How Important is Liquidity to Accessing ILS Capital for Cyber Re/Insurance Risk Transfer?

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Received: December 30, 2024
Revised: February 16, 2025
Accepted: February 23, 2025

Abstract

The insurance linked securities (ILS) market has long been seen as a potential participant in cyber insurance and reinsurance ("re/insurance") risks. ILS managers have long clamored for access to liquid cyber re/insurance instruments and indicated that liquidity would be crucial to scaling their involvement. The issuance of the first cyber catastrophe bonds came alongside first-of-its-kind qualitative research on the importance of liquidity to ILS managers with regard to their prospective participation in the cyber ILS market. This paper makes a unique contribution to the literature by analyzing the views of cyber ILS managers with regard to the need for liquid instruments and then linking those findings to the early cyber catastrophe bond activity of 2023 and 2024.

Keywords: Cyber Insurance, Cyber Reinsurance, Insurance Linked Securities, Capital Markets, Reinsurance

1 Introduction

The global insurance and reinsurance ("re/insurance") industry is eager to access new sources of capital for cyber risk transfer. Appetite for insurance linked securities (ILS) support for cyber re/insurance support dates back almost a decade 2023, the cyber ILS sector reached a major milestone: The issuance of the first cyber catastrophe bond. In fact, seven came to market that year. There are many reasons why the expansion of cyber risk transfer to the capital markets is important. Views on this range simply for the need for additional capital to the transfer of systemic risk to a capital pool outside the global re/insurance industry. Further, the ILS market provides additional growth capacity for a market that has felt strained by the limited size of available pools of capital.

While access to the capital markets in general helps expand the cyber re/insurance community's access to capacity, there are issues within the ILS market that are of strategic importance. Different ILS instruments have different features, and not al such instruments are liquid. Consequently, this article seeks to answer a simple and important research question: How important is liquidity to accessing ILS capital for cyber re/insurance risk transfer?

The march to the first liquid cyber catastrophe bonds appears to presuppose the importance of liquidity, but there is a gap in the historical literature on this issue. The traditional ILS market is of little help, given that securitized risk transfer comes in and out of fashion based on broader market trends. The periodic growth of collateralized reinsurance usually comes during a decline in catastrophe bond use – and vice versa. Especially because cyber re/insurance is relatively new – and cyber ILS is in its infancy, it is necessary to find clear answers to questions about the importance of liquidity to the growth of the cyber ILS market.

This paper thus fills an important gap in the historical literature and addresses one of the newest and most cutting-edge areas of cyber re/insurance and ILS research. Using semi-structured interviews with nearly half of the ILS market conducted shortly before the completion of the first cyber catastrophe bonds, the research below presents a view of the context that pre-existed the issuance of cyber catastrophe bonds, which helps reveal the dynamics that ultimately led to the completion of the nine innovative risk transfer transactions from 2023-4 that provide a foundation for the future growth and expansion of the cyber ILS market.

2 Literature review

The newness of cyber ILS leads to some challenges with regard to the historical literature. Most scholarly circles tend to be uncomfortable with source material that has not been peer reviewed. This is a luxury not afforded the study of cyber ILS – and in fact the ILS market in general. What limited academic research has been conducted itself relies heavily on non-traditional sources of information, such as news articles, blog posts, think tank reports, corporate announcements, and industry conference presentations. Arguably, the most interesting research is being conducted by market participants, which will serve as fodder for scholarly research in further in the future, given that the measured pace of academic research requires time to digest available source information. The literature review below relies heavily on sources that include company

reports and news articles. Such sources are not only necessary for the proper study of cyber ILS but also tend to be far superior to the limited information available in peer-reviewed journals (Brantley 2020 11).

2.1 Review of key ILS terminology

Although there has been considerable research in the field of ILS, it remains as much a niche within re/insurance as the ILS market itself has been a niche within reinsurance. Consequently, a review of relevant terminology is helpful, with a useful guide for neophytes available on the Artemis website, itself an important source of reinsurance and ILS sector news and analysis (Artemis 2024). Further, the nuances in structure and form in the ILS market – and especially in how this is relevant to the use of the ILS market by cyber re/insurers – make the use of accurate language important.

ILS is a broad category used to cover a range of risk-transfer instruments, including catastrophe bonds, collateralized reinsurance, industry loss warranties (ILWs), and sidecars. Most of those instruments are beyond the scope of this article, which focuses on catastrophe bonds. Catastrophe bonds are regulated securities rather than traditional reinsurance or other forms of risk transfer (Artemis 2024b). Triggers are the means by which the payment of a claim is determined. There are indemnity triggers, in which the company covered by the bond (the "sponsor") receives a claim payment based on the losses it sustains. Industry loss index triggers use an independent third-party loss reporting agency to determine whether an instrument should pay (FINRA 2021). Reporting agents are organizations that report the cost to the insurance industry as a whole from a specific type of event (be it property-catastrophe, cyber catastrophe, or other loss event).[1]

Formats and triggers can be used in different combinations. There can be collateralized reinsurance or ILWs that are not securitized, and there can be industry loss index and indemnity catastrophe bonds. For catastrophe bonds, it can be useful to think of the bond format as something of a wrapper around an underlying risk-transfer agreement which may use an industry loss, parametric, or indemnity trigger. Catastrophe bonds themselves have some further differences in format, as well. They can come as either private or 144A transactions. Rule 144A refers to the tradability of securities (not just catastrophe bonds), and for catastrophe bonds, "they are typically issued to broker-dealers or investment banks who then acting as the initial purchasers sell them on concurrently to qualified institutional buyers (investors) under Rule 144A" (Artemis 2024c). Other forms of private catastrophe bond can be issued, and although they are securitized, they may lack the full set of features that makes them more easily tradable. Artemis.bm notes specifically that the "vast majority of cat bond transactions issued are Rule 144A catastrophe bonds" (Artemis 2024).

