Parametric insurance Policies: Do they have to be weather-related?

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WHAT IS PARAMETRIC INSURANCE AND HOW DOES IT WORK?

The World Bank defines parametric insurance – or index insurance, as it is sometimes also known – as insurance that:

> *pays out benefits based upon a pre-determined index for the loss of assets and investments as a result of weather or other catastrophic events, in contrast traditional insurance relies upon assessments of the actual damage.*[1]

As technological advances along with the growth of the internet in the late 1990s, energy companies and traders started to use the increasing availability of high quality, reliable and granular weather data. This, combined with the greater computer modelling capacity, allowed insurance companies to analyse the relationships between costs and revenues and changes in temperatures.[2] An early provider of these derivatives was Enron, a now notorious company, selling a product that would pay $10,000 for each degree it fell below the average temperature during winter.[3] Insurers started to issue policies in the 2000s for food crises following natural disasters or extreme weather scenarios. It was not until the last half of this decade did insurers start to see both an interest from corporates and government bodies to allow them to set up their own underwriting structures.

Parametric insurance contracts typically have three main factors:

1. An index or metric that is intrinsically related to the costs or revenues of the insured but that is independently measured and recorded;
2. A deductible or threshold by which the index must exceed before the policy is triggered;
3. The amount to be paid.

In addition, parametric policies naturally have five main characteristics which similarly act as their main advantages. Firstly, they are objective, through the use of an independent source to define the mechanics of any payment, thus providing for a truly unbiased and fortuitous method of assessing the policy. Secondly, they are quick to pay out, as one underwriter said to me: "The loss adjusting is done at the same time as the underwriting." These policies will pay out upon confirmation of the index threshold being breached. AXA Fizzy, of which I will explore more later, seeks to provide compensation for travel delays as soon as the plane is cancelled or lands in the event of a delayed flight above the predefined threshold. Thirdly, the policies are tailor-made, allowing the consumer, corporate body or government entity to select the metrics, thresholds and payments they want to be protected against and the reimbursement amounts they desire to receive. The policies are global in their nature of being able to respond to an event irrespective of its location. And finally, they have the ability to be cost-efficient, buying coverage only for what is required.

These policies maintain their status as insurance policies because they are fortuitous and outside of the control of the insured. They require underwriting and so allow for the modelling of past events and losses. The payment from parametric policies is calculated pre-event during the underwriting phase, in conjunction with the insurer and insured, but is designed so that the insured cannot be in a more profitable position post-loss than they were pre-event.

They differ, however, from traditional insurance policies in many ways. Most of the sales literature in the marketplace provides the comparison below between the two styles of coverage:

* This paper was one of the top dissertations from the 2019 Airmic Leadership Programme, delivered in partnership with the Business School at City, University of London (formerly known as Cass Business School).

[1] World Bank [blog post], "Index insurance is having a development impact where it's needed most," 16 August 2017. https://blogs.worldbank.org/voices/index-insurance-having-development-impact-where-it-s-needed-most

[2] AXA XL [blog p[ost], "Let's Talk: AXA Global Parametrics," 15 January 2019. https://axaxl.com/fast-fast-forward/articles/lets-talk-axa-global-parametrics

[3] CNN, "How to get rich off the weather," 14 September 2009. http://edition.cnn.com/2009/LIVING/wayoflife/09/14/mf.get.rich.off.weather/

Traditional Policies	Parametric Policies
Payment is triggered by an actual loss	Payment is triggered by an actual event
Reimbursement is made via an adjusted assessment of losses sustained	Payment is made in alignment with parameter value as agreed in the policy
Policy is subject to exclusions and self-insured retentions	Policy is subject to the index or parameter
Claims payments are made following assessments by adjustors and insurers review – often months if not	Payment can be made in 30 days without adjustors
The period is very often annual	Multi-year options are available up to 5 years
Policy wording is often company standard or modified form of company standard	Policy is highly customized to meet the client's requirements

Swiss Re[4] has sought to counter the myths surrounding these policies. They have asserted that parametric insurance:

- Is not necessarily more expensive than traditional covers
- Is not complex or difficult to comprehend
- Is not a direct replacement for traditional policies
- Is an insurance contract
- Is not gambling
- Is appropriate for all organisations
- Is not limited to property exposures
- Cannot cover all uninsurable risks
- Applies to more than natural catastrophe (Nat Cat) events
- Does not need to have a level of retention that is significant.

Many industry participants have stressed to me the importance of managing expectations in obtaining parametric solutions. Whilst it is true that they are simplicity personified once executed and upon payment being received, that is not true of its creation. A take-up rate of less than 10% of enquiries was quoted to me by one underwriter, whilst another advised that many clients struggle to provide the necessary data in advance.

