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# US and Canada: An Era of Value-added Enterprise Risk Management

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## Executive Summary

Enterprise risk management (ERM) is an orderly or guided conduct of an enterprise to deal with risks. For insurers, ERM requires full support and commitment of the senior management. It influences corporate decision making and ultimately becomes part of the insurer's risk culture. It is particularly relevant to the insurance industry, where it acts as a strategic decision-support framework for management. It improves decision making and risk mitigation at all levels of the organization.

ERM in the U.S. and Canada has evolved over the years into a complex ecosystem. About 30 years ago, it had five basic risk categories—underwriting, investment, credit, operational and strategic—which were mostly handled and reported in silos. Today, insurance companies have fine-tuned their ERM programs to work with a single enterprise framework or policy and a joint committee with representation of senior business risk heads across the insurance value chain. Now ERM includes additional risk categories (apart from those mentioned above), such as compliance, insurance, investment and regulatory. ERM is delivered with a divided approach of three lines of defense: risk owners (first line), risk oversight groups (second line) and internal auditors (third line). Practitioners in each of them are responsible, accountable, consulted and informed (RACI) about their specific sphere of action in the organization. In this report, we provide a detailed review of emerging key topics where ERM plays an important role and could bring opportunities as highlighted by practitioners surveyed online or interviewed virtually, particularly around the following issues.

**State of innovation:** Practitioners are rethinking how insurance products could cater to new cohorts of consumers (millennials and beyond), while developing or finding the right talent and skills (data scientists and risk experts-actuaries) and searching for opportunities to mitigate difficulties in performing business as usual activities and innovation simultaneously.

**Business environment:** Insurtechs, the entry of new insurance players such as Tesla Insurance, and rapid business transformation are the key topics driving the insurers' innovation agenda. Other market conditions such as inflation are not only impacting the cost of insurance claims but also increasing premiums, which may lead to policy lapse. The ongoing effort to improve consumer experience and the accelerated model change workflow/process emanating from adoption of artificial intelligence/machine learning (AI/ML), coupled with the prevailing focus on ethical use of AI/ML, are relevant topics to both insurers and ERM practitioners.

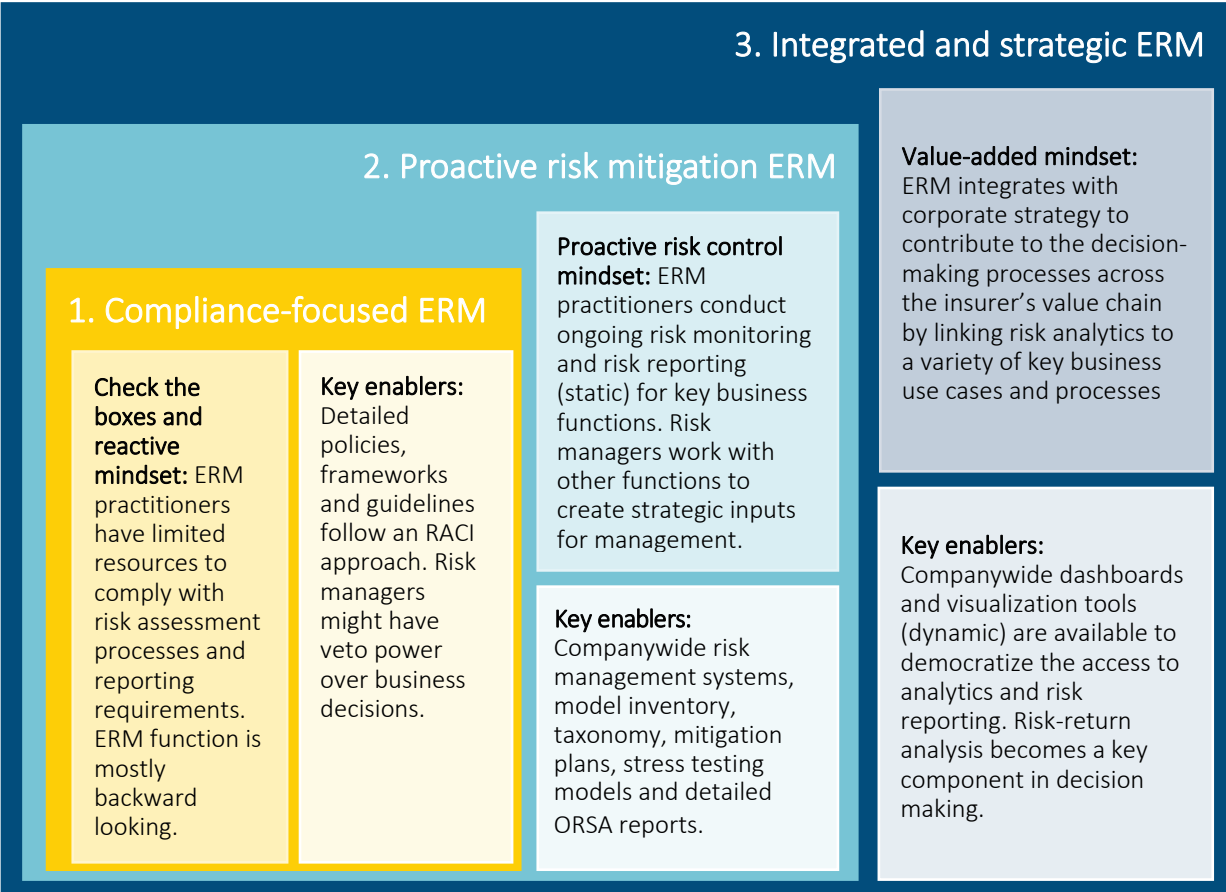
**Insurance regulatory environment:** Slow and complex adoption of regulations at the local entity level, reporting challenges at the corporate level (International Financial Reporting Standards, reporting and aggregation), and differences between federal and local (state/province) regulations, for example, in the New York State Department of Financial Services, already require regulated entities to look at climate change risk whereas other regulatory agencies may not.

The parts of this report land in the realm of ERM in multiple forms, ranging from self-contained projects (e.g., adoption of accelerated underwriting using AI/ML) to a major overhaul (e.g., financial impact of climate risk). To gain corporate-wide buy-in and increase value to deal with these initiatives, the ERM program must be built around the prevailing risk culture within the insurance company; controls, measurable risks, metrics and actionable data; and analyses and assessments that truly reflect the insurer's risk management. In other words, it must be commensurate with the strategy and operating model adopted by the senior management and Board of Directors.

Additionally, insurance companies are exposed to a variety of key risk factors; to perform a proper risk assessment, the ERM practitioners review that the organization's objectives and strategy remain on course and relevant to the market. The ERM function should not be taken by granted under the belief that three lines of defense would do the work automatically; ERM practitioners could take an active role to understand and manage the risk faced by the

organization and create a strategic advantage to aid in effective decision making. The ERM views around insurance risk categories may drive the companywide risk culture. More importantly, the availability and adoption of enablers play a key role to operationalize ERM policies. From this perspective, the steps toward an integrated and strategic ERM may be segmented as shown in Figure 1.

**Figure 1:**  
**STEPS TOWARD AN INTEGRATED AND STRATEGIC ERM FUNCTION**



**Source:** Prepared by the authors from practitioners interviewed. “Transforming Enterprise Risk Management for Value in the Insurance Industry,” McKinsey, July 22, 2016, <https://www.mckinsey.com/>; “Insurance Enterprise Risk Management Practices,” American Academy of Actuaries, July 2013, <https://www.actuary.org/>.

There is no “one size fits all” approach toward achieving an integrated and strategic ERM function: approaches vary depending on factors such as the organization’s size, type, complexity and risk culture. However, a highly integrated, enterprise-wide risk culture could be achieved through the adoption of best practices and enablers of the ERM function to transform the risk mindset to better serve the business strategy:

1. Compliance-focused ERM: Minimum approach toward the ERM practices.
2. Proactive risk mitigation ERM: Intermediate approach toward ERM practices where certain business functions have developed ongoing risk monitoring with static metrics and practitioners use companywide accessible risk systems, for example, model inventory systems and certain risk metrics.

3. Integrated and strategic ERM: Mature approach toward ERM practices where practitioners create and protect value<sup>1</sup> in the business decision-making and companywide strategy.

Some of the building blocks toward integrated and strategic ERM include the following.

**Risk assessment:** The ERM journey for the insurers includes focus on assessing compliance risk and setting up of an acceptable degree of readiness to react appropriately to new regulations. To respond to these regulations, the ERM policy set forth by the organization is both backward and forward looking; the ERM policy is set up to avoid repetition of previous incidents and the prevention of future ones. In some cases the risk functions may have the authority to veto a business decision if it violates a risk policy. For example, a business decision may conflict with prevailing risk policy practices around AI/ML or climate risk best practices; in such a situation the risk function can veto the business decisions.

**Risk measurement:** Once insurers establish a compliance-focused ERM policy framework to meet the internal needs of the organization and improve the ability to respond to the adoption of upcoming regulation and statutory requirements, the overreaching risk appetite statement, risk limits and governance help in the enhancement of the Own Risk and Solvency Assessment (ORSA) report to use it as an extension of the ERM objectives. In addition, risk functions can work with other business functions to help in the risk measurement of capital requirements and stress testing. For instance, key risk indicators or other important metrics are designed based on the insurers' level of maturity or the development of their risk management infrastructure to set limits/thresholds for emerging risks such as cyberrisk, climate risk and inflation risk. This is done to measure and understand the insurers' appetite for such risks.

**Risk monitoring and reporting:** Both static (point in time, e.g., quarterly) and dynamic (centralized and on-demand) risk monitoring is followed by insurers in the U.S. and Canada as they respond to emerging topics, for example, AI/ML and climate risk adoption. Some insurers have developed a cross-functional governance framework for AI/ML systems that addresses issues such as explainability, transparency, data quality, ethics, fairness and legal compliance (refer to Sec. 3.1.3). Many insurers have also included the legal and compliance team in their ERM and model risk management (MRM) committees to monitor the impact of increasing regulatory requirements, for example, new guidelines such as the disclosure of climate risk in line with the Task Force on Climate-Related Financial Disclosures framework. Climate risk can materially impact the insurers' ability to meet policyholder obligations. Hence, many insurers are integrating climate risk into internal processes for assessing effectiveness of their ERM monitoring and reporting capabilities.

**Value addition process with ERM:** Insurers with mature ERM functions have less difficulty in understanding emerging and unexpected uncertainties while protecting value for the organization, for example, included pandemic scenarios in their stress testing scenarios before the COVID-19 pandemic emerged. Also, they have a balanced focus in bringing value to identify events that are most likely to damage the organization (a curated list of risk factors by risk category)—in simple terms, thinking more about immediate risks such as crossing the street instead of being bitten by a shark at the beach. Once the risk limits and appetite are aligned with the business strategy and are finalized, an insurer's options to improve its risk and reward position include modifying exposure or coverage, changing prices or expense structure, and modifying claim management practices. The ERM function could develop an understanding of the corporate strategy and the ability to enhance the value to the organization.

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<sup>1</sup> Christian Bongiovanni, Luca Pancaldi, Uwe Stegemann and Giambattista Taglioni, "Transforming Enterprise Risk Management for Value in the Insurance Industry," McKinsey, July 22, 2016, <https://www.mckinsey.com/business-functions/risk-and-resilience/our-insights/transforming-enterprise-risk-management-for-value-in-the-insurance-industry> (accessed on July 28, 2022).

- **Value creation:** The ERM function creates value by integrating ERM with the corporate strategy. The function becomes a sought-after thought partner, enabling business management to weigh risk-reward implications and potential risk trade-offs in strategic and operational decisions. To become a strategic thought partner, the ERM function must be able to create comprehensive solutions (e.g., economic-capital models) needed to drive business decisions and to link advanced risk analytics to key business processes. For an ERM program to obtain corporatwide buy-in and genuinely add value, it must be built around analysis and metrics that are truly reflective of the company's risk culture. In other words, it must be in line with how senior management wants to run the company. Insurers that embrace a continuous improvement cycle and establish an ERM process that is built on a best practice foundation will unlock value creation across their organization—helping them overcome many of the speed, data and process duplication challenges common at insurers.
- **Value monitoring:** ERM must quantify and manage the risk through rigorous risk response planning and ongoing risk monitoring using data and metrics. For instance, ERM must quantify risk exposures using scenario planning and stress testing to equip leadership with the data points needed to understand a range of potential outcomes (e.g., best case, expected case, worst case). In addition, ERM can then leverage risk-return analysis to understand where to make risk mitigation investments and how much to invest. Instead of telling leadership that a risk (e.g., a pandemic or cybersecurity) is a top risk, ERM should use a data- and analytics-driven narrative to support risk-informed decision-making by the top management on how much and where to employ or prioritize resources to manage risk exposures.
- **Value protection:** At this stage, enterprise risk tolerance and risk limit monitoring drive the ERM approach to incorporate the strategic treatment of risk, which involves the evaluation and effective management of the relationship between risk and reward (risk-return optimization) as the organization pursues its values and goals. The overall ERM policy is very advanced in the organization, which involves strong ongoing communication of risk function with other business functions. Risk managers are very proactive in setting up policies to effectively handle future risk incidents and the risk functions help other business functions to create strategic inputs for top management. Moreover, a transparent and structured risk management process directly aligned with the company's objectives brings a greater awareness of threats and opportunities and greater predictability of performance aligning with the top management objectives.

An additional aspect that has driven the relevance of ERM for insurers is the regulatory oversight and credit rating agencies' increased interest in insurers' ERM policies, practices and controls. For example, credit agencies' rating assessment may trigger a downgrade as part of their qualitative overlay if deficiencies are identified in the insurer's ERM practices. Furthermore, insurers are focusing on innovating their business models to ensure their ERM practices are aligned with the evolving market.

The insurance business will continue to evolve going forward, and its resiliency will hinge on ERM practices and practitioners' efforts toward formalizing their approach to successfully navigate the emerging risks and drivers, particularly around cybersecurity, inflation, AI/ML and climate risk. ERM, in the short term, will also have to respond to the new wave of models in which AI/ML play a crucial role, raising expectations of better MRM and enterprise-wide use of models. Insurers are looking to continue investing in talent, technology, cybersecurity defense and governance, and ERM will continue to be a facilitator/enabler to navigate innovation, business and regulatory environments.



**Authors' note:** The methodology employed in the preparation of this report combines literature review, independent research, practitioner interviews (virtual face-to-face sessions) and an online survey of respondents. The authors of this report have included in each section key opinions of the practitioners interviewed. A conclusions and supplemental sections are provided at the end of the report, particularly on the methodology used, along with an acknowledgement of the practitioners interviewed virtually. Finally, the results of the online survey of practitioners are presented, with additional details on the risks faced by the ERM function and its focus.



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## Section 1: Insurance Market and ERM Overview

Insurers in the U.S. and Canada are rapidly evolving. According to Standard and Poor's (S&P),<sup>2</sup> conditions remain largely favorable for several stakeholders of the insurance sector, such as brokers, health insurance and cost-containment service providers, claims managers and warranty administrators (especially for the middle-market insurance brokers), because of the resilience demonstrated through 2020–2021, when stress in the sector due to the COVID-19 pandemic was at its peak.

Nonetheless, significant risks are looming, not the least of which are the heightened input-cost pressures and ongoing supply disruptions that get reflected into replacement costs within the scope of insurance claims, such as car repairs due to collisions and home repairs due to property insurance claims. With the inflation rate remaining higher and for longer periods than most economists expected, central banks are tightening monetary policy (for instance, the U.S. Federal Reserve increased interest rates by 75 basis points in June 2022). This is prompting investors to rapidly reprice the risks, raising financing costs for borrowers, particularly those at the lower end of the ratings scale.<sup>3</sup>

Insurers are responding to these quick changes and passing their impact on to policyholders by developing more customized products, reducing exposure to guarantee-based products, adjusting risk, updating contractual conditions and reviewing rates/premiums to reflect the increased cost, particularly of claim payments in the property and casualty (P&C) sector.

The emerging risks and their drivers give more scope for the enterprise risk management (ERM) function to adopt practices to assess, reduce and mitigate risks<sup>4</sup>. ERM is crucial to strengthen the insurance industry and deepen its penetration and could contribute to premium volume<sup>5</sup> (by developing operational efficiency and reduced underwriting times, i.e., accelerated underwriting) and lead to better decision making and resiliency in the U.S. and Canada.

### Key Business Issues around ERM Practices

- Risk minimization: Emerging risks (e.g., climate risk and environmental, social and corporate governance [ESG]) and their drivers could be seen as distractions from key business targets like sales and new business. However, these risks and drivers can be viewed as an opportunity to enhance the risk assessment and enterprise integration processes while introducing policy and procedural updates.
- Adoption: Although ERM policies and procedures are in place in most organizations, the extent of implementation varies. It is critical to conduct ERM literacy programs and review the framework for operational risk management to enhance the mechanisms for identifying and managing risks.
- Collaboration: Traditionally, organizations managed risks in silos. Each business unit was treated as an isolated risk source. But ERM aims to treat risk in a holistic manner and manages and assesses risks from a

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<sup>2</sup> "North American Insurance Services 2022 Outlook: Strong Economic Conditions and Rate Environment Support Stability," S&P Global Ratings, January 5, 2022, <https://www.spglobal.com/ratings/en/research/articles/220105-north-american-insurance-services-2022-outlook-strong-economic-conditions-and-rate-environment-support-stabi-12225082> (accessed on June 30, 2022).

<sup>3</sup> Ibid.

<sup>4</sup> A business continuous process, led by senior leadership, that extends the concept of risk management and includes: Identify risks across the entire enterprise; Assessing the impact of risks to the operations and mission; Developing and practicing response of mitigating plans; and monitoring the identifies risk and scan for emerging risks.

<sup>5</sup> Having the ERM framework in place may maintain or improve the insurer's credit ratings, and improved ratings bring confidence to investors that could contribute to the insurer's financial strength and thereby improve policy holder interaction and premium collection process.

multidimensional perspective, and so it benefits from diversification of talent. Hence, increasing collaboration and communication with other functional teams in the organization is important, particularly to enable innovation (for instance, accounting and investment).

To enhance value in the ERM function, practitioners should look beyond traditional risks, and at emerging risks and drivers such as strategic, cybersecurity, ESG and cultural risks. Insurers could also continue investing in cloud computing for liabilities, technology for cybersecurity defense, data processing and robust model risk management (MRM).

Table 1 presents a snapshot of key areas covered in detail in this report.

**Table 1:**

**KEY BUSINESS ISSUES AND SAMPLE OPPORTUNITIES FOR PRACTITIONERS FOR ERM VALUE-ADD**

| Area                          | Key Business Issue  | Sample Opportunities  |
|-------------------------------|---|---|
| <b>Innovation Environment</b> | <ul style="list-style-type: none"> <li>Finding the right talent and skills</li> <li>Rethinking insurance products for new cohorts of consumers (millennials and beyond)</li> <li>Ambidexterity<sup>a</sup> limitations: inability to perform BAU operations and innovation simultaneously</li> </ul>  | <ul style="list-style-type: none"> <li>Promote learning and outline key skills required, such as cloud computing, AI/ML, data analytics and data warehousing</li> <li>Form innovation work groups in the first line and meet monthly to create business ideas, solutions and recommendations</li> <li>Enhance regulatory collaboration. For instance, in the U.S., the NAIC formed the Innovation and Technology Task Force to explore technological developments in the insurance sector.</li> </ul>   |
| <b>Business Environment</b>   | <ul style="list-style-type: none"> <li>Achieving agile AI/ML adoption and data cybersecurity</li> <li>Ethical use of AI/ML</li> <li>Prevailing inflation scenario</li> <li>Rapid business transformation and complex model change management workflow/process</li> </ul>  | <ul style="list-style-type: none"> <li>Prioritize data centralization and cloud-based solutions for model development. Conduct internal “hackathons,” invest in technology and conduct frequent cyberaudits.</li> <li>Review and propose enhancements to key performance Indicators (KPIs) and include periodic impact in reporting (e.g., inflation in insurance-linked products or claims)</li> <li>Streamline model change practices, triggered by new regulations (e.g., IFRS 17, PBR, LDTI),<sup>b</sup> simplify memos, update inventory systems, update model development documentation and so on</li> </ul>   |
| <b>Regulatory Environment</b> | <ul style="list-style-type: none"> <li>Increase regulatory focus on unfair discrimination in insurance pricing and marketing</li> <li>Increase frequency and speed of rate filing</li> <li>Adopt regulations at local entity level and identify differences between local (state/province) and federal regulations (in the U.S. the issue is more about divergence between states)</li> </ul> | <ul style="list-style-type: none"> <li>The adoption of AI/ML and predictive analytics is helping to develop models for a variety of business uses to deal with ratemaking and marketing</li> <li>Provide recommendations on the way the insurer is performing in its own-risk-and-solvency-assessment report, submitted to the regulator</li> <li>Voluntarily participate and present opinions on regulatory exposure drafts and anticipate implementation roadmap</li> <li>Assess model risk arising from new regulations and meet enterprisewide expectations of MRM</li> <li>Review and increase experience study frequency and practices to improve identification of unexpected</li> </ul> |

|  |  |   |
|--|--|---|
|  |  | changes to rates such as mortality and claim severity due to rapidly changing medical cost. |
|--|--|---|

<sup>a</sup> Refers to the Innovation Ambidexterity Theory and the approach of the organization to deal with business as usual (BAU) activities and innovation

<sup>b</sup> Refers to the International Financial Reporting Standard No. 17 (IFRS 17), principle-based reserving (PBR) and long duration targeted improvements (LDTIs).

**Source:** Authors' impressions based on practitioners' opinions.

## 1.1 MARKET SIZE AND GROWTH

The U.S. and Canadian markets have been developing since the 1700s and have gradually increased in regulatory complexity, including federal, local (state/province) regulation and international reporting accounting standards (IFRS) that multinational insurers see today; for the U.S., generally accepted accounting principles (U.S. GAAP) are prevalent for domestic insurers. The regulated insurance environment has been instrumental in shaping the insurance industry in the region. The regulators of the states or provinces and territories laid emphasis on solvency and consumer protection, which includes oversight of pricing, availability of coverage and claims. The insurance industry has been through many paradigm shifts, from tremendous demographical changes to evolution of financial services and emergence of e-commerce. In 2020, in the U.S. total direct premiums written in the insurance industry were near USD 1.5 trillion, up 1.6% from 2019. Direct premiums written in P&C rose 2.3%,<sup>6</sup> and those in life/annuity<sup>7</sup> rose a marginal 1%.<sup>8</sup> Premium income as a percentage of U.S. gross domestic product (GDP), which shows the relative importance of the insurance industry in the domestic economy, was 12.5%, considerably higher than in markets such as Canada (8.7%), China (4.5%) and India (4.2%)<sup>9</sup> (Figure 2). The U.S. is ranked first in global premium volumes, and Canada is ranked ninth. Market penetration for the life insurance industry is relatively stable but has been trending downward over the past decade.<sup>10</sup> Insurance market key figures in the U.S. and Canada are represented in Figure 3.

<sup>6</sup> Direct premiums written before reinsurance transactions. Excludes state funds; includes accident and health insurance.

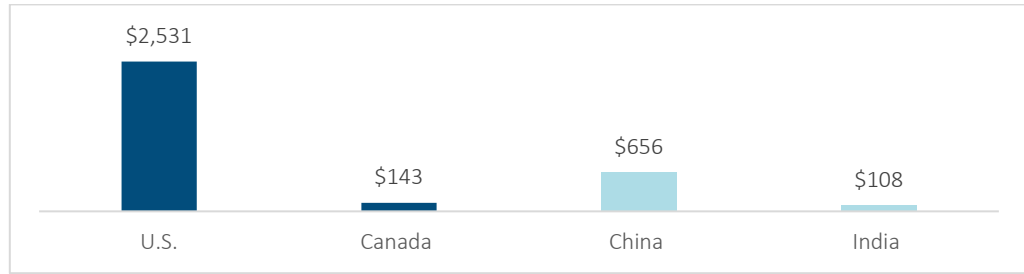
<sup>7</sup> Includes premiums, annuity considerations (fees for annuity contracts), deposit-type funds and accident and health insurance.

<sup>8</sup> "U.S. Insurance Industry: All Sector," Insurance Information Institute, <https://www.iii.org/publications/insurance-handbook/economic-and-financial-data/us-insurance-industry-all-sectors> (accessed on June 30, 2022).

<sup>9</sup> "Life and Non-Life Insurance Penetration by Country 2020," Statista. April 11, 2022, <https://www.statista.com/> (accessed on June 2022)| "Covid Brings Life Insurance Penetration in India to Global Levels," *The Economic Times*. January 31, 2022, <https://economictimes.indiatimes.com/> (accessed on June 30, 2022)| "Insurance Spending," OECD, <https://data.oecd.org/> (accessed June on 30, 2022).

<sup>10</sup> "Life Insurance Ownership," Insurance Information Institute, <https://www.iii.org/> (accessed on June 30, 2022).

**Figure 2:**  
**INSURANCE PREMIUM VOLUME AND GLOBAL RANK BY SIZE OF SELECT COUNTRIES IN 2020 (USD BILLION)**



|                                    |       |      |      |      |
|------------------------------------|-------|------|------|------|
| Global rank                        | 1st   | 9th  | 2nd  | 11th |
| Insurance penetration <sup>a</sup> | 12.5% | 8.7% | 4.5% | 4.2% |

<sup>a</sup> Insurance penetration expressed as ratio of total premiums to GDP.

**Source:** "World Insurance: The Recovery Gains Pace," in *Sigma*, no. 3, Swiss Re Institute, March 2021, <https://swissre.com/>; "Life and Non-life Insurance Penetration by Country 2020," Statista, April 11, 2022; Naveen Kumar, "COVID Brings Life Insurance Penetration in India to Global Levels," *Economic Times*, January 31, 2022, <https://economictimes.indiatimes.com>.

**Figure 3:**  
**U.S. AND CANADA INSURANCE MARKET IN KEY FIGURES**

| U.S.   | Canada   |
|--|--|
| 330+ million population  | 38+ million population   |
| USD 834B+ direct written premiums in health insurance <sup>11</sup>  | CAD 46B+ direct written premiums in health insurance <sup>12</sup>   |
| USD 767B+ direct written premiums in life insurance <sup>13</sup>  | CAD 45B+ direct written premiums in life insurance <sup>14</sup>   |
| USD 725B+ direct written premiums in insurance on homes, cars and businesses <sup>15</sup>   | CAD 56B+ direct written premiums for insurance on homes, cars and businesses   |
| 91%+ covered with private health insurance or received health care services under a federal program (such as Medicare or Medicaid) <sup>16</sup> | 66%+ covered with private health insurance or received health care services under public program <sup>17</sup>                   |
| 50%+ covered by some type of life insurance  | 59%+ covered by some type of life insurance  |
| 87%+ coverage of automobiles (including commercial vehicles), personal property, commercial property and liability                               | 80%+ coverage of automobiles (including commercial vehicles), personal property, commercial property and liability <sup>18</sup> |
| 0.7%+ coverage of pet insurance  | 2%+ coverage of pet insurance  |
| 18%+ GDP in health consumption expenditures  | 13%+ GDP in health consumption expenditures  |
| Country-Specific Gaps  | Country-Specific Gaps  |
| 8%+ have no health insurance   | 30%+ have no supplementary <sup>19</sup> health insurance  |
| 45%+ have no life insurance  | 40%+ have no life insurance  |
| 10%+ have no auto insurance <sup>20</sup>  | 15%+ have no auto insurance  |

**Source:** “Insurance Industry at a Glance,” Insurance Information Institute, <https://www.iii.org/publications/a-firm-foundation-how-insurance-supports-the-economy/introduction/insurance-industry-at-a-glance> (accessed on June 30, 2022); “Canadian Life & Health Insurance Facts,” Canadian Life & Health Insurance Association, 2021, <https://www.clhia.ca/>; “Facts + Statistics: Life Insurance,” Insurance Information Institute, <https://www.iii.org/fact-statistic/facts-statistics-life-insurance> (accessed on June 30, 2022); “Canada Life Insurance: Key Trends and Opportunities to 2025,” Global Data, November 2021, <https://www.globaldata.com/>; “These Are the Top 25 P&C Insurance Companies in the US,” *Insurance Business*

<sup>11</sup> “Insurance Industry at a Glance,” Insurance Information Institute, <https://www.iii.org/publications/a-firm-foundation-how-insurance-supports-the-economy/introduction/insurance-industry-at-a-glance> (accessed on June 30, 2022).

<sup>12</sup> “Canadian Life and Health Insurance Fact,” Canadian Life & Health Insurance Association, 2021, [https://www.clhia.ca/web/CLHIA\\_LP4W\\_LND\\_Webstation.nsf/resources/Factbook\\_2/\\$file/2021+FACT+BOOK+EN.pdf](https://www.clhia.ca/web/CLHIA_LP4W_LND_Webstation.nsf/resources/Factbook_2/$file/2021+FACT+BOOK+EN.pdf) (accessed on June 30, 2022).

<sup>13</sup> “Facts + Statistics: Life Insurance,” Insurance Information Institute, <https://www.iii.org/fact-statistic/facts-statistics-life-insurance> (accessed on June 30, 2022).

<sup>14</sup> “Canada Life Insurance: Key Trends and Opportunities to 2025,” Global Data, November 2021, <https://www.globaldata.com/store/report/canada-life-insurance-market-analysis/> (accessed on June 30, 2022).

<sup>15</sup> Mark Rosanes, “These Are the Top 25 Property/Casualty Insurance Companies in the US,” *Insurance Business America*, September 20, 2021, <https://www.insurancebusinessmag.com/us/guides/these-are-the-top-25-property-casualty-insurance-companies-in-the-us-32630.aspx?Region=United+States> (accessed on June 30, 2022).

<sup>16</sup> “U.S. Health Care Coverage and Spending,” Congressional Research Service, April 2022, <https://sgp.fas.org/crs/misc/IF10830.pdf> (accessed on June 30, 2022).

<sup>17</sup> Charlie Clissitt, “Healthcare in Canada,” *MoveHub*, April 14, 2022, <https://www.movehub.com/uk/moving-abroad/canada/healthcare-for-expats/> (accessed on June 30, 2022).

<sup>18</sup> “Canada Property and Casualty Insurance Market—Growth, Trends, Covid-19 Impact, and Forecasts (2022–2027),” Mordor Intelligence, <https://www.mordorintelligence.com/industry-reports/property-casualty-insurance-market-in-canada> Car Insurance Statistics Canada | Finder Canada (accessed on June 30, 2022).

<sup>19</sup> Supplementary health insurance provides coverage for hospital and medical expenses not covered by public health plans, such as prescription medicines, vision care, dental care and mental health supports. Supplemental insurance can also provide income replacement for those unable to work due to disability.

<sup>20</sup> “Facts + Statistics: Uninsured Motorist,” Insurance Information Institute, <https://www.iii.org/fact-statistic/facts-statistics-uninsured-motorists> (accessed on June 30, 2022).

America, September 20, 2021, <https://www.insurancebusinessmag.com/>; “U.S. Health Care Coverage and Spending,” Congressional Research Service, April 2022, <https://sgp.fas.org/crs/misc/IF10830.pdf>; “Healthcare in Insurance,” *MoveHub*, April 14, 2022, <https://www.movehub.com/>; “Canada Property and Casualty Insurance Market—Growth, Trends, COVID-19 Impact, and Forecasts (2022–2027),” *Mordor Intelligence*, <https://www.mordorintelligence.com/>; “Facts + Statistics: Uninsured Motorist,” Insurance Information Institute, <https://www.iii.org/>.

## 1.2 HISTORY OF INSURANCE

The history of insurance in the U.S. and Canada goes back more than three centuries. As in many other regions, early insurance companies here, too, focused on pooling capital against large, infrequent losses, such as maritime shipment and fire.

As the countries grew and developed, so did the insurance industry, growing in size and sophistication. Insurers’ profitability has followed the path of the financial markets, growing in booms, and shrinking in busts. An abbreviated timeline is given in Table 2.

**Table 2:**  
**TIMELINE OF KEY EVENTS**

| Timeline | Key Event   |
|----------|---|
| 1700s    | <ul style="list-style-type: none"> <li>The first domestic fire coverage in the U.S. and marine coverage insurance products were already in place before the Revolutionary War.</li> <li>The first mutual insurance company in the U.S., the Friendly Society, was founded in 1735 (it went out of business in 1740 after a massive fire destroyed much of Charleston, SC).<sup>21</sup></li> <li>In 1792, the Insurance Company of North America (INA), the oldest stock insurance company in the U.S., was founded. Its successor company, CIGNA, was acquired by Chubb in 1999.</li> </ul>  |
| 1800s    | <ul style="list-style-type: none"> <li>In 1812, the Pennsylvania Company became the first life insurance company founded in the U.S.</li> <li>In 1846, the Canada Life Assurance Company, the first Canadian life insurance company, was founded.<sup>22</sup></li> <li>In 1871, the NAIC was created, instituting a nationwide standard-setting body for U.S. insurers.</li> <li>The passing of the first Canadian insurance law in 1868, the Dominion Insurance Act, prompted the establishment of major insurance companies (Mutual Life, Sun Life, Confederation Life and London Life) in the 1870s.<sup>23</sup></li> <li>Before the Civil War, the U.S. was an important market for insurers from the U.K. to cover the cotton trade. After the Civil War, many foreign insurers, including from Canada, Germany, Russia and Switzerland, were attracted to the growing U.S. market.</li> </ul> |

<sup>21</sup> “Brief History,” Insurance Information Institute, <https://www.iii.org/publications/insurance-handbook/brief-history> (accessed on June 30, 2022).

<sup>22</sup> “Our History,” Canada Life, <https://www.canadalife.com/about-us/who-we-are/company-history.html> (accessed on June 30, 2022).

<sup>23</sup> C. Haehling Von Lanzanauer, “Insurance,” *The Canadian Encyclopedia*, February 7, 2006, <https://www.thecanadianencyclopedia.ca/en/article/insurance> (accessed on June 30, 2022).

| Timeline   | Key Event  |
|------------|--|
| 1900s      | <ul style="list-style-type: none"> <li>The Industrial Revolution brought greater opportunities for innovation in insurance products and enhanced coverage.</li> <li>The San Francisco earthquake of 1906 caused USD 10 billion in damages and USD 4.9 billion in claims, which represented 47 years of profit for the entire U.S. insurance market.</li> <li>U.S. insurers began to successfully expand into European markets, a trend that was stopped by World War I.</li> </ul>   |
| 1920s      | <ul style="list-style-type: none"> <li>Customer culture and mass marketing emerged, and insurance products to protect newly available products, such as automobiles, soon followed.</li> <li>The Stock Market Crash of 1929 impacted the entire U.S. and global economy, as well as insurers. During the Great Depression, life insurers fared better than others as they offered protection to families in a time of economic uncertainty.</li> <li>What is now known as Blue Cross Blue Shield was founded in 1933 as an organization that provided access to medical services at local Minnesota hospitals in exchange for fixed monthly fees.<sup>24</sup></li> </ul>                              |
| 1950–1960s | <ul style="list-style-type: none"> <li>After World War II, the U.S. liberalized insurance markets, allowing insurers to diversify away from single-line underwriting.</li> <li>The postwar economic expansion and customer-driven markets provided a conducive environment for the U.S. insurance industry, driving developments in risk management and actuarial science.</li> <li>By 1965, the number of life insurance contracts in the U.S. was almost three times higher than in 1945.</li> </ul>   |
| 1970s      | <ul style="list-style-type: none"> <li>The 1970s saw a breakdown of international monetary agreements reached in the immediate aftermath of World War II. The U.S. was entering an extended period of economic uncertainty marked by rising inflation and volatile exchange rates.</li> </ul>  |
| 1980s      | <ul style="list-style-type: none"> <li>U.S. insurers competed aggressively in the 1970s and 1980s, offsetting unprofitable underwriting with high investment returns. By the mid-1980s, mounting losses pressured half of the previously existing reinsurers to leave the U.S. market.</li> <li>The worldwide trend toward financial de-regulation prompted changes in Canadian legislation governing investments and capital reserve requirements. The laws in force had been in place since 1899.</li> <li>In 1987, Canada created the Office of Superintendent of Financial Institutions (OSFI), a single federal regulatory agency responsible for the oversight of banks and insurers.</li> </ul> |

<sup>24</sup> “Our Story,” BlueCross BlueShield Minnesota, <https://blog.bluecrossmn.com/future-of-health-care/born-from-the-great-depression-a-continued-promise-to-protect-the-sustainability-of-health-care-costs/> (accessed on June 30, 2022).



| Timeline | Key Event  |
|----------|--|
| 2000s    | <ul style="list-style-type: none"> <li>In 2001, the September 11 terrorist attacks in the U.S. claimed the lives of more than 3,000 people, many of whom worked for insurance and other financial services firms. Insurers paid an estimated USD 23.8 billion, making 9/11 the costliest insured manmade disaster ever.</li> <li>In 2005, Hurricane Katrina became the most expensive natural disaster in U.S. history to date, with 1.7 million claims and USD 41.1 billion in losses to private insurers.<sup>25</sup></li> <li>Competition that followed previous deregulation led to just three insurers controlling 75% of the Canadian life insurance market by 2008.</li> <li>In 2008, the collapse of investment bank Lehman Brothers signaled the onset of the Global Financial Crisis. AIG, which had USD 1 trillion in assets in 2007, lost USD 99 billion in 2008 and was rescued by a USD 85 billion loan by the U.S. Federal Reserve.</li> </ul> |
| 2010s    | <ul style="list-style-type: none"> <li>Over this decade low interest rates in the financial markets pushed multiple insurance companies to redefine their products, for example, eliminating their guarantees in their insurance products.</li> </ul>  |
| 2020s    | <ul style="list-style-type: none"> <li>The onset of the COVID-19 pandemic in 2020 and its continuance has caused widespread economic disruption, spikes in health care costs and life insurance claims, and surging inflation because of monetary policy intervention and economic change.</li> </ul>  |

Source: "A History of US Insurance," Swiss Re, <https://www.swissre.com/>; "A History of Insurance in Canada," Swiss Re, <https://www.swissre.com/>.

### 1.3 ENTERPRISE RISK MANAGEMENT (ERM) OVERVIEW

ERM is an orderly or prescribed conduct or pattern of behavior for an enterprise that requires full support and commitment of the enterprise's management, influences corporate decision making, and ultimately becomes part of the culture of that enterprise. It is particularly relevant to the insurance industry, acting as a strategic decision support framework for management. It improves decision making at all levels of the organization.

From an oversight perspective, ERM encompasses the culture, capabilities and practices that organizations integrate with strategy setting and apply when they carry out that strategy, with the purpose of managing risks in creating, preserving and realizing value. It requires more than taking an inventory of all the risks within the organization. It is a broader concept that includes practices that the management puts in place to actively manage those risks.

The essence of ERM charters, policies, risk appetite, frameworks, guidelines and practices has transcended the compliance goal and aims to bring operational efficiencies and create a more holistic vision of the enterprise. Insurers use ERM to reduce, mitigate and transfer risk.

The evolution of ERM<sup>26</sup> brings to fore business issues and opportunities. These stem from the realization that risk management of "single elements" has its flaws. The approach has changed because of the emergence of new and larger risks (man-made and/or natural catastrophes), the merger and acquisition of insurance and financial institutions, increased management accountability pressures, corporate governance and the prevailing environment around innovation, business and regulatory risks. These scenarios might have been mitigated had the firms possessed connected risk management systems and processes. Importantly, such an understanding of risks across a

<sup>25</sup> "Hurricane Katrina Fact File," Insurance Information Institute, March 2010, <https://www.iii.org/sites/default/files/docs/pdf/HurricaneKatrinaFactFile-0320101.pdf> (accessed on June 30, 2022).

<sup>26</sup> "Overview of Enterprise Risk Management," Canadian Actuarial Society, May 2003, [https://www.casact.org/sites/default/files/database/forum\\_03sforum\\_03sf099.pdf](https://www.casact.org/sites/default/files/database/forum_03sforum_03sf099.pdf) (accessed on June 30, 2022).

firm could also improve its credit rating, and by extension, reduce its cost of business, driving tangible business benefits. ERM combines the traditional risk management activities and take a holistic approach. It allows organizations to analyze the interconnectedness between different risks and the cumulative effects of the risks. From a multidimensional perspective, it also enables organizations to focus on the right risks and allocate resources accordingly.

In terms of scope, ERM could be used by insurers of any size. If an organization has a mission, strategy and objectives—and the need to make decisions that fully consider risk—then ERM is relevant. It can and should be used by all kinds of organizations, from small businesses to community-based social enterprises, government agencies and Fortune 500 companies.