2.2 Cyber ILS market

The origin of the ILS market is open to debate, but the issuance of the first catastrophe bond in 1996 is a reasonable place to start (Artemis 2024d). Since then, re/insurers have turned to the catastrophe bond market more than 650 times (Artemis 2024b) – almost always (but not

[1] There are other trigger types, as well, which is outside the scope of this study.

exclusively) to transfer property-catastrophe risks. The end investors participating in the ILS market have long sought more investment alternatives than property-catastrophe risks, as long as they can deliver a sufficient return profile and demonstrate low levels of correlation to broader financial markets (Kock 2018). Casualty, life and extreme mortality, energy, political violence, and operational risk are among the classes of business that have featured in the global ILS market, according to the Artemis Deal Directory.

Cyber risk has been seen as a potential class of business for the ILS market since at least 2015 (Semir, Braun, and Eling 2015 14). The first publicly revealed cyber ILS deal came in 2017,[2] and since then, most took the form of collateralized reinsurance until 2023, when the first securitized transactions came to market (Artemis 2023). The amount of protection secured through collateralized reinsurance likely exceeded $1.5 billion before the use of catastrophe bonds began, although most of it came from a small number of markets (Johansmeyer 2023 40). During the period prior to the first cyber catastrophe bonds, ILS market participation in cyber risks showed a critical mass beginning to form, with at least seven ILS managers engaging in this sector by 2021 (Johansmeyer and Mican 2022 53) – a number that grew to at least ten by the first half of 2023 (Johansmeyer 2023b).

The importance of the cyber ILS market is linked to the belief that there is an insurance protection gap with regard to cyber. The protection gap is best described as the risk of loss not currently covered by insurance or other economic means (Swiss Re 2019 11). This has had tangible implications for the protection of businesses, as Levite, Kannry, and Hoffman observe: “Even though the insurance industry traditionally plays a critical role in risk channeling, at present the private sector is not fully capable of taking advantage of cyber risk insurance” (Levite, Kannry, and Hoffman 2018 9).

2.3 Cyber re/insurance sector

The protection gap has narrowed since 2017, when worldwide premium was less than $5 billion (Cellerini et al. 2022 15), compared to $13 billion last year (Johansmeyer 2023b). The amount of cyber insurance protection outstanding has climbed to approximately $400 billion. Meanwhile, 90% of what could be covered by cyber insurance is believed to remain unaddressed (Cellerini et al. 2022 15), suggesting that much more opportunity remains. Industry reports advance the belief that the cyber insurance market is poised for profound growth through 2040, with one suggesting that worldwide cyber reinsurance premium should surpass $100 billion by 2032” and the more modest (but still aggressive) forecast of global cyber insurance premium above $50 billion by 2040” (Newman, Pocock, and Hall 2022 12; Howden 2023 22). The ability of the cyber insurance sector to grow to such levels, though, is constrained by several factors.

The heavy reliance on reinsurance is among the most significant constraints on significant cyber insurance market growth in the near future. Recent estimates indicate that at least 50% of cyber insurance is ceded to reinsurers (Cellerini 2022 16), and that the cession rate may even have climbed to 65% (Howden 2024 4). The lack of a robust and mature retrocession market has limited the ability of reinsurers to manage their risk and capital effectively, constraining the market’s

[2] This was revealed in two interviews conducted by this author in 2023 for other research projects.

ability to grow. Additionally, re/insurers continue to fear the perceived risk of financial market correlation (Carter, Pain, and Enoizi 2022 22), resulting from a major cyber catastrophe. From concerns about a "hurricane Andrew of cyber" to the prospect of a $3.5 trillion cyber catastrophe event, cyber risk is seen as highly volatile, despite evidence to the contrary in historical cyber catastrophes and the fact that cyber catastrophe economic losses have been less than 10% of those from natural catastrophes since 1998 (Cuneo 2016; Lloyd's of London 2023; Johansmeyer 2024; Johansmeyer 2024b).

Finally, there remain concerns about the suitability of vendor models for cyber risk within the context of ILS trading. Vendor models are crucial not just to engagement with the ILS market but also to the general management of risk and capital in a manner that can fuel profitable growth. Ongoing criticism of the models (e.g., Pain 2023 7.), in fairness, largely overlooks the perspectives of the modelers themselves, not to mention improvements that have been made to their capabilities (Johansmeyer 2024 c). One indicator that cyber vendor models are gaining adoption and thus becoming an enabler of cyber ILS rather than an impediment is the fact that seven cyber catastrophe bonds came to market in 2023, four of them 144A transactions (2024d), not to mention the additional issuance activity in 2024 (Artemis 2024e).