Underwriting requirements naturally necessitate that the client proves an unquestionable link between the index chosen and the limit of the payment that is being requested. It is not uncommon for insurers to seek loss data for a minimum of ten years or more. The pace of change within businesses – both in terms of technological changes and also of its corporate structure with the number of acquisitions and disposals – may make this unsurmountable or some.

The arrangement of this policy linking, as does risk management with business strategy, does require high-level commitment from an organisation. It does however provide the risk manager with an excellent opportunity to review those risks which can affect the operational ability of a business. This focus on the severity style risks will enable the harnessing of C-suite attention that this approach demands.

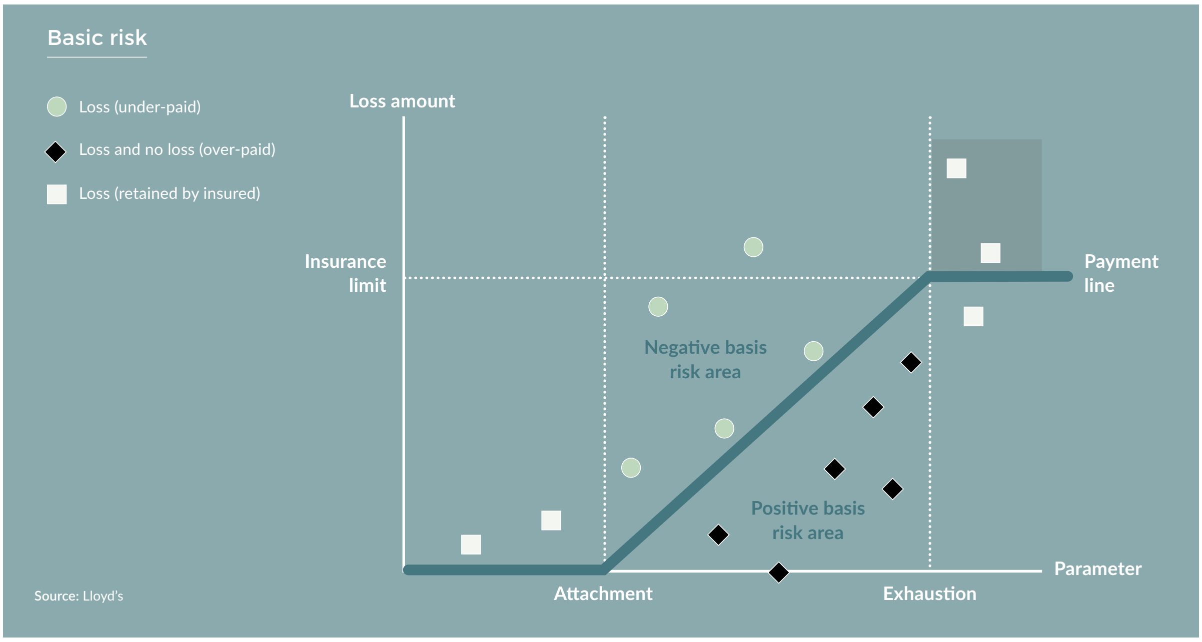
One area that parametric insureds need to be concerned with is that of basis risk. Whilst there are the advantages for the claim to be paid once the trigger is met, the reverse is also true. Understanding that a significant loss could be sustained by the client without the metric being hit is a critical part in the buying decision of this style of policy. For example, if the metric was to pay out in the event of a Category 5 hurricane – it is conceivable that a sizeable and significant loss (or one of equal magnitude) could be sustained from a less serious Category 4 storm. It is also possible that the elected pay-out is short of the ultimate loss borne by the client.

The basis risks exist for insurers too. A loss being paid out which exceeds the actual loss being suffered by the insured means that the insurer is experiencing premium inadequacy, as the insurer is making claims for payments that they did not factor into their pricing.

The following analysis from Lloyd's demonstrates the basis risk for both insured and insurer alike.[5]

[4] Swiss Re [blog post], "10 Myths about Parametric insurance," 23 August 2018. https://corporatesolutions.swissre.com/insights/knowledge/10_myths_about_parametric_insurance.html

[5] Lloyd's (2019) Triggering Innovation – *Parametric Insurance.*



Using a linear style pay-out mechanism, the black squares and red circles reflect the elected basis risk and the potential basis risk respectively, whilst the blue diamonds represent the risk for the insurer. With a binary pay-out based on hitting the trigger, these risks are then amplified for both parties.

Another criticism of parametric-style policies is that they provide coverage for risks that businesses are familiar with and, without traditional insurance, have adapted themselves to be able to either mitigate or hedge against them without the need for external capacity.

