Renting and leasing of construction and civil engineering machinery and equipment, Renting and leasing of office machinery and equipment (including computers), Renting and leasing of other machinery, equipment and tangible goods nec, Renting and leasing of other personal and household goods, Renting and leasing of recreational and sports goods, Renting and leasing of trucks, Risk and damage evaluation, Security and commodity contracts brokerage, Trusts, funds and similar financial entities
Non-Financial	Accounting, bookkeeping and auditing activities; tax consultancy, Advertising, Agents involved in the sale of timber and building materials, Cargo handling, Child day-care activities, Computer programming activities, Construction of roads and motorways, Cultural education, Dental practice activities, Growing of grapes, Hotels and similar accommodation, Manufacture of basic pharmaceutical products, Manufacture of cocoa, chocolate and sugar confectionery, Manufacture of computers and peripheral equipment, Manufacture of motor vehicles, Mining of hard coal, Mixed farming, Private security activities, Publishing of journals and periodicals, Real estate activities, Restaurants and mobile food service activities, Retail sale of automotive fuel in specialised stores, Sewerage, Veterinary activities, Web portals, Wholesale trade, except of motor vehicles and motorcycles, Wholesale, and many others (<i>total of 366 in Non-Financial</i>), etc.

Table 19: Orbis NACE Business Category Mapping. A total of 402 distinct Orbis labels map to six categories. The first five (all financial) include 36 NACE categories; all remaining 366 labels, illustrated above with examples, are classified as Non-Financial.