The issuance of cyber catastrophe bonds in 2023 represents a distinct step forward from the legacy belief that "it is unlikely that ILS or other risk transfer instruments involving alternative capital will be developed, at least at scale (Carter et al. 2022 23). While it is true that scale remains an open question, the completion of seven cyber catastrophe bonds in 2023 (and at least two more since, as of this writing), the possibility of a future robust cyber ILS market is certainly now more than theoretical, with more than $1 billion in cyber ILS activity having been completed in one year for the first time even before the issuance of the four 144A transactions in the fourth quarter of 2023 (Johansmeyer 2023b).

2.4 The importance of liquidity?

The role of liquidity in the growth of the cyber ILS market has generally not been addressed, and it certainly has not been researched in any depth. Liquidity features prominently in the ILS market, as this paper will proceed to discuss, as some ILS managers require at least some amount of the instruments in their portfolio to be liquid. As a result, this article addresses a significant gap in the historical literature with regard to cyber ILS, namely the importance of liquid instruments in cyber risk transfer.

3 Methodology

This study uses a mixed methods approach that blends both publicly available information and the results of interviews with key stakeholders, described below. The analysis of 2023 cyber catastrophe bond issuances generally relies on publicly available information, which is largely sufficient. The foundational source is the Artemis Deal Directory, a database of all known catastrophe bond transactions since 1996 (Artemis 2024d). The data in the Deal Directory is supplemented with news coverage from established and widely accepted insurance industry news outlets.

Primary research regarding the relationships among cyber risk, climate change, and the re/insurance industry comes from interviews with twelve ILS managers. Although this may seem like a narrow sample size, it is consistent with previous studies of niche sectors within the insurance market (Woods and Simpson 2017 212). The discussions ILS risk transfer and the importance of liquidity are extracted from interviews involving a much broader range of cyber re/insurance and security concerns, with the comments relevant to this article's research question specifically extracted for analysis. The research methods used are largely qualitative, a necessity given the small sample size, not to mention the small size of the ILS market itself (Braun and Clark 2006 16). Although much academic research in the insurance sector uses quantitative methods, such approaches would be wholly inappropriate here, given how small the ILS market is. Without the use of qualitative methods, original research on the perspectives and decision-making in the ILS sector in general, let alone with regard to a narrow ILS topic like cyber, would be impossible. The interviews were conducted and recorded using Microsoft Teams and ranged from approximately thirty minutes to sixty minutes, with each participant interviewed once between 24 March 2023 and 15 October 2023. The project uses a thematic analysis approach, with semi-structured interviews and transcripts each coded multiple times.

The twelve ILS managers interviewed represent $48.6 billion in assets under management (AuM), which is nearly 50% of the $104.9 billion ILS sector at the time (Artemis 2024d). Five respondents are based in Bermuda, with one in the Switzerland, four in the United Kingdom, and two in the United States. Of the prospective interview subjects contacted, 100% participated. Two participants have since moved on from the companies where they worked at the time of the interviews. Two others spoke of their work on cyber ILS at companies for which they had just recently worked at the time of their interviews. Further, one ILS manager's AuM is not included in the Artemis total above because it falls outside the traditional ILS market.

Of the twelve participants in this study, eight of them, representing $39.8 billion in AuM (38% of the worldwide total at the time the interviews were conducted), engaged explicitly with the subject of liquidity. Not all participants were prompted to discuss the issue, and those that did not mention it and were not prompted were simply missed because the semi-structured interviews took a different direction and there was ample material to focus on. Of the four respondents who did not discuss liquidity, one is a former employee of a company represented by another respondent, and neither discussed liquidity. One more would not have had reason to discuss liquidity because the company had a preference for collateralized reinsurance and was not interested in securitized instruments. As a result, of the eleven ILS managers (through twelve respondents) participating in this study, liquidity would have been relevant only to ten of them, of which two did not discuss the topic. That said, liquidity mattered to eight of ten addressable respondents, suggesting it is indeed an important matter for the ILS community with regard to cyber risk.

The market share captured by this study represents the need for a cross section of the global ILS market. Increasing market share would not have materially changed the nature of the responses, based on prior research conducted by this author, particularly given the historical reluctance of several large ILS managers to participate in the ILS market, at least yet, a sentiment

captured in the first qualitative study regarding cyber ILS that directly engaged with ILS managers (Johansmeyer and Mican 2022). Although the ILS market represents a narrow subset of the global insurance industry and thus results in a fairly small sample size, expanding the data set by including other insurers and reinsurers would not make sense, given that they would not assume the risk that is traded in ILS form. The importance of liquidity would only matter to them with regard to how liquid instruments become potentially more attractive to ILS managers, which reinforces the need to focus on ILS managers in this study. Future research may contemplate a study of cyber re/insurance executives to see how they perceive the importance of liquidity to being able to access risk transfer capacity.