This may be true. However, many professional investors no longer accept lower than expected results for a risk that was well known. They mandate that earnings potential as well as assets are adequately protected. In addition, as we demonstrated above, the scope for these policies include entities of all sizes of, such as smaller organisations which cannot arrange suitable hedging procedures themselves. The parametric insurance company Stable uses this exposure for mid-size companies heavily.[6]

Furthermore, the application of dual-triggers in a parametric policy can be where the true value of the product lies. The application of not one but two independent events can be the black swan-type scenario that boards concern themselves with.

A final consideration to observe is that the simplicity of the structure allows new entrants into the marketplace, where they are not hindered by the significant barriers to entry and exit that exist for those considering establishing traditional insurance companies.

WHAT IMPACT HAS TECHNOLOGICAL CHANGE HAD ON THE PROVISION OF PARAMETRIC INSURANCE PROGRAMMES?

Beyond the traditional world of insurance, there has been a seismic change in business models as new technology-based organisations have grown to dominate the corporate landscape. Companies like Facebook, Amazon and Google have grown exponentially, whilst older organisations such as Kodak, which either failed to spot the digital revolution or misread the speed or adaptability of any change, have slipped into obscurity.

Disruptive innovation is a term often incorrectly applied, but the insurance industry would seem ripe for disruption with its antiquated systems and processes. Disruption occurs when firms face choices that once defined drove its success, but which now destroy its future. With the features of parametric providers highlighted earlier – can these be utilised to be truly disruptive to the status quo?

Disruption is not an event but a process.[7] A focus on low profitability and new technology that is not immediately valued by existing customers allows for later adoption by customers, and to supersede the unaware incumbents in the medium term.

Insurtech, a relatively new terminology, is now used to define a whole range of market entrants seeking to exploit technological change and customer's digital preferences. Following on from banking, there are

[6] Stable [website]. https://stableprice.com/

[7] Harvard Business Review, "What Is Disruptive Innovation?" December 2015. https://hbr.org/2015/12/what-is-disruptive-innovation

peer-to-peer insurance companies such as Lemonade[8] and Friendsure,[9] as well as insurers exploiting the usage-based model and shared economy[10].

I am also aware of an insurance company trialling software with one of its clients to actively monitor the deliveries and shipments from one of its key distribution centres. Keeping a digital record of actual contents, and therefore the replacement value of the warehouse, allows for a more accurate premium calculation, whilst providing the insurer with an up-to-date maximum foreseeable loss during the fluctuations in business activity.

Lloyd's, that bastion of tradition has itself recognised the technological advances, stated [11]

> ***The world is changing. Technology and data analytics are disrupting traditional business models. The industry needs to react to react to these rapidly evolving business and risk environments so we can continue to provide customers the support and protection they need to grow and prosper. This means accelerating the development of products and services to meet customers' needs and creating new business models to support their delivery.***

It is to the credit of the traditional insurance companies that some of them, either by acquisition or internal development, have started such disruptive entrants. AXA and Chubb have launched flight delay products that take a nimbler and faster approach to providing quotations and, more importantly, the payments of claims. An example of the effortlessness of the product is that it allows for a delay of any cause whatsoever outside of the control of the insured – no small print, no terms and conditions, no exclusions and no warranties to trawl through. It truly emphasises the simplicity of the product, being hassle-free for the consumer. Because of the streamlined coverage, the running costs are much lower than that of traditional travel insurance policies.

Swiss Re is a dominant player in this market and have an offering[12] providing earthquake vouchers, small cash payments to cover incidental expenses depending on your location to an actual earthquake. Swiss Re has the capability to allow for a primary carrier to promote and host parametric placements, utilising their infrastructure.

Jumpstart[13] is a benefit corporation with a legal obligation to help society increase financial resilience against disasters. Jumpstart's innovative model is designed to allow more recovery money to get to affected people when they actually need it, mirroring the nimble and fast quake voucher scheme of Swiss Re.

Another area of technological change is that of Smart Contracts and the use of blockchain technology. Smart contracts, a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract, are inherent in the agile and simple approach promoted by parametric policies. The quake vouchers and flight compensation services referenced earlier will make use of blockchain and its infrastructural advantages.

The challenge for insurers is how they can embrace this technology for larger and more complex coverages. It is highly unlikely that this style of settlement of insurance contracts will be suitable for those that require the review of a highly skilled and trained adjustors. This relates to questions such as whether there was a breach of conditions. Smart contracts cannot respond if one party does not perform as expected or required.

Does this challenge for traditional policies provide parametric providers another cost advantage? How can they exploit this?