Implementation and adoption of ERM is an ongoing process that requires involvement of senior management and all stakeholders of the enterprise, which include shareholders and debtholders, management and officers, employees, customers and the community within which the enterprise resides.

An ERM initiative needs to be a comprehensive and incremental process and cannot be an instantaneous one. Therefore, an organization must decide the scope of the ERM program by establishing clear targets, metrics and reporting requirements as the program develops. The most common risks categories overseen by ERM are the following (refer to Glossary for more details):

- Compliance
- Strategic
- Credit
- Insurance
- Investment<sup>27</sup>
- Competition
- Operational
- Regulatory
- Underwriting

In the U.S. and Canada, practitioners in the insurance industry continue to have a lively debate on how risks should be defined. For an ERM program to obtain corporate-wide buy-in and genuinely add value, it must be built around measurable risks, metrics, analysis and assessments that truly reflect the insurance company's risk culture. In other words, it must be in line with the strategy and operating model adopted by senior management and the Board of Directors. ERM is divided into three lines of defense: risk owners (first line), oversight (second line) and internal audit (third line).<sup>28</sup> The lines of defense are coordinated by the ERM committee chair, who is in direct contact with the company's board of directors in the day-to-day ownership and management over risks and controls.

Typically, the chief risk officer (CRO; ERM chair), along with the board of directors and compliance functions, participates in the process of defining the ERM charter, policies and risk appetite, frameworks and guidelines mentioned earlier. The charter is a foundational document that defines the key roles and responsibilities of the ERM

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<sup>27</sup> Also comprises financial market risk.

<sup>28</sup> Antonius Alijoyo, "Three Lines of Defense," Enterprise Risk Management Academy, <https://www2.erm-academy.org/publication/risk-management-article/three-lines-defense/> (accessed on June 30, 2022).

function, including segregation in the three lines of defense and the scope of each line. The policy has further details on the scope and overall decision-making process and approval requirements to deal with risks, effectively ensuring the risk appetite statement is monitored. The frameworks and guidelines operationalize the policy and include elements to ensure the three lines of defense perform their routine activities effectively. For instance, the first line owns the risk and typically is responsible for risk quantification (controls/testing) because it can add value to the entire organization through risk assessment and monitoring by leveraging its in-depth understanding of the sources of risks. In addition to the above mentioned ERM documents, additional policies may be put in place to achieve prudent oversight. For instance, the asset liability committee may have its own risk appetite and decision-making process. Further, the sustainability team may have its own guidelines (including limits) to deal with the financial impact and scenario analysis of climate change.

### **The First Line of Defense—Risk Owners**

The first line of defense comprises functions that own and manage risks and managers and staff who are responsible for identifying and managing risk. Collectively, they should have the necessary knowledge, skills, information and authority to operate the relevant risk control policies and procedures. This process requires an understanding of the company, its objectives, the environment in which it operates and the risks it faces. Key activities of risk owners include the following:

- Risk assessment: Handle risk assessment and identify emerging risks
- Policy adoption: Adopt and implement risk management policies that govern the roles and responsibilities of risk owners, especially in activities that lead to corporate growth. They are expected to be fully aware of the risk factors to be considered in every decision and action
- Internal controls: Implement effective internal control in business units and a monitoring process and maintain transparency in the internal control process.

### **The Second Line of Defense—Oversight**

The function provides policies, frameworks, tools, techniques and support to enable the first line of defense to manage risk and compliance, monitors effective risk and compliance management, and helps ensure consistency in definition and measurement of risk. Key activities of the oversight team include the following:

- Policy making: Handle development, monitoring and implementation of the company's overall risk management process
- Ongoing monitoring: Monitor and ensure that all business functions comply with risk management policies and standard operating procedures established by the company
- Reporting: Report to the department with the highest accountability on the company's complete exposure to risks

### **The Third Line of Defense—Internal Audit**

Internal audit drives the functions that provide independent assurance. Being outside the risk management processes of the first two lines of defense, its main role is to ensure that the first two lines are operating effectively and suggest improvements. It evaluates the effectiveness of governance, risk management and internal controls and reports to the organization's governing body and audit committee. It can also give assurance to sector regulators and external auditors that appropriate controls and processes are in place and are operating effectively. Key activities of internal audit include the following:

- Review and evaluate the design and implementation of risk management holistically

- Ensure the effectiveness of the first layer of defense and the second tier
- Rationalize and systematize risk assessment and governance reporting
- Provide assurance that risk management processes are adequate and appropriate

Here are a few examples of the best practices followed by insurers:

- *ERM charter.* An ERM charter, along with frameworks and documents such as policies, reporting, guidelines and procedures, helps practitioners navigate the intricacies of risk identification, measurement and mitigation. Putting these in place is crucial for ERM to work effectively.
- *ERM chair.* One of the best practices followed by large insurers lays down that the CRO should chair the ERM committee. Some small insurers may not have an ERM committee, but the chief actuary may be the de facto ERM chair, provided the legislation supports it.
- *ERM committee.* Hold monthly, quarterly or annual meetings to assess the risk universe, interact with stakeholders from each risk category, check controls and mitigants, and escalate issues, if required. ERM committees respond to any risk arising from tweaking of regulations or any other major events (such as the COVID-19 pandemic). A key activity of the ERM committee is to understand what the regulator requires and assess its impact on the insurer. To do that, ERM practitioners actively liaise with regulators to understand the requirement, give opinions, and assess impact, and work with their internal support functions to ensure proper risk controls and guidelines are adopted.
- *ERM lines of defense.* First-line practitioners have the budget to drive most of the business initiatives, be they business-as-usual (BAU) activities or innovation (business transformation). The second line works closely with risk owners in the first line to bring value by identifying efficiency opportunities, specifically around reporting. The third line looks beyond and analyzes interlinkages within the risk categories and their possible impact on policyholders. Together, the three lines create a collaboration matrix. Hence, it is not a one-way communication or workflow process.
- *ERM risk subcategories or risk taxonomy.* Periodic review is performed of risk identification and taxonomy to include emerging or evolving risks, such as pandemic, hyperinflation, cybersecurity, ESG, cultural and climate change.
- *ERM analytics.* Other key activities that ERM practitioners are focusing on include formulation and accessibility metrics, key performance indicators (KPIs), suggestions to improve reporting to enhance portability (e.g., centralization of key business data or portfolio-level data, such as assets, liabilities, new business and claims), and consistent use of data and reports across the organization.
- *ERM collaboration.* ERM practitioners in the three lines of defense—risk owners, oversight groups and internal auditors—are seeking ways to add value to their organizations. Those working at companies with more mature ERM functions in the U.S. and Canada do that by collaborating with other business units to better understand their top-of-mind risks, such as financial, nonfinancial and regulatory.

#### 1.4 JOURNEY TOWARD AN ERM TAXONOMY

The ERM taxonomy may be seen as an inventory common risk categories at the company level. The purpose of an ERM risk category taxonomy is to identify and mitigate risks through a collaborative process, and the risk management organization can seek the assistance of various departments for naming and defining the ERM taxonomy to foster a common risk category across the organization. A coherent taxonomy is an essential ingredient of effective ERM. It is not “nice to have,” but rather a compliance and regulatory requirement.

A defined ERM taxonomy also enables collaboration across functional areas in insurance, particularly in situations where a common risk affects apparently disjoint business units. For example, the recently created data science function at insurance companies is collaborating closely with model risk functions to better understand the scope of their algorithms and how potential bias issues may lead to discrimination risk when used in accelerated underwriting solutions (see Section 3.1.3). This type of interaction is used as an allied advantage to advocate the benefits of adopting ERM practices. Portions of the risk taxonomy are typically authored by varied business units, which collaborate to bring deep expertise to the terms and definitions. To reflect on learnings and changes in business strategy, these groups should be actively engaged to regularly update the taxonomy.

ERM risk taxonomy should help identify risks in critical end-to-end business processes. No one-size-fits-all approach to ERM taxonomy exists, but adoption can be facilitated through collaboration with business practitioners. A successful taxonomy codifies the risk language most frequently used and understood within an organization. Table 3 highlights an approach to define ERM taxonomy. This risk taxonomy forms the backbone of ERM and ensures consistency across different types of risk measurements. The authors have highlighted key risk factors practitioners have focus due to prevailing business and regulatory environment, but the reader could find each of these pertinent at any given time.

**Table 3:**  
**ERM RISK CATEGORIES AND KEY RISK FACTORS**

| ERM Risk Categories | Key Risk Factors (Focus by Practitioners)   |  | Risk Category Scope   | Example: Adoption of ERM Policy or Framework  | Example: Action to Mitigate Risk   |
|---------------------|---|--|---|---|--|
| Compliance          | <b>U.S.:</b><br>Regulatory<br>Political<br>uncertainty  | <b>Canada:</b><br>Corruption                   | Legal and financial penalties for failing to comply with internal and external regulations and legislations       | Compliance teams are taking responsibility and collaborating with multiple business areas ranging from product development to financial reporting                 | Collect cross-functional inputs, leverage data, define responsibilities and reporting requirements for employees, and promote a risk and compliance culture                        |
|                     | <b>Commonality:</b><br>Data privacy protection<br>Conflict of interest<br>Conduct risk  |  |   |   |  |
| Strategic           | <b>U.S.:</b><br>AI/ML adoption  | <b>Canada:</b><br>Climate considerations       | Risk to earnings arising out of adverse business decision, and not keeping up with customer needs and preferences | A risk-aware culture combined with proper controls and KPIs to monitor all business decisions. This should be followed with regular reporting and impact analysis | Economic capital and risk adjusted return on capital are a few metrics to track strategic risk. SWOT analysis, risk factor identification and scenario analysis could be used too. |
|                     | <b>Commonality:</b><br>Changing customer preferences<br>Driving efficiency<br>Maintaining profitability                                     |  |   |   |  |
| Credit              | <b>U.S.:</b><br>Financial<br>health   | <b>Canada:</b><br>Size of the credit extension | A credit agency assigning a score as per credit quality that is used in assessing risk metrics                    | Proper disclosures to investors, providing provisions for key areas observed by credit agencies, such as quantitative and qualitative variables                   | Focus on improving financial metrics evaluated by credit agencies, enhancement of public disclosures and financial reports   |
|                     | <b>Commonality:</b><br>Credit spread/Counterparty default<br>Reputational<br>Societal changes<br>Sustainability agenda (net zero 2050)      |  |   |   |  |
| Insurance           | <b>U.S.:</b><br>Business<br>Strategic   | <b>Canada:</b><br>Biometrics<br>Longevity      | Threat or peril that the insurance company has agreed to insure against in the policy wordings                    | Having sound underwriting and settlement policies, estimating loss distributions for insured events and including necessary exclusions                            | Risk assessment, business impact analysis, reviewing inflation cost or replacement cost, reinsurance or diversifying the risk exposure   |
|                     | <b>Commonality:</b><br>Actuarial/mortality–longevity/premium<br>Severe weather/climate events<br>Portfolio concentration/morbidity/reserves |  |   |   |  |
| Investment          | <b>U.S.:</b><br>Interest rate   | <b>Canada:</b><br>Horizon                      | The possibility that income earned on   | Effectiveness of the Audit Committee and  | Continuous monitoring of risk tolerance,   |

| ERM Risk Categories | Key Risk Factors (Focus by Practitioners)   |   | Risk Category Scope   | Example: Adoption of ERM Policy or Framework   | Example: Action to Mitigate Risk  |
|---------------------|---|---|---|--|---|
|                     | Concentration   | Investment  | assets might not be sufficient to fulfil future liabilities. Mainly risk arising from movement in stock prices, interest rates, exchange rates and commodity prices. Market risk factors are also related to investment risk. | the Board of Directors. Promoting investment teams to follow guidelines on asset class, liquidity considerations, portfolio allocation and asset-liability management. Maintaining risk within thresholds and performing sensitivity and scenario analysis to estimate loss. | diversify assets, hedge investments and update strategies based on market conditions. Ensuring risk metrics like VaR and expected shortfall stays within threshold.                                 |
| Competition         | U.S.:<br>New competitors<br>Increasing digital channels   | Canada:<br>Tight labor market                       | Identifying the risk that arises from entry of new players in the industry, changing consumer preference or reducing profitability.   | Promoting a culture of constant development in the firm and continuously reinventing to stay relevant in the market.   | Diversification, improving efficiency to increase profitability and maintaining product or service differentiations from the competitors.   |
|                     | Commonality:<br>Product relevance (consumer preference)<br>Pricing strategies and profitability<br>Social inflation                                     |   |   |  |   |
| Operational         | U.S.:<br>Cyber<br>Model<br>Technology<br>Obsolescence   | Canada:<br>Climate<br>Talent<br>Cultural<br>Process | Risk and losses arising from human errors, inadequate or faulty internal processes, system failures or external events.   | Regulatory compliance violations, breach of contract, antitrust, market manipulation and unfair trade practices; new laws or regulatory requirements.  | Loss data by the Operational Risk Consortium (ORIC) and recording of events, and choosing a path for controlling the specific risks and considerations by business activity.                        |
|                     | Commonality:<br>Systems and use of alternate data<br>External events<br>Reputational<br>Conduct risk<br>Data privacy protection<br>Conflict of interest |   |   |  |   |
| Regulatory          | U.S.:<br>Ethical and bias concerns  | Canada:<br>New legislation                          | Laws and regulations that impose penalties or sanctions on a business for noncompliance   | A comprehensive summary and analysis of recent enforcement, disciplinary rulings, fines, suspensions, notices and other actions initiated and imposed by regulating authorities against industry members.  | Gap analysis, compliance policies and internal controls, compliance audits and checks. Collaborate with regulators by responding to consultation papers, formulating a proactive compliance policy. |
|                     | Commonality:<br>Legal action<br>Accounting reporting  |   |   |  |   |
| Underwriting        | U.S.:<br>Regulatory   | Canada:<br>Product relevance                        | Risk of uncontrollable factors or an inaccurate assessment of risks when writing an insurance policy.   | Assess the risk of insuring a home, car or driver and individuals who are applying for life insurance policies.  | Collect cross-functional inputs, leverage data and define responsibilities, continued revision of relevant policies.  |
|                     | Commonality:<br>Underwriting discrimination   |   |   |  |   |

Source: "Enterprise Risk Management," NAIC, April 7, 2021, <https://www.manappuram.com/>; "The State of Enterprise Risk Management (ERM) in Canada: A Benchmarking Study," Chartered Professional Accountants, June 3, 2019, <https://www.cpacanada.ca/>.

Color key: Focus by practitioners in the U.S. | Focus by practitioners in Canada | Common focus

## Section 2: Research on Insurance and ERM in the U.S. and Canada

The U.S. and Canada have a long history of publications and organizations dedicated to support ERM practitioners with research, opinions and interactions with the government and public to help enhance risk culture awareness in the insurance industry. Multiple organizations in the U.S. and Canada handle or publish ERM publications:

- North American CRO Council
- American Academy of Actuaries (AAA)
- Canadian Institute of Actuaries (CIA)
- Casualty Actuarial Society (CAS)
- Global Association of Risk Professionals (GARP)
- Professional Risk Managers' International Association (PRMIA)
- Risk Management Society (RIMS)
- Society of Actuaries (SOA)

Other actuarial organizations may publish or comment at professional conferences about ERM; some of these organizations include the Conference of Consulting Actuaries and the American Society of Pension Professionals & Actuaries. Additional public and private associations or other organizations may also publish relevant content about the ERM for the insurance industry.

This section presents key details and a summary of key ERM literature for insurers.

### 2.1 THE NORTH AMERICAN CRO COUNCIL

The North American CRO Council was formed in November 2011 by a group of CROs from North American property and casualty and life insurers. The 30+ council members represent CROs of leading insurers based in the U.S. and Canada, who as a group aim to develop and promote leading practices in risk management throughout the insurance industry and provide thought leadership and direction on risk-based solvency and liquidity assessments.

As part of its mission, the council tracks global developments associated with the harmonization of regulatory capital requirements across jurisdictions. It also provides guidance to North American regulatory bodies on effective methods for evaluating risk management and solvency monitoring standards<sup>29</sup> and ERM. Key positioning highlights from the North American CRO Council's publications that pertain to ERM include the following:

- Resiliency and risk management: A holistic and strategic risk management framework to handle day-to-day practices that enable an organization to manage operational risks by enabling continuous delivery of services and minimizing the impact of potential risks to business objectives and enabling it to react and adapt quickly to events.<sup>30</sup> The publication identifies three risk categories for a resilient organization: Resilient business operations, a culture of preparedness and third-party resiliency. An organization should develop a formal methodology to identify and document critical business processes and process flows,

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<sup>29</sup> Denise Tessier, "Giving a Risk Management a Voice," *Property Casualty 360*, August 1, 2012, <https://www.propertycasualty360.com/2012/08/01/giving-risk-management-a-voice/?slreturn=20220515053858> (accessed on June 30, 2022).

<sup>30</sup> "Resiliency and Risk Management," December 2021, North American CRO Council, [https://cro council.org/file/3/CRO%20Council\\_Resiliency%20and%20Risk%20Management\\_Dec2021.pdf](https://cro council.org/file/3/CRO%20Council_Resiliency%20and%20Risk%20Management_Dec2021.pdf) (accessed on June 30, 2022).

third-party dependencies and information technology (IT) asset relationships. Although some business disruptions may be unavoidable, steps can be taken to reduce the risk of a prolonged impact through crisis management, business continuity planning, proactive IT development and scenario exercises considering cyber- and third-party risks. Based on the size and complexity of an organization, a resiliency program should be considered to provide holistic governance, monitoring and reporting of the various aspects of resiliency risks.

- Climate risk management: Chief risk officers are adopting emerging practices and guidance on how climate risk impacts the risk insurance companies.<sup>31</sup> According to the publications, insurers follow risk management practices to assess to what extent, if any, they could be financially impacted by climate change over both the short and long term. The impact of climate risk is transversal and may impact many areas of an insurer's business and risk profile and therefore will need to be managed across risk disciplines such as investment risk, insurance risk, operational risk and model risk. Some firms have conducted an exercise to look across the firm and catalog the potential risks associated with climate change. Based on this exercise, the firm can develop long-term strategies for addressing these risks, including developing action plans, and/or updating the policies and risk appetite statement, as appropriate. In most cases, existing reporting and governance infrastructures can and should serve as the vehicles for addressing climate risk, such as incorporating consideration of climate risks within the Own Risk and Solvency Assessment (ORSA) or within existing board committees and reporting processes.
- COVID-19 and ERM preparedness: The availability of data was a common theme among the insurers, which could enable rigorous analytics and flexible reporting. Insurers that managed well during the COVID-19 pandemic benefited from risk management infrastructure built over many years in the normal times.<sup>32</sup> These companies also benefited from corporate cultures that value risk management, along with strong ERM organizations that partner with the business and finance, actuarial and investment organizations to effectively measure, report and manage risk across the enterprise. An insurer's risk appetite framework should anchor risk and capital management processes, serving as an enterprise's lens for review of major transactions and strategic initiatives, as well as incremental changes in product risk and investment risk. These processes should be integrated so that risk management and finance have access to the same analyses and scenarios, leading to better decision making. In this way, capital and liquidity management are intricately linked to risk management.

## 2.2 KEY INSURANCE PUBLICATIONS

The *Insurance Journal* provides regional, national and international information related to the insurance industry. Key findings from their ongoing publications and articles include the following:

- ERM framework: Insurers with more complex risk profiles such as property and casualty insurers have the most opportunity to strengthen their ERM framework in the areas of emerging and strategic risk management. Insurances companies have been strengthening their ERM framework since the financial crisis as the crisis exposed the less effective risk management practices of many insurers. Insurers have

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<sup>31</sup> "Climate Risk Management in the Insurance Industry: Setting a Foundation," North American CRO Council, December 2020, [https://crocouncil.org/file/1/CRO%20Council\\_Climate%20Change%20Risk%20Management\\_Dec2020\\_Final.pdf](https://crocouncil.org/file/1/CRO%20Council_Climate%20Change%20Risk%20Management_Dec2020_Final.pdf) (accessed on June 30, 2022).

<sup>32</sup> "Value of Risk Management during a Crisis: Focus on Covid-19 Pandemic," North American CRO Council, December 2020, [https://crocouncil.org/file/2/CRO%20Council\\_Value%20of%20Risk%20Management%20During%20a%20Crisis\\_Jan2021\\_Final.pdf](https://crocouncil.org/file/2/CRO%20Council_Value%20of%20Risk%20Management%20During%20a%20Crisis_Jan2021_Final.pdf) (accessed on June 30, 2022).



improved their processes to better control the tail risk, and most insurers in the U.S., Canada and Bermuda region were assigned a strong or excellent risk management rating as they went through ERM level II reviews.<sup>33</sup>

- Reinsurance ERM focus: Reinsurers are focusing on a strong ERM framework relative to traditional insurers.<sup>34</sup> The S&P ratings agency explains that its assessments reflect that the reinsurance industry’s ERM practices are very favorable compared with those of primary players, aided by reinsurers’ strong investment in risk modeling and increased understanding of complex risks.
- Cyberrisk: “The State of Cyber Resilience,”<sup>35</sup> a survey in May 2022, found that nearly three-quarters of global cyberrisk decision makers recently surveyed said their company experienced at least one cyberattack in the past year, and just 3% rated their company’s cyber hygiene as excellent.<sup>36</sup> The leadership confidence in their organization’s core cyberrisk management capabilities—including the ability to assess cyberthreats, mitigate cyberattacks and respond to cyberattacks—is largely unchanged since the last survey in 2019, when 19.7% of respondents stated they were highly confident compared with 19% in 2022. The survey report concluded that insurance is playing a role in building resilience. Many respondents said insurance is an important part of the cyberrisk management strategy and it is worth the money. Moreover, countering cyberthreats needs to be an enterprise-wide goal aimed at building cyber resilience across the firm rather than singular investments in incident prevention or cyber defense.
- Cloud downtime: Ever since cloud solutions became preferred for businesses of any nature to house and process data,<sup>37</sup> a single hour of downtime from mission-critical, third-party IT service providers can cost small and medium-sized enterprises tens of thousands of dollars, and traditional insurance often does not cover these significant losses. However, insurers such as Parametrix Insurance have created monitoring systems that independently verify uptime and downtime for the cloud and generate sufficient data to model cloud outages.

The *Actuary Magazine* provides SOA members and candidates a global perspective across all areas of practice by publishing content and showcasing people and companies advancing actuaries as leaders and innovators.<sup>38</sup> ERM-related publications include the following:

- ERM and the role of the actuary: It defines how training of actuaries helps them in a risk management role, and how actuaries are being called upon to consider various sustainability issues, including climate risks and opportunities in ERM frameworks.<sup>39</sup>
- Future of ERM: As modeling continues to evolve, driven internally by the need for more accurate and timely risk information and by external stakeholder requirements for reporting on risks and capital,<sup>40</sup>

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<sup>33</sup> “S&P: No. Am, Bermuda Insurers Enhancing Enterprise Risk Management Efforts,” *Insurance Journal*, May 2011, <https://www.insurancejournal.com/news/international/2011/05/02/196878.htm> (accessed on June 30, 2022).

<sup>34</sup> “Reinsurers’ Strong Enterprise Risk Management Key to Success—And Survival: S&P,” *Insurance Journal*, August 22, 2016, <https://www.insurancejournal.com/news/international/2016/08/22/424019.htm> (accessed on June 30, 2022).

<sup>35</sup> Broker Marsh partnered with Microsoft Corp. for the survey.

<sup>36</sup> “Cyber-Hygiene Confidence Low but Insurance Is Making An Impact: Survey,” *Insurance Journal*, May 27, 2022, <https://www.insurancejournal.com/news/national/2022/05/27/669544.htm> (accessed on June 30, 2022).

<sup>37</sup> “How Cloud Downtime Insurance Became a Thing,” *Insurance Journal*, March 8, 2022, <https://www.insurancejournal.com/news/international/2022/03/08/657170.htm> (accessed on June 30, 2022).

<sup>38</sup> *The Actuary*, Society of Actuaries, <https://theactuarymagazine.org/> (accessed on June 30, 2022).

<sup>39</sup> Gavin R. Maistry, “The Role of Actuaries in ERM,” *The Actuary*, May 2021, <https://theactuarymagazine.org/the-role-of-actuaries-in-erm/> (accessed on June 30, 2022).

<sup>40</sup> Rich Lauria, “Riding the ERM Wave,” *The Actuary*, 2020, <https://theactuarymagazine.org/riding-the-erm-wave/> (accessed on June 30, 2022).

practitioners will continue to refine existing methodologies built on pro forma projections. Data analysis of risk events will become more formalized, providing regularly updated assumptions to ERM modelers. Advancements in machine learning (ML) and artificial intelligence (AI) may provide impetus to future models.

Additionally, the Joint Risk Management Section (JRMS) of the SOA, CAS and CIA conducts an online survey annually to track the thoughts of risk managers about emerging risks across time. At the start of 2022, JRMS published its 15th annual survey in November 2021. Key findings from the survey include the following:<sup>41</sup>

- Current risk: In the survey, 27% of respondents consider the pandemic/new diseases as the most significant current risk among other risk categories such as climate risk, financial volatility risk and cyberrisk. Although the score has fallen from 45% over the previous year, it is still considered the top current risk among insurers.
- Emerging risk: The rising trend of a high number of tropical storms, droughts, and wildfires in the U.S. and Canada region over the last two or three years has caused climate risk to become the top emerging risk among 26% of the respondents in the survey. It is followed by cyberrisk, pandemic/infectious disease risk, disruptive technology and financial volatility.

The Enterprise Risk Management Practice Committee of the CIA has prepared and published a practice resource document to aid actuaries, risk practitioners, risk managers, executives and board members who would like to gain a better understanding of risk appetite and incorporate a risk appetite framework into their ERM program.<sup>42</sup> The document addresses key concepts, principles and objectives of an effective risk appetite framework, which can help organizations strike the right balance between uncontrolled risk taking and excessive caution, enhancing risk awareness and communication across an organization. Key insights include the following:

- Objective of the risk appetite framework: An organization's goals in establishing a risk appetite framework include preserving capital adequacy, maintaining adequate liquidity, complying with regulatory requirements and/or improving risk awareness in business decisions, among others. It provides common language and comparable measures to understand risks and offers clearly defined operational boundaries to pursue business goals.
- Risk appetite statement: It is a concise statement used by many stakeholders to relate business objectives and strategy to acceptable levels of risk. It should address the most important risks faced by an organization such as insurance risk, investment risk and liquidity risk, and the organization should consider key factors to effectively communicate the risk appetite statement such as link with the business strategy and use of quantitative and qualitative measures.
- Risk capacity<sup>43</sup> and tolerance:<sup>44</sup> Risk capacity can be viewed as an absolute maximum ceiling for risk taking imposed by forces outside the organization. Externally imposed constraints may include capital requirements, liquidity requirements, third-party credit and claims-paying ability ratings and operational capabilities. The tolerance level sets the overall quantitative and/or qualitative boundaries for a material

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<sup>41</sup> "15th Annual Survey of Emerging Risk," Society of Actuaries, January 2022, <https://www.casact.org/sites/default/files/2022-01/15th-Emerging-Risks-Survey.pdf> (accessed on June 30, 2022).

<sup>42</sup> "Risk Appetite," Canadian Institute of Actuaries, November 2021, <https://www.cia-ica.ca/docs/default-source/2021/221124e.pdf> (accessed on June 30, 2022).

<sup>43</sup> Risk capacity represents the maximum level of risk an organization is able to support before breaching constraints determined by factors such as regulatory capital, liquidity needs and obligations to customers, shareholders and other stakeholders.

<sup>44</sup> Risk tolerances define the boundaries for the maximum amount of risk an organization is willing to accept.

category of risk. It is often expressed in the form of key metrics and targets and established after considering how much variability and risk taking an organization finds acceptable to pursue its business and strategic objectives.

- Risk measures and reporting: Risks that are material to the organization are to be quantified as much as possible. The importance of each risk measure may vary depending on the stakeholder group, as the diverse interests of stakeholders need to be considered.
- Risk governance: The risk appetite framework supports risk governance by providing the board of directors and senior management the information and tools necessary to understand and communicate the risks the organization is taking, risks that it should be taking and risks to be avoided in line with the organization's risk appetite and business strategy.

GARP also has some publications that provide general insight into the ERM. For instance, it discussed the development of an enterprise risk taxonomy for financial organizations and laid out a structure to identify, assess and manage risks consistently across critical business processes.<sup>45</sup> Moreover, other publications also expressed the ways to develop an integrated enterprise-wide risk management process, such as that leveraging ML can generate hundreds of regression-style equations within minutes, quickly linking a firm's business segments to macroeconomic and market environments. These equations immediately clarify which explanatory variables affect most of the business segment, integrating such dependencies at the enterprise level. They are, moreover, particularly helpful when risk managers find themselves in the uncharted territory of an unprecedented business environment.<sup>46</sup>

The Professional Risk Managers' International Association (PRMIA) is a nonprofit organization that focuses on the development and education of the risk management profession. Its membership provides a network of risk professionals working to set standards for the global risk profession. It publishes a quarterly newsletter and white papers from risk management professionals on any matter of professional interest to fellow practitioners. For instance, in its recently published newsletter, *Intelligent Risk*, in April 2022, an article discusses that climate change is increasingly being viewed by financial industry as a systemic risk, and the valuation of climate change risks (both physical and transition risks) represents a complex and multidimensional process for which there is currently no agreed-upon industry standard. In addition, it goes on to discuss how global financial regulators have also been intensifying their scrutiny of climate-related risk management such as the U.S. Securities and Exchange Commission (SEC), which in October 2021 signaled its intention to finalize climate change regulations this year, and the Bank of England's Prudential Regulation Authority, who called on institutions to embed climate change-related financial risks into existing governance and risk management frameworks.<sup>47</sup>

*Risk Management* is the premier publication of analysis, insight and news for the risk management community published by the Risk Management Society (RIMS). RIMS conducts many conferences around emerging risk in insurance industry and risk management practices by professionals across the world such as RE-VISION in Canada and RISKWORLD in the United States. In addition, RIMS recognizes and awards the practitioner or organization for better risk management practices. For instance, in November 2021, RIMS presented the Internal Revenue Service (IRS) with the 2021 Global Enterprise Risk Management Award of Distinction at the society's ERM Conference in New York City. It recognized the IRS's outstanding achievements that allow it to anticipate emerging risks and

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<sup>45</sup> "How to Develop an Enterprise Risk Taxonomy," GARP, July 16, 2021, <https://www.garp.org/risk-intelligence/culture-governance/how-to-develop-an-enterprise-risk-taxonomy> (accessed on June 30, 2022).

<sup>46</sup> "IERM: How to Build a True Risk Business Partnership," GARP, March 18, 2022, <https://www.garp.org/risk-intelligence/culture-governance/ierm-how-to-build-a-true-risk-business-partnership> (accessed on June 30, 2022).

<sup>47</sup> "Intelligent Risk," PRMIA, April 2022, [https://issuu.com/prmia/docs/intelligent\\_risk-apr\\_2022-issuu](https://issuu.com/prmia/docs/intelligent_risk-apr_2022-issuu) (accessed on June 30, 2022).

establish the appropriate culture, processes and structures to strengthen strategic decision-making.<sup>48</sup> Additionally, in 2021, recognizing the devastating economic impact caused by COVID-19, RIMS joined the Business Continuity Coalition to build a more stable insurance market in the U.S. that will support organizations as they navigate future pandemics and develop insurance solutions for them.<sup>49</sup>

### 2.3 OTHER ERM PUBLICATIONS

Each year, the ERM initiative at North Carolina State University, in partnership with the Association of International Certified Professional Accountants, conducts research<sup>50</sup> on the current state of risk oversight processes in large organizations (revenue greater than USD 1 billion), publicly traded companies, financial services entities and not-for-profit organizations. The respondents represent a broad range of industries. The four most common industries responding to this year's survey were finance, insurance, and real estate (26%), not-for-profit (28%), manufacturing (12%) and services (12%). In April 2021, North Carolina State University published its 12th edition. The key highlights are as follows:

- Maturity of risk management practices: Although progress has been made, more than two-thirds of the organizations surveyed still do not have “complete” ERM processes in place. The research indicates that insurers continue to struggle to integrate their risk management and strategic planning efforts, and fewer than half of the respondents describe their organization's approach to risk management as “mature” or “robust.”
- Ongoing risk monitoring: The growing use of data analytics may provide opportunities for management to strengthen their management “dashboards” to include more information that helps track potential risks on the horizon. The integration of risk information with discussion of the strategic plan is not happening extensively across most organizations, which suggests opportunities to enhance such integration with strategic planning information for most organizations.
- Risk environment: Organizations are facing pressures from several stakeholders to provide more risk information, and business leaders want to be better prepared when unexpected risk events emerge to avoid being surprised. The COVID-19 pandemic revealed this need (Table 3).
- Risk culture: Several impediments can be identified as to the embrace of ERM, with the most frequently cited obstacle reflecting a sentiment that organizations manage risks in other ways besides ERM. In addition, too many pressing needs and no request to change risk management approach were among the other impediments to ERM.

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<sup>48</sup> “RIMS ERM Conference 2021: IRS Receives Global Enterprise Risk Management Award of Distinction,” *Risk Management Monitor*, November 15, 2021, <http://www.riskmanagementmonitor.com/rims-erm-conference-2021-irs-receives-global-enterprise-risk-management-award-of-distinction/> (accessed on June 30, 2022).

<sup>49</sup> “RIMS Joins Business Continuity Coalition to Develop an Insurance Solution for Pandemics,” Risk Management Society, June 22, 2021, <https://www.rims.org/about-us/newsroom/rims-joins-business-continuity-coalition-to-develop-an-insurance-solution-for-pandemics> (accessed on June 30, 2022).

<sup>50</sup> “The State of Risk Oversight: An Overview of Enterprise Risk Management Practices—12th edition,” North Carolina State University's Poole College of Management, May 4, 2021, <https://erm.ncsu.edu/az/erm/i/chan/library/2021-risk-oversight-report-erm-ncstate.pdf> (accessed on June 30, 2022).

## Section 3: State of Innovation

The insurance industry has undergone multiple transformations over the years to serve consumers better. Although this transformative evolution may not all be visible to policyholders, its impact on consumer experience, such as speed and transparency in the insurance buying process, reflects successful innovation. From an ERM practitioner standpoint, here are a few aspects that enable innovation and keep it at the core of an insurer's agenda:

- **Freedom to experiment:** An environment is needed that can enable a safe design and testing process to articulate potential solutions to existing business problems. For example, some insurers have innovation committees to help guide and oversee these types of initiatives. However, this centralization can limit participation from practitioners companywide and agility of innovation, adding a bottleneck and unnecessary oversight.
- **Collaboration culture:** Siloed business functions are a detriment to innovation, given that practitioners stay in an operative mode rather than a vigilant and innovative one. Cross-functional teams and periodic role rotation programs are eliminating the need for external support and improving employee retention.
- **Attention from senior risk management:** The board of directors and senior risk executives are changing the way they view ideas, suggestions and recommendations from employees. A high level of attention is helping practitioners further experiment with new models, particularly those that use and benchmark AI/ML algorithms.

Insurers continue to rely on their risk-management functions in the discovery and quantification of potential risks—they remain a must-have during the innovation process. Practitioners, including actuaries, add value by bringing effective and timely solutions with their risk assessments.

As the corporate structures of medium to large insurance companies evolve and become more complex, they present both challenges and benefits to ERM practitioners. One immediate benefit is the exposure to ERM best practices emanating from different jurisdictions where insurers operate. For example, in the U.S. and Canada, insurers have multiple offices and branches—they may be headquartered in one country and have subsidiaries in other countries and need to meet regulatory obligations and practices in both locations. However, innovation and adoption of corporate practices may be a challenge, as local entities may have to prioritize based on local requirements, such as local customer segments and needs.

The corporate structure of insurers is another consideration about the role of ERM and how to drive innovation in risk mitigation. For example, innovation opportunities may increase for companies headquartered in country "A" and having subsidiaries or new business lines in country "B" because cultural differences across geographies can trigger or accelerate innovation. Though corporate structures may provide benefits in managing risk and setting ERM practices, they may also bring a completely different risk exposure, such as when the company ACE acquired Cigna's P&C business and created a separate company of asbestos exposure-related risks.

Also, mergers and acquisitions continue to be a good mechanism to enter new markets and accelerate innovation, for example, the entry of Japanese insurance holding company Dai-ichi in the U.S. market with the recent acquisition of Protective Insurance.

### 3.1 PRODUCT INNOVATION

#### 3.1.1 ADOPTION OF BLOCKCHAIN AND CRYPTO BY INSURERS

Blockchain in its simplest terms is a “chain” of previously validated transaction “blocks” that constitutes an immutable digital ledger and a distributed, resilient basis for value transfers. In other words, one finds private centralized blockchains, a distributed and public digital ledger that is used to record transactions across many computers so that the record cannot be altered retroactively without the alteration of all subsequent blocks and the consensus of the network. The use of blockchain in the insurance field is developing, but insurers are carefully evaluating how to best use blockchain technology to maximize existing advantages and strengths.<sup>51</sup>

The inherent characteristics of blockchain technology help deliver on insurers’ agendas: nonrepudiation with verified and secure customer and claims data, fraud prevention with robust governance, and improved risk management and financial reporting with a defined audit trail.<sup>52</sup> Key applications of blockchain technology in the insurance industry include the following:<sup>53</sup>

- Property & casualty (P&C) insurance: A shared ledger and insurance policies executed through smart contracts<sup>54</sup> can bring an order of magnitude improvement in efficiency to property and casualty insurance.
- Health insurance: With blockchain technology, medical records can be cryptographically secured and shared between health providers, increasing interoperability in the health insurance ecosystem.
- Reinsurance: By securing or executing reinsurance transactions on the blockchain the technology can simplify the flow of information and payments between insurers and reinsurers.
- Life insurance: Blockchain technology can take the burden of filing a death claim away from family members by replacing the manual process of filing claims with an automated system built on a blockchain ledger.

Another wider application for blockchain in the insurance industry is fraud detection and risk prevention by moving insurance claims onto an immutable ledger, through which blockchain technology can help eliminate common sources of fraud. For example, in the U.S., the total cost of insurance fraud (non-health insurance) is estimated to be more than USD 40 billion per year. That means insurance fraud costs the average U.S. family between USD 400 and USD 700 per year in the form of increased premiums.<sup>55</sup>

Blockchain technology may enable better coordination between insurers to combat fraud. On a distributed ledger, insurers could record permanent transactions, with granular access controls to protect data security. Storing claims information on a shared ledger would help insurers collaborate and identify suspicious behavior across the ecosystem. For example, an app called “ClaimShare” developed by IntellectEU, a U.S. software company, uses blockchain-based technology to combat double-dipping, a practice where one claimant fraudulently receives a payout from multiple insurers on the same incident. Once a policyholder files a claim, the app sorts the information

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<sup>51</sup> “Blockchain Benefits for Insurers,” SAPIENS, February 2017, [https://www.sapiens.com/wp-content/uploads/2017/02/WP\\_Blockchains-Benefits-for-Insurers\\_RevC.pdf](https://www.sapiens.com/wp-content/uploads/2017/02/WP_Blockchains-Benefits-for-Insurers_RevC.pdf) (accessed on June 30, 2022).

<sup>52</sup> “Exploring the Promise of Blockchain in Insurance Technology,” Tata Consultancy Services, <https://www.tcs.com/content/dam/tcs/pdf/Industries/insurance/insights/blockchain-technology-can-insurers-realize-its-promise.pdf> (accessed on June 30, 2022).

<sup>53</sup> “How Blockchain Is Disrupting Insurance,” *CB Insights*, August 2, 2021, <https://www.cbinsights.com/research/blockchain-insurance-disruption/> (accessed on June 30, 2022).

<sup>54</sup> Refer to Glossary.

<sup>55</sup> “Insurance Fraud,” FBI, <https://www.fbi.gov/stats-services/publications/insurance-fraud> (accessed on June 30, 2022).

related to the claim into two categories: personally identifiable information (PII) and non-PII. The non-PII information is then shared with other insurers in real time, using the R3 Corda distributed ledger technology. This information is then passed through a confidential computing platform called Conclave, which runs code to compare claims across insurers and detect fraudulent patterns.