4 Summary of cyber catastrophe bond issuance activity

The first cyber catastrophe bonds came to market in 2023. Four sponsors completed seven cyber catastrophe bond transactions in 2023, with two more deals coming in 2024 (one from a new sponsor). Together, the nine transactions brought $510.4 million in fresh capital to the cyber re/insurance market.

Beazley used the cyber catastrophe bond market the most in 2023, with 45% of capital raised, followed by Chubb with 30% AXIS at 15%, and Swiss Re at 10%, as shown in Table 1, below. Although private cyber catastrophe bonds came first, in the end, they represented only 16% of capital raised. Chubb's East Lane Re VII transaction was the largest at $150 million. Three ($81.5 million) were private bonds, all sponsored by Beazley, which also sponsored one of the 144A bonds in 2023 ($140 billion), with AXIS, Chubb, and Swiss Re also participating. Beazley returned to the cyber catastrophe bond market in 2024 with a $160 million follow-on issuance, and Hannover Re debuted with a private catastrophe bond with $13.9 million in limit.

Table 1: Cyber catastrophe bond issuance activity 2023-4

Issuance	Sponsor	Size	Coupon	Tenor	Trigger	Format	Year
Cairney I	Beazley	$45mn	UNK	12 months or less	Indemnity	Private	2023
Cairney II	Beazley	$20mn	UNK	12 months or less	Indemnity	Private	2023
Cairney III	Beazley	$16.5mn	UNK	12 months or less	Indemnity	Private	2023
PoleStar Re[3]	Beazley	$140mn	13%	2 years	Indemnity	144A	2023
East Lane Re VII	Chubb	$150mn	9.25%	2 years	Indemnity	144A	2023

[3] The 2024 PoleStar Re issuance by Beazley is not included in this analysis due to the paucity of information about the transaction so far. It is believed to follow the terms of the 2023 issuance but that is yet to be confirmed (Evans 2024).

Long Walk Re	AXIS	$75mn	9.75%	2 years	Indemnity	144A	2023
Matterhorn Re	Swiss Re	$50mn	12%	2 years	Industry loss index	144A	2023
Cumulus Re	Hannover Re	$13.9mn	UNK	TK	Parametric	Private	2024
PoleStar Re	Beazley	$160mn	UNK	TK	Indemnity	144A	2024

Source: Artemis 2024d

Sponsors relied overwhelmingly on indemnity triggers, with seven of the nine cyber catastrophe bonds featuring them. Interestingly, the first cyber catastrophe bond sponsor was new to the market. Beazley's private bonds were the company's first issuances, followed later in the year by its first property-catastrophe bond (Artemis 2023b). Chubb, AXIS, and Swiss Re were veteran sponsors, together completing more than ninety transactions since 1998 (more than eighty of them by Swiss Re). The private transactions by Beazley were part of a broader capital management strategy intended to culminate in a 144A transaction, which would also serve to minimize the execution risk associated with a first-time 144A issuance. The process itself is complex and difficult, so to have experience with private transactions for a new catastrophe bond risk would ultimately serve to make the 144A issuance process easier.

The issuance of the first cyber catastrophe bonds was highly anticipated. The need for additional risk-transfer support among re/insurers has been evident for several years, and ILS interest in the cyber risk class of business indeed had been growing. Although the debut of cyber catastrophe bonds certainly represents an important development, the risk remains a small portion of total catastrophe bond issuance activity so far. The 2023-4 cyber catastrophe bond market follows the development of a non-catastrophe bond cyber ILS market with more than $1 billion in limit, which was indicative of the growing interest the ILS market had in expanding to cyber (Johansmeyer 2023b). The move to cyber catastrophe bonds – and in particular, use of the 144A format – represents another step in the evolution of the cyber ILS space. The issuance of the first securitized transactions shows that ILS managers are being offered access to liquid instruments, which they had indicated that liquidity can be an important consideration when deciding whether to allocate to a new class of business, as the results of last year's interviews reveal.

5 Analysis of interview results

The timing of the first wave of cyber catastrophe bond issuances tests the perspectives of the ILS managers participating in this research project. Before the 144A transactions were completed, some interview participants had up to three private cyber catastrophe bonds as context for interview discussions. This prompted some discussions about the role of liquidity in attracting investor capital to the cyber ILS space. The prospect of using the issuance activity in the fourth quarter of 2023 as a way to either validate or question the responses provided is seductive given the timing, but to allow too strong a connection is to overlook the fact that the first transactions represent a start rather than a trend. The $446.5 million in 2023 issuance activity in Table 1 is only 2.7% of the2023 issuance total, after all (Artemis 2023c 3).

5.1 About the participants

Eight of the twelve participants in this study raised the role of liquidity in attracting investor capital to the cyber ILS market. That is more than 75% of participants by AuM. Further, nine of the twelve respondents had engaged in cyber ILS activity – six in their current roles and three in previous positions. Together, they represent $35.8 billion in AuM (with one respondent the former employee of another company already represented). Three respondents who discussed liquidity had not yet engaged in cyber ILS activity ($13.5 billion in AuM), and the four respondents who did not discuss liquidity all had experience with cyber ILS (three companies, $8.8 billion in AuM).