HOW PREVALENT ARE WEATHER RISKS WITHIN THE PARAMETRIC SOLUTIONS MARKETPLACE?

It is hard not to overstate how dominant weather (and, for the purposes of this discussion, I include natural events such as earthquakes, floods and tsunamis within the definition of weather events) related triggers dominate this sector of the insurance industry.

A recent decision was made by AXA to rebrand from AXA Parametrics to AXA Climate.[14] The motivations, behind such a move away from an abstract term to one defining the coverage application, are clear. It has the added advantage of tapping into the growing climate change movement, which has strong concerns over the potential impact of the current global activity on climate trends.

Similarly, from a pure marketing perspective, images of hurricane clouds, wildfires or floods make for a dramatic backdrop, drawing on the emotional and inquisitive elements of a potential customer's mind and drawing their attention to the text of the document or website.

[8] Lemonade [website]. www.lemonade.com/de/en

[9] Friendsurance [website]. www.friendsurance.com.au/

[10] Cuvva [website]. www.cuvva.com/

[11] Lloyd's (2019) *Triggering Innovation – Parametric Insurance.*

[12] Swiss Re [website], "Earthquake 'shake vouchers'". https://www.swissre.com/reinsurance/property-and-casualty/solutions/parametric-solutions/parametric-earthquake-insurance-solutions.html

[13] Jumpstart [website]. www.jumpstartrecovery.com

[14] Reinsurance News, "AXA unveils rebranding of parametric insurance unit to AXA Climate", 16 May

Nor is it wise to ignore the benefit to society as a whole, and countries in particular, that the arrangement of specific country protection programmes can have in helping cover the protection gap that exists in developing countries, where insurance is not readily purchased.

An example of such a country scheme is the one that was recently renewed for the Philippines.[15] Arranged in conjunction with the World Bank, this policy provides up to US$350 million of coverage for natural events such as earthquakes and windstorms for the country's exposed territory.

The recording of weather statistics and their ability to model them for specific locations has allowed insurers to respond to these enquiries. Furthermore, the linkage between weather events is relatively straightforward for potential insureds to be able to demonstrate to insurers.

WHAT OTHER TRIGGERS ARE THERE?

We have seen above that there are some niche applications for a trigger that is related to flight delays, which could be caused by weather events but, more importantly, do not have to be. It could be an employee strike, or technical problems with planes, or even drones interrupting the airspace of the airport.

Other examples include:

- **Till receipts.** A high street retailer was not able to accurately correlate a drop in sales with changes in weather. The retailer worked actively with their insurer to identify the number and profit of till receipts to determine the potential for a loss. The till receipts were independently verified by a big four accounting firm, providing the objectivity required.

- **Cyber.** A cyber loss could be identified and assessed with regard to the number of connected devices that an organisation has which are impacted by a cyber-attack. The number of affected terminals would have to be determined and reviewed.

- **Hotel revenue.** Aon has launched a product[16] designed to provide a pay-out if a hotel operator's revenue per available room goes below a certain threshold. The causes for the drop in revenue could be weather-related among others.

- **Footfall.** The product by Aon is also used by retailers for drops in footfall. The product would provide a reimbursement to the customer if there is a drop in the expected footfall following a bogus terrorism alert.

- **Terrorism.** There are also other examples[17] of responding to the changing nature of terrorism. Following terrorist events such as the 2013 Boston Marathon or the recent terrorist events in London, businesses did not suffer damage to property from a bomb, but more so from a loss of people visiting through fear or closed roads.

- **Pandemic**, or rather the fear of pandemic. Munich Re, Marsh and Metabiota have created[18] a risk modelling platform and preparedness index for epidemic risks which they state:

  For the first time, travel and tourism businesses, which is the initial commercial target for this offering, will be able to access a public fear trigger-based business interruption policy, which is designed to provide coverage against a substantial financial loss as a result of an epidemic.

- **Gestational diabetes.** In Singapore, 20% of pregnant women are diagnosed with diabetes. LumenLab in Singapore, working alongside Swiss Re, has developed a product called Vitana, which triggers an automatic payment upon diagnosis of the disease, through access to the insured's medical records.

- **Reputation risk.** Steel City Re, in conjunction with Tokio Marine Kiln,[19] has developed a product providing clients with sigma-styled tools for managing enterprise reputation risk, including monitoring the company's reputation using Steel City Re's proprietary reputation risk metric. The product provides indemnification by paying out when the insured's reputational value metric falls below a certain threshold.[20]. This product is usefully built on the basis of D&O coverage, but in using a parametric trigger, it eliminates the need for the granular wording reviews that are often required for executive and corporate protection.

