The business view: a discussion about insurance & disaster risk

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Guillermo,

Thank you for making the time to talk with me about aspects of insurance and disaster risk. I'm particularly keen to discuss with you how insurance can help people and communities around the world to avoid disasters. Could we start with some general context, by way of an overview of your role at Guy Carpenter and the services the business provides (I know Guy Carpenter was established way back in 1922)?

Guillermo: Sure, Gareth. It's always a pleasure. Guy Carpenter is a global leader in providing risk and reinsurance intermediary services. We create and execute reinsurance solutions and deliver capital market solutions[*] for insurers, reinsurers and public entities. I have worked at Guy Carpenter for almost 12 years, first leading our catastrophe risk research efforts in Europe and later, globally. Today, I focus mostly on research and development aspects of parametric insurance solutions. In my role, I also assist our colleagues in structuring and executing diverse research projects, often in collaboration with academic groups, aimed at improving our catastrophe modelling operations and the development of new products and capabilities.

Gareth: Thanks for this overview, Guillermo. Let's start by looking at the use of parametric insurance today, and whether its use is growing. When we spoke about parametric insurance in March 2021, you were working on an initiative called GC QuakeCube®, which I believe has been on the market for several years, as a system to provide parametric earthquake solutions for clients around the world.

Guillermo: Yes, GC QuakeCube has been in use in the market since 2015 and we have used it to support the transfer of nearly $3 billion of financial earthquake risks globally. We also have other products, such as GC StormGrid® for tropical cyclone risk transfer and GC FireCell® for wildfire. Parametric insurance in general is growing very quickly.

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A primary reason for this growth, in my view, is the increase in exposure to hazards and risks around the world. People and businesses are realising that they need more and broader insurance coverage, and there is a demand for more capacity in the market. Parametric solutions can help respond to this demand by complementing other traditional indemnity solutions.

The insurance industry faces challenges today, which are important to note. Insurers are seeing an increase of the level of risk they have to deal with, and as a result, they need to review and manage their own exposures. In some parts of the world, insurers are moving out of certain markets that they judge as being too risky. In other instances, they keep their presence but restrict their coverage.

Parametric insurance provides an avenue for investors and companies to deploy their capacity in the insurance market. It can provide several benefits to insured parties, including the ability to obtain a quick payout, bypassing an often-lengthy claims adjustment process, and providing a very high level of transparency. Parametric insurance is versatile and can be used to provide coverages for a broad canvas of risks, and it has the advantage of paying from the bottom up without the consideration of a deductible.

Gareth: Thanks for this overview, Guillermo. I have been thinking for a while about how parametric insurance can provide greater efficiencies and help with capacity demand. I appreciate your point about how it also offers a mechanism for broader types of investors to be involved in providing insurance (achieving the right investment/funding is a key part to our Disasters Avoided model).

Are parametric solutions mostly orientated toward certain types of customers of insurance at the moment, and if so, will this change over time?

Guillermo: Parametric insurance products are currently being bought mostly by governments and larger companies. There are some products of this type in the consumer insurance market (which serves the general public), but up until now they have not yet seen a lot of uptake. Sometimes, these products are perceived as complex, and the individual consumer is not familiar with them. For providers of parametric products, there can be a high reputational risk if their customers do not fully understand the payout trigger conditions, which can cause frustration and a loss of trust in the product. That is why these offerings need to be carefully designed and structured. I think that, over time, we could see an expansion in the types of customers that buy parametric insurance.

Gareth: Based on your last point, do you think parametric options could evolve to grow into the consumer insurance market, in various parts of the world (not just developed economies, but developing ones also)?

Guillermo: I am positive that parametric insurance, in its current form or a future form, will play an important part in the consumer insurance market across all geographies over time.

We are constantly developing new ideas at Guy Carpenter to improve these products and make them more understandable and relevant to specific markets. People in the insurance sector often collaborate on novel ideas and options to devise new mechanisms to deploy these products. While I am optimistic for the long-term, I would say that we haven't yet found the right mechanism for the consumer market segment, and much work and exploration remains to be done. With reinsurance pricing increasing and rising prices for risk transfer cascading down the chain, it is becoming increasingly clear that we will need new approaches to risk management, including risk pooling and public-private solutions.