The fact that the four respondents who did not discuss liquidity have engaged in cyber ILS does stand out. It is evident from their interviews that they are already committed to the sector and thus did not see the lack of liquidity (until the 144A transactions were issued) as an impediment. Their participation in the market varied. One respondent had engaged in proofs of concept and another deployed significant amounts of capital to collateralized reinsurance deals, making liquidity irrelevant. The third company (two respondents) is a strategic player in the space with an interest in growing the cyber ILS class of business.

Of the eight respondents mentioning liquidity in their interviews, three offered brief remarks on the subject, and five engaged with more depth. The five represent nearly $24 billion in AuM, making it a significant portion of the the respondents to this study and a meaningful share of the ILS market overall. Only one of the companies not discussing liquidity was (among the top five in the world, while two of the top five commented on liquidity.

5.2 Key themes

Three themes emerged from the discussions about liquidity. The most important, of course, is the role of liquidity in attracting end-investor capital to the ILS sector. Some investors require that ILS managers only invest in liquid instruments, and others may not require liquidity but do prefer it. There is a salient difference between theoretical and practical liquidity, the respondents noted, and the former should be enough to help attract capital to the cyber ILS market. Liquidity may come from format (e.g., 144A), but it also involves being able to understand and analyze the transaction itself, which is why respondents also indicated the importance of structure in liquidity. Finally, participants in the study discussed the importance of both deal size and frictional costs together in achieving a liquid market for cyber ILS.

With regard to the importance of liquidity in accessing end-investor capital, four of the respondents have funds that generally require liquid instruments (although with limited exceptions). Although other respondents do not necessarily require liquidity by mandate, they may see strategic reasons for including (or even preferring) liquid instruments in their portfolios, particularly for new, exotic, or emerging risks. One manager explained that the first question end investors ask is, "Your market, is it liquid?" The respondent continued, "When you say 'no,' most of them turn off … they need to be able to tick that 'liquid' box." For illiquid classes, the amount of capital that end investors can commit is "massively reduced."

The notion of "ticking the box" raises the distinction between theoretical liquidity and genuine liquidity. The former is enabled by the format of transactions that make the trading of securities possible, while the latter is more focused on the practicality of such trading. The format of an instrument can make it tradable (theoretical liquidity), but that may not matter if there are not sufficient buyers and sellers who can reach clearing prices. Given the size of the ILS market in general, let alone the catastrophe bond subset, there are legitimate questions about the practical liquidity of the ILS market in general, and while secondary trades in catastrophe bonds are completed, it is generally accepted that the catastrophe bond market is much less liquid than broader equity and bond markets.

Nonetheless, the lack of practical liquidity has not been a barrier in attracting end-investor capital requiring funds with liquidity mandates. In fact, this is evident from one response, indicating that the private cyber catastrophe bond issuance activity of 2023 lacks liquidity because of "the fact that it's a private placement." Implied in this statement is that the format matters, even if the liquidity enabled is only theoretical. This is validated by another respondent, who explains, "If we can build more liquidity into any of these lines of business [i.e., cyber ILS], the amount of capital that would be interested that line of business would be far greater." He offers a straight line between liquidity in cyber ILS and access to end-investor capital. While this may seem obvious in the broader capital markets, the statement form an ILS manager drives the point that they want to consume liquid instruments in large part because it will help them secure more capital to deploy into ILS.

One ILS manager explains that bringing liquid instruments to the cyber ILS market would be "huge," emphasizing, "I think it would be massive." In addition to the fact that liquidity would appeal to a broader base of end investors as a box-ticking exercise, there are practical considerations. Liquid instruments would make it possible for "more opportunistic investors that potentially would come in post-event." The dynamic the participant refers to is an interesting one. It is not unusual for capital to flow into the market following a major property catastrophe, such as the 2023 inflows that followed 2022's Hurricane Ian (Swiss Re Capital Markets 2024 6). Such investors who are "not buying to hold" would value flexibility and thus see liquid instruments as a "potential exit strategy." Another participant in the study echoes this sentiment, nothing that opportunism and flexibility are enabled by the presence of liquid instruments, which can serve to attract capital to the sector.

As mentioned above, theoretical liquidity is enabled by the format of the risk transfer transaction (e.g., 144A), which is sufficient to address the liquidity requirement that some ILS managers have. While the format is the first step in making liquidity possible, one respondent notes that "greater clarity around the data around the contract, around the structures" contributes to increased liquidity. The format enables trading, but the structure makes it possible to analyze instruments and make decisions around whether to buy or sell them. Opaque, confusing, or ineffective structures would impede liquidity even if the format is one that enables trading. Respondents spent a considerable amount of time on the structuring requirements with regard to liquidity because of how important the concept is in attracting capital to the ILS sector. In addition to the clarity, usefulness, and reliability of the trigger and coverage, other structural concerns raised

by the respondents include the duration of transactions (i.e., tenor), deal size, and the frictional costs needed to bring a cyber catastrophe bond to market.