- **Life insurance.** It seems self-evident that this is a risk that should have a parametric application. As in the Singapore situation above, records could be accessed for the notification of a death, allowing for an automatic payment. It is estimated that in the US alone, there is an amount of $7.4 billion from unclaimed life insurance policies.[21]A blockchain-style solution would eliminate the need for a grieving family to have to find paperwork, to remember or to even know that the policy even existed before a payment would be made.

[15] Artemis, "Philippines parametric insurance doubles, cat bond on the way: World Bank", 14 January 2019. https://www.artemis.bm/news/philippines-parametric-insurance-doubles-cat-bond-on-the-way-world-bank/

[16] Global Finance, "New Applications For Parametric Insurance," 10 April 2019. https://www.gfmag.com/magazine/april-2019/new-applications-parametric-insurance

[17] Risk Management, "The Evolution of Parametric Insurance", 1 April 2019. http://www.rmmagazine.com/2019/04/01/the-evolution-of-parametric-insurance/

[18] Reinsurance News, "Metabiota unveils Pathogen Sentiment Index & agreement with Munich Re, Marsh", 20 April 2018. https://www.reinsurancene.ws/metabiota-unveils-pathogen-sentiment-index-agreement-with-munich-re-marsh/

[19] Steel City Re [website], "Financial". https://steelcityre.com/services/financial/

[20] Insurance Institute of Canada, "Reputation Risk Insurance", May 2017. https://www.insuranceinstitute.ca/en/cipsociety/information-services/advantage-monthly/0517-reputation-risk

[21] Srishti Sawla, "Parametric Insurance & Blockchain: A new dimension to the ever young Insurance Industry", 4 September 2018. https://medium.com/@srishtisawla/parametric-insurance-blockchain-a-new-dimension-to-the-ever-young-insurance-industry-53a26c0d4c79

SHOULD PARAMETRIC INSURANCE REPLACE OR COMPLEMENT TRADITIONAL POLICIES OF INSURANCE?

The rise of parametric insurance could only have happened because of inadequacies in the existing marketplace. The development of this niche sector was borne of a need that customers were prepared to pay premiums for.

Is it a panacea for all of the market failings of the traditional insurance marketplace though? Let us look in turn at some of the more common complaints levelled at the insurance industry, and whether parametric insurance can alleviate or eradicate these for consumers:

- **12-month policies.** As a risk manager, the annual insurance cycle boggles me – the amount of time taken to prepare underwriting submissions, to review with brokers and underwriters, and to negotiate policy wordings and premiums. Then there is the process for allocating premiums, taxes and issuing invoices, certificates and policy documentation. It is not an exaggeration to say that this takes many months, and it is repeated year after year. So much time is invested in this behemoth of an administrative exercise that it leaves the risk manager little time to actually manage the risks within the business.

  Insurers are very reluctant to offer meaningful long-term agreements hiding behind punitive loss ratio escape clauses, which invariably are never triggered as insurers are reluctant to lose premium income. Brokers are market players who are also perversely incentivised to facilitate this annual cycle.

  Parametric policies can simplify this process, aside from the length of time that is required to incept a programme in the first instance. The policies that have been underwritten and identified above can all be for a multi-year period, allowing the insured the comfort of long-term stability in coverage.

- **Claims handling.** Probably the largest area for complaints against insurance companies is in the area of handling and settling claims. A promise to pay that is not fulfilled through a misunderstanding of the terms, conditions, exclusions and warranties of a policy can lead to a significant distress for insureds who have already suffered a loss.

  Similarly, the amount of documentation requested by insurers, and the length of time to finalise and pay the claim settlement, can hinder the recovery of a business that is short of cash.

  Parametric coverages, as outlined previously, can simplify the disputes over coverage intentions and settle payments within hours. For some clients, it can be a decision to complement the capacity of coverage with cash-boosting resources.

- **Uninsurable risks and deductible infill options.** It is understandable that the major reinsurers seek to protect themselves from the potential of large-scale catastrophic weather claims from the myriad of reinsureds. This manifests itself in restrictive terms and conditions within the reinsurance treaties it negotiates with these primary insurers, which in turn leaves clients with exposures to such natural events subject to significant self-insured retentions or prohibitive pricing for such risks.

  For some corporate buyers, the price and availability of natural event coverage can disproportionately affect the entire property insurance buying process. The fluctuation of reinsurance capacity from year to year is another contributing factor to the inability of insurance organisations to provide sustainable, long-term agreements.

  Parametric policy providers have been fairly successful in addressing this market failing. The quake parametric companies have been applying their swift and nimble approach to provide a resource to complement the coverages that the individual or corporate buyer may have in place – perhaps allowing for a more efficient allocation of premium capital.