Additionally, the P&C insurance industry deals with a large amount of claims data for multiple lines of business, such as houses, vehicles and others. Standard mechanisms to process claims require multiple data entry points from numerous sources and coordination among various parties simultaneously. The exchange of data becomes a challenging task for many insurers that involves high-risk transactions between multiple stakeholders and linking and tracking this web of data and its exchange to outcomes such as loss expenses incurred, fraud detection and impact on underwriting.<sup>56</sup> By allowing separate policyholders and insurers to track and manage physical assets digitally, blockchain technology can codify business rules and automate claims processing through smart contracts, while providing a permanent audit trail. For example, State Farm, a U.S. auto insurer, and United Services Automobile Association, a U.S. financial services group, use a blockchain-based solution to settle subrogation<sup>57</sup> claims in auto insurance. The companies utilize their Ethereum-based blockchain solution, which creates a ledger of all the transactions between two insurers. Instead of manually settling each claim, the blockchain-based ledger tallies up all the claims and executes one net transaction after a specified period, while allowing both parties to see the claims and verify them, meaning that trust can be established without ceding control to a third party. Thereby, this technology allows users to claim their deductibles sooner than using the manual process.<sup>58</sup>

Some insurance brokers in the U.S. and Canada are taking their first steps into the cryptocurrencies space as they gain wider acceptance among both private and institutional investors.<sup>59</sup> In some cases, that takes the form of letting customers pay premiums with digital coins, or it can mean paying claims with the currency when a driver gets into an accident. However, the coverage options available for crypto trading platforms and exchanges remain quite limited. Typically, the solutions are coming from the big brokerages, who have access to global markets, data and crypto expertise. Aon, for example, announced a collaboration with Bermudian specialist insurer Realm Insurance and Nayms, an insurtech platform that supports cryptocurrency investors in insuring crypto risk, to launch a pilot program that will help digital asset companies scale their insurance coverage efficiently by matching assets to liability when underwriting crypto risk.<sup>60</sup> Moreover, a U.S.-based pay-per-mile auto insurer, Metromile Inc., whose entrance into the industry promised to meld technology and insurance, recently said it would begin a pilot program allowing its customers to pay premiums and receive claims payouts in cryptocurrency.<sup>61</sup>

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<sup>56</sup> Somya Bhadola and Akanksha Sohil, "Blockchain in P&C Insurance Claims Processing—What Insurers Need to Know to Get Started on the Journey," Everest Group, September 20, 2019, <https://www2.everestgrp.com/reportaction/EGR-2019-28-V-3337/Marketing> (accessed on June 30, 2022).

<sup>57</sup> Subrogation is the process by which an insurance company can reclaim the payout they made to their insured from the insurance company of the driver who was at fault. Usually, subrogation is a manual process where insurers exchange physical checks on a claim-by-claim basis.

<sup>58</sup> "How Blockchain Is Disrupting Insurance," *CB Insights*, August 2, 2021, <https://www.cbinsights.com/research/blockchain-insurance-disruption/> (accessed on June 30, 2022).

<sup>59</sup> Terrence Dopp, "Cryptocurrency: Insurance Industry Tests the Waters with New Initiatives," *AM Best*, August 2021, <https://news.ambest.com/articlecontent.aspx?refnum=310901&altsrc145=%7B%7D> (accessed on June 30, 2022).

<sup>60</sup> "Insuring Canada's Maturing Crypto Market," *Insurance Business Canada*, November 24, 2021, <https://www.insurancebusinessmag.com/ca/news/specialty-insurance/insuring-canadas-maturing-crypto-market-317710.aspx> (accessed on June 30, 2022).

<sup>61</sup> "Cryptocurrency: Insurance Industry Tests the Waters with New Initiatives," *AM Best*, August 2021, <https://news.ambest.com/articlecontent.aspx?refnum=310901&altsrc145=%7B%7D> (accessed on June 30, 2022).

### 3.1.2 INTERNET OF THINGS: WEARABLE DEVICES

The desire for real-time data to measure and assess risk is enabled with devices aimed at collecting consumer data while connected to the internet. These devices are called wearables and can track and measure risk for each policyholder. The use of wearables strengthens the innovative approach that insurers follow to reduce adverse selection of the underwriting process.

The overall objective of a life insurance wearable device is to collect biometric data and assess consumer willingness to buy insurance. The technology uses a points system to provide rewards or incentives. The rewards include premium discounts or program cost elimination for participants with better health habits. The wearable device measures various metrics, such as steps walked on a given day, blood pressure and other physical activities, including exercising.

One of the first adopters of wearables in North America was Manulife, a Canadian life insurer. It announced the adoption of a new wearable technology to incentivize health habits among its users in Q4 2018. The insurer has partnered with Vitality, a third-party provider that collects data using wearable devices, to launch a wearable solution and would make insurer to use risk based pricing for each policyholder based on the information provided by the third party.

Another example of Internet of Things (IoT) is its adoption in home insurance products, where internet-connected devices provide new possibilities to prevent losses and detect fraud earlier by identifying whether the home is empty using smart locks, detecting any leaky pipes, using smart security cameras and so on.<sup>62</sup>

A growing number of carriers are encouraging policyholders to use internet-connected devices for improving risk management, the claims process, marketing and ratemaking. For instance, a home insurer may warn a customer of flooding or leaks or electrical outages due to an impending weather event that could lead to equipment failures. Based on a granular risk review, a home insurer can leverage the collected data to personalize coverage with premiums. Further, it can offer customers a risk assessment by providing sophisticated usage and risk data about weather conditions and incentivize users for their safer behavior.

Figure 4 shows that the percentage of insurers using IoT devices for home insurance has doubled from 10% in 2018 to 20% in 2021 in the U.S.,<sup>63</sup> but the number of insurers that have no interest in using has increased around 10%. This apparent contradiction could be a mirror on how insurers are navigating the cost benefit of this technology and whether consumer experience and/or benefits are positive to them.

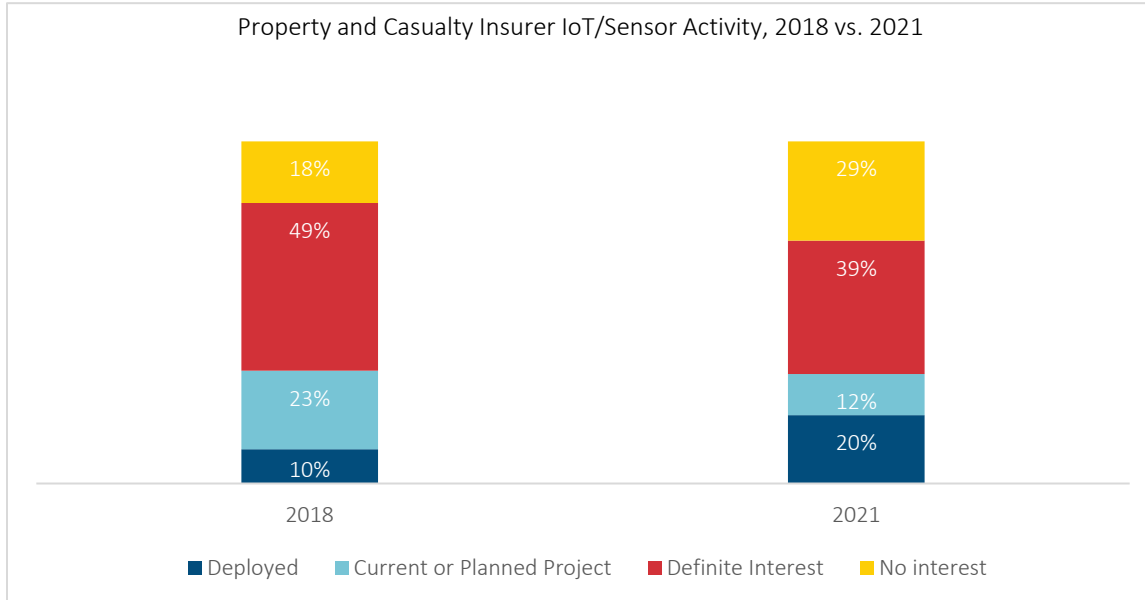
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<sup>62</sup> "The Use of Predictive Analytics in the Canadian Property and Casualty Insurance Industry," Canadian Institute of Actuaries, <https://www.cia-ica.ca/docs/default-source/research/2022/rp222067e.pdf> (accessed on June 30, 2022).

<sup>63</sup> Annmarie Geddes Baribeau, "Getting Personal—Can IoT Do for Homeowners Insurance What Telematics Did for Auto Coverage?," *Actuarial Review*, May 26, 2021, <https://ar.casact.org/getting-personal-can-iot-do-for-homeowners-insurance-what-telematics-did-for-auto-coverage/> (accessed on June 30, 2022).



**Figure 4:**  
**USE OF IOT DEVICES IN HOME INSURANCE**



**Source:** “Getting Personal—Can IoT Do for Homeowners Insurance What Telematics Did for Auto Coverage?,” *Actuarial Review*, May 26, 2021, <https://ar.casact.org/>. Survey groups are not identical year to year.

One of many IoT use cases in auto insurance is usage-based insurance, which includes the behavior-based PHYD (pay how you drive) and the miles-based PAYD (pay as you drive) or PAYGO (pay as you go). For example, in 2020 Boston-based Liberty Mutual Insurance announced its partnership with Ford to offer discounted insurance prices to customers driving a Ford connected vehicle. Further, they joined Tesla and Progressive in providing usage-based insurance.<sup>64</sup> Another example is how consumers have increased their interest in IoT coupled with their insurance products; for example, the number of consumers who accepted a telematics offer from their auto insurance providers increased 33% since end-2021 to date—a trend driven by consumers hoping to lower their premiums by demonstrating safe driving habits.<sup>65</sup>

### 3.1.3 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Artificial intelligence is defined as “the application of computational tools to address tasks traditionally requiring human sophistication” by the Financial Stability Board.<sup>66</sup> Insurers have been sharpening their focus on data-transformation initiatives by deploying AI/ML across operational processes. To be sure, AI/ML are transforming key areas of the insurance value chain, particularly underwriting, claims and fraud, and supporting the development of new products.

In the case of underwriting, AI/ML are being used in consumer and risk identification and pricing to deepen underwriting and reduce the time lag in issuing a policy, such as issuing a health product online without a medical examination. In claims, they are reducing the payout period, such as disbursing a car crash claim with pictures of the

<sup>64</sup> Jayanarayana Bhatt, “5 Insurance IoT Applications in America,” Simple Solve, November 9, 2021, <https://www.simplesolve.com/blog/5-insurance-iot-applications-in-america> (accessed on June 30, 2022).

<sup>65</sup> “Who’s Occupying Your Insured Properties—How Risky Are They?,” TransUnion, <https://www.transunion.com/> (accessed on June 30, 2022).

<sup>66</sup> “Artificial Intelligence and Machine Learning in Financial Services,” Financial Stability Board, November 1, 2017, <https://www.fsb.org/wp-content/uploads/P011117.pdf> (accessed on June 30, 2022).

accident. In fraud, technologies as well as advanced analytics are being leveraged to predict potentially fraudulent claims, such as increasing the adjuster’s capabilities to conduct a thorough investigation.

AI/ML can also extract pertinent risk information from policyholder communication to identify risks and optimize risk level via chatbots and text analytics, such as by using natural language processing and advanced analytics capabilities.

In fact, with the use of advanced tools, practitioners are streamlining and transforming their models, for instance, linkages of data repository with actuarial models and then to financial models, followed by reporting and ledgers.

That said, because of the complex nature of the underlying AI/ML algorithms, the accelerated adoption of AI/ML poses new challenges, such as explainability, bias and ethical issues, for the insurance industry. Some key ERM issues around AI/ML are as follows:

- **Governance:** AI/ML algorithms are often considered “black boxes” because the model’s output and decision-making process are difficult for humans to interpret. AI systems may also use a large amount of unstructured or alternative data, which potentially raises privacy and ethical issues. To address this, some insurers have developed a cross-functional governance framework for AI/ML systems that addresses issues such as explainability, transparency, data quality, ethics, fairness and legal compliance. Firmwide initiatives that educate their employees on AI/ML concepts and risk management are also common across the industry.
- **Bias and ethics measurement:** AI/ML systems are also prone to model output bias and discrimination in the absence of an effective data governance policy. Hence, poor data, variable selection or model training/calibration practices may lead to a biased output. For example, larger datasets are more difficult to validate, and the use of alternative data sources, such as social media, exacerbates this issue. Insurers should avoid using sensitive variables such as gender and ethnicity, and exercise caution when using proxy variables. Despite the lack of a clearly defined federal regulation on ethical AI uses in the current regulatory space, some insurers have developed internal policies and are following the Principles on Artificial Intelligence published by the NAIC. Regulators are becoming increasingly concerned with ethical issues associated with AI usage and are starting to take actions toward formulating official legislations. The AI regulatory environment is discussed in more detail in Section 5.
- **Adoption journey:** Insurers adopt AI/ML use cases at varying pace, with some having an established AI/ML function since as early as 2012. Some are also partnering with insurtechs to leverage external resources, and some are focusing on developing internal, proprietary capabilities. Venture funding programs and innovation labs are also common. It should be noted that insurers have a diversified agenda in terms of areas of investment related to AI/ML, including data infrastructure, upskilling and model benchmarking.
- **Talent availability:** In recent years, insurers have begun focusing on hiring for skillsets related to AI/ML algorithms, programming and data management. Many are looking for candidates with Ph.D. to enhance their AI/ML capabilities. With increasing competition in the job market, insurers are also identifying dedicated resources for AI/ML talent management and retention.

### 3.1.4 ROBOTIC PROCESS AUTOMATON

Over the years, some insurers may have suffered due to low profitability and operational efficiency, such as low premium income and high and rising operational costs. They face difficulties in adapting and incorporating changes owing to challenges associated with legacy systems, complex business models and organizational silos. Here robotic process automation (RPA) is helping insurers and driving opportunities. RPA has proven to be instrumental in the following areas of the insurance value chain:

- Distribution channel: A sale channel is high maintenance and costly. RPA has simplified routine tasks and enabled insurers' rapid workflow and communication with their agents.
- Underwriting: The process is intensive and requires collecting a vast amount of information. It can facilitate the automation of a process that involves data gathering from multiple external and internal sites, evaluate loss runs, analyze customer history, provide pricing options, flag fraud and integrate databases. RPA would eventually streamline the underwriting process and reduce the time for underwriting.
- Claims processing: This has always been document-oriented, time-consuming and complex. The process requires manual intervention and undivided attention. But with the integration of RPA with the business structure, the process is 75% more efficient than it is when solely manual. Also, natural language processing and optical character recognition can be used to extract data and detect and verify claim errors and fraudulent claims. This has reduced multiple touch points and, hence, improved turnaround for claim disbursement, creating a customer-centric process.
- Regulatory compliance: The insurance industry is highly regulated and requires manual compliance checks, thereby entailing the risk of human error and regulatory breaches. RPA can automate report generation for compliance, data security operations and data validations.

### 3.1.5 CYBERSECURITY AND DATA SECURITY

Cybersecurity is critical for effective and efficient operation of businesses. Insurers encounter cybersecurity threats in their daily operations, as do all firms in the financial services sector. The financial services sector is susceptible to cyberthreats because it receives, maintains and stores a substantial amount of personally identifiable information. However, insurers, in many cases, receive personal health information, in addition to personal financial information, from policyholders as well as claimants, and this makes them a target of cybercriminals. This information in the wrong hands could be used to commit fraud. For an insurance company, this means lawsuits, large settlements, fines for breaching regulations, reputational damage, ransoms to cybercriminals and credit or insurance risks (Table 3).

Innovation is having a transformative effect on financial services. Companies are innovating faster to transform customer experience and improve efficiency and effectiveness. Increased interactions with innovative technologies have desensitized customers and workers to sound data security practices. Technology-driven innovations have the potential to increase cyberrisk to data in several ways:<sup>67</sup>

- Data collection: Innovations around the IoT incentivize and facilitate the collection of large volumes of data. Growth in the volume, variety and concentration of data may increase its value as a target for cyberattacks.
- Data sharing: Innovations around open application programming interfaces/microservices enable companies to transfer and share data more easily. Increasing the interconnectedness and velocity of data increases vulnerabilities by widening the attack surface, often to include less sophisticated actors.
- Attack sophistication: Innovations such as AI/ML support the development of more sophisticated cyberattack capabilities. Increasing sophistication of attack capabilities also changes and intensifies the potential impact on data (e.g., manipulation of data, weaponization of data). Commodities of scale and the

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<sup>67</sup> "Innovation-Driven Cyber-Risk to Customer Data in Financial Services," World Economic Forum, [https://www3.weforum.org/docs/WEF\\_Cyber\\_Risk\\_to\\_Customer\\_Data.pdf](https://www3.weforum.org/docs/WEF_Cyber_Risk_to_Customer_Data.pdf) (accessed on June 30, 2022).

growing ubiquity of modular tools may also remove barriers for less sophisticated actors to perform malicious acts.

Research for cybersecurity solutions for protecting big data generally and the insurance industry specifically is advancing rapidly. Large datasets, including financial and private data, are a tempting target for cyber attackers, and therefore protection of these assets is the focus of many new protection solutions.<sup>68</sup> In general, insurers employ AI/ML to protect against malware, ransomware and advanced persistent threats as they analyze large amounts of data quickly and detect any deviation from an expected or prescribed pattern in data behavior, provide periodic cybersecurity training to increase awareness about new social engineering ploys and fishing methods, and upgrade/invest in firewalls, virtual private networks (VPNs) and other security systems.<sup>69</sup>

With ransomware demands potentially nearing USD 100 million, carriers have tightened underwriting and reduced limits in the U.S. Minimum cybersecurity standards that must be met before a company qualifies for ransomware coverage have been increased.<sup>70</sup> If those standards are not met, carriers will exclude ransomware from a cyberpolicy. For instance, cyber insurance policies could require an “educational component” or training exercise where an organization sends out fake spoofing emails to see how the employees respond. If they are responding incorrectly by clicking on a nefarious link, this presents an opportunity to educate the employee on how to better deal with those emails, or to have an outside consultant come in and perform penetration testing to test and assess the actual electronic vulnerabilities of a particular system. Apart from educating employees, practices must be followed such as regularly upgrading software in use because outdated software could potentially open security holes that attackers can penetrate, archiving to back up data, frequently updating passwords, and encrypting data while transferring the data from one place to another.

Once considered optional, software patching has now become imperative because of the increasing frequency and costs of cyber incidents that result from these exposures. Insurers are becoming part of the solution by providing a notification of vulnerabilities as a risk-management service to complement their cyber insurance policies. In 2019 the Ponemon Institute survey reported that 60% of the organizations in the U.S. that experienced a data breach cited a known, unpatched vulnerability as the cause.<sup>71</sup> In addition, insurers are more widely offering their cyber insurance clients access to preventative services from third-party vendors to provide basic cybersecurity hygiene, such as multifactor authentication, endpoint protection, password management and network scanning (see Section 4.3 for further details).

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<sup>68</sup> Steven Bowcut, “Cybersecurity in the Insurance Sector,” *Cybersecurity Guide*, <https://cybersecurityguide.org/industries/insurance/>

<sup>69</sup> Jayanarayana Bhat, “Cybersecurity Threats for Insurance Companies—Are You at Risk?,” Simple Solve Inc, April 28, 2021, <https://www.simplesolve.com/blog/cybersecurity-threats-for-insurance-companies> (accessed on June 30, 2022).

<sup>70</sup> Tom Davis, “Cyberattacks: Insurers Defend against Ransomware,” *Best’s Review*, October 2021, <https://news.ambest.com/articlecontent.aspx?refnum=312823&altsrc=17> (accessed on June 30, 2022).

<sup>71</sup> Michael Kessler, “The Importance of Software Patching and Other Cyber Hygiene Measures,” Risk and Insurance Management Society, <https://www.rmmagazine.com/articles/article/2022/06/20/the-importance-of-software-patching-and-other-cyber-hygiene-measures> (accessed on June 30, 2022).

### 3.1.6 CLIMATE RISK

In the U.S., Hurricane Katrina generated the largest-ever insurance loss in history in 2005, with USD 41.1 billion in losses and 1.7 million claims.<sup>72</sup> Extreme weather events are widely predicted to become more common. NASA climate models project that the frequency of extreme storms may increase 60% by 2100.<sup>73</sup> This means more heat waves, wildfires and floods—and more losses for insurers.

Although P&C is at the highest risk from spikes in claims from adverse weather events, all insurers are broadly exposed. According to the International Association of Insurance Supervisors, more than 35% of insurers' investment portfolios could be considered "climate-relevant" or exposed to adverse climate risks.<sup>74</sup>

Climate risks include the following:

- Physical risks: environmental events such as adverse weather and its aftermath
- Transition risks: business impacts from changes in policy and technologies, such as unknown impacts of transitions to renewable, low-carbon or "green" energy sources, as well as surrounding regulatory, legal and reputational risks

Other climate-related exposure includes liability risks and the risks of legal exposure in climate change-related lawsuits, for instance, shareholders who might sue a company for failing to plan for climate-related events, or prospective lawsuits by parties who have suffered losses from climate events against polluting companies who could be held partly responsible.

Claim losses can occur from extreme weather-related events originating from diverse factors simultaneously, impacting both assets and liabilities, but risks may increase by failing to mitigate, adapt to or disclose climate risks. Also, investment portfolios can suffer losses from exposures to "climate-relevant" assets, even causing an asset to be stranded. Finally, insurers may also face legal risk from potential lawsuits from shareholders and policyholders, which may allege breaches of fiduciary duty in the insurer's failing to manage the impact of financial risk due to climate change.

#### Regulatory Awareness and Action

Managing the financial risks of climate change is becoming an increasing focus for insurance regulators. In 2019 regulators were either unaware or unconvinced of insurers' preparedness for the impacts of climate risks.<sup>75</sup>

The Task Force on Climate-Related Financial Disclosures (TCFD) has become one of the most influential (nongovernmental) initiatives to bring transparency in the industry around climate risks. For example:

- The European Union is integrating climate change reporting into ORSA requirements. This will impact U.S. and Canadian multinational insurers with footprints in Europe.

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<sup>72</sup> "Hurricane Katrina Fact File," Insurance Information Institute, March 2010, <https://www.iii.org/sites/default/files/docs/pdf/HurricaneKatrinaFactFile-0320101.pdf> (accessed on June 30, 2022).

<sup>73</sup> "How Climate Change May be Impacting Storms over Earth's Tropical Oceans," Global Climate Change NASA, <https://climate.nasa.gov/ask-nasa-climate/2956/how-climate-change-may-be-impacting-storms-over-earths-tropical-oceans/> (accessed on June 30, 2022).

<sup>74</sup> Michele Adcock and Matthew Francis, "Regulating for Climate Change in Insurance," KPMG, <https://home.kpmg/xx/en/home/insights/2021/11/regulating-for-climate-change-in-insurance.html> (accessed on June 30, 2022).

<sup>75</sup> "How Insurance Companies Can Prepare for Risk from Climate Change," Deloitte, <https://www2.deloitte.com/us/en/pages/financial-services/articles/insurance-companies-climate-change-risk.html> (accessed on June 30, 2022).

- In Canada, the federal government, in its Budget 2022, included significant measures to build a net-zero economy. The OSFI will consult regulated entities on climate risk disclosure in 2022.
- In the U.S., in November 2021, the New York Department of Financial Services (NYDFS) provided guidance on managing climate-related financial risks. The U.S. SEC also recently proposed rule changes, requiring climate risk-related disclosures with material impacts. Climate risk guidance is likely to become more prevalent at both state and federal levels. Also, the NAIC Climate Risk & Resiliency Task Force (Task Force) developed a new TCFD-aligned survey. Under this framework, insurance companies are required to respond to the annual NAIC Climate Risk Disclosure Survey and will need to comply with TCFD reporting by November 2022.

Regulatory entities will continue to push the adoption of financial impact measurement due to climate change; for example, in the U.S. the NAIC reported that 15 states, representing nearly 80% of the U.S. insurance market, have committed to using the NAIC survey in 2022 for insurance companies licensed in their jurisdictions. This means that, although 28 insurance companies provided TCFD-compliant reports in 2021, this number will grow to nearly 400 insurance companies and groups in 2022 because of the adoption of the new standard, as per the NAIC.

### Emerging Practices for Managing Climate Risk

How physical and transition risks could materialize for the usual risk factors (credit, legal, liquidity, investment, competition, operational, pricing, underwriting, reputational and strategic) must be assessed.

While the industry awaits regulatory clarity and best practices to emerge, insurers' ERM functions would do well to take reasonably foreseeable and material climate risks into consideration.

Recommendations on best practices<sup>76</sup> include the following:<sup>77</sup>

- Internal and external data monitoring
  - Identify and gather relevant quantitative and qualitative information on the firm's physical, transition, and liability risks and exposures
  - Establish metrics and KPIs
  - Conduct impact assessments and ongoing weather event reporting; identify and deploy thresholds that can lead to a catastrophic event, such as precipitation reporting in areas with many insureds or properties
  - Manage and monitor these risks using time horizons that are appropriately tailored to the type of insurers, the insurer's activities and the business decisions being made, and review their analysis on a regular basis
- Climate risk policies and governance<sup>78</sup>
  - Embed climate risks into risk management and governance frameworks
  - Align with TCFD disclosure and reporting requirements

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<sup>76</sup> "Application Paper on the Supervision of Climate-Related Risks in the Insurance Sector," International Association of Insurance Supervisors, <https://www.sustainableinsuranceforum.org/> (accessed on June 30, 2022).

<sup>77</sup> "Combating Climate Risks: The Future of Insurance," KPMG, <https://home.kpmg/xx/en/home/insights/2019/03/combating-climate-risks-the-future-of-insurance-fs.html> (accessed on June 30, 2022).

<sup>78</sup> "What's Next for Climate Risk Management?: Top Tips for Insurers to Address NY DFS's Climate Guidance," FTI Consulting, <https://www.fticonsulting.com/> (accessed on June 30, 2022).

- Appoint a senior risk manager to handle climate risk issues
- Climate disclosures
  - Add material climate-change risks to insurer financial disclosures and ORSA
  - Identify, assess, monitor and manage the financial impact of climate risk exposure with support from the ERM function to report-disclose to the board
  - Document in the written ERM and board risk reports the material climate risks considered (including their transmission channels and their impact on existing risk factors) and update existing risk-management policies to reflect climate risks
  - Release ESG reports that cover sustainability topics, including the insurer’s internal efforts to attain Net Zero by 2050 and how to help customers
- Business and investment strategy
  - Perform scenario analyses of business impacts
  - Where appropriate, consider incentives for policyholders who take action to lower their exposures
  - Review policies for relevant inclusions and exclusions
  - Participate in shaping industry and regulatory policy by working toward standardized disclosures and best practices
- Alignment of business risk processes
  - Assess the impact of physical and transition risks on investment portfolios, liabilities and asset-liability management
  - Incorporate climate risks into stress testing, risk and solvency assessments
  - Measure and analyze exposure at multiple levels of granularity, such as portfolio, business line, subportfolio and transaction
  - Evaluate concentration risk across industries and regions

### 3.2 OPINIONS OF PRACTITIONERS ON INNOVATION ADOPTION

Practitioners who participated in the online survey (Question 7 in Section 11 of this report) acknowledged (30% or more) they are very familiar with

- Personal data protection and privacy policies in their jurisdiction of work
- Cybersecurity
- AI/ML

However, the practitioners were less familiar (less than 15%) with other innovation topics such as digitization, gadgets (IoT), telematics and biometrics.

Practitioners also discussed several innovations (or investment needed) and how they could be used in the decision-making in their insurance companies. These topics are discussed below:

- Among the practitioners interviewed (a subset of the online survey participants), many discussed the adoption of AI/ML tools in underwriting, marketing, fraud detection and other areas of the insurance value chain. For example, some practitioners in the life and P&C insurance sector are adopting workflow automation in the underwriting processes, reducing the time taken to respond to applicants from days to minutes or even seconds. By reducing customer wait times, automation accelerates the underwriting

process, increasing customer satisfaction and increasing revenue for insurers. AI/ML models and RPA continue to be the common algorithms/technology used in the automation process.

- Data-driven insights are being developed in the health insurance sector to assess the capacity and performance of the network of suppliers and vendors to improve the ability to assess risk, optimize productivity and control costs. Integration of AI/ML and IoT has also been observed in the health sector. By collecting data on customers' lifestyles and daily activities, insurers can tailor insurance products for each individual.
- Similarly, P&C insurers are seeking ways to increase transparency and accelerate the process of exchanging information during the claim-handling process. Text analysis, natural language processing and computer vision are common AI/ML techniques used by insurers to process documents and evidence submitted by customers. These capabilities enable quicker, streamlined claim handling.

### 3.2.1 PRODUCTS AND CUSTOMER EXPERIENCE

Insurers have experienced a great need to provide online insurance services as the COVID-19 pandemic has changed consumer behavior, with a concerted shift to online shopping. Consumers are undertaking research and exploring product details as well, and seeking suggestions from experts across multiple channels, such as social media and search engines, before buying.

Practitioners have been leveraging consumer data for making insurance products more flexible, geared toward customers' changing needs and launching customizable policies. To meet customer expectations and succeed in a highly competitive market, practitioners are innovating consumer-facing solutions and controls, including the following:

- Claim-processing automation: Many insurers are streamlining their claim-handling process through automation. Text analysis and optical recognition are used to extract information from claim documents that the customers have uploaded. Computer vision and image recognition are used to derive meaningful information from images and videos, such as severity of damage and geographical location.
- Use of IoT: Devices connected to the internet and useful for insurers, such as wearables and usage-based insurance, are helping tailor existing products to customer needs and behaviors (see Section 3.1.2). Previously, health insurance ratings depended on factors such as age, disease, smoking habits and gender, and it was difficult to reward policyholders for their healthy habits. However, the revolution in connectivity of devices and wearable devices has allowed incentivizing customers for their healthy habits in the form of rewards or wellness points. These points can be redeemed as a discount on the premium they pay to their insurers. Moreover, practitioners have seen the rising use of smart-home devices to prevent water damage, fire or theft, and many insurers are offering lucrative discounts on home insurance premiums for the usage of advanced devices. Such uses of IoT devices by users help insurers better understand risks associated with customers and additionally explore new customer segments that can help reshape existing products to create new offerings.
- Chatbots: As practitioners tap AI to analyze risk and validate claims, they are also deploying more of that technology in customer-facing applications such as chatbots. These can enable intelligent conversations with humans via text or voice and are now being used to assist both customers and agents in many areas. Many insurers believe that to truly deliver the promise of conversational AI, fundamentally new technology must be built to perform multiturn conversations and execute judgment-intensive tasks just like humans. Many emerging startups are also bringing new chatbot solutions to the market such as the AI bot created by Lemonade, which can accept applications, secure a policy for consumers in as little as 90 seconds and process claims in only three minutes. However, some practitioners also raised their concerns around the



deployment of chatbots because poorly designed solutions that malfunction or don't meet customers' expectations can backfire and result in brand damage—reputational risk.

- Drone technologies: The trend of using drones, in integration with AI, in the insurance industry is evolving, and it is possible that more insurers adopt the technology. Various applications can be found for drones in the insurance industry; the notable ones are in P&C and auto insurance. Drones could be used to perform farm inspections in agriculture insurance, claim inspections of disaster and mapping an accident zone to process quicker claims.

Furthermore, insurers are enhancing customer experience through digital services by making them more convenient for consumers. For instance, they are providing easy-to-understand modules for educating their customers about their products and enhancing their user interface to allow customers to purchase an insurance product via a few clicks, manage policy and submit and track claims. Driving this are three main demands: greater accessibility, customization and ease of use, with speed and convenience being the outcomes. The industry sometimes has been plagued by a bad reputation of working against customers, not for them. The insurance industry has indeed suffered an erosion in trust as long call center wait times, frustrating chatbot experiences and adverse publicity about disappointed claimants have all undermined customer confidence. However, insurers suggest that it is no longer enough to just offer a digital-centric experience, it also needs to be customer-centric. Becoming more responsive by providing clear, concise and timely communications that keep customers informed is the key to improving customer experience.

### 3.2.2 MODEL RISK MANAGEMENT

Insurers must realize that models require changes with higher frequency than before due to the expanding array of risks, technologies, data sources, regulatory expectations and changing customer demands.

The past two years of the pandemic have demonstrated the value of strong insurance risk management as actuarial models helped the industry through one of the most uncertain periods in recent memory. But the unprecedented events also revealed the need for insurers to improve their risk-management practices, governance and modeling—to a greater extent for some insurers than others.

In fact, with insurers increasingly adopting digital solutions and AI/ML-based insurance products to cater to evolving customer needs, model risks are increasing. The major concerns with respect to model risks arising from these technologies are explainability, ethical bias and regulatory scrutiny.

However, these techniques are increasing efficiencies at various stages of the MRM process. In the U.S. and Canada, in the absence of guidelines and regulations, most insurers are taking steps to understand and eliminate any bias in their insurance products. In addition, a few insurers are highly selective in adopting AI/ML-based models. These insurers perform detailed benchmarking with traditional models and back-testing with varied datasets and adopt these new AI/ML models only if they find a considerable increase in model performance.

Indeed, the adoption of new technologies has led to innovation in model development. With availability of talent and active participation of top management, innovations have percolated into model validation activities as well. A few of the common innovations related to MRM are as follows:

- Workflow management systems: Insurers are using automated tools to track and report various activities in the model lifecycle. They are extensively leveraging automated inventory management systems, which are designed to assist in planning the validation scope, tracking deadlines and closing remediation tasks.

- Automated testing tools: Insurers with a mature MRM program are increasingly investing in in-house automated testing tools. These tools help improve testing efficiency, thereby resulting in incorporation of more models under the validation scope and bringing standardization in testing procedures.
- End-user computing tools (EUCTs): Insurers typically classify EUCTs into model and nonmodel categories. Usually, EUCTs classified as models undergo similar testing as other models, but EUCTs classified as nonmodels undergo less testing. Because nonmodel EUCTs are more numerous and face significant financial risk, insurers are moving to automated testing tools to validate the nonmodel EUCTs.
- Report-generation tools: Insurers are extensively adopting automated report-generation tools to generate the final validation report and bring standardization in the reports. These tools are designed in a way that once all the test results and associated explanations are fed into the tool, they automatically generate the final report. Certain versions of the tools even allow managers to review and make suggestions. The added advantage of these tools is that they automatically monitor the report version control.

### 3.2.3 CLIMATE RISK

Practitioners indicated growing demand from stakeholders for use of environmental, social and governance (ESG) factors in decision-making. The relevance of ESG and its practical applications are still in their infancy for insurance companies. Insurers that are embracing ESG are well placed though. In fact, ESG has moved away from only pertaining to some aspects of corporate behavior and is becoming embedded in the core reporting of companies.

Specifically, on the environmental front, practitioners indicated that climate risks are a growing concern for insurers and regulators alike. The risks are uncertain, hard to predict and measure, and have many far-reaching second-order impacts.

Recommendations from practitioners include the following:

- Transitioning to a responsible investment approach by bringing metrics and considerations to ensure that investment portfolios backing liabilities are appropriate
- Integrating physical and transition risks into climate risks
- Updating products, particularly the way key acute-risk products such as flood and fire insurance are transformed, and the role of the industry in supporting consumers, changing the narrative from withdrawing from the market to helping society
- Considering the role of climate-related events in the increase of cost of supplies and repairs, particularly in the P&C sector, due to claims, such as home insurance
- Shifting away from “dirty” industries and exposures—this could create business opportunities for niche players. For instance, a practitioner noted that nuclear insurance policies have their own captive insurance providers, because insurance products exist for construction but not radiation.

### 3.2.4 REQUIRED INVESTMENTS

Insurers are making investments to improve the efficiency of data-processing and data-sharing systems, as customers expect fast, personalized insurance services wherever and whenever they need them. Additionally, practitioners mentioned that the ERM function provides oversight and views on innovation to enhance customer experience. Hence, practitioners are playing a key role in the process of adding value.

Some practitioners mentioned investing in better software and innovating insurance packages, for example, enhancement of actuarial models with variables that can capture company-wide risk categories and severe

scenarios. Modernization of the actuarial function is in the opinion of practitioners an area that can help insurance companies bring more business efficiencies, for example, in the data transformation processes, systems and people. The modernization must have the right balance of centralized and decentralized operating models.

Another example is the data analytics, reporting and balance-sheet models that are required for business planning and cash-flow projections, which are areas indicated by practitioners in which insurers are actively investing. Also, insurers are focusing on innovation in data technology and data quality by investing in platforms to improve data consumption process for data analytics and modeling.

The pandemic again exposed the importance of macroeconomics in the insurance industry: how a change in macroeconomic variables affects the sector, how markets are interconnected and how the supply chain gets disrupted? Thus, innovation in business models is the need of the hour as the insurance industry focuses on specific risks, such as underwriting risks or traditional insurance risks, but not on credit or investment risks. For example, the expansionary monetary stance by the U.S. Federal Reserve following the outbreak of COVID-19, coupled with decades of a persistent low-interest-rate environment—this is a major threat to life insurance companies given their rate-sensitive products, such as whole life insurance and annuities, and investments, the majority of which are interest-earning bonds.

### 3.2.5 INNOVATION AND EMERGING ERM BEST PRACTICES

The COVID-19 pandemic has had a considerable impact on insurance companies in the U.S. It has led to businesses finding new ways to interact with key stakeholders. The practitioners interviewed mentioned the use of digital controls to build relationships and collaborate to support critical business operations.

Most of the practitioners in large multinational insurance companies have made risk management part of their business culture and adopted ERM as a logical consequence of sound practices around risk management. However, some insurers and practitioners may be at a different stage in their ERM journey and may look at it as just another compliance activity and perform it only because they are required to do so.

Practitioners also stated that a robust strategic risk management framework can help navigate emerging threats caused by technological transformation and change in consumer preferences in an increasingly digitalized economy.

Many practitioners, though, raised concerns over the fast-widening gap between ERM requirements and siloed legacy risk management frameworks. They also identified several areas that are critical to close the gap; some are empowering customers to participate actively in the innovation process, developing platform-enabled digital ecosystems and creating digital solutions, among other technological advancements.

Certain practitioners believe ERM solutions such as AI/ML tools can help insurance companies develop an understanding across the enterprise and the business environment. Such tools facilitate the gathering and analysis of information from multiple external sources, including digital, print, blogs and surveys. The data gathered can help identify trends and help in managing the risk, volatility, knowns and unknowns surrounding the business model and value proposition in a more holistic approach.

The ERM framework provides a structured approach to risk-taking and risk-management activities across the enterprise, supporting long-term revenue, earnings and the capital growth strategy. It is communicated through risk policies and standards, which are intended to enable consistent design and execution of strategies across the organization. For example, multinational insurers mitigate the claim exposure risk by operating globally, thereby reducing the likelihood of claims being aggregated from a specific country. Risks above the determined thresholds, including residual risks, are then reinsured.

From the ERM angle, managing wearables can pose multiple risks, particularly around bias, and cost of existing business units dedicated to screening policyholders under the prewearable processes, effectively maintaining

parallel processes. Additionally, consumers or policyholders may not be comfortable using the new technology, which is still in the early stages, as a main approach. Organizations in general have not effectively responded to this innovation because many models and the underwriting process are old and do not use the wearable technology. This presents challenges in managing innovation while maintaining a BAU environment (ambidexterity ability in ERM), that is, managing the old process (prewearable) of underwriting insurance versus the new process (using wearable-collected data).

Many insurers face the above-mentioned challenges, given their main business is to measure risk and receive premiums to cover the underwritten risk. Practitioners feel they have limited knowledge of how to exploit newer technologies and innovate to estimate this risk. Therefore, the implementation and adoption of new technology is a potential area of opportunity for insurers to work with all business units and identify partnerships needed to trigger innovation.

A comparison of innovation requirements for key risks faced by practitioners in the U.S. and Canada and the mitigation practices followed by them have been presented in Table 4.