Catastrophe bond tenor has been noted as a barrier to liquidity. One respondent observed that the short tenors in the private transactions represented "a practical constraint on liquidity, in that there isn't really enough time to trade them." The ILS manager continued that "if a tradable event were to occur," such as a cyber catastrophe or even just further issuance activity that causes an ILS manager to rebalance the portfolio, "such short tenors afford little time to do any analysis for a trade." If a trade could get done, the buyer of the bond would not have much time left to on the transaction. The respondent explains, "Trading out of a twelve-month transaction with a 15% coupon with only four months left would leave the buyer with only 5% of the principal as income. Five percent of a $10 million trade would be $500,000, which would hardly cover the soft costs of the relevant analysis."

In addition to trigger and contract structure and tenor, size matters with regard to the liquidity of cyber catastrophe bonds. There are several reasons why deal size matters. First, there needs to be enough size to enable trading among many potential buyers and sellers, according to an executive from a large ILS manager with experience in the cyber sector. According to the respondent, "I think investors do need liquidity, they do need size … ultimately I think you do need some scale for the market." Generally, size limits the ability to scale analysis and trading activity, in addition to simply not making enough product available for potential investors to review and trade. However, the availability of bonds is not the only constraint that deal size can have on liquidity.

Size is also a concern with regard to the costs associated with issuing a catastrophe bond (cyber or otherwise), known as frictional costs. Cyber catastrophe bonds have to be large enough to make the frictional costs associated with the deal worth it. Frictional costs include the lawyers, intermediaries, independent cyber catastrophe modelers, and other service providers necessary to bring a transaction to market. Some catastrophe bond frictional costs are either fixed or otherwise structured in a way that favors larger issuances. Smaller deals are proportionately more expensive, which increases the ultimate cost of protection.

The other interviews validate this view, believing that smaller transactions "probably wouldn't cover the broking expenses." This particular respondent, who came from an organization not requiring liquid instruments, sees that as a reason to avoid 144A transactions. That ILS manager sees the reduced frictional costs of non-securitized deals as advantages – not to mention the absence of other complexity involved in securitization – because of the speed with which transactions can be completed and the favorable deal economics that come with reduced frictional costs. Since this manager does not require liquid instruments, it can favor these other factors. However, the respondent did concede that the growth of a liquid market is necessary for the overall expansion of the cyber ILS sector as a tool for broader cyber re/insurance market growth.

In the end, given how small the catastrophe bond market is in general (not just for cyber risks), real liquidity is unlikely to come to the cyber ILS sector anytime soon. Instead, according to one manager, "the only reason it makes a difference would be because I can put it into a fund

that does only liquids." While this view may seem cynical, the reality is quite the contrary. Taking these formal and symbolic steps today is what creates a foundation for future evolution. Genuine liquidity tomorrow requires the fund mandates, deal structures, and commitment to those instruments today. The issuance of four 144A transactions shortly after the interviews for this study were completed shows, in fact, how this evolution is proceeding. The continued success of the cyber ILS market from its current nascent state, though, is hardly assured. Future success requires building on recent efforts.

6 Discussion

The fact that the interviews were conducted before and during the period during which the three private cyber catastrophe bonds were issued provides an insightful backdrop for the 144A issuances in 2023 that followed soon after the interviews on which this study is based. While there is plenty of reason to celebrate – and build on – the 144A activity in the cyber ILS sector in the fourth quarter of 2023 and into 2024, it is too soon to declare victory. In fact, doing so could constrain future issuance activity. Theoretical liquidity has been sufficient to attract ILS manager interest and capital, and the momentum is palpable. Scale is the next order of business, though.

It is certainly true that the cyber catastrophe bond market will start small and take time to add both sponsors and participating ILS managers. To make this possible, it is necessary to recognize today what is the result of a new and emerging market versus the constraints that are genuine impediments to scale and which require focused attention and remediation. This includes understanding the companies that potentially could sponsor cyber catastrophe bonds and the base of ILS managers that would consume them willingly in the near term, as well as which managers would take longer to engage with cyber ILS activity.

The population of potential sponsors is somewhat limited. As the ILS managers participating in this study noted, deal size is important to liquidity. A transaction that is too small will struggle with frictional costs. Further, smaller transactions are more difficult to trade because of the scale associated with trading analysis. Also, there is something to be said for deal size as the raw material of trading – a lack of raw material implies a constraint on future secondary trading, as discussed above. Consequently, the cyber re/insurers most likely to sponsor catastrophe bonds would have to have sufficient risk transfer need to require sizeable transactions. The three insurers participating in the cyber catastrophe bond market are among the largest, each with a market share of at least 5%. The reinsurer 144A sponsor is among the five largest cyber reinsurers in the market, as is the sponsor of the private parametric catastrophe bond in 2024.

Smaller re/insurers could turn to private catastrophe bonds to access cyber ILS capacity, and whether the ILS market will accept that as a compromise solution to bring scale will depend on how eager they are for more cyber ILS deal flow. Additionally, some of the smaller deals may come to the cyber ILS market as collateralized reinsurance or ILWs, simply to reduce frictional costs and because they may not need securitization to access ILS capacity. For catastrophe bonds – and those in 144A format in particular – the universe is pretty small today. It may grow over time, but that will likely require further growth in the underlying cyber insurance sector.