- **Flexibility of coverage.** A constant source of frustration and dissent from insurance market observers is the lack of innovation or flexibility. Whilst the insurance industry is rightly proud of the sustainability of its business models over centuries, it has allowed its pride to restrict their development. Complaints remain about premium and coverage being allocated for aspects of coverage that are not required and ignored for areas that of interest to the buyer.

It is not for this paper to discuss the merits of whether an insured is sufficiently able to identify all the coverage options they want or require. The provision of parametric policies does allow those who know what they want and do not want from their policy to arrange coverage more flexibly.

- **Asymmetric information – adverse selection and moral hazard.** We discussed earlier this asymmetric information risk for the buyer over complex insurance contracts, but there remains also the lack of visibility, from the insurer's perspective, over the true risk potential of the insured, and whether their behaviours will change with an insurance policy in place. This risk of adverse selection and moral hazard is a fundamental one for insurers to include within their actuarial assessment and pricing tools.

  Parametric coverages for independently assessed triggers help to alleviate the issue of moral hazard by choosing the determination of a claim pay-out on the trigger, and not on an action which could be impacted by the policyholder. It is also noticeable from the advice from market players that efforts in underwriting these styles of programmes are more data-driven and detailed than those of traditional coverages. This emphasis on pre-coverage, pre-claim underwriting can only contribute to reduced adverse selection hazard for the providers of these coverages, once more reducing the asymmetrical gaps between the two participants.

CONCLUDING REMARKS

We have seen that the emergence and subsequent growth of parametric insurance has been as a result of a number of contributory factors, including new and existing players utilising disruptive behaviours gained from technological advances such as blockchain, innovative business models with rapid and agile approaches to strategic decision making. These players have sought to use the advantages of parametric-style policies to give consumers a quicker and more efficient claims process, which in turn allows for a more flexible and straight-forward attitude to policy terms and conditions. Additionally, with the comfort of reduced moral hazard and adverse selection risk, parametric providers have been able to work confidently with clients to find the trigger that generates the risk that is to be protected against. It has been demonstrably proven that these policies can have a national or even supranational role in protecting against significant natural events – none more so than in those parts of the world where a substantial insurance protection gap exists at a local level.

And yet these all seem to be weather-related – with the rebranding of AXA Climate, we saw the recognition of weather and climate being the prime, and ultimately successful, selling points for this type of coverage. It is inevitable that as long as growth opportunities remain for this application of parametric insurance, then the providers will pursue it wholeheartedly.

The recent attempts and approaches by brokers such as Aon and Marsh, along with the number of partners Swiss Re has engaged with, have shown in very specific examples that there is a pathway of development for parametric policies to follow where the advantages of the simplicity and speed can be harnessed for the benefit of the consumer.

The flight delay and retail examples both provide insureds with an instantly understandable coverage that can be applied whatever the cause. It will be interesting to watch their fortunes closely and to see whether there is an increase in public demand for such solutions as it becomes more widely known.

Perhaps the most interesting example is that of the gestational diabetes solution in Singapore. It is here that I consider non-weather parametric as having the best chance of future success. Life insurance is a significant investment for individuals and families alike, and transferring the responsibilities of making a claim away from the grieving has pointed benefits for society as a whole. Challenges remain with regard to the balancing of the asymmetrical information risk along with the privacy of individual's health records, but it is not insurmountable.

The explosion of data, and the ever-increasing speed of modern life lived online and via an individual's smartphone, naturally leads to the conclusion that the application of parametric insurance will be more prevalent and will inevitably be so for a greater array of triggers than those related to weather and natural events.

It is of vital importance that traditional market players, such as Lloyd's, continue to invest in the research and development in this technological space. Irrespective of their strategic decisions, it is certain that other participants already have a hunger for the market share of premium that will become available in the future.

With the fixation on weather related and natural catastrophe triggers, the disruptors have the opportunity and the means to develop these non-weather policies, which may initially have a low margin. But in the medium to long-term, they will be able to utilise and exploit their technological and cost base advantages to dominate the future marketplace, providing both weather and non-weather trigger parametric policies.

Postscript

Since this paper was written 12 months ago, we have seen the closure of Fizzy by Axa, citing the lack of commercial appetite,[22] and a global pandemic prompting an article with the headline "This Insurance would have helped but nobody bought it," referring to the parametric possibilities of covering a pandemic or even the fear of pandemic that I explored in 2019.[23]

We have also seen a further hardening of the insurance marketplace, including property risks. As brokers and risk managers look for alternative structures, there has been an increase in enquiries for parametric solutions, even though actual placements have proved to be more elusive.