Some actors in the insurance industry are actively experimenting with new concepts, but much of the industry continues to operate according to old standards and traditions, for justifiable reasons. It takes a while for new solutions to make it into the mainstream, and the right type of testing needs to be undertaken to make sure we deploy solutions that are robust and reliable. We often explore and experiment with small pilots that we hope can scale progressively.

Gareth: I can appreciate the need for pilots and testing to get things right (which is the case in most industries and sectors). Is there a forum in the insurance sector to work out new ways forward?

Guillermo: There are several forums and groups that are actively looking at new concepts and products. For example, [the Insurance Development Forum](#) (IDF) is a consortium among governments, development agencies and the private sector that has the aim of funding pilot projects to test novel products and ideas in the market. The IDF has a large portfolio of projects that aim to explore solutions that may one day be scalable and self-sustained.

Gareth: I also appreciate that insurers fund a lot of good work in various ways, such as resilience engineering and R&D for protecting properties. Are there any examples you can provide of parametric and other solutions helping to reduce disaster exposure – be it for a nation, a city or a state, or a private-sector business?

Guillermo: A few examples come to mind. At Guy Carpenter, we work with corporations and governments interested in parametric coverage because their needs are varied and complex. Sometimes, these clients may choose to access capacity through a catastrophe bond that is traded publicly, such as one that provides coverage to a major US health insurer.

The largest parametric transaction executed by this client was their 2021 $475 million catastrophe bond. Sovereign nations also use similar mechanisms for accessing capacity to offset emergency response losses.

We participated in the deployment of such a solution in early 2023, in which a national government in South America accessed $350 million in parametric earthquake capacity, assisted by the World Bank. We are seeing more and more nations showing interest in these products.

Gareth: It's interesting to hear about the insurance coverage in South America. I visited there in April 2022 and I have discussed matters with people there, including drought and wildfire risk. I wonder whether other countries that face many threats and have many vulnerabilities – for example, countries in South and Southeast Asia – could benefit from such solutions, for example for cyclone and flooding risk.

Guillermo: Yes, nations in South and Southeast Asia are prime candidates for these types of coverages, and there are new products in constant development to address climate-related risks, such as heavy rainfall, tropical cyclones and multiple types of flooding.

Sometimes, solutions are not viable because there is no market appetite or because the technology to enable good-quality parametric risk transfer isn't advanced enough. Risk appetite plays a role in wildfire, for example. I mentioned earlier that we own a solution called GC FireCell, which consists of defining a series of polygons depicting the exposure of the client and then monitoring wildfire occurrences through [the NASA FIRMS system](#) and other agencies that provide a wildfire event footprint to see whether an insurance payout will be triggered.

Almost in real time, we can tell the client whether a wildfire event is overlapping the polygons that define their exposure. Based on the proportion of overlap, the client will receive a pre-agreed commensurate payout.

Wildfire risk represents a complex modelling challenge as the damaging potential of a wildfire depends on multiple factors, such as wind patterns, fuel availability, etc. These factors change rapidly and dynamically, and as such represent a challenge for current models to capture. This results sometimes in some areas being classified, almost perpetually, as high risk regardless of how the dynamics of the system have changed. This presents a problem to some clients but also an opportunity to some new entrants who are developing new solutions for more granular and dynamic underwriting to tackle this risk characterization challenge.

On the flood technological front, [FloodFlash](#) have been making some great advances installing in situ flood sensors to enable insurance solutions that pay according to the water levels reached.

This is an example of parametric solutions using remote sensing of the highest quality, and it highlights the need — for some particular applications — of on-the-ground sensors for real-time monitoring when satellite monitoring does not suffice.

Gareth: I appreciate that working on models is important, and this requires continued investment – whether it is the private sector or the public sector. I have had this discussion with a number of people working in this area. This point relates very much to the need for good data that we highlight in our Disasters Avoided model.

Guillermo: Yes, it is important and requires further investment. The investment in data modelling could, in turn, facilitate the deployment of more insurance capacity. If we can get it right, there is an opportunity to help more people with insurance coverage. Better and more confident approaches would mitigate concerns from potential investors and other interested entrants in the insurance market about the quality of current tools and models.