**Table 4:**  
**KEY RISKS WHERE INSURERS ARE FOCUSING<sup>79</sup>**

| Area             | U.S.  | Canada   |
|------------------|---|--|
| <b>Key Risks</b> | <ul style="list-style-type: none"> <li>Insurance products</li> <li>Cybersecurity</li> <li>AI/ML adoption</li> </ul>   | <ul style="list-style-type: none"> <li>Climate change</li> <li>Data privacy</li> <li>People skills</li> </ul>  |
| <b>Mitigants</b> | Insurance product risk mitigants: Practitioners are focusing on introducing more flexible insurance plans or new products to cater to rapidly evolving consumer preferences for risk coverages that were earlier not provided by insurers, such as for gig economy workers or usage-based or personalized coverage.   | Climate risk mitigants: For climate risk, practitioners have been working to introduce better underwriting criteria and insurability in terms of profitability and premium for policyholders. Several insurers are looking to invest in advanced analytics that could help them assess historical weather records, insured property data and assumptions regarding future climate conditions to improve risk selection and pricing.          |
|                  | Cyberrisk mitigants: Practitioners have responded to cyberattacks by advancing/innovating technology, such as implementation of advanced firewalls, sending awareness emails to employees and, most importantly, incorporating a policy around it.  | Data privacy mitigants: Insurers are investing to advance their understanding and use of data, including accessibility and usability, and make data insights useful for multiple purposes, such as helping marketing and sales teams reach new customers, and building relationships with existing members. Some insurers are also accelerating the technology agenda and using data for risk monitoring and management and fraud detection. |
|                  | AI/ML risk mitigants: Practitioners are implementing trustworthy solutions and transparency in the use of AI by creating ethical principles, reviewing, validating and testing models to eliminate discrimination. They are also providing model transparency using internal controls around data and algorithms, including procedures to ensure regulatory compliance. | People skills mitigants: Insurers have been looking to attract and retain the right talent from across the world. Some insurers, to ensure the right skills of employees, are getting more people interested in actuarial science and risk-management roles.   |

<sup>79</sup> Canada and the U.S. show different interest or focus on prevailing risks affecting the industry. For example, financial impact due to climate change risk is important for U.S. insurers but is not at the top of the agenda, while for Canada, it dominates.

| Area                            | U.S.   | Canada   |
|---------------------------------|--|--|
| Key Examples from Practitioners | Insurance products: Insurance policies are being introduced around evolving therapies, such as gene and cell therapies: these are very low-frequency, extremely high-dollar occurrences. Hence, insurers' products need to adapt to steer the insured toward appropriate places (centers of excellence) to ensure customers are receiving the right care for such expensive therapies. | Climate risk: Practitioners mentioned that in Canada, climate risk has proliferated over the past two years, impacting policyholders. In fact, claims have been rising because of climate change. For example, an increased number of wildfires has been observed in the Vancouver area, raising the financial risk for insurers, with practitioners required to adjust products according to the changing scenario. |
|                                 | Cyberattacks: Frequent cyberattacks have exposed insurance companies to reputational and financial risks (Table 3). Over the past few years, some insurers were targeted by hackers, which impeded their business systems for several days or weeks, and they were forced to pay ransom to continue their business activity.   | Data privacy: Wider use is being made of digital services by insurers in day-to-day operations. However, insurers have been facing challenges to clean, transform and derive useful information from the complex sets of data generated from multiple sources. In fact, several insurers in Canada are still struggling to provide better customer experience as they are lagging in data-processing systems.        |
|                                 | AI/ML adoption: Insurers are targeting and offering personalized products to customers to enhance customer experience. However, leveraging of data from social media channels has raised concerns among customers of misuse of their personal data to discriminate on several fronts, such as price discrimination as per race or criminal history                                     | People skills: A shortage of a skilled workforce is found in many places. Insurers are also concerned about retaining skilled employees. A shortage of skilled labor, particularly in the insurance industry, has delayed insurers' actioning timelines, because execution of many tasks requires human intervention, thereby affecting insurers' ability to achieve economies of scale.                             |

**Source:** Authors' impressions based on practitioners' opinions.

Innovation is important, especially in underwriting and for improving customer experience. The practical applications of innovation include adding value in second-line risk management—oversight, risk identification, measurement, managing and financial reporting. The ERM team is involved in enabling innovation by making structural changes in policies to remove potential roadblocks. In other words, ERM policies and practices enable better risk assessment and bring efficiencies to the organization. In fact, some insurers have created innovation councils or innovation committees that look at various trending topics, including AI/ML adoption, IoT and climate change.

## Section 4: Business Environment

In the U.S. and Canada, the primary challenges for insurance companies are assessing risks and growth drivers. Here the ERM function enhances companies' business resiliency and crisis management processes. One example is the recent response and adaptation by the industry following the outbreak of COVID-19, where insurers continued to pay claims and provided certainty to policyholders by moving most of their business to online platforms.

However, some expectations are set by policyholders as they continue to deal with job security, evolving insurance products and economic environment. This exigency translates into better consumer experience, cost reduction, better coverage, faster claim processing and simplified contractual terms. In other words, they want more accessible, simplified and affordable insurance products (Table 3).

A plausible consequence of not meeting consumer expectations is new competitors and hence market-share reduction. New business may enter the insurance market: for example, the owners of electric vehicles from automaker Tesla were struggling to get insurance coverage; in response, the automaker created Tesla Insurance<sup>80</sup> for this coverage. In the future, this may bring further innovation as actual recorded driver data, such as driver habits, vehicle camera footage and the Global Positioning System (GPS), may be used. Insurance companies are navigating ongoing risks emanating from new policyholders (millennials and beyond), recent increase in inflation, cybersecurity and data security, and operational efficiency. In this regard, companies' risk teams are asking for more involvement of the management in risk-management activities. That said, the U.S. and Canada are at the medium-risk level, based on the authors' aggregated risk assessment considering country-level and industry-specific risks,<sup>81</sup> with risks categorized as low, medium and high. The overall assessment of the U.S. and Canada industries is given in Table 5.

**Table 5:**

### U.S. AND CANADA INSURANCE INDUSTRIES BY TOP RISKS: OVERALL ASSESSMENT—MEDIUM RISK

| Risks       | U.S.   | Canada   |
|-------------|--|--|
| Investment  | <ul style="list-style-type: none"> <li>• <b>Performance.</b> Investment performance risk (life/health), and capturing financial market (investment) risks, including interest rates and mark-to-market volatility</li> <li>• Life insurance companies comparatively face increased investment risk because of the long duration contracts.</li> </ul>  |  |
| Competition | <ul style="list-style-type: none"> <li>• <b>Competition.</b> A competitive environment because of pricing strategy by insurers or by entry of new players in the industry. This competitive environment could lead to price wars and hurt profitability. Competition risks are typical in the P&amp;C and health insurance because of frequent repricing. However, life insurance is not immune to competitive pressure as acquiring new customers is still a challenge.</li> </ul>  |  |
| Environment | <ul style="list-style-type: none"> <li>• <b>Regulations.</b> Government policy and regulatory risks (life/health): Exposure to institutional and rule-of-law risks, including changes in government, regulatory policies and accounting, often results in material impact on insurers' business models or profitability</li> <li>• <b>Climate.</b> Exposure to physical and external risks (P&amp;C): Material exposure to natural disasters, as well as other external or manmade risks such as cyberattacks and terrorism</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Growth.</b> Muted premium growth prospects (life/health): Lack of potential for premium growth—either because the industry is mature or due to high inflation—is resulting in near-zero (or negative) real premium growth</li> <li>• <b>Results.</b> Weak technical results (P&amp;C) due to adverse technical performance, typically measured by combined ratios (nonlife) and return on assets (life)</li> </ul> |
| Other       | <ul style="list-style-type: none"> <li>• <b>Other.</b> Macroeconomic risks (life/health/P&amp;C): Muted economic growth, recessionary environment, inflationary pressures and foreign exchange risk</li> </ul>   |  |

Source: "Insurance Industry and Country Risk Assessment Update," S&P Global, April 4, 2022, <https://www.spglobal.com/>.

<sup>80</sup> Sarah O'Brien, "Tesla Dips into the Car Insurance Business. Whether It Would Cost Less Is Not Clear," CNBC, <https://www.cnbc.com/2019/09/18/tesla-wants-your-car-insurance-business-it-may-not-save-you-money.html> (accessed on June 30, 2022).

<sup>81</sup> "Insurance Industry and Country Risk Assessment Update," S&P Global, April 4, 2022, <https://www.spglobal.com/ratings/en/research/articles/220404-insurance-industry-and-country-risk-assessment-update-april-2022-12332776> (accessed on June 30, 2022).

#### 4.1 INSURANCE PRODUCTS AND OPERATIONAL EFFICIENCY

The insurance industry has been predominantly selling products through traditional channels via agents working directly with the insurer or independent agents selling products of multiple insurers. It is estimated that over 90%<sup>82</sup> of life insurance products are sold through agents, with the share nearly unchanged over the past decade.

However, changing customer preferences and the pandemic have increased adoption of digital distribution channels. Auto and home insurance products are gaining more traction online than life and health insurance products, which are still purchased using traditional channels because they require a higher degree of trust. Hence, it could be some time before customers purchase these online.

A few common insurance products<sup>83</sup> by sector are as follows:

**Life insurance**—Broadly a type of insurance that provides benefits to the insured’s beneficiaries should the insured die during the term of the contract. Many variations are based on settlement amount, policy tenure and other factors.

**Health insurance**—A generic term that applies to all types of insurance indemnifying or reimbursing for losses caused by bodily injury or illness, including related medical expenses. Property/casualty insurance can be broken down into two major categories: personal lines and commercial lines.

##### Personal Lines

- **Auto**—Usually segregated into two categories: auto liability and auto physical damage. Auto liability provides coverage against financial loss because of legal liability for motor vehicle–related injuries or damages to another’s property. Auto physical damage insurance provides coverage that insures against material damage to the insured’s vehicle.
- **Home**—A package policy, combining real and personal property coverage with personal liability coverage, such as renters’ insurance.
- **Saving**—An annuity, a savings policy, which acts as a safety net by providing individuals with a lifetime of guaranteed income streams. Several types of annuities exist, which are classified according to frequency and types of payments such as fixed annuity, variable annuity, life annuity and perpetuity.

##### Commercial Lines

- **Workers’ compensation** provides medical and wage loss benefits to injured workers.
- **Commercial auto Insurance**—Coverage for vehicles such as trucks, cars, vans or other vehicles used for business or commercial purposes. Commercial vehicle insurance can offer both liability coverage and collision coverage for business vehicles and their drivers. The former obligates the insurer to pay all damages the business is legally obligated to pay because of bodily injury or property damage caused by a covered vehicle. The latter pays for repairs or medical costs that business owners incur for themselves or their vehicle if they are involved in an accident.

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<sup>82</sup> “Facts + Statistics: Distribution Channels Report,” Insurance Information Institute, <https://www.iii.org/fact-statistic/facts-statistics-distribution-channels> (accessed on June 30, 2022).

<sup>83</sup> “Glossary of Insurance Terms,” National Association of Insurance Commissioners (NAIC), [https://content.naic.org/consumer\\_glossary#Back%20to%20the%20Top](https://content.naic.org/consumer_glossary#Back%20to%20the%20Top) (accessed on June 30, 2022).

- Marine Insurance—Coverage of the loss or damage of ships, cargo, terminals and any transport by which the property is transferred, acquired or held between the points of origin and the destination. Cargo insurance is the subbranch of marine insurance, though marine insurance also includes onshore and offshore exposed property (container terminals, ports, oil platforms, pipelines), hull, marine casualty and marine liability.
- Medical Malpractice Insurance—Protecting health care providers against patients who file suits against them under the complaint that they were harmed by the professional’s negligence or intentionally harmful treatment decisions. Malpractice insurance also covers the death of a patient.

Other specialty lines—Apart from the product types listed, several insurance products cater to the specific needs of the customer. A few examples are pet insurance, disability insurance, casualty insurance, general liability, aircraft, flood and fire.

## 4.2 INFLATION

Inflation is perhaps the most important current topic of concern for the insurance industry and customers. Inflation in the U.S. is currently the highest in 40 years, with consumer prices increasing at an annualized rate of 8.6% in May 2022.<sup>84</sup> Similarly, inflation in Canada is at a 40-year high, with an annualized rate of 6.8% in April 2022 and 7.7% in May 2022.<sup>85</sup>

In this environment, changes in pricing of insurance products affect insurers as well as customers. Table 6 illustrates how cost is affected by sources: economic inflation, social inflation and unexpected inflation.

**Table 6:**

### INFLATION DRIVERS EMBEDDED INTO TOTAL COST OF INSURANCE CLAIMS

| Total Claim Cost            | Key Drivers  |   |   |   |
|-----------------------------|--|---|---|---|
| <b>Unexpected Inflation</b> | Other sources of cost increase; cost changes that are not reconciled with social or economic inflation; external events disrupting the supply chain or manufacturing   |   |   |   |
| <b>Social Inflation</b>     | <b>Litigation and Legal</b> <ul style="list-style-type: none"> <li>• Interpretation of legal doctrines</li> <li>• New legal practices</li> <li>• Claims management</li> <li>• Personal injury limits</li> <li>• Novel damage</li> </ul>  | <b>Medical</b> <ul style="list-style-type: none"> <li>• New treatments and drugs</li> <li>• Public health resource constraints</li> <li>• Availability of health treatments or medicines</li> </ul> | <b>Societal</b> <ul style="list-style-type: none"> <li>• Geopolitics</li> <li>• Demographics</li> <li>• Public sentiment of corporations</li> <li>• Attitudes to risk and inequality</li> <li>• Individual propensity to claim</li> </ul> | <b>Emerging</b> <ul style="list-style-type: none"> <li>• New injuries or diseases</li> <li>• Climate change (physical and transition risks)</li> <li>• Scientific evidence of harmful products or substances (next asbestos)</li> </ul> |
| <b>Economic Inflation</b>   | Increase in replacement cost of tangible assets in insurance products (auto and home insurance) or insurance products adjusted by economic inflation<br>Wage and price: Wage settlements and earnings, trend in general price level, costly repair and technology (e.g., introduction of electric vehicle (EV) vs. internal combustion engine (ICE)) |   |   |   |
| <b>Expected Claim Cost</b>  | Baseline cost used to design product rates: this can be affected by economic inflation, social inflation or unexpected inflation to reach actual total claim cost  |   |   |   |

**Source:** Social Inflation: Navigating the Evolving Claims Environment, The Geneva Association <https://www.genevaassociation.org/>; Authors’ impressions based on practitioners’ opinions.

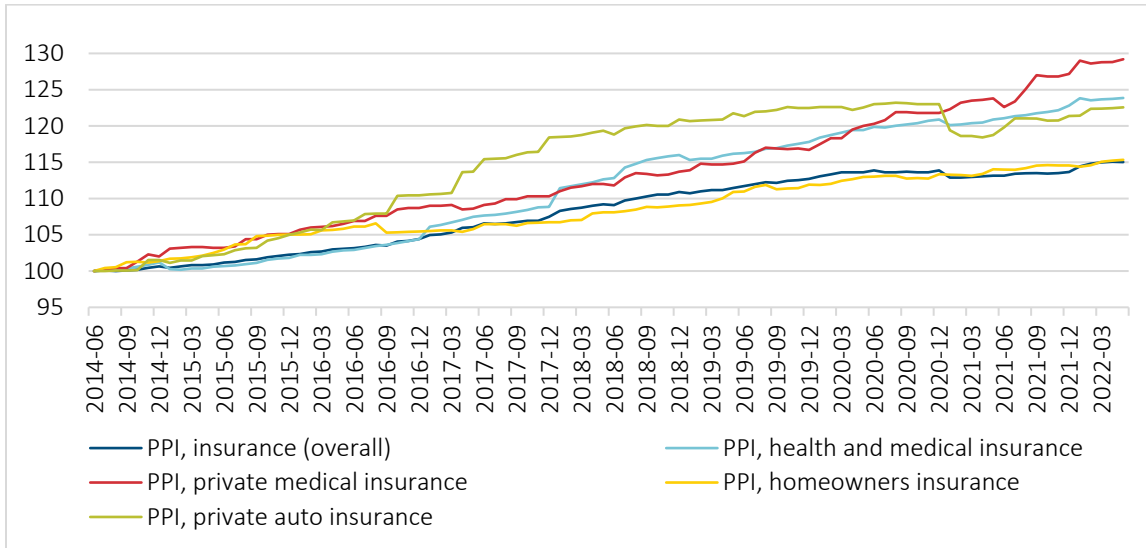
<sup>84</sup> Christopher Rugaber, “US Inflation at New 40-year High as Price Increases Spread,” *AP News*, June 11 2022, <https://apnews.com/article> (accessed on June 30, 2022).

<sup>85</sup> Julie Gordon, “Canada Inflation Up near 40-year High; Calls Mount for 75-bps Rate Hike,” *Reuters*, June 22, 2022, <https://www.reuters.com/> (accessed on June 30, 2022).



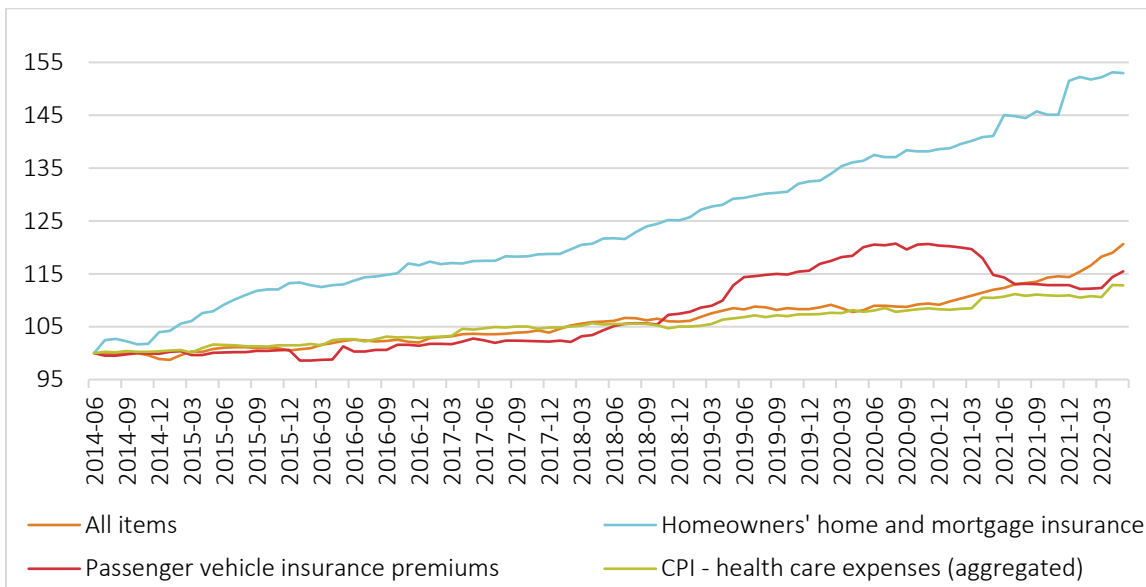
The U.S. insurance producer price index (PPI) has risen across all related insurance segments, with medical insurance and automotive insurance growing the highest (Figure 5). Meanwhile, Canadian insurers have seen the largest increase in homeowners’ insurance premiums of nearly 55% in eight years. In contrast, other Canadian segments have grown lower than the average, all-item consumer price index (CPI) (Figure 6).

**Figure 5:**  
SELECTED U.S. INSURANCE PPI (JUNE 2014 = 100)



Source: Federal Reserve Economic Data, <https://fred.stlouisfed.org/>.

**Figure 6**  
SELECTED CANADA INSURANCE PPI- AND CPI-RELATED EXPENSES (JUNE 2014 = 100)



Source: Statistics Canada, <https://www.statcan.gc.ca/en/>.

#### 4.2.1 ECONOMIC INFLATION

Inflation began climbing as the U.S. economy quickly recovered from the pandemic-driven recession in 2020 and intensified in 2021. Economists in early 2022 were optimistic that accelerating inflation would subside by the end of the year, but the fallout from recent world events is likely to pressure inflation upwards into 2023. Russia's war against Ukraine and major COVID-19 lockdowns in China are affecting prices and global supply chains, fanning the flames of inflation and slowing the pace of economic growth. Instead of inflation falling to 2.6% at the end of 2022, rating companies are now forecasting that inflation will decelerate to 4.5% by year's end, eventually declining to 2.6% in 2023.<sup>86</sup>

Owing to a high inflation rate, the U.S. Federal Reserve has embarked on a path of aggressive interest hikes, causing bond yields to rise and, consequently, their prices to fall. A combination of rate hikes and volatility in the macroeconomic environment (including supply-chain disruptions and the Ukraine-Russia war) has caused the broad-based S&P 500 index to decline 20% from its high at end-2021.

Consumer confidence has fallen to levels seen in the early days of the pandemic in 2020, and consumer polls indicate a pessimistic outlook toward business conditions and personal financial prospects through the end of 2022.<sup>87</sup> Some prominent economists, such as Mohamed El-Erian, have even argued that the U.S. may be entering stagflation, an environment when high inflation exists alongside rising unemployment and a stagnating or recessionary economy.<sup>88</sup>

In Canada, in response to CPI inflation of 6.8% in April 2022, the Bank of Canada has similarly begun pursuing a tighter policy, reiterating its commitment to a CPI inflation target of 2.0%. It hiked the rate by 50 basis points to 1.5% on June 2, 2022, and to 2.5% on July 13th, and provided forward guidance on the interest rate path, indicating that rates may be moved above the 2% to 3% neutral range.<sup>89,90</sup> Canadian money markets have priced in interest rates of about 3.0% by the end of 2022.<sup>91</sup> Meanwhile, Canadian consumer confidence is at a 13-year low.<sup>92</sup>

#### Impact of Economic Inflation on Insurers

Insurers have responded to rising claim amounts by repricing new policies upward. Indeed, insurers have largely been able to pass along rising costs to consumers. For instance, the credit-rating agency Experian expects insurers to raise auto insurance premiums from 6% to over 10% in 2022.<sup>93</sup> Although some insurers will largely keep their premium income in pace with inflation, others may not; for example, auto insurance and others are not keeping pace with inflation because they have longer-tailed liability lines of insurance. High inflation affected the P&C

<sup>86</sup> Annmarie Geddes Baribeau, "Inflation Nation," *Actuarial Review*, May-June 2022, [https://ar.casact.org/wp-content/uploads/2022/06/AR\\_May-June\\_2022.pdf](https://ar.casact.org/wp-content/uploads/2022/06/AR_May-June_2022.pdf) (accessed on June 30, 2022).

<sup>87</sup> "US Consumer Confidence," The Conference Board, June 28, 2022, <https://www.conference-board.org/topics/consumer-confidence> (accessed on June 30, 2022).

<sup>88</sup> Thomas Barrabi, "Stagflation in US Economy 'Unavoidable,' Economist El-Erian Says," *New York Post*, May 18, 2022, <https://nypost.com/2022/05/18/stagflation-in-us-economy-unavoidable-economist-el-erian-says/> (accessed on June 30, 2022).

<sup>89</sup> Paul Beaudry, "Economic Progress Report: Navigating a High Inflation Environment," Bank of Canada, June 2, 2022, <https://www.bankofcanada.ca/> (accessed on June 30, 2022).

<sup>90</sup> Fergal Smith, "High Inflation Expectation Raise Stakes for Bank of Canada Ahead of CPI Data," *Reuters*, June 20, 2022, <https://www.reuters.com/> (accessed on June 30, 2022).

<sup>91</sup> Julie Gordon, "Bank of Canada Turns to Interest Rate Guidance as It Battles Inflation," *Reuters*, May 10, 2022, <https://www.reuters.com/> (accessed on June 30, 2022).

<sup>92</sup> "Canada Consumer Confidence near 13-Yr Low: Survey," *Wards Auto*, July 7, 2008, <https://www.wardsauto.com/canada-consumer-confidence-near-13-yr-low-survey> (accessed on June 30, 2022).

<sup>93</sup> "Homeowners Insurance Premium Are Rising Fast," *Washington Post*, <https://www.washingtonpost.com/business/2021/12/27/rising-home-insurance/> (accessed on June 30, 2022).

insurance industry, resulting in weaker underwriting performance and reserve levels, with rising rates leading to fixed income asset value deterioration, unpredictable claims trends and reduced underwriting quality from “cash flow” underwriting.

Broad increases in costs of goods and services lead to higher payout on claims and decrease the profitability on existing policies. For instance, from December 2019 through December 2021, the price of construction materials rose by 44.1%, with some lumber prices in mid-2021 up 400%. Factors including the lack of truck drivers impacting the supply chain, fewer mills and tariffs imposed by the U.S. on Canadian lumber are contributing to higher building costs, and hence loss trends have worsened for property coverage insurers.<sup>94</sup>

Additionally, inflation also impacts the practicing actuary as they routinely predict the future by studying the past, and this clearly is more challenging when we are living through a rapidly changing environment. For example, the U.S. insurance industry has experienced noticeable percentage reserve development in commercial auto liability and workers’ compensation over last two decades. During 2004 to 2010 both commercial auto liability and workers’ compensation were in the negative range, but over the last decade from 2011 to 2020 they have shown an inverse pattern, with commercial auto liability in the positive and workers’ compensation in the negative range.<sup>95</sup>

Economic uncertainty also creates cost pressures on pricing of new policies. The need for increased prices and a “margin of error” for future unanticipated cost increases is offset by reduced consumer confidence and slowing economic activity (Table 7).

P&C insurers have been the most affected by economic inflation. For insurance policy claims, among the most immediate impacts have been increases in replacement cost of tangible assets in products such as auto and home insurance. Among the most visible segments, automobile prices have surged over the past two years because of disruption of global supply chains, computer chip shortages and rising labor costs impacting repairs. As a result, auto insurance has been significantly impacted, with recent spikes in loss ratios not keeping pace with premium hikes.

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<sup>94</sup> Annmarie Geddes Baribeau, “Inflation Nation,” *Actuarial Review*, May-June 2022, [https://ar.casact.org/wp-content/uploads/2022/06/AR\\_May-June\\_2022.pdf](https://ar.casact.org/wp-content/uploads/2022/06/AR_May-June_2022.pdf) (accessed on June 30, 2022).

<sup>95</sup> Dale Porfilio, “Economic and Social Inflation: How They Impact the Company Actuary,” *Actuarial Review*, July 19, 2022, <https://ar.casact.org/economic-and-social-inflation-how-they-impact-the-company-actuary/> (accessed on July 29, 2022).

**Table 7:**  
**INFLATION POSES MULTIPLE RISKS TO INSURERS**

| Impact of Inflation on Key Insurance Business Segments |  |   |  |
|--|--|---|--|
| Area   | Revenues from Underwriting   | Claims  | Other Areas  |
| Business Lines Most Affected                           | <b>Fixed value policies</b> (e.g., term life insurance): Less attractive to consumers when value of money decreases with time (prolonged inflation periods)  | Falling real cost of claim settlements due to inflation   | <b>Business Operations</b><br>Health services quality or interruption due to scarcity of health professionals<br><br><b>Investment Portfolio</b><br>Low or negative real yields on fixed-income assets lead to investment losses and reevaluation of desirable business segments across the firm <sup>96</sup> |
|  | <b>Tangible asset coverage</b> (e.g., car, home and medical insurance): Neutral to positive (customers seek coverage from rising costs)  | Higher claim costs due to cost increases in materials, parts and labor                            |  |
|  | <b>Intangible coverage</b> (e.g., legal risks such as malpractice): Neutral to positive (customers wish to reduce large risks)   | Neutral: Primary risk is social inflation (see next section)                                      |  |
|  | <b>Umbrella insurance:</b> Neutral to positive impact on demand (overflow from other policies)   | Increased claim costs (higher likelihood of claims in excess of coverage on other policies)       |  |
| Impact   | <b>Insurers:</b> Cost pressures incentivize price hikes to offset future cost increases<br><b>Consumers:</b> Reduced confidence amid economic uncertainty lowers demand and leads to aversion to premium increases | Increases in costs of goods and services lead to higher claim payouts and decreased profitability | <b>Business Operations</b><br>Rising labor and third-party costs; employee turnover; pressures to identify efficiencies<br><b>Investment Portfolio</b><br>Reduced real (inflation-adjusted) investment income; fixed-income investments (e.g., government bonds) are most affected                             |

**Source:** Authors' impressions based on practitioners' opinions.

Because of regulatory requirements, insurers hold a significant portion of their investment portfolio in fixed-income securities. In recent years of loose monetary policy and quantitative easing, fixed-income portfolio managers faced the challenge of finding yields, given historically low nominal interest rates often leading to negative real yields (i.e., falling purchasing power) after accounting for inflation. Surging inflation has made this the most important concern for insurers. For example, in the case of life insurers with continuing low yields, legacy insurance product holders have continued to hold policies longer, extending the portfolio duration and leading to low or negative margins on

<sup>96</sup> Annie B. Walsh, "The Life Insurance industry's Investment Conundrums," Guggenheim, February 22, 2022, <https://www.guggenheiminvestments.com/perspectives/portfolio-strategy/the-life-insurance-industrys-investment-conundrums> (accessed on June 30, 2022).

many policies. Guggenheim, a major investment firm, estimates that (nominal) net investment yield for U.S. insurers fell from about 5.5% in 2010 to about 4.4% at end-2021.<sup>97</sup>

Insurers will be forced to make up the shortfall in investment income elsewhere. A solution is to ensure that premium and investment incomes are not evaluated in silos, but rather jointly, as total return from operations for each segment. For instance, revenues from underwriting for a single segment should be considered together with investment income on the capital held against expected losses for the segment.<sup>98</sup>

A best practice for an insurer's ERM function is to monitor the net assets (e.g., duration risks, investments and loss reserves) and liabilities (forecasted claims). In the short term, rising interest rates lower the value of fixed-income assets of the insurer's investment portfolio. This creates the risk of asset-liability mismatches between firm loss reserves and necessary claim payouts. In the long term, higher interest rates can provide higher returns on new investments. However, this also requires real (inflation-adjusted) interest rates to increase, such as via falling inflation after rates are raised.

#### 4.2.2 SOCIAL INFLATION

Social inflation affects the cost of claims for insurers and thus impacts premiums. Hence, the increase triggers opportunities to review ratemaking and ERM practices, particularly measurement and controls around predictive models of social inflation.

The SOA defines social inflation as the amount that liability claim costs rise above the rate of general economic inflation.<sup>99</sup> However, the CAS and the Insurance Information Institute state the "the term defies strict definition, though it is widely acknowledged to involve excessive growth in insurance settlements."<sup>100</sup> The costs of insurance products can be expected to rise in sync with broad-based inflation measures over the long term. However, the key drivers of social inflation are societal, legal and regulatory changes, rather than the unexpected economic inflation discussed in the previous section.

According to the Geneva Association, an industry group, social inflation tends to occur in waves. Previous occurrences in the 1960s and 1970s on the back of government overspending were followed by abrupt disinflation in the early 1980s. It was relatively stable in the 1990s (the end of the recession and North Atlantic Free Trade Agreement (now replaced with USMCA/CUSMA)) and continued from the 2000s (tech bubble burst)<sup>101</sup> until 2021 (effect from the COVID-19 pandemic). We have seen a particularly large impact on product liability, professional liability and medical malpractice insurance during high inflation cycles.<sup>102</sup>

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<sup>97</sup> Annie B. Walsh, "The Life Insurance Industry's Investment Conundrums," Guggenheim, February 22, 2022, <https://www.guggenheiminvestments.com/perspectives/portfolio-strategy/the-life-insurance-industrys-investment-conundrums> (accessed on June 30, 2022).

<sup>98</sup> Stephen P. D'Arcy, "An Illustration of the Impact of Inflation on Insurance Company Operations," Canadian Actuarial Society, [https://www.casact.org/sites/default/files/database/dpp\\_dpp79\\_79dpp096.pdf](https://www.casact.org/sites/default/files/database/dpp_dpp79_79dpp096.pdf) (accessed on June 30, 2022).

<sup>99</sup> Anthony Cappelletti, "Developments in Social Inflation," Society of Actuaries, June 2021, <https://www.soa.org/news-and-publications/> (accessed on June 30, 2022).

<sup>100</sup> Jim Lynch and Dave Moore, "Social Inflation and Loss Development," [https://www.iii.org/sites/default/files/docs/pdf/social\\_inflation\\_loss\\_development\\_wp\\_02082022.pdf](https://www.iii.org/sites/default/files/docs/pdf/social_inflation_loss_development_wp_02082022.pdf) (accessed on June 30, 2022).

<sup>101</sup> Kimberly Amadeo, "US Inflation Rate by Year from 1929 to 2023," *The Balance*, May 17, 2022, <https://www.thebalance.com/u-s-inflation-rate-history-by-year-and-forecast-3306093> (accessed on June 30, 2022).

<sup>102</sup> "Social Inflation: Navigating the Evolving Claims Environment," Geneva Association, December 2020, <https://www.genevaassociation.org/> (accessed on June 30, 2022).

Factors influencing social inflation include the following:

- Increased litigiousness of society
- Corporate mistrust<sup>103</sup>
- Growth in third-party litigation financing
- Social pessimism and jury settlement favoring plaintiffs
- Regulatory reform and impact
- Legal business drivers
- Social changes (both direct and indirect impact)

### Impact of Social Inflation on Insurers

Unanticipated and persistent social inflation can cause underpricing of insurance products and inadequate claims reserves for future payouts.<sup>104</sup> This leads to potential losses and additional rate filing with regulatory authorities.

Depending on the line of business, a 1% increase in inflation could result in an average 2% to 3% increase on the calendar-year loss ratio.<sup>105</sup> If inflation is expected to rise 3% a year, but actual inflation is 4%, future losses will rise in varying amounts by line of business, based on the duration of the liabilities. For example, a 1% unexpected increase in inflation would affect the combined ratio for short-tailed lines, such as auto and property coverage, by around 1%. However, for a long-tailed line of business such as medical malpractice, the same 1% higher-than-expected inflation hike may increase the combined ratio by more than five points.

From 2015 to 2020, eight P&C lines measured by the Willis Towers Watson Claim Cost Index were above the CPI. The index, which is used in reserving analyses to adjust losses to present value, can be used as an indicator of the rate of change in claim severity. The index is based on several sources, including the CPI and PPI, to reflect “insurance inflation.” General inflation adds a layer of about 1.25% to 1.50% to insurance inflation. The index’s composite insurance inflation rate has been outpacing the overall inflation rate for each year from 2013 to 2021 (preliminary), excluding 2018.<sup>106</sup>

### Measurements and Estimates of Social Inflation

It can be challenging to measure social inflation directly. Years may go by before trends in claims become apparent. Notably, whereas much of the discussion focuses on the causes of social inflation, considerably less time is spent examining data for the presence of social inflation. The Geneva Association and the Insurance Research Council take nearly identical, and typical, approaches. The Geneva Association compares annualized growth in claims across two time periods: 2007 to 2013 versus 2014 to 2019. In each of the seven lines of business examined, the growth in claims in the former period lags growth in consumer prices, while in the latter period claims growth exceeds the increase in the CPI. The Insurance Research Council takes a similar approach and reaches a similar conclusion,

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<sup>103</sup> “3 Factors Fueling Today’s Supersized Verdicts,” Liberty Mutual, May 29, 2019, <https://business.libertymutual.com/insights/3-factors-fueling-todays-supersized-verdicts/> (accessed on June 30, 2022).

<sup>104</sup> Anthony Cappelletti, “Developments in Social Inflation,” Society of Actuaries, June 2021, <https://www.soa.org/news-and-publications/> (accessed on June 30, 2022).

<sup>105</sup> Anmarie Geddes Baribeau, “Inflation Nation,” *Actuarial Review CAS*, May-June 2022, [https://ar.casact.org/wp-content/uploads/2022/06/AR\\_May-June\\_2022.pdf](https://ar.casact.org/wp-content/uploads/2022/06/AR_May-June_2022.pdf) (accessed on June 30, 2022).

<sup>106</sup> *Ibid.*

focusing on six lines instead of seven and using 2018 as its endpoint instead of 2019.<sup>107</sup> The CAS and SOA publications have recommended the following three factors:<sup>108</sup>

- Loss development patterns, since loss development factors can increase over time (when compared with previously written policies at the same period of development).
- Claim frequencies, since increasing or higher-than-expected claim counts can be early indicators of increased future claim costs.
- Statistics on court awards, since they can be the most directly observable metric. It should be noted, though, that this metric generally understates the total impact for multiple reasons. Out-of-court and pre-trial settlements are not observable. Moreover, there is no central database of court awards, and court awards can be reduced on appeals. Finally, one sees a trade-off between the frequency and severity of payouts. Record-breaking settlement amounts are headline news owing to shock value, yet increasing costs of high-frequency settlements, such as P&C auto insurance claims, could have higher overall impact than one-off headline events.

As per the recommendations of the CAS research report, actuaries who are encountering social inflation should take care when selecting link ratios and/or methods on which to rely.<sup>109</sup> If using a loss development method, actuaries should consider selecting link ratios from the most recent development year instead of any multiyear average or consider extrapolating link ratios. As noted previously, they should consider giving greater weight to the methods that are performing better in an actual versus expected analysis.

According to Swiss Re, the magnitude of large settlements has been increasing year-on-year in general liability and vehicle negligence cases.<sup>110</sup> Among cases with awards greater than USD 1 million, the median award size has grown 26% for general liability and 32% for vehicle negligence between 2010 and 2019 (Table 8).

**Table 8:**  
**COMPARISON OF INFLATION MEASURES FOR THE U.S. AND CANADA**

| Comparison of Inflation Measures   | 2010            | 2019             | % Change |
|--|-----------------|------------------|----------|
| <b>% of Verdicts Resulting in Awards of More than USD 5 Million (U.S.)<sup>111</sup></b> |                 |                  |          |
| General Liability  | 29%             | 37%              | +28%     |
| Vehicle Negligence   | 22%             | 29%              | +32%     |
| <b>Median Awards for Verdicts Larger than USD 1 Million (U.S.)<sup>112</sup></b>         |                 |                  |          |
| General Liability  | USD 8.2 million | USD 10.3 million | +26%     |

<sup>107</sup> Jim Lynch and Dave Moore, "Social Inflation and Loss Development," Canadian Actuarial Society, [https://www.casact.org/sites/default/files/2022-02/RP\\_Social-Inflation-Loss-Development.pdf](https://www.casact.org/sites/default/files/2022-02/RP_Social-Inflation-Loss-Development.pdf) (accessed on June 30, 2022).

<sup>108</sup> Anthony Capelleti, "Developments in Social Inflation," Society of Actuaries, June 2021, <https://www.soa.org/news-and-publications/> (accessed on June 30, 2022).

<sup>109</sup> Jim Lynch and Dave Moore, "Social Inflation and Loss Development," Canadian Actuarial Society, [https://www.casact.org/sites/default/files/2022-02/RP\\_Social-Inflation-Loss-Development.pdf](https://www.casact.org/sites/default/files/2022-02/RP_Social-Inflation-Loss-Development.pdf) (accessed on June 30, 2022).

<sup>110</sup> "US Litigation Funding and Social Inflation: The Rising Costs of Legal Liability," Swiss Re, <https://www.swissre.com/institute/research/topics-and-risk-dialogues/casualty-risk/us-litigation-funding-social-inflation.html> (accessed on June 30, 2022).

<sup>111</sup> Ibid.

<sup>112</sup> Ibid.

|  |                 |                 |             |
|--|-----------------|-----------------|-------------|
| Vehicle Negligence   | USD 6.1 million | USD 7.9 million | +30%        |
| <b>U.S. CPI (Urban Consumers)<sup>113</sup></b>              | <b>218.1</b>    | <b>255.7</b>    | <b>+17%</b> |
| <b>Canada CPI (All Items)<sup>114</sup></b>                  | <b>116.5</b>    | <b>136.0</b>    | <b>+17%</b> |
| <b>PPI, Health and Medical Insurance, U.S.<sup>115</sup></b> | <b>104.6</b>    | <b>137.0</b>    | <b>+31%</b> |
| <b>CPI, Health and Personal Care, Canada</b>                 | <b>113.8</b>    | <b>127.9</b>    | <b>+12%</b> |

**Source:** “US Litigation Funding and Social Inflation: The Rising Costs of Legal Liability,” Swiss Re, December 9, 2021, <https://www.swissre.com/>; Consumer Price Index, 1913–, Federal Reserve Bank of Minneapolis, <https://www.minneapolisfed.org/>; “Consumer Price Index, Annual Average, Not Seasonally Adjusted,” Statistics Canada, January 19, 2022, <https://www150.statcan.gc.ca/>.

The average rate of umbrella insurance policies, which are particularly exposed to large claims, has increased 20% in the first half of 2021.

The SOA continues to monitor trends in social inflation. Recent statistics on court actions suggest the increasing social inflation in the U.S.:<sup>116</sup>

- Median awards from the top 50 verdicts in U.S. courts have increased from USD 27.7 million to USD 54.3 million between 2014 and 2018.<sup>117</sup>
- Likelihood of a U.S. company being named in a securities class action was 8.9% in 2019, triple the average rate between 1997 and 2018.<sup>118</sup>
- Between 2015 and 2019, the median award for cases with a single fatality in the U.S. has doubled to over USD 300,000.<sup>119</sup>
- Total class action settlements in the U.S. have increased over 10% (USD 2 billion to USD 2.3 billion) from 2019 to 2020.<sup>120</sup>

However, it needs to be noted that compiling authoritative statistics on the matter is challenging. Most insurance claims are settled before suits are filed; awards are also frequently reduced during appeals. Insurance cases may differ in both frequency and severity (e.g., automobile accidents vs. medical malpractice or product liability).