It will be interesting to see if the market conditions continue to harden, and whether this will see an increase in demand for parametric programmes for weather-related and non-weather risks too.

Stuart Turner
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[22] Coin Rivet, "AXA drops Ethereum-based flight insurance platform," 10 November 2019. https://coinrivet.com/axa-drops-ethereum-based-flight-insurance-platform/

[23] Insurance Journal, "This insurance would have helped in coronavirus crisis but nobody bought it," 3 April 2020. https://www.insurancejournal.com/news/national/2020/04/03/563224.htm

BIBLIOGRAPHY

Parametric Companies Websites

1. Stable price. https://stableprice.com/
2. Jumpstart. https://www.jumpstartrecovery.com/
3. Meteo Protect. https://meteoprotect.com/en/
4. AXA. https://www.axa-corporatesolutions.com/en/page/insure-parametric
5. Munich Re one storm. https://www.munichre.com/onestorm
6. AXA fizzy. https://fizzy.axa/en-gb/
7. Chubb Connect. https://connect.chubbtravelinsurance.com/en/about-fdi
8. Blink. https://blinkblink.io/
9. FloodFlash. https://floodflash.co/
10. Etherisc. https://etherisc.com/
11. AssuredRiskCover. http://www.assuredriskcover.com/
12. Steel City Re. https://steelcityre.com/
13. Vitana. http://www.vitana.sg/
14. Swiss Re Quake. https://www.swissre.com/reinsurance/property-and-casualty/solutions/parametric-solutions/parametric-earthquake-insurance-solutions.html
15. Marsh. https://www.marsh.com/uk/insights/risk-in-context/parametric-solutions-for-insurance-programme-design.html
16. Aon https://www.aon.com/unitedkingdom/products-and-services/risk-services/weather-solutions/default.jsp

Articles & Papers

1. CNN, How to get rich off the weather, September 2009. http://edition.cnn.com/2009/LIVING/wayoflife/09/14/mf.get.rich.off.weather/
2. Harvard Business Review, What is disruptive innovation, December 2015. https://hbr.org/2015/12/what-is-disruptive-innovation
3. Norton Rose Fulbright, Smart Contracts in Insurance, September 2016. https://www.nortonrosefulbright.com/en-gb/knowledge/publications/88244592/the-future-of-smart-contracts-in-insurance
4. Porrini, Donatella, Insurance Market Failures, ResearchGate, January 2017. https://www.researchgate.net/publication/315214990_Insurance_Market_Failures
5. Mind The Bridge, From Insurance to Insurtech, May 2017. https://mindthebridge.com/from-insurance-to-insurtech/
6. Insurance Institute, Reputation Risk Insurance, May 2017. http://goodwithwords.com/wp-content/uploads/2013/10/Reputation-Risk-Insurance-Insuring-Your-Good-Name.pdf
7. World Bank, Index insurance is having a development impact where it's needed most, August 2017. https://blogs.worldbank.org/voices/index-insurance-having-development-impact-where-it-s-needed-most
8. Insurance Information Institute, Accelerating change Insurance: Leading through disruption, September 2017. https://www.iii.org/presentation/accelerating-change-092717

9. AXA: AXA goes blockchain with fizzy, September 2017. https://www.axa.com/en/newsroom/news/axa-goes-blockchain-with-fizzy

10. Strategic Risk, Parametric 2.0 – The developing insurance world, October 2017. https://www.strategic-risk-europe.com/parametric-20-the-developing-insurance-world/1425301.article?adredir=1

11. Lloyd's Parametric Insurance, Evolution or Revolution, December 2017. https://www.lloyds.com/~/media/files/news-and-insight/risk-insight/class-of-business/parametric-insurance---evolution-or-revolution.pdf

12. Swiss Re Corporate Solutions, Innovating Together: Examples of innovative risk solutions, 2018.

13. Clyde & Co, Parametric Insurance – Closing the protection gap, January 2018. https://resilience.clydeco.com/articles/inclusive-insurance-report

14. Reinsurance News, Metabiota unveils Pathogen Sentiment Index & agreement with Munich Re, Marsh, April 2018. https://www.reinsurancene.ws/metabiota-unveils-pathogen-sentiment-index-agreement-with-munich-re-marsh/

15. Airmic: Parametric solutions - Overcoming the challenge, White paper, June 2018. https://www.airmic.com/technical/library/white-paper-parametric-solutions

16. Swiss Re, What is Parametric Insurance? August 2018. https://corporatesolutions.swissre.com/insights/knowledge/what_is_parametric_insurance.html