Gareth: On this point about modelling, I spoke with the team at ImageCat recently, who have some research projects with NASA. I interviewed them about modelling and the application of AI and machine learning, and how this type of analysis can and should integrate with humans to check and analyse data for decision-making.

Guillermo: Yes, the team at ImageCat does a lot of good work. I have known them for a long time, and I have had the opportunity to work with them on several occasions.

Approaches that use AI to model and transfer risks need to be understood by every stakeholder in the risk transfer chain. This is key to ensuring that people have confidence in them. I think there is enormous potential for AI techniques to be applied to our field, but the application of these capabilities needs to be thought through very carefully. We have worked with the Polytechnic University of Valencia in Spain to develop machine learning algorithms to structure parametric insurance solutions. Through this work we have seen how easy it can be, if we are not careful, to produce offerings via a black-box numerical process that would be nearly impossible to have accepted in the market. In my view, applying AI techniques aided by agreed constraints on simplicity and clarity would go a long way. We are working on some related approaches in this area.

Gareth: Thanks for these examples, Guillermo. I appreciate that the use of AI in all industries and sectors is evolving. Returning to the capture of data for modelling purposes, you mentioned earlier the use of NASA and other Earth observations solutions. I appreciate that there can be limitations to using satellite imagery for granular data analysis (dealing with aspects such as cloud cover and foliage that can cover things up), but I know it is continually improving.

Guillermo: Remote sensing technologies, including satellite monitoring and in situ instrumentation, are improving all the time.

We know that some features of sensor technology are not yet at a point where we can confidently use them to structure parametric insurance solutions, but the advancement is continuing, and I am of the opinion that our capabilities to structure a variety of parametric products based on these technologies will grow immensely and rapidly.

Gareth: Your point about the advancement of data analysis and modelling makes me think about our energy monitoring as it exists today – for example, household consumers can see their energy consumption in real time on an app connected to a smart meter (which until really quite recently was not possible).

I do wonder how governments can help to support the accuracy and granularity of data capture and models, and the use of sensors to support this. We briefly discussed investors earlier – I wonder if investment returns can be achieved for private sector investors that achieve both economic and social goals (social being for more people to gain better insurance coverage).

Guillermo: I am convinced this is so. Insurance is an economic driver but also a societal pillar of certainty and stability. Investments in insurance solutions and/or technology that, in turn, supports new ways to insure people have the potential to be both profitable and to provide great societal and environmental benefit.

I'm excited about a particular research project being carried out at [Columbia University](#) regarding [smart cities](#). The data streams that can be captured today (and there will probably be even more such data streams available in the future) allow us to manage the infrastructure of a complex city, which also provides a potential usage for meaningful insurance solutions. Picture a situation in which sensors installed on a bridge continuously monitor its physical state and also, upon reaching certain thresholds that could jeopardize its structural integrity or operational capability, activate a business interruption cover for the operator that allows them to temporarily halt traffic and repair the structure, knowing that it can be rapidly funded. I find such future applications very enticing. Insurance could, in this way, become more seamless, invisible, automatic, responsive and exciting.

Gareth: This is good to hear, Guillermo. Your example of the use of smart city data is a really good point. I have looked at various angles and applications of smart city approaches in the part of my work that focuses on urban resilience and sustainability. More and more people are living in urban centres, and smart cities can provide many benefits when they are inclusively designed and operated for societal and environmental benefit. It will be interesting to see how cities approach their critical infrastructure and their disaster risk vulnerabilities and exposures they face.

Are you doing anything in the field of parametric insurance for cities, by the way?

Guillermo: We are looking at city solutions. We undertook a pilot project in New York City at the beginning of 2023, in part as a response to the damage caused by [Hurricane Ida in 2021](), which tragically caused several fatalities. There were a lot of economic losses in the city after that hurricane due to flooding.

As we know, disasters affect low-income populations more severely. An initiative was launched in New York City to mitigate financial and economic impacts that devastating storms and floods can and do have on livelihoods in selected neighbourhoods. An experimental solution was funded by [the National Science Foundation]() (NSF) in the US and led by Carolyn Kousky (now at [the Environmental Defense Fund](), EDF), supported by [Swiss Re]() and our team at Guy Carpenter. The project devised a parametric mechanism through which the city would be able to access emergency funds to quickly allocate to populations in need of help after a damaging event.