This leads to an important next question: Did the ILS market in 2023 truly adopt cyber risks, or were the prices simply too attractive to pass up? The answer will come with future issuances and the extent to which risk transfer pricing comes down and the extent to which ILS managers continue to consume the risk. As cyber risk becomes more familiar, novelty premiums should decline, causing spreads to tighten and making cyber catastrophe bonds more price competitive. The result should be increased use of this form of risk transfer by prospective sponsors, as long as other market conditions remain favorable (such as the need for capacity beyond what is available in the cyber reinsurance and retrocession markets).

One outstanding possibility is the extent to which improved education on cyber risks among ILS managers could increase their tolerance of the risk. The transactions completed so far are for remote risks, and there is the possibility that an improved understanding of the potential size of cyber catastrophe industry-wide insured losses could attract further ILS market interest. Simply put, as ILS managers begin to realize how unlikely the recent transactions are to trigger, they may gain enthusiasm for the cyber ILS sector. A $9 billion industry-wide insured loss in the United States – the attachment point for Matterhorn Re – is not far off the worldwide economic loss (of which U.S. insured losses would be a smaller subset) of $10 billion from NotPetya in 2017, and such a loss is presumably more difficult to achieve today (Economist 2024).

Of course, achieving scale does not require the use of today's ILS community. Support could come from capacity providers new to the ILS sector, not to mention formats and structures not yet contemplated for the transfer of cyber risk to the capital markets. In fact, one respondent raised the possibility that appealing to a broader capital markets community could be beneficial. The participant explained, "There are pockets of money which are happy to take a longer view," mentioning both private equity and pension funds. Patient capital could give the cyber ILS market the time it needs to grow, expand, and find its way to scale. That said, the conversation quickly returned to the importance of liquidity, with the participant continuing, "They would be able to invest a lot more if you could say there was some level of liquidity in there."

7 Conclusion

A robust cyber ILS market may seem to be in sight, but reaching it will require discipline, planning, and an understanding of the most appropriate uses of this form of capital for a new and emerging class of business. A range of market constraints still stands to limit the rapid adoption of cyber catastrophe bonds by both sponsors and ILS managers. However, addressing the need for liquidity has clearly begun to make a difference already. The demand for liquid cyber risk transfer instruments expressed by a dozen ILS managers throughout 2023 was not idle chatter, given that nine such transactions have now come to market, five of them using the 144A format.

The ILS community has indeed sought to consume cyber risk as a way to grow the range of risk-transfer solutions that it can deliver to its end investors, and cyber risk has confirmed that property-catastrophe risk was a first stop rather than a final destination (Johansmeyer 2024b). Future demand among ILS managers for cyber risk, however, is likely to remain limited in the near term by a limited base of prospective cyber catastrophe bond sponsors. As the cyber re/insurance

market grows, so will the base of potential sponsors, which in turn should help attract more ILS managers and their end investors to the cyber re/insurance class of business.

Of course, other factors remain. As several respondents noted, liquidity relies on more than just the use of the 144A format. Rather, it requires a large number of buyers and sellers who are comfortable transacting. This comfort comes from a range of factors, including such issues as contract structure and their ability to analyze the underlying risk. ILS managers will need to continue to become more comfortable with cyber risk in general, not to mention the structures that are used in cyber catastrophe bonds. The distribution shown in the first nine – with industry loss index and parametric instruments included among the overwhelming reliance on indemnity triggers – is a start, but progress must continue.

Despite the fact that there are many clear constraints on the future growth of the cyber catastrophe bond market, there remains palpable cause for optimism. In the year that the first cyber catastrophe bond was sponsored, a total of seven were completed. Two more have followed so far in 2024. Sponsors from several countries including both insurers and reinsurers have sponsored cyber catastrophe bonds. It is already safe to say that the cyber catastrophe bond market no longer consists of one-off transactions. The foundation for a strategic source of capital has been developed, and what comes next is to achieve scale.

References

Artemis.bm. (2024). New to catastrophe bonds, insurance-linked securities (ILS) and reinsurance linked investments? *Artemis.bm*. Retrieved from https://www.artemis.bm/#newtothis.

Artemis.bm. (2024b). What is a catastrophe bond (or cat bond)? *Artemis.bm.* Retrieved from https://www.artemis.bm/library/what-is-a-catastrophe-bond/.

Artemis.bm. (2024c). Rule 144A Catastrophe Bond. *Artemis.bm.* Retrieved from https://www.artemis.bm/glossary/rule-144a-catastrophe-bond/.

Artemis.bm. (2024d). Catastrophe Bond & Insurance-Linked Securities Deal Directory. *Artemis.bm*. Retrieved 15 February 2025 from https://www.artemis.bm/deal-directory/.

Artemis.bm. (2024e). PoleStar Re Ltd. (Series 2024-2). *Artemis.bm*. Retrieved from https://www.artemis.bm/deal-directory/polestar-re-ltd-series-2024-2/.

Artemis.bm. (2023c). Beazley cyber cat bond (Cairney) *Artemis.bm*. Retrieved from https://www.artemis.bm/deal-directory/beazley-cyber-cat-bond-cairney/.