17. Swiss Re, 10 myths about parametric insurance, August 2018. https://corporatesolutions.swissre.com/insights/knowledge/10_myths_about_parametric_insurance.html

18. Business Wire, MetLife's New Blockchain Health Insurance Product Eliminates Claims, August 2018. https://www.businesswire.com/news/home/20180820005644/en/MetLife%E2%80%99s-New-Blockchain-Health-Insurance-Product-Eliminates

19. Srishti Sawla, Parametric Insurance & Blockchain: A new dimension to the ever young Insurance Industry, Medium, September 2018. https://medium.com/@srishtisawla/parametric-insurance-blockchain-a-new-dimension-to-the-ever-young-insurance-industry-53a26c0d4c79

20. AIG Institute, Society 5.0 and parametric insurance clearing a path to risk transfer for catastrophic disaster, September 2018. http://www-510.aig.co.jp/assets/documents/institute/insight/aiginstitute-insight-001-en.pdf

21. SCOR, How parametric re/insurance can support the development of insurability, October 2018. https://www.scor.com/en/media/news-press-releases/how-parametric-reinsurance-can-support-development-insurability

22. Construction Executive, Parametric Insurance: Mitigating risk from weather-related events November 2018. https://constructionexec.com/article/parametric-insurance-mitigating-risk-from-weather-related-events

23. Thomson Reuters, Blockchain, smart contracts and parametric insurance: Made for each other, November 2018. https://www.crowell.com/files/20181116-Blockchain-Smart-Contracts-And-Parametric-Insurance-Made-For-Each-Other.pdf

24. Willis Towers Watson, A New Insurance Paradigm: Event-Based Insurance, December 2018. https://www.willistowerswatson.com/en-US/Insights/2018/12/quarterly-insurtech-briefing-q3-2018

25. Munich Re, One Storm flyer. https://onestorm.munichre.com/UserGuide/OneStormflyer.pdf 2019

26. George Kesselman, Why Parametric is the Future of Insurance, 9 January 2019. https://www.linkedin.com/pulse/why-parametric-future-insurance-george-kesselman/

27. Artemis, Philippines parametric insurance doubles, cat bond on the way, January 2019. https://www.artemis.bm/news/philippines-parametric-insurance-doubles-cat-bond-on-the-way-world-bank/

28. AXA XL, Let's Talk: AXA Global Parametric (Climate), January 2019. https://axaxl.com/fast-fast-forward/articles/lets-talk-axa-global-parametrics

29. Risk Management Magazine, The Evolution of Parametric Insurance, April 2019. http://www.rmmagazine.com/2019/04/01/the-evolution-of-parametric-insurance/

30. Global Finance, New Applications For Parametric Insurance, April 2019. https://www.gfmag.com/magazine/april-2019/new-applications-parametric-insurance

31. Strategic Risk, How to claim it from the weatherman, May 2019 https://www.strategic-risk-europe.com/how-to-claim-it-from-the-weatherman/1430264.article

32. Reinsurance News, AXA unveils rebranding of parametric insurance unit to AXA Climate, May 2019. https://www.reinsurancene.ws/axa-unveils-rebranding-of-parametric-insurance-unit-to-axa-climate/

33. Swiss Re, Parametric for people June 2019. https://europe.cpcusociety.org/docs/public

34. Celsius Pro, Agriculture & Parametric Insurance, June 2019. https://europe.cpcusociety.org/docs/public

35. Celsius Pro, Weather Index Insurance for Microinsurance Schemes, June 2019. https://europe.cpcusociety.org/docs/public

36. Lloyd's, Triggering Innovation: How Smart contracts bring policies to life, July 2019. https://www.lloyds.com/news-and-risk-insight/risk-reports/library/technology/triggering-innovation

37. Lloyd's & School of Risk Management of St. John's University, Triggering Innovation: Parametric Insurance, Market Insight Report, July 2019 (only available to Lloyd's market participants).

38. Miller, Evolving solutions for reputational risk management, July 2019. https://www.miller-insurance.com/News-and-insights/Latest-bulletins/North-American-Bulletin---July-2019/Reputational-risks

39. Stanbrough, Lucy, How to pay a claim before a customer realises they've experienced a loss, LinkedIn, 10 July 2019. https://www.linkedin.com/pulse/how-do-you-pay-claim-before-customer-realizes-theyve-loss-stanbrough/

40. AXA Corporate Solutions, Parametric insurance: A fitting solution for the weather-sensitive. https://axa-prod.s3.amazonaws.com/www-axa-com%2F2c3da04e-12f8-489c-a356-ee84800d8550_axa_parametric_insurance.pdf