There were some intense rains in the city in October 2023 — and while they did not attain the necessary threshold to produce a payout, nevertheless, this storm gave us an opportunity to run through the response protocol and to test the system. Whether this type of solution can scale remains to be seen, but the design process has taught us a lot already and it has served to socialize options for financial protection mechanisms within a large and complex city such as New York. This links back to our discussion point earlier about finding new solutions to address growing risks around the world.

Gareth: This experimental parametric insurance solution for New York City is very interesting to hear about, Guillermo. The point you mention about how the rains in October 2023 allowed you to test the response protocol is interesting. It -+-gets me thinking about using counterfactual analysis to look at "what if?" scenarios, in particular, what if the situation had been worse (a downward counterfactual). I discussed counterfactual analysis with Gordon Woo in November 2023 ([our interview is published on the Disasters Avoided website]()).

A counterfactual for the situation you mention about the heavy rains in the city in October 2023 could be: what if the rainfall had been a lot worse, and what if their homes had been severely flooded and unusable? Having quick insurance payouts to help people maintain their lives and livelihoods, which also supports their mental well-being, can be crucial. It could perhaps avoid a societal economic disaster situation as well. Good governance (a factor in our Disasters Avoided model) will surely be key to ensure such parametric insurance solutions work well.

Guillermo: Exactly. We can think of various scenarios for which these solutions can add meaningful value. There are some historical scenarios where these tools have been put to good use. One country, for instance, received a $150 million payout after an earthquake event occurred off the Pacific coast in 2017. The first parametric solution that I was involved with was structured for earthquakes. I started working on it in 2007, and the transaction was placed in the market in 2008. It triggered just months before it matured, when [the Tohoku earthquake and tsunami of 2011]() struck, paying out $300 million to the sponsor, a Japanese mutual insurer.

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We know these products do not always work perfectly. The industry needs to continue to improve towards designing better solutions while avoiding mistakes.

Gareth: Thanks for these examples, Guillermo. Are there any additional points that you would like to mention about where things are heading for disaster risk and insurance?

Guillermo: I think there are exciting developments in the insurance industry that point to better and more responsive solutions in the future. Some frameworks that we use in the industry will have to change and evolve in order to adapt to increasing pressures due to climate change, rapidly changing and evolving (and sometimes cascading) risks, and financial stressors. We need new methods, platforms and paradigms to provide more effective risk management.

More and more, I think it will require all of us, as citizens and members of the general public, to be involved more closely in the management of the risks we face individually and collectively. From businesses to homeowners, we need to be involved in the insurance debate and test new ideas. We collectively need to come up with mechanisms and find ways to make risk manageable as a society. The burden of risk can no longer be placed solely on the insurance industry, but new methods of risk sharing will have to emerge. Otherwise, the situation in some regions of the world could render an uninsurable future, which would then cascade to paralyze a large part of the economy.

Gareth: This point you have just made makes me think of one of the key factors in our Disasters Avoided model, which is what we refer to as "meaningful inclusion," which is about ensuring there is a whole of society engagement to find solutions to avoid disasters (which I appreciate is easier said than done). Your point about the parts of the world that are under stress makes me think again about the value of counterfactual analysis, to imagine serious consequences that could occur if we do not have good resilience solutions in place.

I read on the Guy Carpenter website an article written in January 2023 by your colleague, Julian Enoizi, which talks about "how to shift from disaster recovery to prevention, resilience and risk reduction." This article references a 2018 FEMA note about how every dollar spent on pre-disaster risk reduction saves between 6 and 13 dollars in damages, and notes that – at the time of the article's publication – 88% of disaster management funds from humanitarian, development and government sources are allocated to post-event response.

Thank you very much for your time, Guillermo. The world continues to see turbulent times, with disasters and catastrophes of various types continuing to occur. I look forward to seeing how insurance solutions for disaster risk develop, especially those that can help to avoid disasters. I do appreciate the regular updates I receive by email from the GC Capital Ideas Newsletter, I would like to add.