Artemis.bm. (2023b). *Q4 2023 Catastrophe Bond & ILS Market Report: An unprecedented year of new risks, records, and huge market growth*. Artemis.bm.

Artemis.bm. (2023c). London Bridge 2 PCC Limited (Fuchsia 2023-1). *Artemis.bm.* Retrieved from https://www.artemis.bm/deal-directory/london-bridge-2-pcc-limited-fuchsia-2023-1/.

Brantley, A. (2020). Beyond Hyperbole. *The Cyber Defense Review*, *5*(3), 99-120.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101.

Carter, R.A.; Pain, D.; & Enoizi, J. (2022). *Insuring Hostile Cyber Activity: In search of sustainable solutions*. Geneva Association.

Cellerini, E.J.; Finucane, J.; Lanci, L.; & Holzheu, T. (2022). Cyber insurance: strengthening resilience for the digital transformation. *Swiss Re Institute*.

Cuneo, J. (2016). AIR Worldwide: Business interruption could be the hurricane Andrew of cyber. *Global Reinsurance*. Retrieved from https://www.globalreinsurance.com/air-worldwide-business-interruption-could-be-the-hurricane-andrew-of-cyber/1418710.article.

Economist, The. (2024). Unexpectedly, the cost of big cyber attacks is falling. *The Economist*. Retrieved from https://www.economist.com/graphic-detail/2024/05/17/unexpectedly-the-cost-of-big-cyber-attacks-is-falling.

Evans, S. (2024). Beazley sponsors further $160m cyber cat bond via PoleStar Re, takes total to $300m. *Artemis.bm.* Retrieved from https://www.artemis.bm/news/beazley-sponsors-further-160m-cyber-cat-bond-via-polestar-re-takes-total-to-300m/.

FINRA. (2021). Insurance-linked securities. *FINRA*. Retrieved from https://www.finra.org/investors/insights/insurance-linked-securities.

Howden (2023). *Cyber Insurance: Coming of Age*. Howden.

Howden Re. (2024). *Reframing cyber risk: Navigating threats and embracing opportunities*. Howden Re.

Johansmeyer, T. (2024). Surprising stats: the worst economic losses from cyber catastrophes. *The Loop: ECPR's Political Science Blog*. Retrieved from https://theloop.ecpr.eu/surprising-stats-the-worst-economic-losses-from-cyber-catastrophes/.

Johansmeyer, T. (2024b). Why Natural Catastrophes Will Always Be Worse Than Cyber Catastrophes. *War on the Rocks*. Retrieved from https://warontherocks.com/2024/04/why-natural-catastrophes-will-always-be-worse-than-cyber-catastrophes/.

Johansmeyer, T. (2024c). How Cyber Model Vendors See Their Role in Closing the Cyber Insurance Protection Gap. *Journal of Insurance Issues, 47*(1), 118-134.

Johansmeyer, T. (2024d). Natural Catastrophes: The New Cyber Threat. *8th ASTIN Cyber Workshop.*

Johansmeyer, T. (2023). Cyber ILS – Developing a strong and sustainable market. In Pain, D., *CYBER RISK ACCUMULATION: Fully Tackling the insurability challenge*.

Johansmeyer, T. (2023). How Big Is the Cyber Insurance Market? Can It Keep Growing? *Lawfare*. Retrieved from https://www.lawfaremedia.org/article/how-big-is-the-cyber-insurance-market-can-it-keep-growing.

Johansmeyer, T. & Mican, A. (2022). Cyber ILS: How Acute Demand Could Drive a Scalable Retro Market. *Journal of Risk Management and Insurance, 26*(1), 40-59.

Koch, A. (2018). Casualty: The Next ILS Frontier? *Carrier Management*. Retrieved from https://www.carriermanagement.com/features/2018/07/09/181437.htm.

Levite, A.; Kannry, S.; & Hoffman, W. (2018). *Addressing the Private Sector Cybersecurity Predicament: The Indispensable Role of Insurance*. Carnegie Endowment for International Peace.

Lloyd's of London. (2023). Lloyd's systemic risk scenario reveals global economy exposed to $3.5trn from major cyber attack. *Lloyds*. Retrieved from https://www.lloyds.com/about-lloyds/media-centre/press-releases/lloyds-systemic-risk-scenario-reveals-global-economy-exposed-to-3.5trn-from-major-cyber-attack.

Newman, I.; Pocock, E.; & Hall, J. (2023). *CY-FI: The Future of Cyber (Re)insurance*.

Semir, B.A; Braun, A.; & Eling, M. (2015). *Alternative Risk Transfer and Insurance-Linked Securities: Trends, Challenges and New Market Opportunities*. Institute of Insurance Economics, University of St. Gallen.

Swiss Re Capital Markets. (2024). *Insurance-Linked Securities Market Insights.* Swiss Re Institute.

Swiss Re. (2019). *Global Risks, Trends and Closing the Protection Gap*. Swiss Re Institute.

Woods, D. & Simpson, A. (2017). Policy measures and cyber insurance: a framework. *Journal of Cyber Policy*, *2*(2), 209-226.