According to a CAS research report, commercial auto liability is the line where social inflation<sup>121</sup> appeared first and where the impact has been greatest.<sup>122</sup> The report aimed to provide consistent with social inflation via standard actuarial analyses of aggregate industry data. Specifically, it examined the loss development factors from standard

<sup>113</sup> “Consumer Price Index, 1913,” Federal Reserve Bank of Minneapolis, <https://www.minneapolisfed.org/about-us/monetary-policy/inflation-calculator/consumer-price-index-1913-> (accessed on June 30, 2022).

<sup>114</sup> “Consumer Price Index, Annual Average, Not Seasonally Adjusted,” Statistic Canada, January 19, 2022, <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1810000501&pickMembers%5B0%5D=1.2&cubeTimeFrame.startYear=2010&cubeTimeFrame.endYear=2021&referencePeriods=20100101%2C20210101> (accessed on June 30, 2022).

<sup>115</sup> FRED, Economic Research, <https://fred.stlouisfed.org/tags/series?t=health%3Binsurance%3Bmedical%3Bppi%3Bprice%3Bprice+index>

<sup>116</sup> Anthony Capelleti, “Developments in Social Inflation,” Society of Actuaries, June 2021, <https://www.soa.org/news-and-publications/> (accessed on June 30, 2022).

<sup>117</sup> “Social Inflation: Navigating the Evolving Claims Environment,” Geneva Association, December 2020, <https://www.genevaassociation.org/> (accessed on June 30, 2022).

<sup>118</sup> Ibid.

<sup>119</sup> Ibid.

<sup>120</sup> Larry Cotser, “Social Inflation: 2021 Trends,” *Insurance Coverage Law Center*, April 12, 2021, <https://www.law.com/insurance-coverage-law-center/2021/04/12/social-inflation-2021-trends/> (accessed on June 30, 2022).

<sup>121</sup> Not that some people attribute trends in commercial auto to increases in texting and distracted driving behaviors, along with increased driving.

<sup>122</sup> Jim Lynch and Dave Moore, “Social Inflation and Loss Development,” Canadian Actuarial Society, [https://www.casact.org/sites/default/files/2022-02/RP\\_Social-Inflation-Loss-Development.pdf](https://www.casact.org/sites/default/files/2022-02/RP_Social-Inflation-Loss-Development.pdf) (accessed on June 30, 2022).



accident year loss triangles. From 2013 through 2018, commercial auto claim losses increased at an annualized rate of 10.9%, compared with a 1.0% annualized rate from 2007 to 2013, whereas other property and casualty business lines such as private passenger auto and medical malpractice rose 5.6% and 3.2%, respectively, over the same period.<sup>123</sup> The impact of social inflation has been measured in the commercial auto liability using three insurance metrics:<sup>124</sup>

- Ratio of net earned premium to nominal GDP
- Ratio of accident year losses and defense and cost containment (DCC) expenses at 12 months to nominal GDP
- Ratio of accident year losses and DCC expenses to nominal GDP as of December 31, 2019.

If the ratio of net earned premium to nominal GDP grows, it is a sign of increasing rates. If the ratio of accident year loss to nominal GDP grows, it is a sign of rising losses in excess of general economic trends and a potential indicator that social inflation is present.

The commercial auto liability line followed a cyclical process as the net ultimate loss and DCC per million of GDP as of December 31, 2019, decreased until 2009, and first increased in 2010, and the net earned premium per million of GDP decreased until 2012. This signifies losses began growing in 2010 and earned premium began growing in 2013, which suggests a two- or three-year delay recognizing that losses were increasing. Thus, losses fell across the years, and the reserving process was slow to recognize the true scope of the phenomenon. When the phenomenon reversed, both pricing and reserving were slow to recognize the change.

Moreover, the CAS research report found substantial evidence in industrywide loss triangles that three lines of business (commercial auto liability, other liability—occurrence—and medical malpractice—claims made) display characteristics consistent with what one would expect from most common discussions of social inflation, namely, that the inflation component of loss development factors has been rising. It is estimated by the report that rising LDFs have increased losses in commercial auto liability by more than USD 20 billion, or approximately 14% of all losses in that line from 2010 to 2019.

### Impact of Litigation Finance on Social Inflation

Historically, the primary way someone without the means to hire lawyers could seek redress was to find a contingency-only lawyer. In such an arrangement, legal firms would self-finance the expenses from lawsuit to settlement. More recently, litigation finance has become more prevalent, with investors providing capital to legal firms in exchange for a portion of the settlement.

Although litigation finance and contingency-only legal services are often advertised as helpful to those without the means to pursue a lawsuit to get redress, they can serve to incentivize litigiousness in society. As a result, the changing balance between the plaintiffs (that benefit from increased legal financing) and defendants (insurers facing lawsuits) has been a driver of social inflation. In some legal cases involving insurers, the insurance company is the defendant. In turn, the plaintiff is most often a client or another person covered by an insurance product feeling aggrieved by a proposed settlement amount. U.S. litigation finance assets under management have been rising over the last three years as depicted in Figure 7.

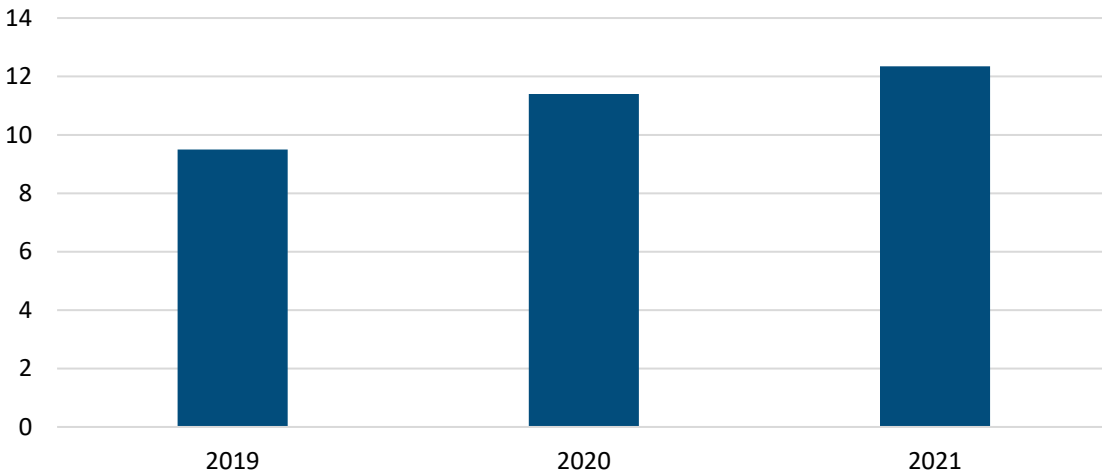
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<sup>123</sup> “Social Inflation: Evidence and Impact on Property-Casualty Insurance,” International Insurance Society, June 10, 2020, <https://www.internationalinsurance.org/node/661> (accessed on June 30, 2022).

<sup>124</sup> Jim Lynch and Dave Moore, “Social Inflation and Loss Development,” Canadian Actuarial Society, [https://www.casact.org/sites/default/files/2022-02/RP\\_Social-Inflation-Loss-Development.pdf](https://www.casact.org/sites/default/files/2022-02/RP_Social-Inflation-Loss-Development.pdf) (accessed on June 30, 2022).

The increased costs of coverage can be gauged from the average combined ratio (ACR), a metric of insurance company profitability. ACR values under 100% indicate profitable products, whereas ACR values over 100% indicate claim losses in excess of collected premiums. Conning Inc., an insurance asset manager and industry research firm, estimated the ACR for U.S. general liability at 105% and for U.S. medical malpractice at 117.5% in 2020, the seventh consecutive year of underwriting losses for each segment.<sup>125</sup> This suggests that writing these policies has been unsustainable. As a result, insurers have raised premiums 5% to 25% per quarter since mid-2019.<sup>126</sup> The increased costs of coverage threaten insurer margins through higher claim loss ratios. These higher costs can also force insurance consumers to reduce or avoid coverage entirely.<sup>127</sup>

**Figure 7:**  
U.S. LITIGATION FINANCE ASSETS UNDER MANAGEMENT (USD BILLIONS)



**Source:** “Big Law Warms Up to Litigation Finance as Deals Pot Hit \$2.8B,” *Bloomberg*, March 23, 2022, <https://news.bloomberglaw.com/business-and-practice/big-law-warms-up-to-litigation-finance-as-deals-pot-hits-2-8b>

However, the trend may change going forward. In March 2022, a litigation finance advisory firm, Westfleet, estimated litigation finance providers managed USD 12.4 billion in assets in 2021, up from USD 9.4 billion in 2019. Interestingly, though, their data suggest this increase may be tapering.<sup>128</sup> Some 53% of total law firm portfolio funding commitments were allocated to the 200 largest U.S. law firms by revenue in 2021, up from 9% the prior year.

Although more money has entered the litigation finance industry, the average deal size has decreased 20% since 2020 to USD 6.5 million, and new funds are finding their way in smaller deal sizes.<sup>129</sup> This represents a movement down the market, suggesting a sign that the established players are getting better at underwriting smaller transactions and that a growing number of specialty funders are focusing on these smaller deals. It could also suggest that although large players are continuing to benefit, returns for new players are increasingly found only in smaller cases, resulting in the trend’s slowing in coming years.

<sup>125</sup> Tom Davis, “Shock Verdicts: Insurers Sound the Alarm as Billion-Dollar Jury Awards Drive Up Claims Costs,” *AM Best Magazine*, March 2022, <https://news.ambest.com/articlecontent.aspx?refnum=317590> (accessed on June 2022).

<sup>126</sup> *Ibid.*

<sup>127</sup> *Ibid.*

<sup>128</sup> Roy Strom, “Big Law Warms Up to Litigation Finance as Deals Pot Hit \$2.8B,” *Bloomberg*, March 23, 2022, <https://news.bloomberglaw.com/business-and-practice/big-law-warms-up-to-litigation-finance-as-deals-pot-hits-2-8b>.

<sup>129</sup> *Ibid.*

Social inflation has been prominent in commercial auto because of high limits, at-fault claims, sympathetic plaintiffs and less sympathetic defendants. Traditional backward-looking reserving methods can mistake litigation delays for favorable case development. Civil case filings fell in both 2020 and 2021 because so many courts were closed for the pandemic, with 2021 finishing 21% below the peak in 2019. However, social inflation pressure is expected to increase as court activity resumes.<sup>130</sup>

#### 4.2.3 UNEXPECTED/RESIDUAL INFLATION

Beyond the impact of economic and social inflation, insurers have another key consideration, the cost of attracting and keeping qualified talent, including recruiting, salaries and benefits. Pressed with rising costs, many firms have been reluctant to pass along price increases to consumers, instead choosing to compress their margins. This, in turn, has been impacting employee salaries. In the U.S., despite 7.9% annualized CPI inflation as of April 2022 and national unemployment of just 3.6% (near historic lows), as of November 2021, employers budgeted average salary increases of just 3.4% in 2022.<sup>131132</sup>

With pay raises trailing inflation, employees have responded by changing jobs more frequently with the need for financial security in inflationary environments. A survey of 52,000 workers across 44 countries by the consultancy PwC reflects this “Great Resignation”: 30% to 45% of employees plan to ask for a raise.<sup>133</sup> Many of those who do not see sufficient raises will be looking for new jobs.

To remain productive and minimize the costs of turnover, employers will need to respond accordingly. Incentives will be necessary to entice top performers to stay. Higher salaries will be needed to attract well-qualified talent. Nonmonetary benefits should also be considered. The ability to work remotely is among the most highly sought-after nonmonetary perk. Employers can improve retention by embracing more flexible working locations and hours for their employees. This may require investment in necessary technology and reviewing company policies but may pay off elsewhere. Surveys indicate 60% workers would consider pay cuts of up to 5% in exchange for the ability to work remote full time, and companies may save up to USD 11,000 per remote worker, per year.<sup>134</sup>

Hence, firms stand to gain many benefits from remote work, such as broader access to talent and savings on office space real estate. However, insurance businesses in the U.S. and Canada face more challenges than other industries because of the state-by-state (province-by-province) regulations and employee licensing requirements that may drive employment mobility. Therefore, companies may have ambivalent results of gaining employees but also losing them.

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<sup>130</sup> Dale Porfilio, “Economic and Social Inflation: How They Impact the Company Actuary,” *Actuarial Review*, July 19, 2022, <https://ar.casact.org/economic-and-social-inflation-how-they-impact-the-company-actuary/> (accessed on July 29, 2022).

<sup>131</sup> John M. Bremen, “Why Salary Increases Do Not Keep Pace with Inflation,” *Forbes*, <https://www.forbes.com/sites/johnbremen/2022/04/07/why-salary-increases-do-not-keep-pace-with-inflation/?sh=2666d7b87533> (accessed on June 30, 2022).

<sup>132</sup> “U.S. Employers ‘Again’ Boosting 2022 Pay Raises, WTW Survey Finds,” WTW, January 13, 2022, <https://www.wtwco.com/en-US/News/2022/01/us-employers-again-boosting-2022-pay-raises-wtw-survey-finds> (accessed on June 30, 2022).

<sup>133</sup> “No End in Sight for the ‘Great Resignation’ as Inflation Pushes Workers to Seek Better-Paid Jobs,” *Euronews.next*, May 25, 2022, <https://www.euronews.com/next/>. (accessed on June 30, 2022).

<sup>134</sup> Denitsa Tsekova, “Workers Give Up Pay to Stay Remote—But Don’t Always Take a Financial Hit,” Yahoo, October 6, 2021, <https://news.yahoo.com/workers-give-up-pay-to-stay-remote-162853850.html?guccounter=1> (accessed on June 30, 2022).

#### 4.2.4 ERM IMPACT OF SOCIAL INFLATION

Insurers continue to engage actively in public policy debates to ensure a level legal playing field, fairness and practicality in settlement awards.<sup>135</sup>

Beyond participating in the discussions around tort reform, improving exposure modeling to move away from expert judgment and toward formal models can help better predict and manage expenses. The Geneva Association notes casualty underwriting, which presently relies largely on expert judgment, could benefit most from more systemic approaches. This would also help improve loss modeling.

Hence, the next focus area is improving the management of expenses surrounding litigation and claims disputes. By improving capabilities in analytics and predictive modeling around claim disputes, insurers can better predict whether cases should be settled or litigated. They can even identify fraud and ascertain which lawyers or strategies may work best in their favor in specific courts and jurisdictions.<sup>136</sup> Pretrial settlements can help reduce the expenses of litigation in public courts and the risk of outsized jury damages. Moving to alternative resolution methods, such as arbitration and mediation, can also help manage outlays.

Last, the Geneva Association recommends insurers explore alternative product strategies, such as parametric insurance (payouts based on trigger events; for instance, agricultural insurance, which may vary based on the number of days with extreme temperatures within a coverage period).<sup>137</sup> They also suggest transferring peak liability risks to capital markets. One such option may be models such as incentive-linked (or KPI-linked) bonds, where an insurer can transfer risk by selling bonds with an underlying option linked to a covered event. In the case where the insurer pays out on a covered claim, bondholders would be subject to a lower repayment.

#### 4.3 CYBERSECURITY AND DATA SECURITY

Cybercrime accelerated during the COVID-19 pandemic, with cybercriminals taking advantage of the crisis. This caused immense disruption to the insurance sector at a time when it was facing enormous claim demands. Ransomware attacks nearly doubled in 2021 compared with 2020 globally, and more than half of these attacks (53%) were in North America.<sup>138</sup> For instance, CNA Financial Corp., among the largest insurance companies in the U.S., paid USD 40 million in March 2021 to a gang that infected it with Phoenix Locker, a ransomware variant linked to the cybercrime network Evil Corp. The payment was made to regain control of its network after that attack.<sup>139</sup> In early 2020, computers at a Canadian insurance company (company name not disclosed) were disabled for more than a week due to a ransomware attack that resulted in a payout of nearly USD 1 million.<sup>140</sup> The hackers managed to infiltrate and bypass the firewall of the Canadian company and encrypted files on the company's servers and locked desktop computers.

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<sup>135</sup> "Social Inflation: Navigating the Evolving Claims Environment," Geneva Association, <https://www.genevaassociation.org/> (accessed on June 30, 2022).

<sup>136</sup> Ibid.

<sup>137</sup> Ibid.

<sup>138</sup> "Cybersecurity and Risk Management," One Inc, May 17, 2022, <https://www.oneinc.com/resources/blog/cybersecurity-risk-management-a-critical-insurer-focus> (accessed on June 30, 2022).

<sup>139</sup> Kartikay Mehrotra and William Turton, "CNA Financial Paid \$40 Million in Ransom after March Cyberattack," *Bloomberg*, May 21, 2021, <https://www.bloomberg.com/news/articles/2021-05-20/cna-financial-paid-40-million-in-ransom-after-march-cyberattack> (accessed on June 30, 2022).

<sup>140</sup> Ryan Flanagan, "Canadian Insurance Company Lost Nearly US\$1M in Ransomware Attack," *CTV News*, January 30, 2020, <https://www.ctvnews.ca/sci-tech/canadian-insurance-company-lost-nearly-us-1m-in-ransomware-attack-1.4790490> (accessed on June 30, 2022).

The rise in ransomware<sup>141</sup> has increased pressure on the insurance industry that underwrites policies for these specific crimes. Not only have cyber insurance firms been paying out large sums for coverage payouts, but they have also become targets themselves. Cybercriminals started hacking these insurance providers to gain access to their systems to find out how much coverage companies have and how much they are likely to pay in ransom. This insight gives hackers an advantage in negotiating ransom payments; they can capture client identities and the scope of their coverage for later attacks. North America saw 9% of all cyberattacks on the finance and insurance organizations in 2021; however, manufacturing was the top attacked industry in North America, bearing the brunt of about 28% of all cyberattacks.<sup>142</sup>

Cyber insurance has become the fastest-growing segment for U.S. P&C insurers since evolving threats have boosted demand for coverage, with insurers actively raising prices in response to rising claims. Premium rates for cyber coverage skyrocketed in 2021 in response to expansion of claims activity and cyber incidents, with prices increasing at a pace more than 50% considerably higher than other commercial business lines. Cyber insurance direct written premiums grew 74% in 2021 to over USD 4.8 billion, according to statutory financial data from the “Cybersecurity and Identity Theft Insurance Coverage Supplement.”<sup>143</sup> Moreover, in 2021, 421.5 million attempted ransomware attacks were made in the U.S. and 623.3 million globally, up 98% and 105% year-on-year, respectively, according to a March 2022 report from the Senate Committee on Homeland Security and Governmental Affairs.<sup>144</sup>

According to the recently released “Cyber Insurance Risk in 2022” survey report, 82% of the largest insurance carriers in the U.S. are the focus of ransomware attacks from cybercriminals.<sup>145</sup> The report, which examines rising cyber risk concerns and ransomware susceptibility in the insurance sector, found 20% of the top 99 insurance carriers have a high rate of vulnerability to ransomware (Table 3). In addition, the frequency of software supply chain attacks has been rising sharply, with the rate of hacks increasing by 300% in the past year alone. Moreover, the U.S. health insurance industry is facing growing risks from cybersecurity threats due to the increasingly sophisticated techniques used by cybercriminals amid the expansion of remote health care delivery and growing digitization of insurance transactions, clinical records and billing.<sup>146</sup> Health insurers and related third parties that fail to inventory and protect sensitive customer information face increased financial, reputational, operational and regulatory risks from cyberattacks (Table 3). Health insurers handle large amounts of sensitive data and are protected by federal laws such as the Health Insurance Portability and Accountability Act of 1996 (HIPAA). Various legislation in the U.S., such as the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 and the Patient Protection and Affordable Care Act (PPACA), have promoted increased digitization of health records.

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<sup>141</sup> When malware holds a victim’s data for a hefty price, it’s called ransomware. The most straightforward action, such as an employee clicking on an infected link, downloading malicious software, or forgetting to complete the newest browser update, can trigger this type of attack.

<sup>142</sup> IBM Security X-Force Threat Intelligence Index 2022, IBM, <https://www.ibm.com/downloads/cas/ADLMYLAZ> (accessed on June 30, 2022).

<sup>143</sup> “US Cyber Insurance Payouts Increase amid Rising Claims, Premium Hikes,” Fitch Ratings, May 6, 2022, <https://www.fitchratings.com/> (accessed on June 30, 2022).

<sup>144</sup> “Ransomware Growing Cyber Risk for US Corporates, Financials, Govt,” Fitch Ratings, April 27, 2022, <https://www.fitchratings.com/research/corporate-finance/ransomware-growing-cyber-risk-for-us-corporates-financials-govt-27-04-2022> (accessed on June 30, 2022).

<sup>145</sup> “A Fight for Coverage; Cyber Insurance Risk In 2022,” Black Kite, <https://blackkite.com/wp-content/uploads/2022/04/Black-Kite-CyberInsurance-Report-2022.pdf> (accessed on June 30, 2022).

<sup>146</sup> “Cyber Theft of Customer Data a Growing Risk for US Health Insurers,” Fitch Ratings, 29 June, 2021, <https://www.fitchratings.com/research/insurance/cyber-theft-of-customer-data-growing-risk-for-us-health-insurers-29-06-2021> (accessed on June 30, 2022).

In the U.S., the NAIC has adopted the new Insurance Data Security Model Law. This requires insurers and other entities licensed by state insurance departments to develop, implement and maintain an information security program, investigate any cybersecurity events, and notify the state insurance commissioner of such events.<sup>147</sup> Twenty states have adopted the model to date; for instance, in April 2022, Kentucky and Maryland enacted insurance data security legislation based on the NAIC’s Insurance Data Security Model Law.<sup>148</sup> Additionally, the New York Department of Financial Services issued its NYDFS Cybersecurity Regulation in 2017. Considered to be groundbreaking in its approach, it has emerged as the leading standard for insurance companies in the U.S. and Canada. Although the NYDFS Cybersecurity Regulations were set up for firms specifically in New York, states around the country have begun to adopt and deploy similar regulations. Also, Canadian insurance firms are expected to follow protocols and guidelines set up by the NYDFS.<sup>149</sup>

In Canada, financial and technology companies are digitizing faster than others in the country and paying more per lost or stolen record. The average cost of a data breach in Canada was CAD 6.75 million per incident in the 2021, up from CAD 6.35 million the year before.<sup>150</sup> With ransomware attacks increasing in severity and sophistication, it is becoming more difficult and expensive for organizations to obtain cyber insurance. At the same time, provincial governments are taking the protection of personal information more seriously. Quebec’s adoption of Bill 64, for example, will introduce substantial legal requirements for organizations over the next three years—everything from expanded breach reporting to new rules for consent.<sup>151</sup> Ontario, New Brunswick, Nova Scotia and other provinces have also adopted substantially similar legislation regarding the collection, use and disclosure of personal information (PI). At a federal level, all private businesses including insurers are subjected to the PIPEDA Act, including their collection, use or disclosure of PI.<sup>152</sup>

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<sup>147</sup> “Cybersecurity,” NAIC, May 12, 2022, <https://content.naic.org/cipr-topics/cybersecurity> (accessed on June 30, 2022).

<sup>148</sup> “Two States Enact Insurance Data Security Laws,” Hunton Andrews Kurth, May 4, 2022, <https://www.huntonprivacyblog.com/2022/05/04/two-states-enact-insurance-data-security-laws/> (accessed on June 30, 2022).

<sup>149</sup> “Cybersecurity Regulation for Insurance Companies,” Packet Labs, December 09, 2021, <https://www.packetlabs.net/posts/cybersecurity-regulations-for-insurance-companies/> (accessed on June 30, 2022).

<sup>150</sup> Amanda Stephenson, “Cost of Data Breaches in Canada Hit New Record in 2021: IBM,” *Toronto Star*, July 28, 2021, <https://www.thestar.com/business/2021/07/28/cost-of-data-breaches-in-canada-hit-new-record-in-2021-ibm.html> (accessed on June 30, 2022).

<sup>151</sup> Julie M. Gauthier and Eric S. Charleston, “Organizations with Weak Cybersecurity Policies Will Be Penalized,” *Mondaq*, December 24, 2021, <https://www.mondaq.com/canada/insurance-laws-and-products/1144618/organizations-with-weak-cybersecurity-policies-will-be-penalized> (accessed on June 30, 2022).

<sup>152</sup> “Cybersecurity Laws and Regulation Canada 2022,” International Comparative Legal Guide, <https://iclg.com/practice-areas/cybersecurity-laws-and-regulations/canada> (accessed on June 30, 2022).

#### 4.4 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (AI/ML)

The use of AI has increased exponentially across industries. The increase of accessible data, increased computing capabilities and changing consumer expectations have led to a strong acceleration of AI development. AI is rapidly evolving and creating viable opportunities for business growth, including insurance.

Insurers define AI/ML differently. In fact, no unified definition of AI/ML is being used in the industry. The Financial Stability Board (FSB), National Association of Insurance Commissioners (NAIC) and Office of the Comptroller of the Currency (OCC) each defines AI/ML with slight variations:

- FSB calls it “the theory and development of computer systems able to perform tasks that traditionally have required human intelligence”<sup>153</sup>
- NAIC defines it as “a technology which enables computer systems to accomplish tasks that typically require a human’s intelligent behavior”<sup>154</sup>
- The OCC MRM Handbook defines AI as “the application of computational tools to address tasks traditionally requiring human analysis” and ML as “a method of designing a sequence of actions to solve a problem that optimizes automatically through experience and with limited or no human intervention”<sup>155</sup>

Based on those definitions given by the regulatory bodies, many insurance companies have created their own unique definitions of AI/ML models, considering their existing MRM framework. A common approach to manage risk associated with AI/ML models is to treat them in the same way as non-AI/ML models, but with supplemental policies around ethics and legal compliance. On the other hand, some insurers have developed a separate governance framework for AI/ML, which involves stakeholders from various business units such as ERM, IT and legal. Within the AI governance framework, AI/ML models follow a different set of standards and risk assessments compared with non-AI/ML models.

AI/ML has a wide range of use cases. Examples include gathering information, analyzing data by running a model and making decisions. For the insurance industry, the most effective use of AI/ML is in the customer experience space.<sup>156</sup> It is also being harnessed in areas such as claims processing, underwriting, fraud detection, customer service and marketing (Table 9).

NAIC adopted guiding principles for the use of AI in August 2020, based on the Organisation for Economic Co-operation and Development (OECD)’s AI principles emphasizing the importance of accountability, compliance, transparency, and safe, secure and robust outputs. The AI principles outline five tenets—fair and ethical, accountable, compliant, transparent and secure/safe/robust—collectively called FACTS.

According to a report by Research and Market,<sup>157</sup> AI spending in the U.S. insurance industry has increased 83.3% in 2018 to USD 258.7 million. Over the forecast period (2019–2025), AI outlays are expected to record a compound annual growth rate of 30.3%, increasing from USD 412.6 million to USD 2,628 million.<sup>158</sup>

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<sup>153</sup> “Artificial Intelligence and Machine Learning in Financial Services,” Financial Stability Board, November 1, 2017, <https://www.fsb.org/wp-content/uploads/P011117.pdf> (accessed on June 30, 2022).

<sup>154</sup> “Artificial Intelligence,” NAIC, October 14, 2021, <https://content.naic.org/cipr-topics/artificial-intelligence> (accessed on June 30, 2022).

<sup>155</sup> “Model Risk Management, Comptroller’s Handbook,” Office of the Comptroller of the Currency, August 2021, <https://www.occ.treas.gov/> (accessed on June 30, 2022).

<sup>156</sup> “AI for Insurance,” Office of the Comptroller of the Currency, <https://www.occ.treas.gov/publications-and-resources/publications/comptrollers-handbook/files/model-risk-management/pub-ch-model-risk.pdf> (accessed on June 30, 2022).

<sup>157</sup> One of Ireland’s market insight and data analytics companies.

<sup>158</sup> “Artificial Intelligence in United States Insurance Industry—Forecast to 2025: A \$2.62 Billion Opportunity,” *Business Wire*, March 28, 2019, <https://www.businesswire.com/> (accessed on June 30, 2022).

**Table 9:**  
**HIGHEST VALUE-ADD USE CASES FOR AI/ML AT INSURERS**

| Use Case                        | U.S.  | Canada  |
|---------------------------------|---|---|
| <b>Customer Experience (CX)</b> | <ul style="list-style-type: none"> <li>Virtual assistants giving basic advice, checking billing information and addressing common inquiries and transactions<sup>159</sup></li> <li>Chatbots and automation for claims processing</li> <li>Customizable and on-demand insurance coverage based on consumer needs</li> </ul>   | <ul style="list-style-type: none"> <li>Insurtechs and nontraditional start-ups encroaching on insurance market<sup>160</sup></li> <li>Insurers are enhancing capabilities and delivering better CX by utilizing emerging technologies, big data and advanced analytics to achieve competitive advantage</li> </ul>  |
| <b>Claims Management</b>        | <ul style="list-style-type: none"> <li>Damage severity assessment and repair costs prediction</li> <li>Application of big data on risk assessment, underwriting and claims processing</li> <li>Big data pick up nuances that a human brain could miss and allow for more accurate risk assessment<sup>161</sup></li> <li>Some insurers allow customers to begin claims process through chatbots<sup>162</sup></li> </ul>                                | <ul style="list-style-type: none"> <li>Insurers in Canada have been lacking in adopting advanced tools and software for efficient claim management<sup>163</sup></li> <li>According to Canadian Underwriter's Trusted Advisor 2021 survey, only 24% of respondents were satisfied their broker had "provided information proactively about what to do if I needed to make a claim"</li> </ul> |
| <b>Fraud Detection</b>          | <ul style="list-style-type: none"> <li>Fraud activities are becoming more complex and more difficult to identify and investigate</li> <li>According to a survey conducted by the Coalition Against Insurance Fraud (CAIF), out of 80 insurance companies surveyed, 65% of insurers use AI/ML technologies in their fraud detection system</li> <li>Common technologies include text mining and photo recognition and analytics<sup>164</sup></li> </ul> | <ul style="list-style-type: none"> <li>In February 2022, the Canadian Life and Health Insurance Association announced a plan to launch an industry initiative that will pool and analyze claims data from the industry and identify patterns associated with fraudulent activities with the use of AI<sup>165</sup></li> </ul>  |

**Source:** "Artificial Intelligence (AI) in Insurance," Data Mation, January 3, 2022, <https://www.datamation.com/>; "How Chatbots Can Settle an Insurance Claim in 3 Seconds," Venture Beat, May 27, 2017, <https://venturebeat.com/>; "AI for Claims Processing and Underwriting in Insurance—A Comparison of 6 Applications," Emerj, February 26, 2020, <https://emerj.com/>; "CLHIA Launching Initiative to Pool Data, Use AI to Detect Benefits Fraud," Benefits Canada, February 15, 2022, <https://www.benefitscanada.com/>; "The State of Insurance Fraud Technology," Coalition Against Insurance Fraud, 2020, <https://www.sas.com/content/>.

<sup>159</sup> Drew Robb, "Artificial Intelligence in Insurance," Data Mation, January 3, 2022, <https://www.datamation.com/artificial-intelligence/ai-in-insurance/> (accessed on June 30, 2022).

<sup>160</sup> Deloitte recently in 2021 surveyed senior executives at 15 of Canada's largest life and health insurers—both banks and insurance carriers—to better understand their strategic focus over the next one to three years.

<sup>161</sup> Alex Sun, "How Chatbots Can Settle an Insurance Claim in 3 Seconds," Venture Beat, May 27, 2017, <https://venturebeat.com/2017/05/27/how-chatbots-can-settle-an-insurance-claim-in-3-seconds/> (accessed on June 30, 2022).

<sup>162</sup> Dylan Azulay, "AI for Claim Processing and Underwriting in Insurance," Emerj, February 26, 2020, <https://emerj.com/ai-sector-overviews/ai-for-claims-processing-and-underwriting-in-insurance/> (accessed on June 30, 2022).

<sup>163</sup> Jeff Buckstein, "Survey Shows Brokers Need to Improve Claims Management Services," *Canadian Underwriter*, October 26, 2021, <https://www.canadianunderwriter.ca/insurance/survey-shows-brokers-need-to-improve-claims-management-services-1004213722/> (accessed on June 30, 2022).

<sup>164</sup> "State of Insurance Fraud Technology Study," Coalition Against Insurance Fraud, 2021, <https://www.sas.com/> (accessed on June 30, 2022).

<sup>165</sup> "CLHIA Launching Initiative to Pool Data, Use AI to Detect Benefits Fraud," *Benefits Canada*, February 15, 2022, <https://www.benefitscanada.com/> (accessed on June 30, 2022).



## 4.5 MRM PRACTICES IN THE INSURANCE INDUSTRY

The importance of MRM has been continually increasing following the 2007–2008 global financial crisis. The emergence of new technologies and automation has increased the need for insurance companies to monitor risk arising out of incorrect or misused models. Triggered by model changes, innovation and additional oversight, MRM is regaining importance as a key function, where ERM practitioners have added focus.

For example, insurers are reviewing model classification by updating their model risk-scoring methodologies. Model developers—the first line of defense—are identifying and documenting a business rationale for new models or for changing an existing model and following a model-development process clearly outlined in the MRM policy.

Additionally, to ensure model-inherent risks are reduced and the models are fit-for-purpose, insurers are implementing model-review-validation processes. Hence, model validation teams or independent teams within model developers—as a second line of defense—are validating models independently to check whether the models are sound.

The first step in the MRM journey is to formulate an effective framework for a company that properly addresses its model risks. The next step is setting up inventory, including all the models used in the firm. Based on discussions with a few insurers in the U.S., it is evident that all their risk management teams recognize model risk as a key risk that needs to be addressed. These insurers are at various stages of the MRM program journey—formulating the MRM framework, establishing a model inventory management system, to having evolved a matured MRM program involving independent validation of all models in the inventory. Another interesting aspect to note is that the level of MRM adoption is largely influenced by the importance given by business leaders in the organization to model risk.

Insurers have been extensively adopting model inventory management systems. With a growing number of models and increasing model complexity, the static spreadsheet-based systems have become ineffective and unmanageable. So insurers are implementing advanced platforms that can maintain a centralized inventory of models, provide adequate model documentation storage, incorporate guidance from various global regulations, and track validation-finding, workflows and reporting.

## 4.6 PRACTITIONERS’ OPINION ABOUT THE BUSINESS ENVIRONMENT

Practitioners interviewed consider cybersecurity, social/unexpected inflation, ethical usage of AI and new diseases/pandemics as the emerging risks in the insurance environment over the next few years in the U.S. and Canada. The practitioners’ views on these risks are discussed below.

### 4.6.1 OPERATIONAL EFFICIENCY

Practitioners raised concerns about the COVID-19 pandemic disrupting operations across the insurance industry. With economies gradually recovering and returning to pre-COVID-19 conditions, most insurers are looking to build frameworks that are adaptable, transform their operating models, improve talent structure and enhance customer experience. A constant need is seen to digitalize and virtualize operations and provide top-notch consumer experience (CX). Since the pandemic-induced restrictions forced businesses to shift to remote and work-from-home setups, insurers are determining the preferred and optimal workplace model going forward. Most said that businesses are planning to adopt a “progressive hybrid” model while maintaining productivity levels.

Practitioners also stated that policymakers are beginning to examine long-term solutions to address the gap in financial protection from pandemic-induced business interruption. Meanwhile, insurers have enhanced their capabilities in modeling the financial consequences of COVID-19 pandemic risks.

The pandemic also served as a stimulus to experiment with business models and improve policyholders' awareness of preventive health. One ERM practitioner mentioned making a renewed focus on improving the health of the firm's policyholders during the pandemic through measures such as delivering oximeters and basic medication to policyholders. Some insurers also focused on creating incentives for health screening to improve early detection of serious health problems through greater informational marketing, as well as waiving deductibles for screenings.

During the interview, practitioners from U.S. and Canada discussed their views on how key risk factors could affect the insurance business. They also shared details about the impact (high, medium or low), speed (incremental or radical), direction (positive or negative) and type of change (core or peripheral to the insurance business). This is useful for interpreting how practitioners qualified each risk factor according to its relevance to their own insurance companies.

Practitioners interviewed also raised concerns about technology becoming obsolete and the accelerated pace to stay relevant in the market. Some practitioners indicated that the insurance industry has been quite laid back in responding to the changing technological dynamics, but the COVID-19 pandemic has forced it to fast track the shift to retain market share and stay competitive. This is expected to give rise to another medium-term emerging risk of cyberattacks. Regulators, on their part, have been proactive in establishing guidelines and regulations to address these risks. Practitioners mentioned that investments are being made toward robust systems, digitalized platforms and technological solutions.

#### 4.6.2 INFLATION

Inflationary risks were among the most frequently voiced practitioner concerns.

Inflation is a trend of rising price levels for a basket of goods. Insurers first saw this trend in the P&C segments, particularly auto (where the cost of parts and replacement value have increased significantly). Broad increases in labor costs have also been a factor, with practitioners noting increasing costs of claims and operational expenses.

Second-order effects of inflation arise from rising interest rates on fixed income products. After nearly 15 years of near-zero rates following the financial crisis, central banks have begun to increase interest rates. This particularly impacts investment products and reserves.

Some practitioners have found it challenging to quantify and incorporate inflation risk as increases in CPI or the retail price index because they may not directly feed into the claim costs of certain lines of businesses. For instance, physical damage prices increased over the past year, which increased claim costs for insurers, especially in property and casualty lines of businesses because of rising inflation. Unexpected inflation is also a major source of worry as insurers need to revise and develop their investment strategy to mitigate inflation risks and assets mismatch in their asset-liability management (ALM) process due to rising rates and loans.

With inflation being the industry's focus, insurers are working on incorporating inflation risks into their models through metrics and indicators. For instance, one firm set risk limit indicators for data from the first line of defense. These inflation risks feed through to actions that are needed if certain inflation-linked triggers are breached, such as changing the premiums charged for products. Insurers should also consider data from multiple perspectives, including using regional, corporate, financial markets and credit risks, to organize the data. Insurers have their tools to deal with business uncertainties, which will also play a role in their response to inflation.

##### **Inflation Response I: Pricing**

The first universal response is to increase premiums to parallel expected increases in claims costs. However, this is not possible for all products. Insurers are particularly concerned about maintaining margins on long-term contracts with fixed cost guarantees.

This is especially noticeable in the life insurance segment. With rising inflation, new policies with fixed-value payouts are less attractive for customers. Life insurance products with long-term guarantees and high flexibility (such as whole life) have the highest exposure to interest rates. Long-term care insurance has been the most affected by inflation because of its characteristics of fixed premiums, long-term guarantees and risks of social inflation stemming from litigation (see the discussion of practitioner feedback on social inflation). As a result, life insurers are concerned about the combination of tight margins and low real yields on investments.

One practitioner also mentioned the widespread presence of social inflation causing companies to leave the annuity business segment, including those dealing in fixed index annuities (FIAs), registered index-linked annuities (RILAs) and variable annuities. However, this could not be confirmed through publicly available sources; for instance, in the U.S. RILAs have repeatedly set new highs both by volume (USD 24 billion in 2020 and USD 39 billion in 2021) and by number of registrations with the SEC (five in 2020, 15 in 2021).<sup>166</sup>

Regulatory approval may also create constraints on insurers' abilities to pass on rising costs to policyholders. Some insurers are mandated to receive regulatory approval on policy rate increases. If sufficient price increases are not approved, insurers may be locked into underwriting policies at low or even negative margins.

Product pricing has become more difficult owing to the need to price in inflation expectations over the life of new policies, as well as increased customer price sensitivity. The related economic volatility also increases volatility in insurers' customer bases. One interviewed actuary at a life insurance firm commented that economic volatility has resulted in volatility in their firm's customer base. For instance, group buyers have become more prone to shop around, while individuals switch back and forth between Medicaid and insurance depending on needs and budgets. This customer churn also makes pricing more challenging.

### **Inflation Response II: Capital Reserves**

The second universal response is to increase capital reserves to absorb unexpected losses. Although overcapitalization remains the best protection against the unknown depending on the composition of a firm's investment portfolio, higher-than-expected inflation can erode the purchasing power of existing reserves. One practitioner expressed that although their firm has sufficient reserves to deal with mild inflation, continuing inflation increases would represent a high level of risk for their reserves. Economic uncertainty has caused some insurers to shift focus from product development toward managing their investment portfolio to minimize their liabilities and monitor financial risks more closely.

Insurers' ongoing search for real yield needs to be considered against investment risks. In the previous decade, insurers, when faced with lower interest rates, saw falling yields even as they took on higher levels of equity, credit and illiquidity risk, though this was balanced against local solvency frameworks and regulatory requirements.<sup>167</sup>

Canadian practitioners discussed that persistent inflation and rising rates could lead to compressed investment returns and chronic under-reserving. This is likely to impact profitability of insurers, given tight competition for pricing insurance products. In some cases, approval of revised rates is delayed and require intense regulatory scrutiny.

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<sup>166</sup> "Registered Index-Linked Annuities Achieve Record Growth," Cerulli Associates, January 25, 2022, <https://www.cerulli.com/press-releases/registered-index-linked-annuities-achieve-record-growth> (accessed on June 30, 2022).

<sup>167</sup> "Lower for Even Longer: What Does the Low Interest Rate Economy Mean for Insurers?," Swiss Re, September 2020, <https://www.swissre.com/dam/jcr:034ab136-3b5b-47a0-9021-56513647c6aa/expertise-publication-swiss-re-institute-low-interest-rates.pdf?msclkid=a8f5ca5cb5b111ecaf3f180f204d4bd5> (accessed on June 30, 2022).

## Inflation: A Challenge for ALM

Insurers' ALM function is responsible for overseeing the joint impact on assets (policies and investments) and liabilities (such as claims and annuity payments).

Incidentally, practitioners' most frequently stated concerns pertaining to inflation were about impacts to their ALM practices. Many companies have seen their ALM processes become constrained, with increasing interest rates leading to asset-liability mismatches. For instance, offering products priced at 1% to 2% over inflation is risky if real rates are low or negative. One possible solution would be to offer real rate guarantees instead of nominal rates within policy riders.

A Canada-based practitioner noted that as the Bank of Canada embarked on increasing interest rates, this has compressed returns on the firm's investments and introduced asset-liability mismatches. For instance, previously established premium cash flows may be insufficient to cover the payments in the case of a later claim event. According to the practitioner, updating the insurance processes and systems (and receiving often necessary regulatory approval for associated changes) often takes time—which can delay the speed at which the insurer can adapt.

Continued low or negative real returns within business segments create strategic dilemmas for insurers: raise premiums to improve margins, remove loss-causing products or divest from unprofitable or noncore business lines in their entirety. Reinsurance can also be a useful tool to managing capital, especially over shorter periods. The optimal response will be unique to each insurer's situation. In other words, insurers need to decide whether to cut losses or remove products: that is the strategic issue before issuing a policy. Innovation is important, but it is also key to look at the downside of the decision-making process in advance.

## Social Inflation

Among the interviewed practitioners, only three mentioned that they were aware of social inflation or expressly listed it as a matter of concern. Most practitioners discussed inflation in the context of economic inflation, such as broad-based price inflation causing increases in expenses.

Nevertheless, despite low explicit awareness of social inflation, interviewed practitioners remain aware that regulatory and legal risks may impact costs of claims. Broad consensus is seen that insurers' ERM functions are actively tracking regulatory requirements and possible changes. In the words of one practitioner, "there is a view that insurers are taking advantage of the consumer."

Insurers remain exposed to social inflation emerging from regulatory changes. For instance, a Michigan-based practitioner mentioned social inflation as a particular concern for their P&C practice. Michigan passed a no-fault reform for auto insurance in 2020, under which out-of-state drivers were disqualified from receiving personal injury protection benefits unless operating a vehicle registered and insured in the state. Now out-of-state drivers must pursue remedy through tort law and must prove that they are less than 50% at-fault for the collision and have sustained "threshold" injuries (those that impact daily life).<sup>168</sup> In turn, Michigan residents are now liable for the injured party's medical expenses. As a result, Michigan drivers are exposed to greater liability. The practitioner stated that this reform had significant impact to how they value and pay claims, with the overall impact playing out over multiple years. The impact of social inflation by insurance business segment is classified in Table 10.

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<sup>168</sup> "Out-of-State Drivers Involved in Michigan Accidents: Impacts of the Recent No-Fault Reform," Sinas Dramis, <https://sinasdramis.com/no-fault-reform-out-of-state-drivers/> (accessed on June 30, 2022).

A portion of social inflation pertains to the ease and magnitude of obtaining legal settlements; it most affects P&C lines of business such as product liability, professional liability and medical malpractice insurance.<sup>169</sup> Umbrella and excess liability policies have seen secondary impacts because of their backstop roles when primary policy caps are breached.<sup>170</sup>

For example, to reduce social inflation due to litigation in auto car insurance, the province of British Columbia adopted a no-fault insurance regulation in May 2021. The idea behind this regulation is that consumers should not need a lawyer to get their paid-for benefits.<sup>171</sup>

**Table 10:**  
**IMPACT OF SOCIAL INFLATION BY INSURANCE BUSINESS SEGMENT**

| Level of Impact | Insurance Product  |
|-----------------|--|
| High            | Liability: professional, product, malpractice  |
| Medium          | Health/medical insurance<br>Liability: directors and officers, errors and omissions, workers' compensation, general liability<br>Property and casualty: automobile, vehicle negligence<br>Umbrella and excess liability (secondary effects when primary policies are exceeded) |
| Low             | Term life/variable annuity (VA)/ UL with secondary guarantee (long-term contracts, fixed terms, repricing), such as an increase of FIAs or RILAS but companies leaving the VA market<br>Whole life (reduced dividends, leading to worse persistency)                           |

**Source:** "Developments in Social Inflation," Society of Actuaries, June 2021, <https://www.soa.org/news-and-publications/>; Authors' impressions based on practitioners' opinions.

#### 4.6.3 CYBERSECURITY AND DATA SECURITY

The intensified use of web-based solutions by insurance companies has increased exposure to cybersecurity risk due to cybercriminals' motivation to obtain insurance data assets. Sophisticated techniques used by cybercriminals make mitigation challenging amid expansion in digital insurance transactions. Insurers are trying to maintain focus on data security and expend in technology and people to deal with this risk (Table 3). Key mitigants include the following:

- Early warning systems (EWSs): Practitioners deploy EWSs to warn of a potential or an impending attack to minimize the damage against the attack with preventive scanning and analysis. It has usually been included to alert the organization of any intrusion or data security breaches. Some practitioners have been using third-party vendors' network detection and response (NDR) solutions, which serve as an early warning system to better detect and defend against cyberattacks. Such security platforms enable the insurers to leverage NDR capabilities, powered by behavioral analytics, to detect unknown threats on its network and identify anomalous behaviors and deliver actionable attack intelligence.
- Performing risk assessments to identify which systems are protected and determine exposure to cyberthreats: Practitioners discussed how the risk appetite for cyber risk sets the high-level strategy

<sup>169</sup> Anthony Cappelletti, "Developments in Social Inflation," SOA, June 2021, <https://www.soa.org/news-and-publications/newsletters/general-insurance/2021/june/gii-2021-06/developments-in-social-inflation/> (accessed on June 30, 2022).

<sup>170</sup> Ibid.

<sup>171</sup> Jason Contant, "B.C.'s Move to No-Fault," *Canadian Underwriter*, April 8, 2020, <https://www.canadianunderwriter.ca/features/b-c-s-move-to-no-fault/> (accessed on 2022).

regarding cybersecurity. However, like other operational risks, proactive management is important to make sure that the cyberrisk tolerance level will not be exceeded. The components of active risk management include the following:

- a) **Investment in Technology**—It is important as new technologies can help identify the sources of cyberrisk, prevent cyberattacks and maintain robustness of the internet-linked system
  - b) **Training**—It helps employees understand the sources and formats of cyberattacks, detect the existence of these attacks, follow precautionary procedures and be able to take timely actions to mitigate their impact
  - c) **Risk Limiting**—Risk-limiting settings for cyberrisk are quite different from other risk types. Key risk indicators (KRIs) for cyber risk need to be designed based on the company’s specific business, data and systems. Possible KRIs may include the number of system breakdowns per month, number of users with access to key sensitive data, level of risk awareness measured by the training that has been taken by employees and the average length of time before a cyberattack is detected. Limits can be set by making reference to pioneers in cyberrisk management while at the same time making adjustments according to the company’s situation.
  - d) **Risk Monitoring** —As cyberrisk events can happen quickly, the monitoring frequency needs to be higher than most other risk types such as insurance risk. Monitored issues may include a break of system security policies and procedures, malware, inappropriate user privileges, irregular system activities, communication to outside systems such as a third-party system or a home computer, key data access and transfer and others.
  - e) **Cyber Insurance**: Even with heavy investment in technology, training and active risk monitoring, unexpected cyberrisk events can still happen. Cyber insurance adds an extra layer of protection to cover unexpected losses. Proactive cyberrisk management is needed because cyber insurance does not cover all losses, and good cyberrisk management can reduce the exposure to cyberrisk and therefore get lower cyber insurance premiums. However, cyber insurance may be difficult to get because many providers are leaving the market, decreasing capacity and raising prices; also, for those options available, the underwriting process, questionnaire and requirements are becoming more stringent: for example, insurers may require specific controls or technology put in place before issuing a policy.
- Awareness: Practitioners in the U.S. and Canada are conducting training programs to create awareness and educate employees, especially the first line, about security measures undertaken because they could inadvertently put the organization at a risk by clicking on a bad risk or opening a malicious attachment. In addition, some of them discussed developing data integrity across the organization, which means the intrusion prevention structure inside security departments and data availability at the highest level. Data integrity means all the data from customers should be structured, with multiple contingencies and at the highest level of security and having customers’ and internal processing data at the most possibly organized structure, diminishing any data theft risks.
  - Guidelines and playbooks on how to respond in the event of an attack: A contingency plan is critical to managing losses, either financial or reputational, caused by cyberrisk events. An action plan should be constructed having a whole cross section of leadership involved at the outset, from legal, finance and risk to human resources and communications, not just IT and security, which can help the company quickly respond to a cyberrisk event such as a data breach and a system failure. It can help minimize business disruption and avoid being a headline on cybersecurity, or at least demonstrate the company’s determination and capability to manage cyberrisk.

#### 4.6.4 ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

##### Implementation and Adoption

Practitioners have been seeking opportunities to use AI to address the key challenges they face in the digitized/digitalized world. Insurers have adopted AI/ML in various value chain activities, including marketing, underwriting, product management and claims management. Some have established AI/ML capabilities over the past decade. Practitioners have a diversified agenda in terms of areas of investment related to AI/ML, including model monitoring, talent acquisition, enhanced capability and infrastructure. Although innovation in AI is important and the volume of structured and unstructured data available has provided opportunities, ethical considerations must guide innovation for the general good. AI systems integrated in the business structure should be tested for trustworthiness.

##### Ethical Use of AI

In the U.S. practitioners discussed that regulators at NAIC are concerned that technological developments could increase the risk of unfair discrimination against protected classes. This is because some factors, such as criminal histories and credit scores, may be inaccurate or reflect historical and systemic biases, and because an automated system could substitute certain big data elements for prohibited characteristics. According to some insurers, regulators have been active in curbing such risks, and new committees have been formed to specially look at big data, cybersecurity and innovation within the insurance industry. However, regulators and legislatures are already acting in this area. Some are also liaising with regulators to gain better insights on industry best practices and to help formulate relevant regulations.

In Canada practitioners mentioned that the guidelines are flexible in nature and give insurers ample independence in implementation. Proper use of data is considerably critical to the ERM framework to innovate while protecting consumers, as are mentoring, upskilling and training the taskforce to narrow the knowledge gaps. Insurers will need to continue to adapt their practices to ensure that the specific elements of big data analytics and the development of ML algorithms comply with (and can be shown to comply with) evolving privacy regulations, especially as additional data resources are used by AI, such as social media.

#### 4.6.5 MODEL RISK-MANAGEMENT PRACTICES IN THE INSURANCE INDUSTRY

Practitioners are of the opinion that most insurers have formalized MRM at a given degree in their organization; however, the level of adoption and journey could vary. Depending on the level of adoption, insurers are focusing on different priorities to manage model risk. Insurers are also undertaking MRM literacy sessions involving key issues to understand what shifts the dial-in model risk and by what degree. Incorporating AI/ML model-focused factors, such as explainability and interpretability, into an MRM policy framework, integrating different ethical and legal bias consideration in modeling activities, and increasing the adoption of MRM practices in different functions are some of the key focus areas by insurers irrespective of the level of MRM maturity in the organization. A need exists to follow risk reporting trends by expanding the MRM appetite around key performance indicators, defining thresholds and disclosing residual risk of models. This is ensured by including legal and compliance teams in the risk committee to accommodate the increasing regulatory requirements on MRM.

Additionally, the MRM practices adopted by insurers are quite different from each other mainly due to the lack of a single regulation and sometimes the practices depend on the overall resources dedicated to MRM. For example, differences exist in how insurers are formulating the MRM program to accommodate current or future regulations or differences in how insurers prioritize to achieve minimum requirement or to improve process efficiency. Table 11 highlights similarities and differences between insurers in Canada and the U.S. on select MRM focus areas.

**Table 11:**  
SIMILARITIES AND DIFFERENCES IN MRM BEST PRACTICES FOLLOWED BY CANADA AND THE U.S.

| MRM Building Block                            | Similarities  | Canada   | U.S.  |
|---|---|--|---|
| <b>Regulation</b>                             | Establishing guidelines and incorporating emerging trends in regulatory requirements.   | P&C insurers follow OSFI E-25 guidelines.<br>OSFI proposes to expand Guideline E-23 for all federally regulated institutions.  | ASOP No. 56 Modeling<br>Use SR11-7, a banking regulation, to develop their internal MRM.  |
| <b>Model Inventory and Process Automation</b> | Insurers are making efforts to maintain an up-to-date inventory of models in use and those decommissioned recently.<br>Model inventory helps in the generation of automated reports and early warnings.<br>Rigor and frequency of validation activities depend on model risk-rating or materiality. | The OSFI also expects institutions to maintain thorough documentation during a model's life cycle, which must be itemized in the model inventory.<br>Insurers establish a process to manage modified and decommissioned models.<br>Insurers should have accountabilities for all outsourced activities, in accordance with OSFI. | Insurers with matured MRM are focusing on automated validation tools and improving coordination between model owners and validators to bring efficiency.  |
| <b>Vendor Models</b>                          | Guidelines seek adequate technical documentation related to the model from vendors to understand how the model is designed and calibrated and how it operates.  | Access to documentation is restricted due to the vendor's proprietary intellectual property. These restrictions must be demonstrated to the OSFI's satisfaction. Hence, insurers will need to consider how these proprietary restrictions are articulated in vendor agreements.  | Increased partnerships are established with vendors, academics and insurtech companies to enhance the model's capability and to take a principle-based approach in areas where no formal regulations exist (e.g., ethical risks, legal compliance).   |
| <b>Ongoing Monitoring</b>                     | Models are subject to periodic review at a frequency consistent with their materiality assessments. The rigor of monitoring is dependent on the potential to generate immediate and material losses.  | The responsibility for ongoing monitoring falls on model users and owners (first line of defense) and reviewers (second line of defense).  | Validation of high-risk models is a key focus for insurers, but the widely observed resource constraints has led to detailed model tiering being viewed as a crucial activity.<br><br>Industry practice is typically for model developers to take primary responsibility for ongoing monitoring, with targeted assistance and oversight from dedicated MRM functions. |
| <b>Internal Audit</b>                         | Insurers maintain a strong relationship between audit and management and  | The third line of defense should assess the overall effectiveness and adequacy of  | Insurers are seeking an independent audit function from operations to preserve  |



| MRM Building Block | Similarities   | Canada  | U.S.   |
|--------------------|--|---|--|
|                    | engage with specialized auditors dedicated to supporting operations in different business units. | the model risk policy and determine compliance by various stakeholders. | objectivity for following the best internal audit practices in the industry. |

Source: Prepared by the authors.

#### 4.6.6 BUSINESS ENVIRONMENT AND EMERGING ERM BEST PRACTICES

The COVID-19 pandemic posed the biggest challenge to the ERM function, according to the practitioners, because it had an unprecedented impact on the insurance industry's conventional operating mode and interaction with extended enterprise, including adaptation of work from home and use of new tools and technologies. Some insurers have seen mortality improvement until the onset of the COVID-19 pandemic and focused on other relevant areas such as asset management. At the same time, practitioners mentioned they reevaluated ALM as a cross-functional department rather than only from an actuarial function angle.

Practitioners also opined that they saw a need to establish a culture to aggregate risks, understand them and bring down findings to the core of the business to attain a competitive advantage. Some practitioners recommended the consideration of various "long tail" risks. For instance, one practitioner recently published an article about bacterial antimicrobial resistance and the development of effective new antibiotics. Another practitioner mentioned tracking the risk of existing technologies becoming obsolete and tracking impacts of these prospective changes. Many practitioners suggested that if an unconventional risk arises, insurers can measure its potential financial impact, severity and probability of the impact as part of their ERM process. In brief, practitioners' comments suggest that although the bulk of ERM departments' attention should be focused on more immediate concerns, it is useful to allocate a small portion of time on early identification and planning for speculative risks.

Multiple practitioners emphasized on the importance of evaluating risks from a holistic viewpoint across the firm's major segments: underwriting, claims and investments. The accumulation and interconnectedness of risks is also important to consider. One practitioner mentioned that "business model innovation is the need of the hour," as actuaries tend to focus on singular risk exposures, such as underwriting and other traditional insurance risks, without simultaneously considering investment, credit and other financial risks.

Furthermore, insurers are encouraging specific owners of all departments to implement, develop or enhance their risk management systems. The advantages can be translated as increased efficiencies and ultimately important tangibles, reduced earnings volatility, stronger capital position and higher profitability.

Practitioners largely agreed that their companies' ERM functions were monitoring regulatory changes and how they might impact the firms' businesses, including through impacts on claims and litigation. However, concerns persist. In a broader context, one practitioner noted that "we understand and can model actuarial risks, but regulatory risk is unpredictable and, in extreme cases, could shut the business down."

Two additional aspects<sup>172</sup> to ERM can have far greater effect on an entity's value: the possibility of the strategy not aligning, and the implications from the strategy chosen.

The possibility of the strategy's not aligning with an organization's mission, vision and core values is central to decisions that underlie strategy selection. Every entity has a mission, vision and core values that define what it is trying to achieve and how it wants to conduct business. In regard to implications from the strategy chosen, when management develops a strategy and works through alternatives with the board, it makes decisions on the inherent trade-offs.

In Canada, the ERM framework has been evolving over the last two decades. It has typically grown along with other areas, as discussed by the industry practitioners, and insurers are focusing on improving their risk register templates to broaden their ERM framework. The current regulations do not affect the ERM function, but the primary issue is understanding the requirement, seeing how the industry liaises with regulators, and ensuring that the oversight is not very prescriptive, which is a deterrent for businesses.

### **Talent, Learning and Development**

Most interviewed practitioners mentioned talent as an area of concern.

As in virtually every other white-collar industry, insurers have struggled with the challenges of remote work induced by COVID-19. Since then, candidates have shown a clear preference for having the flexibility to work remotely. Given the shortage of qualified employees in the industry (perceived), remote work is likely to continue. Many practitioners shared concerns about effectively attracting, integrating, managing, retaining and developing employees, all the while allowing them to work remotely. Insurers will have to develop new talent strategies to remain competitive.

Practitioners attributed the challenge of attracting qualified and diverse talent to the lack of broad familiarity with the important role of insurance and the actuarial profession. An emphasis on standards and candidates' qualifications was voiced as a potential solution to career development and hiring.

Practitioners also expressed concern about talent skill gaps and ensuring that their teams possess not only the core actuarial skills, but also relevant new skill sets—mainly related to data analytics, software and emerging technologies (such as blockchain)—as well as an understanding of their potential risks. One practitioner voiced a worry that the profession's conservatism leads to slow responses to new opportunities, which are then adopted by fintechs and startups instead.

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<sup>172</sup> Enterprise Risk Management Integrating with Strategy and Performance," Committee of Sponsoring Organizations of the Treadway Commission, June 2017, <https://www.coso.org/Shared%20Documents/2017-COSO-ERM-Integrating-with-Strategy-and-Performance-Executive-Summary.pdf> (accessed on June 2022).

## Section 5: Insurance Regulatory Environment

This section discusses recent or key insurance regulation driving the insurance business. For example, regulation around risk-based capital (RBC), AI/ML, climate risk, reporting and disclosure are at the top of the minds of practitioners as they implement the necessary changes to meet regulatory expectations. The insurance regulatory environment is complex and continuously evolving, and the complexity is driven by the volume of different regulations, such as one for each state or province or territory within the U.S. and Canada. Federal regulations in the U.S. and Canada add a layer of complexity combined with insurance regulations emanating from other countries or regions that multinational insurers need to follow or adhere to.

Because of increased industry regulations, costs of regulatory compliance by the insurance industry are estimated to be in the hundreds of millions of dollars in Canada and are likely an order of magnitude higher for U.S.-based insurers (because of the size of the market and population).<sup>173</sup> Table 12 presents some examples of regulations around cybersecurity and data protection.

**Table 12:**  
**REGULATORY ENVIRONMENT IN THE U.S. AND CANADA**

| Insurance Regulations   | U.S.   | Canada   |
|---|--|--|
| <b>Regulators</b>   | <ul style="list-style-type: none"> <li>• NAIC</li> <li>+ 50 state-level regulators<sup>174</sup></li> </ul>  | <ul style="list-style-type: none"> <li>• OSFI</li> <li>+ 10 provincial-level regulators<sup>175</sup></li> </ul>   |
| <b>Largest<sup>176</sup> State or Province for Insurance Business</b>       | <ul style="list-style-type: none"> <li>• California</li> <li>• Florida</li> <li>• New York</li> <li>• Texas</li> </ul>   | <ul style="list-style-type: none"> <li>• Alberta</li> <li>• British Columbia</li> <li>• Ontario</li> <li>• Quebec</li> </ul>   |
| <b>Key Recent Regulations and Accounting Driving the Insurance Business</b> | <ul style="list-style-type: none"> <li>• California Consumer Privacy Act, 2018</li> <li>• NYDFS: Services Cyber Security Regulations, 2017, and Climate Risk Guidelines for Insurers, 2020</li> <li>• FASB Long Duration Targeted Improvements (LDTI), 2018</li> </ul> | <ul style="list-style-type: none"> <li>• Unfair or Deceptive Acts or Practices, Ontario, 2021</li> <li>• Captive Insurance Companies Act, Alberta, 2021</li> <li>• Bill 64, Quebec, 2021</li> <li>• IFRS 17, 2017</li> </ul> |
| <b>Other Relevant Insurance Regulations or Accounting Requirements</b>      | <ul style="list-style-type: none"> <li>• Principal-Based Reserving, 2017</li> <li>• HIPAA, 1996</li> <li>• Federal Exchange Data Breach Notification Act, 2015</li> <li>• ORSA, Enterprise Risk Reports, and Corporate Governance Annual Disclosures, 2012</li> </ul>  | <ul style="list-style-type: none"> <li>• General Data Protection Regulation, 2016</li> <li>• Personal Health Information Privacy Act, 2004</li> <li>• PIPEDA, 2000</li> <li>• Insurance Companies Act, 1991</li> </ul>       |
| <b>Other Relevant International Regulatory Bodies<sup>177</sup></b>         | <ul style="list-style-type: none"> <li>• Bermuda Monetary Authority</li> </ul>   | <ul style="list-style-type: none"> <li>• European Insurance and Occupational Pensions Authority (EIOPA), 2011</li> <li>• Bermuda Monetary Authority</li> </ul>   |

**Source:** “Insurance and Reinsurance Laws and Regulations in Canada,” ICI, 2022, <https://iclg.com/practice-areas/>; “Q&A: Insurance & Reinsurance Regulation in USA,” Lexology, <https://www.lexology.com/>; “The Personal Information Protection and Electronic Documents Act (PIPEDA),” Office of Privacy Commissioners of Canada, <https://www.priv.gc.ca/>; “Top 10 Insurance Laws and Regulations of the Decade,” Insure Reinsure, <https://www.insurereinsure.com/>.

<sup>173</sup> “Canada’s P&C Insurance Industry, All Sectors,” IBC, 2021, [http://assets.ibc.ca/Documents/Facts%20Book/Facts\\_Book/2021/IBC-2021-Facts-Section-one.pdf](http://assets.ibc.ca/Documents/Facts%20Book/Facts_Book/2021/IBC-2021-Facts-Section-one.pdf) (accessed on June 30, 2022).

<sup>174</sup> The U.S. has 14 territories, of which only five are permanently inhabited: American Samoa, Guam, Northern Mariana Islands, Puerto Rico and the U.S. Virgin Islands. Other agencies may also advise regulators in insurance matters, e.g., the Federal Insurance Office.

<sup>175</sup> Other than 10 provinces, Canada has three territories: Northwest Territories, Nunavut and the Yukon.

<sup>176</sup> Largest based on the number of premiums issued, number of insurers registered, population etc.

<sup>177</sup> For example, U.S. and Canada insurers may create a legal entity in Bermuda to access new markets and tax benefits.

## 5.1 RISK-BASED CAPITAL (RBC) REGULATION: OVERVIEW

The capital and solvency requirements are imperative to the ERM function, not only because of the statutory, reporting and accounting requirements, but also the overarching risks, including reputational risk (Table 3).

### 5.1.1 RBC IN THE U.S.

Generally, U.S. insurance companies are not subject to bankruptcy under the U.S. Bankruptcy Code. All states have laws allowing the state insurance commissioner to act if the solvency of a domestic insurer or reinsurer becomes a concern. The level of control that can be exerted differs depending on the severity of the insurer's distress.<sup>178</sup>

In 1945, the U.S. Congress passed the McCarran-Ferguson Act to guarantee that the states would be responsible for the regulation of the insurance industry. The NAIC adopted RBC for the Insurers Model Act in 1993, which has since been adopted, at least in part, by every state in the U.S. and has become a key tool that insurance regulators use to regulate insurer solvency. RBC regulates the amount of risk a company can expose itself to by requiring that the company maintain an amount of capital that is appropriate to support its business operations, based on its size and risk profile.

Under the RBC instructions established by the NAIC, a baseline capital requirement for each company, called the authorized control level RBC (ACL RBC), is determined. This amount is determined using the applicable RBC formula, which incorporates an analysis of the various risks to an insurer based on its business written, volume of premiums, investments and other considerations. Under the NAIC's RBC Model Act, the following levels of RBC are defined:

- If a company's RBC falls below 200% of ACL RBC, it is deemed to have company action level RBC, and its management must submit a plan to increase its RBC levels.
- If a company's RBC falls below 150% of ACL RBC, it is deemed to have regulatory action level RBC, and the regulator may issue an order directing the company to take specific actions to increase its RBC level.
- If a company's RBC falls to its ACL RBC level, the regulator has the discretion to place the company into rehabilitation or liquidation.
- If a company's RBC falls below 70% of its ACL RBC, it is deemed to have mandatory control level RBC and is subject to mandatory rehabilitation or liquidation by the regulator.

In response to the 2008 financial crisis and various international developments, the NAIC began to modernize its approach to solvency in 2008 with the Solvency Modernization Initiative (SMI).

The SMI focuses on key solvency metrics, including capital requirements, statutory accounting, financial reporting, group supervision, corporate governance and risk management. Under the proposed SMI, insurers will be required to undertake an own risk and solvency assessment (ORSA) exercise to document their risk management activities and controls.<sup>179</sup>

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<sup>178</sup> "Insurance and Reinsurance in the United States: Overview," Thomson Reuters, June 2021, [https://uk.practicallaw.thomsonreuters.com/9-501-3187?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/9-501-3187?transitionType=Default&contextData=(sc.Default)&firstPage=true) (accessed on June 30, 2022).

<sup>179</sup> Fred E. Karlinsky, Richard J. Fidei and Christian Brito, Greenberg Traurig LLP, "Solvency Regulation Framework for United States Insurers," LexisNexis, October 10, 2020, <http://www.lexisnexis.com/supp/LargeLaw/no-index/business/insurance-solvency-regulation-framework-for-united-states-insurers.pdf> (accessed on June 30, 2022).

Additionally, the NAIC developed liquidity stress testing framework to provide more evidence-based analyses for large life insurers that would aim to capture the outward impacts on the broader financial markets of aggregate asset sales under a liquidity stress. It employs a company cash flow projection approach incorporating liquidity sources and uses over various time horizons a baseline assumption and some number of stress scenarios.<sup>180</sup> It is part of the Macroprudential Initiative and SMI in the U.S. to measure the state of insurers at the legal entity level (i.e., “inward” impacts to the insurer). Earlier there was recognition that the NAIC toolbox could be further enhanced with the addition of more granular data in the annual statement and a tool that would enable an assessment of macroprudential impacts on the broader financial markets (i.e., “outward” impacts) of a liquidity stress impacting a large number of insurers simultaneously.<sup>181</sup>

### 5.1.2 RBC IN CANADA

Federal insurers are expected to establish a risk appetite framework that guides the company’s risk-taking activities, considering its risk profile to address material risks and risks to the reputation of the company.

Additionally, the Insurance Companies Act requires federally regulated insurance companies and societies, holding companies and companies operating in Canada on a branch basis to maintain adequate capital or to maintain an adequate margin of assets in Canada over liabilities in Canada. The OSFI assesses whether insurers in Canada maintain adequate capital or margin using the following requirements:

- Life insurance capital adequacy test (LICAT): It came into force on January 1, 2018, when it superseded the earlier minimum continuing capital and solvency requirements (MCCSR) framework. LICAT measures the capital adequacy of a life insurer and is one of several indicators used by the OSFI to assess an insurer’s financial condition. The OSFI has established a supervisory target total ratio<sup>182</sup> of 100% and a supervisory target core ratio<sup>183</sup> of 70%. The supervisory targets provide cushion above the minimum requirements and a margin for other risks and facilitate OSFI’s early intervention process.<sup>184</sup> Compared with the MCCSR framework, LICAT is significantly more complex and time consuming. This risk-based regulatory approach has had an impact on insurers’ risks and capital management, as they must reassess their internal target capital ratios, in the context of their ORSA exercise.<sup>185</sup> Insurance companies under these guidelines would rethink the appropriateness of their target capital level considering their risk appetite and risk exposures. Credit risk would be measured on a more granular basis because it is tied to bond duration. Given that many insurers’ fixed-income portfolios are long to match the duration of liabilities, companies are evaluating optimal levels of asset mix in terms of quality and net of cost of capital basis. Since the LICAT framework measures regulatory capital more than best estimate reserves, life insurance companies would

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<sup>180</sup> “NAIC 2021 Liquidity Stress Test Framework for Life Insurers Meeting the Scope Criteria,” NAIC, February 15, 2022, <https://content.naic.org/> (accessed on June 30, 2022).

<sup>181</sup> “NAIC 2021 Liquidity Stress Test Framework for Life Insurers Meeting the Scope Criteria,” NAIC, February 4, 2022, <https://us.eversheds-sutherland.com/> (accessed on June 30, 2022).

<sup>182</sup> The total ratio focuses on policyholder and creditor protection. The formula used to calculate the total ratio is the sum of available capital, surplus allowance and eligible deposits over base solvency buffer.

<sup>183</sup> The core ratio focuses on financial strength. The formula used to calculate the core ratio is the sum of Tier 1 capital, 70% of surplus allowance and 70% of eligible deposits over base solvency buffer.

<sup>184</sup> “Life Insurance Capital Adequacy Test—Chapter 1 Overview and General Requirements,” OSFI, [https://www.osfi-bsif.gc.ca/eng/if-if/rg-ro/gdn-ort/gl-ld/Pages/LICAT18\\_chpt1.aspx](https://www.osfi-bsif.gc.ca/eng/if-if/rg-ro/gdn-ort/gl-ld/Pages/LICAT18_chpt1.aspx) (accessed on June 30, 2022).

<sup>185</sup> “What Is the Life Insurance Capital Adequacy Test and How It Will Affect Canadian Insurers,” Willis Tower Watson, August 2018, <https://www.wtwco.com/en-GB/Insights/2018/09/what-is-the-life-insurance-capital-adequacy-test-and-how-will-it-affect-canadian-insurers> (accessed on June 30, 2022).

be paying more attention to the determination of best estimate assumptions relative to margins for adverse deviations.

- **Minimum capital test (MCT):** The MCT guideline applies to Canadian property and casualty insurance companies that are not mortgage insurance companies, as well as foreign property and casualty companies operating in Canada on a branch basis, collectively referred to as insurers. These are expected to be effective from January 1, 2023. Under the MCT, regulatory capital requirements for various risks are set directly at a predetermined target confidence level. The OSFI has elected 99% of the expected shortfall (conditional tail expectation [CTE] 99%) over a one-year time horizon, as the target confidence level. Insurers' minimum capital requirements are calculated on a consolidated basis and determined as the sum of the capital requirements at the target level for risk components such as insurance risk, investment risk and credit risk, less the diversification credit, divided by 1.5.<sup>186</sup>
- **Mortgage insurer capital adequacy test (MICAT):** The MICAT guideline applies to Canadian mortgage insurance companies (insurers). Insurers' minimum capital requirements are calculated on a consolidated basis and determined as the sum of the capital requirements at the supervisory target level for each risk component, divided by 1.5. The MICAT ratio is expressed as a percentage and is calculated by dividing the insurer's capital available by minimum capital required, which is derived from capital required calculated at the target level for specific risks. Federally regulated insurers are required, at a minimum, to maintain a MICAT ratio of 100%. The OSFI has established an industry-wide supervisory target capital ratio (supervisory target) of 150% that provides a cushion above the minimum requirement and facilitates OSFI's early intervention process.<sup>187</sup> Insurers are required to inform the OSFI immediately if they anticipate falling below their internal target and to lay out their plans, for OSFI's supervisory approval, to return to their internal target. The OSFI will consider unusual conditions in the market environment, if any, when evaluating insurers' performance against their internal targets. Insurers are expected to maintain their MICAT ratios at or above their established internal targets on a continuous basis.

### 5.1.3 ADDITIONAL RBC CONSIDERATIONS

In addition to North American countries, this study also drafted two other research report for two Asian countries: China and India (for more details refer to their respective research report). Many geographies around the world are developing their capital requirement framework to better protect insurance companies in challenging times from becoming insolvent and policyholders. For instance, countries such as China implemented a risk-based regime known as the China Risk-Oriented Solvency System (C-ROSS) in 2016; meanwhile India currently follows a factor-based regime, but it is contemplating the introduction of the RBC regime, though its framework and date to implement are as yet uncertain. A brief comparison of the capital framework among the countries in the scope of this study is given in Table 13.

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<sup>186</sup> "Minimum Capital Test," OSFI, <https://www.osfi-bsif.gc.ca/Eng/fi-if/rg-ro/gdn-ort/gl-ld/Pages/mct23.aspx#Toc-1> (accessed on June 30, 2022).

<sup>187</sup> "Mortgage Insurer Capital Adequacy Test," OSFI, <https://www.osfi-bsif.gc.ca/Eng/fi-if/rg-ro/gdn-ort/gl-ld/Pages/micat.aspx#Toc-1> (accessed on June 30, 2022).

**Table 13:**  
**CAPITAL REQUIREMENT REGIME COMPARISON**

|                            | U.S.   | Canada   | China   | India   |
|----------------------------|--|--|---|---|
| <b>Regulator</b>           | National Association of Insurance Commissioners (NAIC)   | Office of Superintendent of Financial Institutions (OSFI)  | China Banking and Insurance Regulatory Commission (CBIRC)   | Insurance Regulatory and Development Authority of India (IRDAI)   |
| <b>Regime Name</b>         | U.S. Risk-Based Capital regime   | Risk-Based Capital regime  | C-ROSS Risk-Based Capital regime  | Factor-Based Capital regime   |
| <b>Scope or Approach</b>   | <p>The generic RBC formula under the U.S. based regime works by:</p> <ol style="list-style-type: none"> <li>1. Adding up the main risks insurance companies commonly face.</li> <li>2. Considering potential dependencies among these risks.</li> <li>3. Allowing for the benefits of diversification.</li> </ol> <p>For instance, RBC requirements in life insurance are based on four categories of risk: asset risk, insurance risk, interest rate risk, business risk.</p> | <p>Currently, life and mortgage business line insurers are following a risk-based capital regime; however, property and casualty is expected to follow the same effective from January 1, 2023. RBC for each business line is as follows:<sup>188</sup></p> <ol style="list-style-type: none"> <li>1. LICAT for life insurers</li> <li>2. MCT for property and casualty</li> <li>3. MICAT for mortgage insurers.</li> </ol> <p>In general risk factors such as operational risk, investment risk and credit risk are used to compute capital requirements at the supervisory target level.</p> | <p>The C-ROSS is a standard formula approach where risk factors such as operational risk, insurance risk and interest rate risk are applied to determine the amount of solvency capital required. C-ROSS is a framework structured in three pillars, similar to the Basel and Solvency II frameworks.<sup>a</sup> The three pillars are</p> <ol style="list-style-type: none"> <li>1. Quantitative capital requirement</li> <li>2. Qualitative supervisory requirement</li> <li>3. Market self-discipline mechanism.</li> </ol> | <p>IRDAI requires insurers to follow a factor-based solvency system similar to Europe’s Solvency I type of regime.<sup>b</sup> It uses one model fit for all approaches, and it does not explicitly link solvency capital with insurers’ key risk such as operational risk, investment risk or credit risk.</p> |
| <b>Limits or Threshold</b> | To avoid any regulatory action insurers in the U.S. are required to maintain an RBC ratio of more than 200%, and a minimum surplus level is needed (see Section 5.2.1)   | The minimum threshold to remain solvent falls in the range of 100% to 150% depending on the business line of the insurer (see Section 5.2.2).  | Limits for solvency ratio depend on the business line of insurer and level of risk they are exposed to. The minimum comprehensive solvency ratio requirement is 100%.   | For all insurers in India require to maintain their assets 1.5 or 150% of their liabilities to remain solvent.  |

<sup>a</sup>Similar to Solvency II in Europe, C-ROSS adopted a multipillar approach, risk-based capital requirements and differentiated treatment by insurance tier or types and level of disclosure.

<sup>b</sup>Before 2016, Europe used to follow a factor-based solvency regime, Solvency I.

**Source:** “Risk Based Capital,” NAIC, November 11, 2021, <https://content.naic.org/>; “Life Insurance Capital Adequacy Test,” OSFI, January 1, 2019, <https://www.osfi-bsif.gc.ca/>; “Analysis of China’s New C-ROSS Solvency Capital Regime,” Milliman, November 2015, <https://cn.milliman.com/>; “Which Insurance Companies Have More Paying Capacity in India,” *The Economics Times*, January 8, 2022, <https://economictimes.indiatimes.com/>.

<sup>188</sup> “LICAT, MCT and MICAT Review for IFRS 17,” OSFI, September 30, 2020, <https://www.osfi-bsif.gc.ca/Eng/fi-if/in-ai/Pages/IFRS17-let0920.aspx> (accessed on June 30, 2022).

## 5.2 REPORTING AND DISCLOSURE

Changes that affect the business environment and influence the way the ERM function identifies and mitigates risks include the following key important reporting and disclosure topics. Key reporting and disclosure developments in the U.S. and Canada are briefly given in Table 14.

**Table 14:**  
**KEY REPORTING REQUIREMENTS**

| Area                                      | U.S.  | Canada  |
|---|---|---|
| Changes to Accounting Standards Reporting | <b>Commonality:</b> New insurance accounting standards will be effective from January 1, 2023. Their implementation would require companies to consider integration from an ERM perspective because they affect a variety of business functions such as actuarial, finance and IT. The decision will require collaboration between these business departments.  |   |
|   | LDTI: It introduces four targeted improvements: 1) assumptions to measure the liability for future policy benefits for traditional and limited-payment contracts; 2) measurement of investment risk benefits; 3) amortization of deferred acquisition costs; 4) disclosure, which introduces new requirements such as liability roll-forward and information about significant inputs, judgments, assumptions and methods used in the measurement.  | IFRS 17: It would have a fundamental impact on balance sheet liabilities, reporting of earnings and disclosure requirements, as it introduces the contractual service margin (CSM), which is established at contract inception for profitable contracts, and requires it to represent the future profits in the contracts.  |
| Climate Risk Disclosure                   | <b>Commonality:</b> Climate risk disclosure would enhance transparency on how insurers manage climate-related risks and opportunities and enable better-informed collaboration and engagement on climate-related issues among regulators and interested parties. This would include climate risk assessment more consistently in their broader ERM framework, which can help identify and correlate impacts across different lines of businesses as well as investments. This would give insurers a holistic view of climate risk exposure, thereby helping top management make sound decisions. <sup>189</sup> |   |
|   | On November 15, 2021, the NYDFS issued guidance for New York domestic insurers on managing financial risks from climate change. In April 2022, the NAIC announced a framework requiring insurers to report their climate-related risks. Insurers are required to respond to the annual NAIC Climate Risk Disclosure Survey, to comply with the TCFD framework by November 2022.   | The OSFI will consult FRFIs on climate disclosure guidelines in 2022 and will require financial institutions to publish climate disclosures, aligned with the TCFD framework using a phased approach, starting in 2024. It requires disclosure around four core areas: governance, strategy, risk management, metrics and targets. TCFD recommends providing climate-related disclosures in financial institutions' mainstream (i.e., public) annual financial filings. |
| ORSA                                      | <b>Commonality:</b> The ORSA is an internal assessment conducted by the insurer or insurance group of material and relevant risks associated with the insurer or insurance group's current business plan and the sufficiency of capital resources to support those risks. It is intended to foster an effective level of ERM for all insurers in the group and to provide a group-level perspective to regulators on risk and capital to supplement the existing legal entity view.   |   |
|   | As part of the SMI, the NAIC adopted ORSA.  | The OSFI considers this information in its assessment of inherent risks and risk management practices.  |

**Source:** "LDTI," *Risk and Compliance*, <https://riskandcompliancemagazine.com/>; "IFRS 17 Transition and Progress Report Requirements for Federally Regulated Insurers," OSFI, September 2020, <https://www.osfi-bsif.gc.ca/>; "Canada Introduces Mandatory Climate Disclosures for Banks, Insurance Companies Beginning 2024," *ESG Today*, April 8, 2022, <https://www.esgtoday.com/>; "U.S. Insurance Commissioners Endorse Internationally Recognized Climate Risk Disclosure Standard for Insurance Companies," NAIC, April 8, 2022, <https://content.naic.org/>; "Own Risk and Solvency Assessment (ORSA)," NAIC, May 11, 2022, <https://content.naic.org/>.

<sup>189</sup> "How Insurance Companies Can Prepare for Risk from Climate Change," Deloitte Analysis, <https://www2.deloitte.com/> (accessed on June 30, 2022).



Another example of potential reporting and disclosure is the Common Framework (ComFrame). In November 2019, the International Association of Insurance Supervisors announced the adoption of revised insurance core principles, which establish supervisory standards and guidance focusing on the effective groupwide supervision of internationally active insurance groups (IAIGs). The baseline version of the insurance capital standard (ICS), ICS version 2.0, was agreed to in Abu Dhabi, following six years of field testing, with final modifications expected to be consulted upon in 2025. Once implemented, the ICS will be a core component of ComFrame for the supervision of IAIGs and will deliver a groupwide prescribed capital requirement. Also, it will provide a common way for supervisors of IAIGs to compare group solvency.

### 5.3 CYBERSECURITY AND DATA SECURITY

#### Canada

In Canada, the OSFI and the Canadian Securities Administrators each provides guidance to address the cybersecurity risks for organizations subject to their regulations. The OSFI regulates federally regulated financial institutions (FRFIs), including banks, most insurance companies and federal pension plans.

In 2013 the OSFI released Cybersecurity Self-Assessment Guidance for FRFIs to assess their level of preparedness and assist in the implementation of useful cybersecurity practices. The template focuses on six categories for assessment: organization and resources; cyberrisk and control assessment; situational awareness; threat and vulnerability risk management; cybersecurity incident management; and cybersecurity governance. While releasing the self-assessment guidance, the OSFI noted that it “expects FRFI senior management to review cyberrisk management policies and practices to ensure that they remain appropriate and effective in light of changing circumstances and risks.”<sup>190</sup>

In the private sector, several laws require organizations to protect personal information within their possession or control. Although several laws are designed to protect privacy in general, two federal privacy acts are in force in Canada:

- PIPEDA, 2001, is a federal legislation to protect employees’ personal information by federally regulated insurance organizations in Canada, as well as protect personal information during commercial activities in all jurisdictions that do not have substantially similar legislation.<sup>191</sup>
- The Privacy Act is the federal information-privacy legislation of Canada that came into effect on July 1, 1983. Administered by the Privacy Commissioner of Canada, the act sets out rules for how institutions of the government of Canada collect, use, disclose, retain and dispose of personal information of individuals.<sup>192</sup> The act applies to the government’s collection, use, disclosure, retention or disposal of personal information while providing services such as: old age security benefits, employment insurance, border security, federal policing and public safety, tax collection and refunds.

An important aspect of PIPEDA is that it reassures the European Union that the Canadian privacy law is protecting the sensitive information of European citizens. Amendments were made to PIPEDA in coherence with the European Union’s General Data Protection Regulation (GDPR). Like GDPR, under PIPEDA, individuals have the right to access

<sup>190</sup> Lyndsay A. Wasser and Kristen Pennington, “Cybersecurity Laws and Regulation 2021,” *Mondaq*, December 2020, <https://www.mondaq.com/canada/security/1012302/cybersecurity-laws-and-regulations-2021> (accessed on May 2022).

<sup>191</sup> “Policy Proposals for PIPEDA Reform to Address Artificial Intelligence Report,” Office of the Privacy Commissioners of Canada, <https://www.priv.gc.ca/> (accessed on June 30, 2022).

<sup>192</sup> “The Privacy Act in Brief,” Office of the Privacy Commissioner of Canada, August 2019, [https://www.priv.gc.ca/en/privacy-topics/privacy-laws-in-canada/the-privacy-act/pa\\_brief/](https://www.priv.gc.ca/en/privacy-topics/privacy-laws-in-canada/the-privacy-act/pa_brief/) (accessed on June 30, 2022).

personal information held by an organization, know who is responsible for collecting it, understand why it is being collected and challenge its accuracy. PIPEDA contains several provisions applicable to data protection and cybersecurity,<sup>193</sup> including the following:

- Organizations are responsible for personal information under their control and must designate an individual or individuals who will be accountable for compliance with PIPEDA.
- Personal information must be protected by security safeguards appropriate to the sensitivity of the information.
- Security safeguards must protect personal information against loss or theft, as well as unauthorized access, disclosure, copying, use or modification, regardless of the format in which it is held.
- The nature of the safeguards will vary depending on the sensitivity of the information that has been collected; the amount, distribution and format of the information; and the method of storage. More sensitive information should be safeguarded by a higher level of protection.

Furthermore, the federal government of Canada has tabled Bill C-27 in June 2022, which is a reintroduction of the previously retracted Bill C-11. Bill C-27, the Digital Charter Implementation Act, aims to overhaul Canada's federal data privacy law. If passed, the bill would repeal the privacy provisions of PIPEDA and enact the Consumer Privacy Protection Act and the Personal Information and Data Protection Tribunal Act. Collectively, this legislation would change Canada's privacy landscape by overhauling PIPEDA and making Canada's consumer privacy protection regulations more relevant to modern data and make it a more responsive law such that innovative businesses will benefit from clear rules, even as technology continues to evolve.

## U.S.

The U.S. insurance industry is facing growing risks from cybersecurity threats because of the increasingly sophisticated techniques used by cybercriminals amid the expansion of remote health care delivery and the growing digitalization of insurance transactions, clinical records and billing.<sup>194</sup>

Amid the rising incidence of cyberattacks and high-profile data breaches, the government has stepped up its scrutiny of cybersecurity.<sup>195</sup> This has led to increased call for legislation and regulations for enhanced cybersecurity measures to address the numerous risks posed by cyberattacks, including, but not limited to (1) identity theft, (2) business interruption, (3) damage to reputation, (4) data repair costs, (5) theft of customer lists or trade secrets, (6) hardware and software repair costs, (7) credit monitoring services for impacted consumers and (8) litigation costs.

The National Institute of Standards and Technology (NIST) has provided a framework for improving critical infrastructure cybersecurity, most recently updated in 2018.<sup>196</sup> The framework provides a structure of standards, guidelines and practices to aid organizations, regulators and customers with critical infrastructures in effectively managing their cyberrisks (Table 3).

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<sup>193</sup> Mitch Kocerginski, Lyndsay A. Wasser and Carol Lyons, "Cybersecurity—The Legal Landscape in Canada," McMillan, <https://mcmillan.ca/insights/publications/cybersecurity-the-legal-landscape-in-canada> (accessed on June 30, 2022).

<sup>194</sup> "Cyber Theft of Consumer Data Growing Risk for the US Health Insurers," Fitch Ratings, June 29, 2022, <https://www.fitchratings.com/research/insurance/> (accessed on June 30, 2022).

<sup>195</sup> "Cybersecurity," NAIC, July 9, 2022, <https://content.naic.org/cjpr-topics/cybersecurity> (accessed on June 30, 2022).

<sup>196</sup> "Framework for Improving Critical Infrastructure Cybersecurity," National Institute of Standards and Technology April 16, 2018, <https://nvlpubs.nist.gov/nistpubs/cswp/nist.cswp.04162018.pdf> (accessed on June 30, 2022).

In December 2021, the NAIC members voted to form the Innovation, Cybersecurity, and Technology (H)<sup>197</sup> Committee.<sup>198</sup> In a statement, the NAIC said the new committee would focus on the following areas:

- Providing a forum for state insurance regulators to learn about and discuss cybersecurity, innovation, data security and privacy protection measures, and emerging technology issues
- Keeping track of developments in areas that affect the state insurance regulatory framework
- Understanding evolving practices and use of innovative technologies by insurers and producers
- Coordinating NAIC efforts regarding innovation, cybersecurity and privacy, and technology across other committees
- Making recommendations and developing regulatory, statutory or guidance updates

Key laws for data protection and privacy are the following:

- Health Data Privacy: Health insurers handle large amounts of sensitive data when processing benefit claims or uploading patient information. These data are protected by federal laws such as HIPAA (1996). Various legislation in the U.S., such as the HITECH Act (2009) and PPACA (2010), has promoted increased digitalization of health records.
- Gramm-Leach-Bliley Act (GLBA): The GLBA, also known as the Financial Modernization Act of 1999, is a federal law enacted in the U.S. to control the ways financial institutions deal with private information of individuals. The act consists of three sections: the Financial Privacy Rule, which regulates the collection and disclosure of private financial information; the Safeguards Rule, which stipulates that financial institutions must implement security programs to protect such information; and the pretexting provisions, which prohibit the practice of pretexting or accessing private information using false pretenses. The act also requires financial institutions to give customers written privacy policy notices that explain their information-sharing practices.<sup>199</sup>

#### 5.4 OTHER RELEVANT REGULATORY CHANGES

Collaboration is key for successful multilateral support. For example, the Five Eyes (FVEY) agreement is an intelligence alliance composed of Australia, Canada, New Zealand, the U.K. and the U.S. These partner countries share a broad range of intelligence with one another in one of the world's most unified multilateral arrangements.<sup>200</sup> FVEY stands out from other arrangements because the parties are diverse societies, governed by the rule of law and robust human rights, and are bonded by a common language. These characteristics aid the partners in sharing information with one another to protect their shared national interests. It is a cooperative intelligence network that monitors electronic communications of citizens and foreign governments. In the past, it

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<sup>197</sup> Here "H" only stands for numbering system.

<sup>198</sup> "NAIC Members Vote to Form New Letter Committee," *Cision PR Newswire*, December 16, 2021, <https://www.prnewswire.com> (accessed on June 30, 2022).

<sup>199</sup> Garry Kranz, "Gramm-Leach-Bliley Act (GLBA)," *Tech Target*, <https://www.techtarget.com/searchcio/definition/Gramm-Leach-Bliley-Act> (accessed on June 30, 2022).

<sup>200</sup> "Five-Country Ministerial," Public Safety Canada, <https://www.publicsafety.gc.ca/cnt/ntnl-scrf/fv-cntry-mnstrl-en.aspx> (accessed on June 30, 2022).

was used to monitor foreign communications among a few countries, serving various political interests. Today FVEY monitors private communications of billions of people worldwide.<sup>201</sup>

The FVEY alliance uses communications methods such as signal intelligence to monitor citizens of other FVEY member countries. By monitoring each other's citizens, FVEY can bypass domestic surveillance regulations. FVEY has steadily advanced since its inception and has developed to the point of a multinational global surveillance program, capable of monitoring the data of the entire population.

FVEY collects information by intercepting private communications—such as telephone calls, faxes, emails and text messages—from infrastructure such as satellites, telephone networks and fiber optic cables. FVEY also receives records of user data from large technology companies, including Microsoft, Yahoo, Google, Facebook, Paltalk, YouTube, AOL, Skype and Apple. Each member country has three to five government agencies involved, and each agency is responsible for one to two roles, including human intelligence, defense intelligence, security intelligence, geo intelligence and signal intelligence.

#### 5.4.1 AI/ML Regulation on Bias

Insurers are on the journey of adopting AI/ML, and some key aspects of the direction regulators are taking are highlighted below:

- U.S.: The NAIC adopted guiding principles on AI, emphasizing the importance of accountability, compliance and transparency, and safe, secure and robust outputs with insurers implementing AI tools to facilitate operations.
- Canada: The OSFI proposed revision to the existing Enterprise-wide Model Risk Management Guideline E-23 in May 2022. The proposed revisions identified several AI/ML-related issues that firms should incorporate into their MRM framework, including AI/ML model monitoring, bias, transparency and explainability. The final guidance is expected to be published by the end of 2023.<sup>202</sup>

Although no federal legislation regulates the use of AI in the U.S. currently, several bills on the ethical use of AI have been proposed at the federal and state levels. The Algorithmic Accountability Act,<sup>203</sup> proposed in February 2022, calls for companies, including insurance companies, to monitor and assess the impact of AI systems in use. If enacted, it will establish a standard for the level of transparency and accountability for companies utilizing AI/ML systems. At the state level, the Algorithmic Accountability and Bias Prevention Act in Massachusetts<sup>204</sup> and the Stop Discrimination by Algorithms Act in Washington, DC,<sup>205</sup> were introduced in 2021. Both propose prohibiting companies from discriminating against consumers based on sensitive information with the use of algorithms. Similar legislation, SB 169 in Colorado, was also proposed and passed in 2021. SB 169 specifically focuses on the insurance

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<sup>201</sup> Wesley Chai, "Five Eyes Alliance," TechTarget, <https://www.techtarget.com/whatis/definition/Five-Eyes-Alliance> (accessed on June 30, 2022).

<sup>202</sup> "OSFI Announces Proposed Revisions to Guideline E-23 on Model Risk Management," *Lexology*, May 31, 2022, <https://www.lexology.com/library/detail.aspx?g=6bb49113-05b6-41db-bec8-25d50069c6f1> (accessed on June 30, 2022).

<sup>203</sup> "Federal Lawmakers in House and Senate Introduce Algorithmic Accountability Act of 2022," *National Law Review*, February 11, 2022, <https://www.natlawreview.com/> (accessed on June 30, 2022).

<sup>204</sup> "An Act Relative to Algorithmic Accountability and Bias Prevention," 192nd General Court of the Commonwealth of Massachusetts, <https://malegislature.gov/Bills/192/H4029> (accessed on June 30, 2022).

<sup>205</sup> DC AG Introduces "Stop Discrimination by Algorithms Act," JDSUPRA, February 1, 2022, <https://www.jdsupra.com/legalnews/dc-ag-introduces-stop-discrimination-by-5180671/> (accessed on June 30, 2022).

industry and prohibits insurers from discriminating against protected classes (consumers) with the use of algorithms, models and external data sources. The bill may take effect as early as January 1, 2023.<sup>206</sup>

Without a clearly defined regulation on ethical AI, many insurers are following the Principles on AI published by the NAIC. The principles outline several important topics in conducting ethical AI activities, ensuring they are fair and ethical, accountable, compliant, transparent, secure, safe and robust.<sup>207</sup> The NAIC also has a working group that reviews existing regulatory policies and coordinates with subject matter expert (SME) committees on drafting guidance and handbooks.

Similarly, no official law is in effect in Canada to regulate the use of AI at both the federal and provincial levels. The Digital Charter Implementation Act (Bill C-27) was introduced in June 2022. It was a reintroduction of the similar Bill C-11, which was retracted from the Parliament in August 2021.<sup>208</sup> The new bill proposed a package of acts including the Artificial Intelligence and Data Act (AIDA), the Consumer Privacy Protection Act (CPPA), and the Personal Information and Data Protection Tribunal Act. AIDA requires companies to have policies for monitoring and mitigating risks associated with “high-impact” AI systems and to maintain comprehensive technical documentation on AI systems. It also prohibits the use of AI that “may result in serious harm” to others.<sup>209</sup> CPPA proposed a set of data protection rules, including data consent requirements, privacy protection mechanisms and monetary penalties for noncompliant companies. If the bill passes, it would be Canada’s first AI legislation.

At the provincial level, the British Columbia and Yukon Privacy Commissioners and Ombudsman jointly published a report in June 2021 that discussed and proposed recommendations to address fairness and ethical issues related to AI.<sup>210</sup> Although the report mainly focused on the public sector’s use of AI, it also provides useful insights for private sectors on the trend of AI regulations that may be introduced in the future.

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<sup>206</sup> “CO SB169,” LegiScan, 2021, <https://legiscan.com/CO/bill/SB169/2021> (accessed on June 30, 2022).

<sup>207</sup> “National Association of Insurance Commissioners (NAIC) Principles on Artificial Intelligence (AI),” NAIC, <https://content.naic.org/> (accessed on June 30, 2022).

<sup>208</sup> “AI, Machine Learning & Big Data Laws and Regulations 2022 | Canada,” *Global Legal Insights*, <https://www.globallegalinsights.com/practice-areas/> (accessed on June 30, 2022).

<sup>209</sup> “Government Bill (House of Commons) C-27 (44-1),” Parliament of Canada, 2022, <https://legiscan.com/CO/bill/SB169/2021> (accessed on June 30, 2022).

<sup>210</sup> “British Columbia and Yukon Privacy Commissioners and Ombudsman Call for Strengthened Regulation and Oversight of Artificial Intelligence in Public Sector Decision-Making,” International Ombudsman Institute, June 22, 2021, <https://www.theioi.org/ioi-news/current-news/> (accessed on June 30, 2022).

Table 15 summarizes key and overlapping principles that have been proposed in different regions.

**TABLE 15:**  
**AI PRINCIPLES IN DIFFERENT REGIONS**

| U.S. (NAIC) <sup>211</sup> and Canada—<br>Specific to Insurers | Europe (EIOPA) <sup>212</sup> —Specific<br>to Insurers | China (MOST) <sup>213</sup> —General<br>Guidance | India (NITI Aayog) <sup>214</sup> —<br>General Guidance  |
|--|--|--|--|
| <b>Fair and Ethical</b>  | Fairness and<br>nondiscrimination                      | Harmony and friendliness                         | Protection and reinforcement<br>of positive human values |
|  |  | Fairness and justice                             | Equality, inclusivity and<br>nondiscrimination           |
| <b>Transparent</b>   | Transparency and<br>explainability                     | Respect of privacy                               | Transparency, privacy and<br>security                    |
| <b>Accountable and Compliant</b>                               | Human oversight  | Security and safety                              | Safety and reliability                                   |
|  |  | Shared responsibility                            | Accountability   |
| <b>Secure, Safe and Robust</b>                                 | Robustness and performance                             | Agile governance                                 | Safety and reliability                                   |
|  | Data governance of record-<br>keeping                  |  |  |
|  | Proportionality  |  |  |
|  |  | Inclusivity and sharing                          | Equality, inclusivity and<br>nondiscrimination           |

**Source:** “Responsible AI: Approach Document for India, Part 1—Principles for Responsible AI,” NITI Aayog, February 2021, <https://www.niti.gov.in>; “NAIC Principles on AI,” NAIC, 2020, <https://content.naic.org>; “Artificial Intelligence Governance Principles,” EIOPA, June 17, 2021, <https://www.eiopa.europa.eu>.

#### 5.4.2 CLIMATE RISK

Managing the financial risks of climate change is becoming an increasing focus for insurance regulators. In 2019 regulators were either unaware or unconvinced of insurers’ preparedness for the impacts of climate risks.<sup>215</sup>

The Task Force on Climate-Related Financial Disclosures (TCFD) has become one of the most influential (nongovernmental) initiatives to bring transparency in the industry around climate risks. For example:

- The European Union is integrating climate change reporting into ORSA requirements. This will impact U.S. and Canadian multinational insurers with footprints in Europe.

<sup>211</sup> “National Association of Insurance Commissioners (NAIC) Principles on Artificial Intelligence (AI),” NAIC, <https://content.naic.org/> (accessed on June 30, 2022).

<sup>212</sup> “EIOPA Publishes Report on Artificial Intelligence Governance Principles,” EIOPA, June 17, 2021, <https://www.eiopa.europa.eu/media/> (accessed on June 30, 2022).

<sup>213</sup> “A New Generation of Artificial Intelligence Ethics Code” (in Chinese), Ministry of Science and Technology of the People’s Republic of China, September 26, 2021, [https://www.most.gov.cn/kjbgz/202109/t20210926\\_177063.html](https://www.most.gov.cn/kjbgz/202109/t20210926_177063.html) (accessed on June 30, 2022).

<sup>214</sup> “Responsible AI for All,” NITI Aayog, February 2021, <https://www.niti.gov.in/sites/default/files/2021-02/Responsible-AI-22022021.pdf> (accessed on June 30, 2022).

<sup>215</sup> “How Insurance Companies Can Prepare for Risk from Climate Change,” Deloitte, <https://www2.deloitte.com/us/en/pages/financial-services/articles/insurance-companies-climate-change-risk.html> (accessed on June 30, 2022).

- In Canada, the federal government, in its Budget 2022, included significant measures to build a net-zero economy. The OSFI will consult regulated entities on climate risk disclosure in 2022.
- In the U.S. in November 2021 NYDFS provided guidance on managing climate-related financial risks. The U.S. SEC also recently proposed rule changes, requiring climate risk-related disclosures with material impacts. Climate risk guidance is likely to become more prevalent at both state and federal levels. Also, the NAIC Climate Risk & Resiliency Task Force developed a new TCFD-aligned survey. Under this framework, insurance companies are required to respond to the annual NAIC Climate Risk Disclosure Survey and will need to comply with TCFD reporting by November 2022.

Regulatory entities will continue to push for the adoption of financial impact measurement due to climate change. For example, in the U.S. the NAIC also announced that 15 states, representing nearly 80% of the U.S. insurance market, have committed to using the NAIC survey in 2022 for insurance companies licensed in their jurisdictions. This means that, although 28 insurance companies provided TCFD-compliant reports in 2021, this number will grow to nearly 400 insurance companies and groups in 2022 because of the adoption of the new standard, as per the NAIC.

### 5.4.3 CAPITAL AND RESERVE-ORIENTED REGULATION

Both the countries in consideration have been working towards advancing their reserve requirement regulations. The capital requirement in each country is discussed briefly in this section.

#### CAPITAL REQUIREMENTS IN CANADA

Insurers expect the OSFI to publish revised capital guidelines, including the Life Insurance Capital Adequacy Test (LICAT), Minimum Capital Test (MCT) for property and casualty insurance companies, and Mortgage Insurer Capital Adequacy Test (MICAT) later in 2022. Although the revised guidelines will be updated to reflect IFRS 17, the OSFI intends to keep capital frameworks consistent with current capital policies to the extent possible to reduce potential industry-wide impacts.

#### PRINCIPLE-BASED RESERVING IN THE U.S.

The NAIC updated statutory reserve requirements by introducing Principle-Based Reserving (PBR) for life insurers to model their reserves based on a set of fundamental principles rather than one-size-fits-all rules, which went into effect on January 1, 2017. It requires insurers to make complex calculations and establish assumptions based on their actual company experience, with additional margins added for prudence. This will result in substantial changes to processes, IT systems and internal controls, and will introduce intercompany variability in capital required to back life insurance policies. The shift to PBR from the statutory-reserve requirements by the NAIC was necessary because the earlier approach was uniform and led to excessive reserves being held for some insurance products and inadequate reserves for others.<sup>216</sup>

For instance, insurers were to hold certain amounts of reserve funding to ensure that the insurance claims on policies are paid. Reserves that are too high can unnecessarily raise the cost of insurance, whereas reserves that are set too low can raise the risk of an insurer's not being able to pay all claims and becoming insolvent. Thus, features and risk profiles for most products were not done properly. Therefore, the "one-size-fits-all" approach is being phased out.

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<sup>216</sup> "It's Time to Talk Principle-Based Reserving," Swiss Re, September 22, 2020, <https://www.swissre.com/reinsurance/life-and-health/solutions/customer-retention/countdown-to-principle-based-reserving-begun.html>.

PBR requires insurers to make complex calculations and establish assumptions based on their actual company experience, with additional margins added for prudence. This shift has led to substantial changes to the processes in the company. Life insurers will have to calculate up to three separate reserve requirements and perform an assessment of internal control over their process to perform PBR valuations. Furthermore, the PBR framework for nonvariable annuities borrows and leverages the existing and already approved VM-20 (life) and VM-21 (variable annuity) methodologies. This framework, which covers fixed indexed annuities, strives to ensure that reserving requirements are aligned with the product risk profile and the company's exposure to prevailing market conditions.<sup>217</sup>

The NAIC is expected to adopt some version of the PBR framework for nonvariable annuities, with an anticipated initial target effective date of January 1, 2023 (variable annuities had implemented the PBR framework). Fixed-annuity PBR is being discussed now, with implementation in 2025 or later. The Annuity Reserve Working Group has not yet decided whether the new framework will apply only to business issued after the effective date or whether it will apply to in-force businesses as well.

#### 5.4.4 OTHER KEY STATE OR PROVINCIAL REGULATIONS

This section discusses about other key state or provincial regulations that have been adopted or are in the stage of development in Canada and the U.S.

#### CONSUMER PROTECTION AGAINST UNFAIR DISCRIMINATION

The Financial Services Regulatory Authority of Ontario conducted several consultations in 2021 relating to its proposed rule on Unfair or Deceptive Acts or Practices (UDAP), which was recently approved by the Ministry of Finance and became effective from April 1, 2022, in Ontario. The principles-based rule will replace the current UDAP regulation under Ontario's Insurance Act and aims to strengthen the supervision of the insurance industry's conduct by clearly defining the outcomes that are unfair or otherwise harmful to consumers in response to social and technological changes. This will apply to insurers of life and health as well as P&C, including auto, risks and related providers of goods and/or services. It will facilitate improved outcomes by better protecting consumers from harm due to improper practices such as unfair discrimination, unnecessary claims, delays and fraudulent activities reducing regulatory burden, and removing barriers to innovation for the industry by being less prescriptive, supporting the transition to principles-based regulation by focusing on outcomes and eliminating overly prescriptive provisions.

#### Quebec's Bill 64

On September 21, 2021, Quebec, Canada's second-largest province by population, unanimously adopted Bill 64, an act to modernize legislative provisions pertaining to the protection of personal information, enacting significant changes to the requirements governing the use and protection of personal information under various statutes including the Private Sector Act and the Public Sector Act.<sup>218</sup> Bill 64 sets a precedent for important reforms in the privacy law of the Canadian private sector as it will alter the province's privacy landscape. For instance, the bill affords individuals increased rights and control over their personal information. As a necessary corollary to this, it also significantly increases the obligations of public and private sector entities that hold personal information. Many

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<sup>217</sup> "Potential Impact of Non-Variable Annuity PBR on Fixed Indexed Annuity Pricing," SOA, February 2021, <https://www.soa.org/sections/product-dev/product-dev-newsletter/2021/february/pm-2021-02-motiwalla/> (accessed on June 30, 2022).

<sup>218</sup> Private Sector Act: The act respecting the protection of personal information in the private sector. Public Sector Act: The act respecting access to documents held by public bodies and the protection of personal information.



entities doing business in Quebec will, therefore, need to implement significant changes to the ways in which they collect, store, share and retain personal information to comply with the requirements of the bill. Those who fail to do so may face prescribed noncompliance consequences—the most punitive in Canada, as the bill increases the fines for noncompliance with the privacy legislation, providing that private sector entities be subject to fines ranging CAN 15,000 to 25,000,000, or an amount corresponding to 4% of worldwide turnover for the preceding fiscal year, whichever is greater.<sup>219</sup>

### **BUSINESS MODEL AND CAPTIVES’ OPERATIONS**

Additionally, the Alberta legislature also created a different risk management option, which will allow companies to arrange insurance through related, purpose-built Alberta insurance companies that they own either directly or indirectly. Alberta passed the Captive Insurance Companies Act in December 2021 to do the following:

1. Outline the rules necessary for forming, operating and dissolving a captive insurer in Alberta.
2. Provide requirements to ensure captive insurance companies are conducting their business according to sound financial and corporate governance principles.
3. Specifically require a captive insurance company to be physically located in Alberta to ensure the province sees all the economic benefits of this new activity.
4. Allow Alberta-licensed captives to insure risks of a single entity (a company), members of an association (an industry group) or a knowledgeable client with complex insurance needs.

### **California Consumer Privacy Act (CCPA), 2018**

The California Consumer Privacy Act of 2018 (CCPA) is a data privacy law that was passed on June 28, 2018, and took effect on January 1, 2020. It is the first U.S. law of its kind to protect online data privacy.<sup>220</sup> The CCPA legislation applies to most businesses that possess the personal data of California residents. CCPA gives California residents a certain amount of control over the personal data that businesses collect about them. In late 2020, California voters passed a proposition, the California Privacy Rights Act, that amended and expanded CCPA. CCPA gives California consumers the following important rights:<sup>221</sup>

1. The right to know: Consumers should be informed about what personal information an organization collects about them and how that information is used.
2. The right to delete: With some exceptions, consumers can delete information collected about them.
3. The right to opt out: Consumers can prevent the sale of their information to third parties.
4. The right to nondiscrimination: An organization cannot treat users who exercise their CCPA rights differently, such as by charging them more for regular services. However, at times exercising CCPA rights impacts what services an organization can provide. For instance, if a user of an ecommerce website exercises the “right to delete” and deletes their account, they may not be able to save their shipping address or credit card information on that website anymore.

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<sup>219</sup> Julia Kappler, Melissa Tehrani, Philippe Matziorinis and Naïm Antaki, “Canada: Bill 64 Marks a New Direction in Quebec Privacy Law April 2022,” *Mondaq*, <https://www.mondaq.com/canada/data-protection/1187858/bill-64-marks-a-new-direction-in-quebec-privacy-law-key-takeaways-for-businesses> (accessed on June 30, 2022).

<sup>220</sup> Robert D. Keeler and Lauren C. Matturri, “Understanding the California Consumer Privacy Act’s Effect on Business,” *Mondaq*, May 21, 2021, <https://www.mondaq.com/unitedstates/privacy-protection/1071282/understanding-the-california-consumer-privacy-act39s-effect-on-businesses> (accessed on June 30, 2022).

<sup>221</sup> “What Is CCPA (California Consumer Privacy Act),” Cloud Flare, <https://www.cloudflare.com/en-in/learning/privacy/what-is-the-ccpa/> (accessed on June 30, 2022).

### **New York Department of Financial Services (NYDFS): Cybersecurity Regulations, 2017**

The NYDFS places cybersecurity requirements on all covered financial institutions such as mortgage companies, insurance companies and state-regulated banks that operate under Department of Financial Services (DFS) licensure, registration or charter, or that are otherwise DFS-regulated, as well as, by extension, unregulated third-party service providers to regulated entities.<sup>222</sup> The regulation came into effect on March 1, 2017, with implementation within 180 days (August 28, 2017). The NYDFS cybersecurity regulation works by imposing strict cybersecurity rules on covered organizations, including the installment of a detailed cybersecurity plan, the designation of a chief information security officer, the enactment of a comprehensive cybersecurity policy, and the initiation and maintenance of an ongoing reporting system for cybersecurity events. In addition, NYDFS cybersecurity regulation will adhere to several key requirements, aligned to the NIST cybersecurity framework (as discussed above), and requires covered organizations to develop a cybersecurity policy, including an incident response plan that includes data breach notifications within 72 hours. The policy must address concerns in alignment with industry best practices and ISO 27001 standards.

### **Virginia’s Consumer Data Protection Act**

Virginia’s Consumer Data Protection Act (CDPA) was passed on March 2, 2021. It grants Virginia consumers certain rights over their data and requires companies covered by the law to comply with rules on the data they collect, how the data are treated and protected and with whom the data are shared. The law contains some similarities to the EU GDPR’s provisions and CCPA. It applies to entities that do business in Virginia or sell products and services targeted to Virginia residents. CDPA requires companies covered by the law to assist consumers in exercising their data rights by obtaining opt-in consent before processing their sensitive data, disclosing when their data will be sold and allowing them to opt out. It also requires companies to provide users with a clear privacy notice that includes a way for consumers to opt out of targeted advertising.

Several other data privacy laws are found in states in the U.S., including Colorado, Connecticut and Utah. Many other states such as Alaska, Louisiana, Massachusetts, Michigan, New Jersey and North Carolina are considering data privacy laws.

## **BLOCKCHAIN AND CRYPTOCURRENCY REGULATIONS**

Regulators at the federal and state level are showing increasing interest in the blockchain and cryptocurrency space, and the regulatory environment of the two issues is rapidly evolving. As more insurers are tapping into these innovative technologies, they may face additional regulations. At the federal level, active engagement has been seen from federal regulatory agencies such as the Securities and Exchange Commission (SEC), the Commodity Future Trading Commission (CFTC), the Internal Revenue Service (IRS) and the Financial Crimes Enforcement Network (FinCEN).<sup>223</sup> At the state level, 37 state governments have proposed or passed relevant legislation.<sup>224</sup>

### **Money Transmission and Anti-Money Laundering**

Under the Bank Secrecy Act, FinCEN stated that organizations engaging in virtual currency exchanges would be considered money transmitters and that they must have anti-money-laundering programs in place.

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<sup>222</sup> “What Is the NYDFS Cybersecurity Regulation? A Cybersecurity Compliance Requirement for Financial Institutions,” *Digital Guardian*, December 01, 2020, <https://digitalguardian.com/blog/what-nydfs-cybersecurity-regulation-new-cybersecurity-compliance-requirement-financial> (accessed on June 30, 2022).

<sup>223</sup> “Blockchain & Cryptocurrency Laws and Regulations| USA,” Global Legal Insight, <https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/usa> (accessed on June 30, 2022).

<sup>224</sup> “Cryptocurrency 2022 Legislation,” National Conference of State Legislatures, May 7, 2022, <https://www.ncsl.org/research/financial-services-and-commerce/cryptocurrency-2022-legislation.aspx> (accessed on June 30).

In most states, cryptos are regulated under existing money transmitter laws. Depending on each state’s definition on money transmission, money transmitter licenses may be required for companies involved in receiving and paying cryptos. Some states define money transmission as issuing or selling payment and/or store value, whereas some states explicitly include virtual currency in the definition. In such cases, money transmitter licenses are required by state laws when using virtual currency payment systems. Examples include the District of Columbia, Maryland, Michigan, New Jersey, New York, North Carolina and Ohio.

## 5.5 PRACTITIONERS’ OPINIONS ABOUT THE INSURANCE REGULATORY ENVIRONMENT

The regulatory environment in the U.S. and Canada has metamorphosed over the years to impact all spheres of the insurance sector, from consumer data protection to the inclusion of evolving risks in the ERM function.

Practitioners interviewed have indicated concerns about the prevailing dynamic environment in the U.S. and Canada, where risks, strategies, the organization and the competitive landscape are continuously evolving (Table 16). The key emerging risks are posed by cyberthreats, analytics, AI/ML advancements and climate change. Regulators have been frequently updating their norms to protect consumer information and restrict insurers from using AI/ML if any potential discrimination against users arises.

Practitioners indicated that insurers, despite their systematic approach, are striving to deal with these changes. According to them, insurers are increasingly using externally sourced data sets such as information from social media and climate, weather and financial risks. Although digitalization does present new opportunities through the availability of new data and business channels, it also creates additional cybersecurity risks. Many practitioners have expressed concerns about the speed at which the regulatory environment is evolving and how regulations are being implemented swiftly.

### 5.5.1 PRACTITIONERS’ TOP REGULATORY CONCERNS

Practitioners expressed concerns on key areas affecting the insurance business, particularly financial reporting, data privacy and protection. A sense is also seen, which could be interpreted as strong, that some regulations are needed on many aspects such as know your consumer, anti–money laundering, deposit insurance and insurance regulations, to mention a few, and some regulatory initiatives are ongoing. One also finds the sentiment of constant challenge by the practitioners regarding the fast-evolving regulatory environment. Analytics and AI advancements, recreational drug legalization, shifting population demographics and climate change are all topical examples of issues that can impact the design of ERM programs and prioritization of risk-mitigation efforts. Practitioners mentioned that they are tracking regulatory changes around ERM expectations.

The top regulatory concerns among practitioners are tabulated in Table 16.

**Table 16:**  
**TOP REGULATORY CONCERNS AMONG PRACTITIONERS**

| U.S.   | Canada  |
|--|---|
| <p><b>Federal vs. state regulations.</b> Insurers find it difficult to deal with multiple regulations in each state in which they do business. Insurers are burdened by duplicate and often inconsistent regulations in many aspects of their operations, products, prices and market conduct except for solvency, which is equal in all states.<sup>225</sup> Some practitioners have mentioned that the health insurance segment is particularly sensitive to both federal and state insurance regulations.</p>  | <p><b>Federal vs. provincial regulations.</b> Regulatory activities such as ensuring fair treatment of customers and making sure the products are appropriate for customers as well as the views of the provinces and territories are getting harmonized. Provincial and federal regulators oversee distinct aspects of the insurance business, leading to regulatory divergence. Some practitioners indicate regulatory proposals and consultations have different approaches and may potentially affect their ongoing data-harmonization process.</p> |
| <p><b>Premiums, ratemaking.</b> Overlay of regulations and response time may hinder the viability of insurance products and jeopardize the ability to update better rates, potentially affecting the very consumers insurers are seeking to protect.</p>   | <p><b>Premiums, ratemaking.</b> In Canada, all provinces and territories require drivers to have at least liability and accident benefits/bodily injury coverage. Some provinces may require additional coverage; for instance, Alberta has specific regulations that require an annual review of auto insurance trends and premiums relating to basic and additional coverage for private passenger vehicles.</p>  |
| <p><b>Cybersecurity.</b> Since insurance companies are widely connected to the internet and are adopting more digitalized products and solutions, they are exposed to evolving cyberrisk and its wide range of impacts. These include loss of business because the risk may halt business activities and impact insurers in terms of finance and reputation. Thus, stakeholders need to be proactive in assessing cyberrisk, follow regulatory guidance and enhance their ERM policies and practices.</p>  | <p><b>Cybersecurity.</b> Practitioners indicated that insurers operate in a dynamic environment where risks, strategies and the competitive landscape are evolving. Hence, emerging risks posed by cyberrisk warrant attention, where the ERM function is essential, particularly the operational risk category, which is typically accountable for cybersecurity and business continuity plans. Although practitioners did not mention any specific regulation, they expressed compliance concerns.</p>  |
| <p><b>Climate risk.</b> Practitioners from the U.S. and Canada expressed concerns about upcoming regulations or requirements to assess the financial impact of climate change, particularly how new laws will be implemented in their functional areas, such as investment and actuarial. In fact, practitioners thought the regulators may start with the large insurers, such as assessment of physical risk beyond operations and business continuity, but more holistically as how policyholders can be affected and investments and insurance products changed. Additionally, practitioners mentioned that state regulators and lawmakers are watching the implications of climate-related risks carefully, such as the Five Eyes (FVEY) agreement that includes the U.S. and Canada. Societal idiosyncratic changes and development of regulations related to climate risk can impact insurers soon.</p> |   |

**Source:** Authors' impressions based on practitioners' opinions.

<sup>225</sup> Solvency is identical in all states for life insurers.

## 5.5.2 DIGITAL ENVIRONMENT: DATA ISSUES, AI/ML AND IOT

### Data Challenges

Insurers are required to demonstrate to regulators, the public, clients and/or shareholders their ability to ensure confidentiality and avoid outcomes that are unfairly discriminating or violate legal requirements, such as privacy and data security laws and regulations. Practitioners stated that operating within a unified regulatory and data confidentiality framework is becoming increasingly important as data become more widespread and exchanged across ecosystems.

Given that AI/ML development requires extensive use of data, data accessibility and reliability are key legitimate concerns among practitioners. In fact, some practitioners expressed concerns about data sharing between business subsidiaries becoming more challenging, which may cause roadblocks for larger AI/ML rollouts that require access to large data sets. This is a potential issue of data jurisdiction and portability for multinational insurers. For example, existing laws limit how consumer data can be used, while establishing additional standards on data protection, according to practitioners.

For personal data protection, insurers need to comply with data laws such as the European GDPR directive to secure personal information. The regulation affects certain U.S. and Canada-based multinational companies that write business in Europe (or their parent company is in Europe). Therefore, some states have been responding to data protection regulations, for instance, CCPA in the U.S. and the PIPEDA equivalent regulation to GDPR for regulated entities in Canada.

Thus, complying with these regulations and frequently updating these laws have impacted insurers, who need to review their previously developed strategies for data usage. For instance, insurers are unable to use the data gathered during product marketing as part of the underwriting process, preventing them from improving their risk models. Thus, insurers must bear costs associated with improving systems and internal controls to remain compliant with the regulations.

### AI/ML

AI/ML adoption is accelerating among insurers. The pandemic has forced insurers to shift from being heavily reliant on in-person interactions, appraisals and inspections to digitalizing of many of those activities using AI/ML.

Although insurers understand that AI/ML is reshaping the competitive marketplace, significant roadblocks still are faced by many insurers in optimizing huge volumes of data within their legacy systems to realize the full value of AI/ML modeling and the underlying technology evolving in tandem.

Practitioners voiced their concerns about the risk of AI/ML creating any discrimination (race and gender), which would cause financial and reputational risks. As a result, practitioners mentioned they have been taking a proactive stance toward governing AI/ML to eliminate bias. In general, practitioners mentioned they already have internal ethical principles they adhere to, but the authors did not find a consistent approach to this in their annual financial reports or websites.

Practitioners continue to struggle to ensure models are not discriminatory. They have mentioned the involvement of legal and compliance teams in the projects with AI usage, which helped prevent unfairness and discrimination. They also expressed optimism over potential guidelines by the regulators in this area soon.

Insurers are also preparing themselves to defend their decisions regarding data selection, data quality and auditing procedures to ensure there is no bias in machine-driven decisions. If the regulation tightens further, insurers will have to change their data types or sources in the future.

Also, practitioners mentioned that an insurance company can go only so far with the use of advanced tools such as AI/ML, because it needs to show to the regulator how it has come up with the price of product for rate approval

from the authority. Thus, they are being more careful about commercial and personal property rates because their models may have to be public.

**5.5.3 RECENT REGULATORY OR ACCOUNTING CHANGES**

The interviewed practitioners highlighted that the recent accounting changes from LDTI and IFRS 17 have posed challenges in the adoption and triggered business transformation, including the way ERM must respond to these changes. Table 17 contains details about practitioners’ views on their adoption journey. Although this table is split between the U.S. and Canada, it is important to note that both LDTI and IFRS 17 triggered similar transformative changes, particularly around the increase in collaboration between actuarial and finance functions as well as streamlining of insurance data management.

**Table 17:**  
**CHALLENGES AND THE INITIAL IMPACT OF LDTI IN THE U.S. AND IFRS 17 IN CANADA**

| U.S.—Interviewed Practitioners  | Canada—Interviewed Practitioners  |
|---|---|
| <p>Practitioners mentioned that the implementation of LDTI for insurance contracts and the associated expected complexities require higher collaboration between teams, such as actuarial, financial and ERM oversight. LDTI is being viewed as the trigger for long-deferred investments, ranging from targeted data, system or process upgrades to full-scale modernization, with ERM in the center to understand risks and implement controls or adopt mitigants.</p> <p>Some LDTI implementation challenges include the following:</p> <ul style="list-style-type: none"> <li>a) Data management</li> <li>b) Coordination across streams</li> <li>c) Simultaneous business transformation to actuarial and financial functions</li> <li>d) Resource-talent constraints</li> <li>e) Alignment of LDTI project goals</li> <li>g) Interpretations of the standard and adapting to policy change</li> </ul> <p>Moreover, practitioners also mentioned that LDTI has affected multiple processes. For instance, insurers had to update their risk models (liabilities). Other key ERM initiatives to analyze and simplify processes were put in place to review the LDTI data management requirements at the company level while reviewing and validating inputs and assumptions to be used.</p> | <p>Practitioners mentioned that the implementation of IFRS 17 in Canada would impact their business. But on the positive side, the adoption of the accounting standard has allowed insurers to optimize certain processes around finance and actuarial functions, ensuring they work seamlessly: for instance, increasing financial reporting capabilities and streamlining internal information and data processing.</p> <p>The interviewed practitioners also mentioned that the change from IFRS 17 does not impact the fundamentals and economics of their business. However, it impacts where, when and how specific items are recognized on financial statements.</p> <p>During the transition to IFRS 17, practitioners also said they are required to upgrade their current skills and capabilities, both to streamline the transition to new accounting standards and to effectively manage the business under the new standard. Some practitioners are relying on third-party software to adopt IFRS 17.</p> <p>Practitioners expect relatively less complexity for short-term contracts that qualify for the simplified Premium Allocation Approach. However, greater complexity is expected in the IFRS 17 adoption for companies writing long-term insurance products.</p> |

**Source:** Authors’ impressions based on practitioners’ opinions.

Practitioners also highlighted climate risk guidelines, particularly the uncertainty about the related regulatory requirements, adoption of TCFD and how to navigate potential model change.

#### 5.5.4 MRM PRACTICES IN THE INSURANCE INDUSTRY

In the U.S. currently no regulation governs the MRM processes of insurance companies. However, most insurers are adopting the Supervisory Guidance on Model Risk Management (SR 11-7) issued by the Federal Reserve and the Office of the Comptroller of the Currency along with the MRM handbook.<sup>226</sup> Thus, the banking industry guidance is being adopted by the insurance industry for MRM. Additionally, actuarial practitioners adhere to the Actuarial Standards of Practice 56 (ASOP 56), which provides guidance to actuaries with respect to designing, developing, selecting, modifying, using, reviewing or evaluating models.

In Canada, the OSFI guidelines, such as OSFI E-23 and E-25, are the common MRM-related regulations. Guideline E-25 applies only to P&C insurers, and Guideline E-23 currently applies only to banks; however, OSFI has proposed to expand the scope of E-23 to all federally regulated financial institutions. In September 2017, the OSFI issued guideline E-23, Enterprise-Wide Model Risk Management for Deposit-Taking Institutions, which sets out the OSFI's expectations on the life cycle approach to manage the use of models by federally regulated deposit-taking institutions.<sup>227</sup> The guideline outlines the OSFI's expectations on how models are used by institutions, covering models used in regulatory capital requirements, risk management and pricing and models assisting business decisions and stress testing. OSFI E-25, Internal Model Oversight Framework, outlines its expectations for insurers, specifically those that identify, assess and manage risk of internal models to determine regulatory capital requirements.

OSFI E-23 clearly outlines the roles and responsibilities of different stakeholders and expects institutions to have a complete model inventory, including decommissioned models, governance systems, model materiality classification, and independent validation and audit functions to independently assess the model risk management governance framework.

As no single regulation governs the MRM function of insurance companies, the MRM practice followed by each insurer has been different, though converging. As noted earlier, the one common aspect is the across-the-board acknowledgment of the need to set up an inventory of all the models and perform model risk assessment.

However, differences are found among insurers in which teams perform independent validation and the extent of bringing effective challenges by performing additional tests. It was noted that a few insurers have separate second line-of-defense validation teams that perform model validation, including standalone testing, whereas a few others facing resource constraints adopt an independent review of model developer testing by other teams within the first line of defense. Another key challenge that insurers are facing is finding the most appropriate way to handle EUCTs and the adoption of AI/ML models.

#### 5.5.5 REGULATORY ENVIRONMENT AND EMERGING ERM BEST PRACTICES

The ERM function needs to respond and adapt to each regulatory change to ensure constant compliance. The ongoing transformation and emerging best practices are paving the way for the inclusion of a broad typology of risks that are arising in the insurance industry, such as climate and cybersecurity risks. The regulations mentioned in this report, while not exhaustive, provide a glimpse at how practitioners approach risk identification and assessment as well as the evolving ERM function at insurance companies in the U.S. and Canada.

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<sup>226</sup> "Model Risk Management," Office of the Comptroller of the Currency, August 2021, <https://www.occ.treas.gov/publications-and-resources/publications/comptrollers-handbook/files/model-risk-management/pub-ch-model-risk.pdf> (accessed on June 30, 2022).

<sup>227</sup> "Enterprise-Wide Model Risk Management for Deposit-Taking Institutions," OSFI, September 2017, <https://www.osfi-bsif.gc.ca/Eng/if-if/rg-ro/gdn-ort/gl-ld/Pages/e23.aspx> (accessed on June 30, 2021).

## ERM Adoption and Risk Culture

According to practitioners, ERM is most effective when it permeates an organization's culture so that every employee recognizes that they have a role to play in the firm's risk management. ERM frameworks, policies and reporting need to be communicated, understood and followed by employees. In turn, they must accurately portray how the most material risks should be managed. In other words, they must be more than words on paper.

Practitioners in the ERM function are positioning themselves as value-added professionals and strategic advisors on the business. To really put governance into practice, the policies, guidelines and processes defined to manage risks must be put into play when making decisions.

ERM and business leaders must actively communicate with one another and examine all sides of an issue to develop alternative solutions. ERM tools can provide an unbiased yardstick to anchor those discussions. Integration is a goal pursued by many ERM leaders as an important means of leveraging the effectiveness of ERM. For ERM to gain a stronger foothold in strategy and business operations, ERM practitioners must turn their attention beyond the ERM committee and toward active collaboration with other parts of the organization.

## Stress Testing

Although sensitivity analysis has been the prevailing practice for the actuarial and interest rate risk functions for a long time, enterprise-wide exercises are emerging as best practices to ensure the insurer is capable of enduring adverse situations.

For instance, in the U.S., practitioners are adopting the liquidity stress testing framework from the NAIC, especially for large life insurers. The stress test is likely to run annually, and the findings are to be reported to identify vulnerabilities and address them. Further, enhancements with the addition of more granular data will enable the assessment of macroprudential impact of a liquidity stress on the broader financial market including many insurers.

Another stress-testing framework that the practitioners were vocal about was Best's Capital Adequacy Ratio models that depict the relationship between an insurer's balance sheet and its operating risks. These models are well integrated into the ERM framework of many insurers, as mentioned by the practitioners. The model enables an insurer to determine adequate capital against different risk categories and value-at-risk scenarios. Practitioners noted that significant stress is being laid on capital requirement adequacy, and that risk-based capital frameworks need to be integrated into the existing ERM frameworks.

## Climate Risk

Climate change is an emerging threat to the financial system. The physical and transition risks resulting from climate change affect both sides of insurers' balance sheets—assets and liabilities—as well as their business models.

In the U.S., insurers are starting to assess the financial impact of climate change. This is being driven not only by insurers' initiatives, but also by regulatory actions at various levels (see Section 5.5.2 for more details). Additionally, practitioners view that dialogue among industry risk professionals and key stakeholders, including investors, policyholders, regulators and standard setters, is essential for fostering a deeper understanding of the potential risks, advancing best practices and ensuring that regulatory approaches are aligned with effective risk management.

Practitioners also pointed to the SEC's release of proposed climate change-related disclosure requirements, which has set the stage for insurers to integrate climate risk into the ERM framework in a structured way. U.S. insurers have begun voluntarily submitting the NAIC climate risk disclosure survey. The NAIC's Climate Resiliency Task Force will continue to identify and provide guidance around its five workstreams: Pre-Disaster Mitigation, Solvency,



Climate Risk Disclosure, Innovation and Technology. The maturation of climate risk approaches can be expected to drive new ERM practices.

The practitioners in Canada highlighted the recent budget released in April 2022, in which the federal government of Canada stated that insurance companies will be required to provide disclosures on their climate-related risks and exposures, beginning in 2024. Continuous efforts by the OSFI to build capability of financial institutions include guidelines to help insurers understand potential impacts of physical and transition risks across a range of different climate pathways such as performing pilot projects for the climate risk scenario exercise. As climate risk governance evolves, insurance companies will reflect that evolution within their organizations. For example, a practitioner from Canada indicated its company recently created the position of chief climate risk officer, who will be responsible for assessing the financial exposures related to climate risk in the firm’s insurance portfolio, as well as associated systemic impacts.

Practitioners discussed that their ERM function has helped their firms formalize their understanding of ESG and financial impact due to climate change. For instance, it helps in the risk identification system, although much has not changed for some insurers, and they consider these as external functions, which could help insurers upgrade their ratings and reputation in the market.

Most interviewed practitioners discussed ESG and climate risk as upcoming future regulatory changes. NYSDF guidance was specified by multiple practitioners as a key driver. Most firms are in an early “reactive” phase, making plans to comply with applicable regulations, such as including climate risk into their ORSA. More broadly, most firms are currently taking a “see what others do” approach. One practitioner expressed that their firm plans to procure consultants or in-house experts to help improve their understanding of climate risk impacts to their existing models.

### **Reporting and Disclosure**

Internal reporting has evolved to include metrics and KPIs that enable practitioners and stakeholders to oversee or monitor key risks at the insurance business, including the risk categories mentioned in Table 3. Practitioners are developing dashboards and reporting visibility in their internal cloud platforms to democratize the access to key indicators so that other business functions can make timely decisions. According to practitioners, the main priorities or areas of reporting are statistics on new business acquisitions, loss reserves and key solvency ratios.

Reporting has helped insurers in their process for identifying, assessing and managing the impact on other risk factors such as underwriting, operational, reputational and investment risks as part of their overall risk management and how well such risks are integrated into the ERM process (Table 3).

The external reporting and disclosure requirements are evolving. As discussed above, the most recent requirement (while still voluntary in some cases) is for sustainability and climate risk readiness. Practitioners in the U.S. indicated that they have been updating their ORSA reports to include new emerging risks, such as climate risk and ESG.

Another reporting focus area for many insurers (if not adopted already) is IFRS 17, which impacts both U.S. and Canadian entities, especially if their parent company operates in a country where this accounting standard is expected to be adopted by the regulatory authorities.

## Section 6: Conclusions

The insurance industry in the U.S. and Canada is undergoing significant innovation, business and regulatory changes. This presents an opportunity for practitioners to deploy their expertise to add value to ERM policies, frameworks and controls, to anticipate and mitigate risks. Insurance companies operating in the U.S. and Canada also navigate differences related to risk culture practices and regulatory focus between the two countries. Furthermore, each insurer has its own unique business model, priorities, exposures and vulnerabilities. These specificities make the ERM function an active player in determining the unique aspects of insurers' strategies on emerging risks and drivers where practitioners could bring value-added inputs.

This report also highlights how trending topics such as blockchain technology, crypto and AI/ML are influencing and transforming the insurance industry. ERM is at the center of the adoption of these technologies in the insurance value chain. Hence, the ERM function, along with its practitioners in the three lines of defenses, will continue to be the facilitator or enabler to navigate innovation, business and regulatory environments.

The prevailing market conditions urge insurance companies to continue enhancing their competitiveness through a strategic focus on consumer experience and operational efficiency. To enhance their ERM function, practitioners are responding in the following areas:

- **Cybersecurity:** The increasing frequency and severity of cybersecurity attacks have caused some insurers to bear monetary loss and reputational damage. Insurers are involving cyberrisk experts to reduce exposure and vulnerability, where the ERM function provides ongoing oversight under the operational risk category.
- **Inflation:** Globally, inflation is affecting the way insurers conduct business, with policy lapsation and premium pricing at the center of ERM discussions today. Practitioners are performing assessments of inflation-linked products at the region, portfolio and product levels. Regulatory authorities may also see an influx of premium-update requests from insurers, so they can continue to respond to the increased cost of coverages included in policies, particularly in personal lines.
- **AI/ML:** New models and algorithms such as AI/ML are playing a key role in modern enterprises, bringing MRM and enterprise risk into the spotlight as oversight functions. Although regulations covering AI/ML have not been issued, practitioners are taking readiness steps by adopting an "information-gathering approach." Additionally, many insurers are developing ethical principles for the use of AI/ML, along with the corresponding policies overseen by ERM and MRM, in preparation for the expected AI/ML regulations.
- **Climate risk:** Although not introduced as another risk category in the ERM function, climate risk is bringing additional scrutiny by senior risk professionals to better understand the financial impact of climate change on governance, reporting and disclosure. Regulators in the U.S. and Canada are in the early stages of planning how regulated entities will need to assess exposure and respond to climate-change vulnerabilities for insurers.

Modernization of the actuarial function is in the opinion of practitioners, an area that can help insurance companies to bring more business efficiencies, for example, in the data transformation processes, systems and people. The modernization must have the right balance of centralized and decentralized operating models.

The insurance business will continue to evolve going forward, and its resiliency will hinge on ERM practices and practitioners' efforts toward formalizing their approach to successfully navigate the emerging risks and drivers, particularly around cybersecurity, inflation, AI/ML and climate risk, and around other difficult to predict extreme events such as the COVID-19 pandemic. Practitioners in the ERM space highlight the importance of continued investment in talent, cybersecurity defense and governance.

## Section 7: Acknowledgments

The researchers' deepest gratitude goes to those without whose efforts this project could not have come to fruition: the Project Oversight Group (POG) and others for their diligent work in overseeing questionnaire development, analyzing and discussing respondent answers, and reviewing and editing this report for accuracy and relevance.

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## Section 8: List of Participating Practitioners Interviewed

The authors' deepest gratitude goes to those without whose efforts this project could not have come to fruition: the U.S. and Canada practitioners, both those interviewed (virtual face-to-face meetings) and those surveyed (respondents to an online survey). The former is a subset of the latter, who generously shared their wisdom, insights, advice, guidance and arm's-length review of this report before publication. Any opinions expressed may not reflect their opinions nor those of their employers. Any errors are the authors' alone. The following practitioners have agreed to disclose their names:

Mr. Robert B. Anderson

Mr. Joel Atkins

Mr. Debarshi Chatterjee

Ms. Dawn Elzinga

Mr. Jim Flinn

Mr. Alex Granovsky

Mr. Todd Hess

Ms. Linda Lankowski

Ms. Vy Le

Ms. Emily Li

Mr. John Di Meo

Mr. John Miller

Ms. Stefanie Porta

Ms. Pooja Rahman

Mr. Max Rudolph

Mr. John Wiklund

Mr. Jon Wu

Ms. Lisa Zwicker

Other practitioners preferred to remain anonymous. Practitioners surveyed (not interviewed virtually) are also anonymous.

Interviewees agreed to disclose the names of insurance companies associated with them at the time of the interview for this report:

Breach Insurance

CNA Insurance

Davies Insurance Services

Equitable Life of Canada

Economical

Farm Bureau Insurance of Michigan

Hannover Life Reassurance Company of America

Health New England

Intact

Pan-American Life Insurance Group

Protective Life Corporation

Rudolph Financial Consulting

Swiss Re

Trustmark Insurance

United Services Automobile Association

## Section 9: Methodology

This section includes details about the scope, objectives and procedures of the ERM study.

### Geographical Scope and Research Objective

The full ERM series covers China, India, the U.S. and Canada. This report focuses only on the U.S. and Canada.

The study's objective is to prepare a report with insights and actionable intelligence to help ERM professionals manage regulatory risks. It provides an overview of the ERM function in the insurance innovation, business and regulatory environments.

### Information Sources

Information and/or data for this project was derived from recent ERM literature, insights and suggestions from POG members, insurance practitioners' findings (surveyed and then sourced from face-to-face virtual interviews), historical research and documentation from actuarial sources, and CRISIL's insights. The secondary sources comprised regulations announced in the geography understudy, news and articles, academic papers and white papers.

### Procedures

- **Sample:** The methodology incorporates practitioners interviewed (over a virtual face-to-face session) and those surveyed (respondents to an online survey); the first are a subset of the latter. With the help of the SOA, CIA and CAS survey links were shared with 33,132 individuals involved with risk management. To be precise, the blast emails count for the SOA is 19,648, for CIA 12,908, and for CAS 576. A total of 163 individuals responded to the online survey, out of which only 93 entries were useful to analyze, as other entries were only partially completed and had missing values. The final number of face-to-face interviews conducted was 28.
- **Interview timeline:** Practitioners were interviewed during March–May 2022.
- **Reach:** Some practitioners were contacted directly via email and were invited to participate; others were introduced by the sponsors of the research project. Additionally, a microsite was set up on CRISIL's website to facilitate project information dissemination.
- **Interview process:** A measuring instrument (guide) was prepared with a set of interview questions designed to gather ERM information from practitioners.
- **Interview duration:** Practitioners were invited for a face-to-face interview lasting 30 to 45 minutes.
- **Interview support:** During the interviews, at least one interviewer was based in the practitioner's location and an experienced ERM actuary deployed the measuring instrument.
- **Practitioners' views:** Practitioners had a preview of the report so they could share their views.
- **Anonymity:** All responses were kept anonymous unless the practitioners gave permission to reveal their identity. The POG had access only to an anonymized version of the practitioners' responses; that is, the version excluded any reference that could help identify the participant or company.
- **Practitioners' profile:** The practitioners contacted were chief risk officers, chief financial officers, chief technology officers, compliance officers, heads of ERM, data protection officers, chief data science or AI/ML officers, and appointed actuaries who have extensive experience in the insurance and regulatory space.
- **Governance:** A periodic review was scheduled with the POG to seek guidance and advice to shape the research.

## Section 10: Glossary

- ALM: Asset liability management
- BAU: Business as usual
- CAD: Canadian dollar
- CCPA: California Consumer Privacy Act
- Compliance risk: It includes an organization's potential exposure to legal penalties, financial forfeiture and material loss, resulting from its failure to act in accordance with industry laws and regulations, internal policies or prescribed best practices. Compliance risk is also known as integrity risk.
- Credit risk: It includes the possibility of a loss resulting from a borrower's failure to repay a loan or meet contractual obligations
- CX: Consumer experience
- Financial risk: It includes inflation risk, interest rate risk, reserve requirement, investment risk, use of complex assets and equity
- Fintechs: It is any business that uses technology to modify, enhance, or automate financial services for businesses or consumers.
- IFRS: International Financial Reporting Standards
- Insurance risk: It includes a threat or peril that the insurance company has agreed to insure against in the policy wordings
- Investment risk: It includes the risk that arises from movements in stock prices, interest rates, exchange rates and commodity prices. This also comprises the market risk factors used in the industry.
- KPIs: Key performance indicators
- KRIs: Key risk indicators
- LDTI: Long duration targeted improvement
- Nonfinancial risk: It includes climate change risk, risk from economic scenario generator, mortality and morbidity risk, and environmental, social and governance reporting
- Operational risk: It includes the risk of losses caused by flawed or failed processes, policies, systems or events that disrupt business operations
- ORSA: Own risk and solvency assessment
- PBR: Principle-based reserving
- Project Oversight Group (POG): POG is a team of SOA volunteers who diligently worked in overseeing questionnaire development, analyzing and discussing respondent answers, and reviewing and editing this report for accuracy and relevance
- Regulatory risk: It includes rate regulations, health insurance regulations, regulations for reinsurance, counterparty collateral requirement and reinsurance with nondomestic reinsurance as well as changing requirements from local regulators.
- SEC: Securities and Exchange Commission

- Smart contract: A smart contract is a digitally signed, computable agreement between two or more parties. A virtual third party, a software agent, can execute and enforce at least some of the terms of such agreements. Smart contracts are digital and written using programming code languages. This code establishes the rules and consequences, similar to a regular contract, and can be automatically executed by a distributed ledger system.
- TCDF: Task Force on Climate Risk Financial Disclosure
- Underwriting risk: It includes the risk of loss borne by an underwriter.
- USD: U.S. dollar
- VPN: Virtual private network



## Section 11: Online Survey with Key ERM Items from Practitioners

This section includes details on the scope, objectives, procedures and results/observations of the survey conducted in the U.S. and Canada.

### Geographical Scope and Survey Objective

The survey covers the U.S. and Canada.

The survey's objective was to gauge market perception about the innovation, business environment and regulatory environment prevalent in the insurance market and assess the willingness of industry practitioners to participate in a 30-to-45-minute interview.

### Survey Dissemination

The survey was circulated to the target audience via email blasts to the CIA, CAS and SOA members.

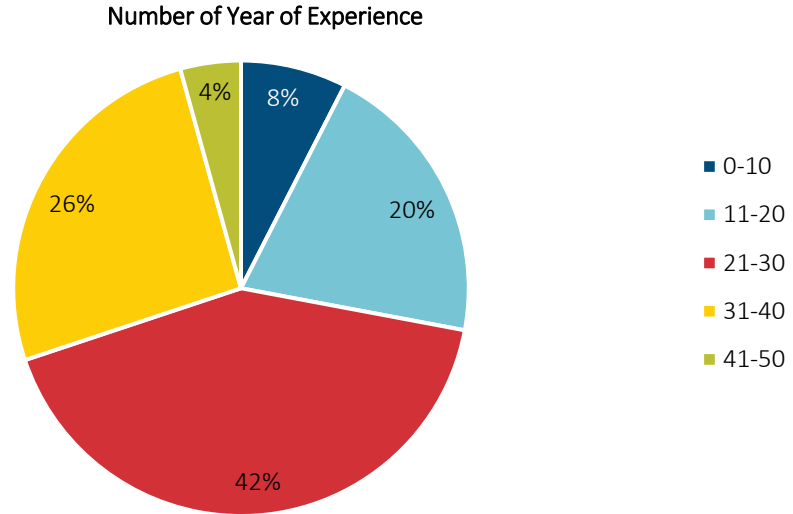
### Procedure

1. Audience: With the help of the SOA, CIA and CAS, survey links were shared with 33,000+ individuals as mentioned in Section 9
2. Respondents: 93 responses were collected and analyzed; the findings are included in the section below
3. Reach: Some individuals were contacted directly via email, and some were invited via our newsletter
4. Interview process: Participants who agreed to be interviewed were invited for a 45-minute face-to-face interaction to gain deep and extensive insights on the insurance environment in the U.S. and Canada
5. Practitioners' profiles: Chief risk officers, chief financial officers, chief technology officers, compliance officers, heads of ERM, data protection officers, chief data science or AI/ ML officers, appointed actuaries and independent consultants with extensive experience in the insurance and regulatory space were invited to participate in the survey
6. Governance: A periodic review was scheduled with the POG to seek guidance and advice to shape research

**Survey Questions and Results**

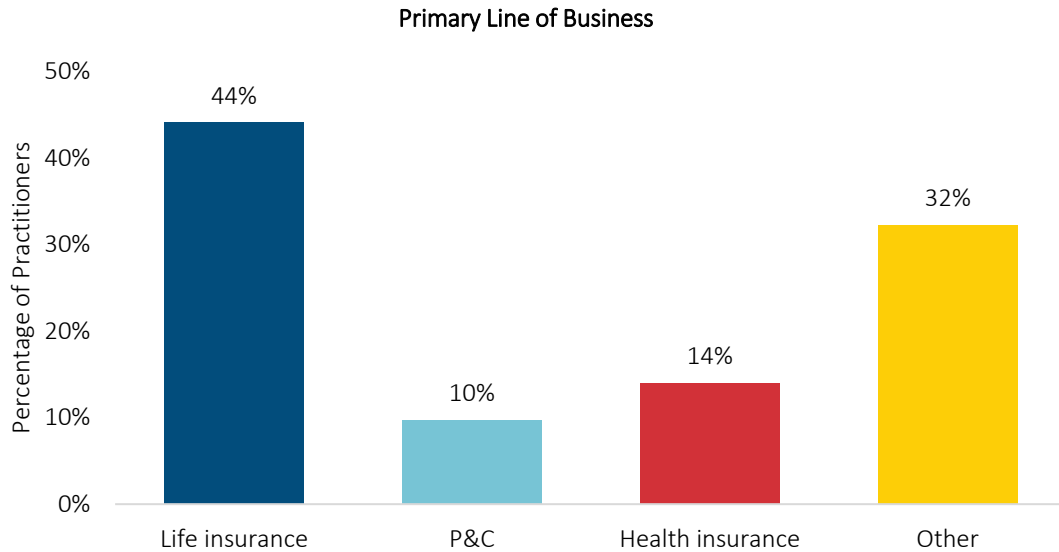
The following questions were asked in the survey:

**1. How many years have you been involved in the insurance industry?**



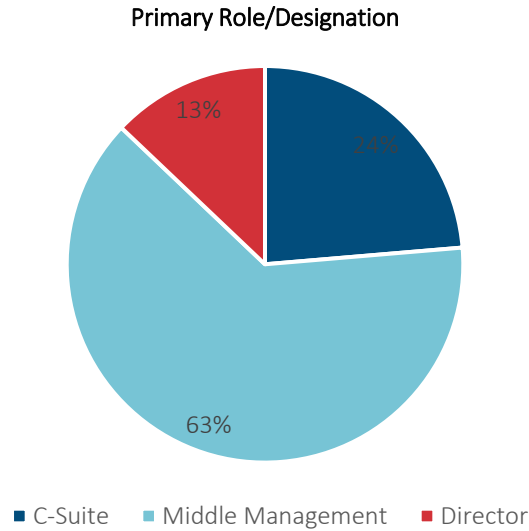
Of 93 respondents, 42% had 21 to 30 years of experience in the insurance industry and 26% had 31 to 40 years of experience, indicating that the survey results reflect the views of industry veterans, and their analysis will be highly insightful and vital for preparing this report.

**2. What primary line of business is your work related to?**



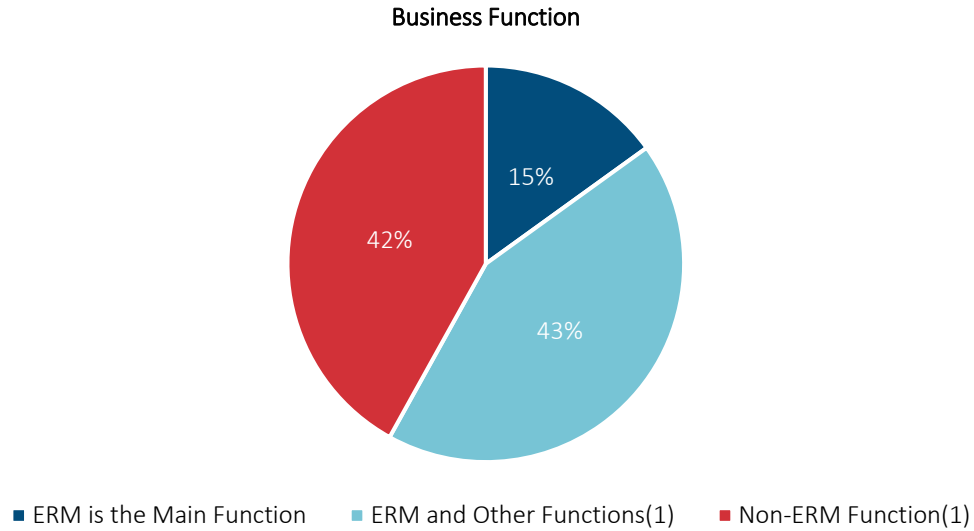
This graph shows that in the survey most participants (44%) work in life insurance, followed by 14% in health insurance and 10% in the property and casualty insurance line of business. The remaining 32% selected the category “Other” as their primary line of business, which includes independent consultants, reinsurance or regulators.

3. What is your primary role and/or designation?



When asked about their primary role/designation at their respective company, around 63% respondents said they are managers up to middle management (vice president, lead analyst, managers) or practitioners working as consultants, 24% are C-Suite (chief financial officer, chief risk officer or chief actuary), followed by director with 13%.

4. What is the business function that you support?



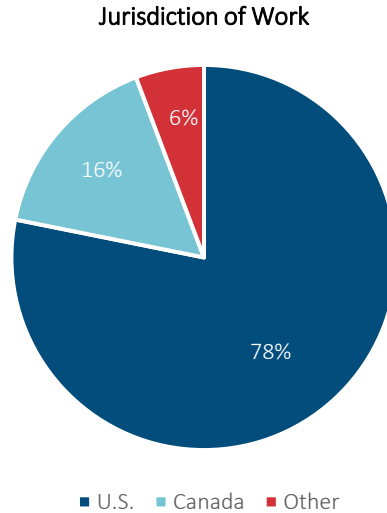
Although 15% respondents selected ERM as their main business function in which they are involved, 43% respondents have a business function in ERM along with other business functions as well.<sup>228</sup> The remaining

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<sup>228</sup> (1): Others and non-ERM include business functions such as actuarial function, corporate function, model risk management, investment and treasury.

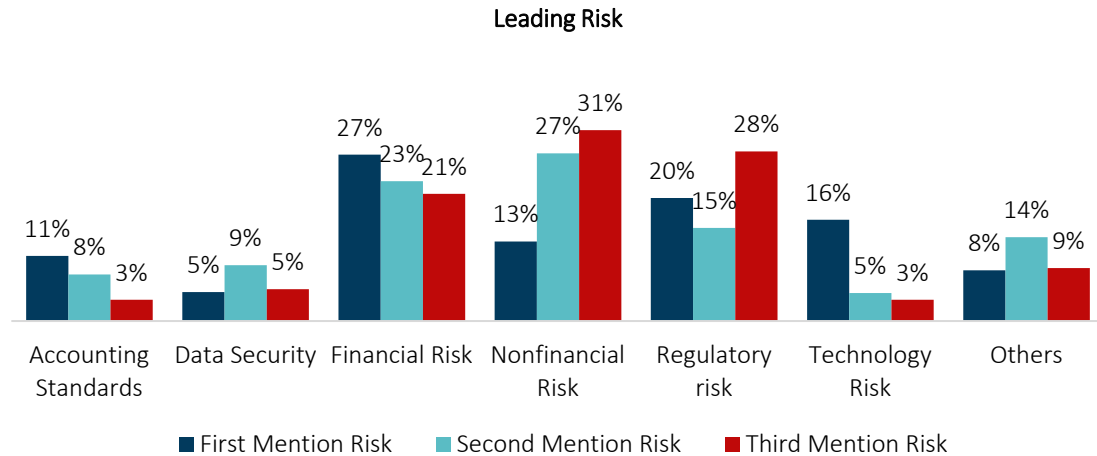
42% respondents have non-ERM business functions such as actuarial function (76%), corporate function (32%), model risk management (29%) and investment and treasury (15%).

5. Which jurisdiction does your work primarily relate to?



In the survey, 78% of participants reported that their work pertains to the U.S. jurisdiction, highly correlated with their location, followed by Canada, with 16% as their jurisdiction of work, as represented in the pie chart above. The remaining 6% also do work for Bermudas or Latin America.

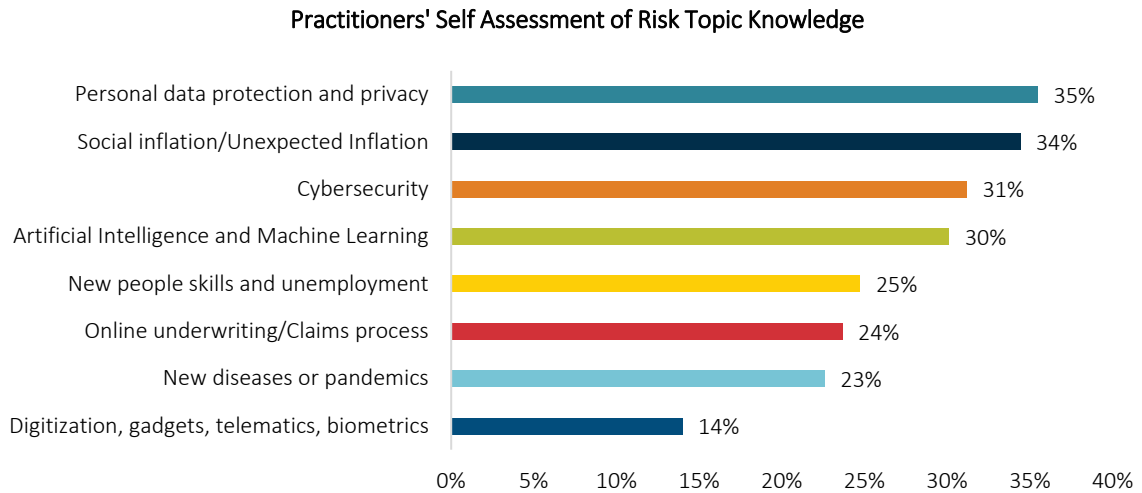
6. In your view, what are the top three risks that will affect the insurance industry in the next 3–5 years?<sup>229</sup>



<sup>229</sup> Financial risk includes inflation risk, interest rate risk, reserve requirement, investment risk, use of complex assets and equity and liquidity risk. Nonfinancial risk includes climate change risk, risk from economic scenario generator, mortality and morbidity risk, and environment, social and governance reporting. Regulatory risk includes rate regulations, health insurance regulations, regulations for reinsurance, counterparty collateral requirement, reinsurance with nondomestic reinsurance as well as changing requirements from local regulators.

Around 27% of the survey respondents mentioned the first mention risk was the “financial risk” affecting their insurance business, the second mention risk was “nonfinancial risk” (27%) and the third mention risk was “regulatory risk” (28%). Apart from these primary risks, “technology risk” (16%), “accounting standards risk” (11%) and “data security” (5%) were among risks that the respondents believe would impact the insurance industry in the next three to five years. Additionally, in the “other” category, responses displayed concerns for new disease/pandemic, pricing, model, political and economic risks (Table 3).

**7. Do you have reasonable knowledge about any of the following topics pertaining to the insurance industry?**



In the survey, we also asked about their knowledge of the topics included in this report. About 35% of respondents were very comfortable talking about “personal data protection and data privacy,” followed by the “social inflation/unexpected inflation” with 34%, “cybersecurity” with 31%, and “artificial intelligence and machine learning” with 30% (see graph above). Additionally, respondents in the survey were relatively less aware about topics such as “new people skills and unemployment” (25%), “online underwriting/claim process” (24%), “new disease or pandemic” (23%), and “digitization, gadgets, telematics, biometrics” (14%).

## About the Canadian Institute of Actuaries (CIA)

The CIA is the qualifying and governing body of the actuarial profession in Canada. We develop and uphold rigorous standards, share our risk management expertise, and advance actuarial science to improve lives in Canada and around the world. Our more than 6,000 members apply their knowledge of math, statistics, data analytics, and business in providing services and advice of the highest quality to help Canadian people and organizations face the future with confidence.

The CIA Board has 15 actuaries, six councils focused on the core needs of the profession, and over 40 committees and numerous task forces working on issues linked to the CIA's strategic plan.

The CIA:

- Promotes the advancement of actuarial science through research
- Provides for the education and qualification of members and prospective members
- Ensures that actuarial services provided by its members meet extremely high professional standards
- Is self-regulating and enforces rules of professional conduct
- Is an advocate for the profession with governments and the public in the development of public policies

The CIA and its members are active in the international actuarial community. The CIA is a founding member of the International Actuarial Association and was involved in the 1998 restructuring of the body.

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## About the Casualty Actuarial Society (CAS)

The CAS is a leading international organization for credentialing and professional education. Founded in 1914, the CAS is the world's only actuarial organization focused exclusively on property and casualty risks and has over 9,100 members worldwide. Its members are experts in property and casualty insurance, reinsurance, finance, risk management, and ERM. Professionals educated by the CAS empower businesses and governments to make well-informed strategic, financial, and operational decisions.

The objectives of the CAS are:

- To advance the body of knowledge of actuarial science applied to general insurance, including property, casualty, and similar risk exposures
- To expand the application of actuarial science to enterprise and systemic risks
- To establish and maintain standards of qualification for membership
- To promote and maintain high standards of conduct and competence
- To increase the awareness of actuarial science
- To contribute to the well-being of society as a whole

In principle and in practice, the CAS values and seeks diverse participation within the property/casualty actuarial profession. In support of those values, the CAS encourages an inclusive community where differences are celebrated, and all have the opportunity to participate to their fullest potential in its success.

Actuaries are required to adhere to high standards of conduct, practice, and qualifications of the actuarial profession, thereby supporting the actuarial profession in fulfilling its responsibility to the public.

Casualty Actuarial Society

4350 N. Fairfax Drive, Ste. 250  
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<https://www.casact.org/>

## About the SOA Research Institute

Serving as the research arm of the Society of Actuaries (SOA), the SOA Research Institute provides objective, data-driven research bringing together tried and true practices and future-focused approaches to address societal challenges and your business needs. It provides trusted knowledge, extensive experience and new technologies to help effectively identify, predict and manage risks.

Representing thousands of actuaries who help conduct critical research, the SOA Research Institute provides clarity and solutions on risks and societal challenges. It connects actuaries, academics, employers, the insurance industry, regulators, research partners, foundations and research institutions, sponsors and non-governmental organizations, building an effective network, which provides support, knowledge, and expertise regarding the management of risk to benefit the industry and the public.

Managed by experienced actuaries and research experts from a broad range of industries, the SOA Research Institute creates, funds, develops, and distributes research to elevate actuaries as leaders in measuring and managing risk. These efforts include studies, essay collections, webcasts, research papers, survey reports, and original research on topics impacting society.

Harnessing its peer-reviewed research, leading-edge technologies, new data tools, and innovative practices, it seeks to understand the underlying causes of risk and the possible outcomes. The Institute develops objective research spanning a variety of topics with its strategic research programs: aging and retirement; actuarial innovation and technology; mortality and longevity; diversity, equity and inclusion; health care cost trends; and catastrophe and climate risk. The Institute has a large volume of topical research available, including an expanding collection of international and market-specific research, experience studies, models, and timely research.

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