

# PREDICTIVE ANALYTICS AND ARTIFICIAL INTELLIGENCE IN INSURANCE CONTRACTS AND RISK CULTURE

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**ABSTRACT:** *Predictive analytics can use statistical techniques to predict future events through data mining, predictive modelling, machine learning, etc. Thus, predictive analytics is having an impact in legal matters too and especially in risk distribution in contract law. What are the limits of predictive analytics in this field? The paper considers InsurTech as an example of predictive analytics applied to legal matters.*

**SUMMARY:** 1 Introduction. - 2. Predictive analytics in short. - 3. Application of predictive analytics to legal issues: managing risk. Certus ex incertis. 3.1. Data Analytics, Big Data, AI and information asymmetry 4. Predictive analytics and InsurTech. 4.1. Impact on production. Examples in the motor insurance and agricultural insurance sectors. 4.2. Impact on distribution. 4.3 Data Sharing and Open Insurance. 5. Conclusions.

1. Risk can be defined as the danger of an unplanned occurrence.<sup>7</sup> It finds its

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The paper is an output of the projects “Sostenibilidad, digitalización e innovación: nuevos retos en el derecho del seguro” (PID2020-117169GB-I00); “Insurance Solutions to enhance crop production resilience to extreme climatic events by means of blockchain and IOT technologies” - Next Generation EU.

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<sup>7</sup> M. Henssler, *Risiko als Vertragsgegenstand*, Mohr Siebeck Verlag, Tübingen 1991.

causes in human failure, but more often in natural causes and, generally speaking, in the inevitable uncertainty of the future.

Over time, some dangers recede, but in the meantime, others arise and risk prevention becomes the guiding principle. Since around 1990, legal scholars have also stressed this point. In his book *Risiko als Vertragsgegenstand*, Martin Henssler analyses the risk distribution concept applied to the interpretation of contracts. One of the most relevant problems addressed in the book is the determination of the legal limits to risk distribution. The assessment of the fairness of the assumption of risk can rely on the criterion of the “equivalence check” according to § 138 BGB (German Civil Code). A look at the development of modern capital and financial markets reveals the importance of an interpretation of civil law provisions (§§ 762-764 BGB), in which it is possible to find a basic regulation of aleatory contracts. What Martin Henssler wrote in 1993 is going to become more and more evident and important in the present time.

As the sociologist Ullrich Beck said in 1986, whilst the problem of class society was the distribution of wealth, the new problem is the distribution of risk, understood as “a systematic way of dealing with the insecurities and risk of losses induced and introduced by modernity itself”. The changing nature of society's relation to production and distribution is related to the globalising economy based on scientific and technical knowledge that become more central to social organisation and social conflict.<sup>8</sup>

More recently, in 2007, Zigmunt Bauman noted in his book *Liquid Times: Living in an Age of Uncertainty* that the movement from ‘solid’ to ‘liquid’ modernity has created new challenges never before encountered. Social forms, norms and institutions have not had enough time to solidify and cannot serve as frames of reference for human actions and long-term life plans, so individuals have to find other

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<sup>8</sup> U. Beck, *Risikogesellschaft Auf dem Weg in eine andere Moderne*, Suhrkamp, 1986.

ways to organise their lives through unending series of short-term projects and episodes. This situation requires individuals to be flexible and adaptable, ready and willing to change tactics at short notice, under conditions of endemic uncertainty.<sup>9</sup> Can predictive analytics help? What is the impact on risk distribution in contracts? How can data analytics change the concept of information asymmetry in insurance (the insurer is less informed than the insured about the risk, so the insured has a duty of disclosure) and the concept of insurance itself?

2. Data Analytics permits the analysis of raw data to make conclusions about information obtained. In the last ten years, most of the techniques and processes of data analytics have been automated into mechanical processes and algorithms that work on raw data useful for human beings.

Data analytics is of course fundamental in decision-making generally speaking: marketers utilise customer data, industry trends, and performance data from past campaigns to plan marketing strategies; product managers analyse market, industry, and user data to improve their companies' products, and finance professionals use historical performance data and industry trends to forecast their companies' financial trajectories. HR managers gain insights into employees' opinions, motivations, and behaviours and pair them with industry trend data to make meaningful changes within their organisations. And what about legal professionals? Legal professionals are involved in decision-making processes. As some scholars have said "the business of law is the business of making decisions. Decisions are made at every step of the legal process, though obviously some are weightier, more consequential for the individual, than others"<sup>10</sup>; we must underline that this insight does not concern only judges and

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<sup>9</sup> Z. Bauman, *Liquid Modernity*, Cambridge, 2000.

<sup>10</sup> Keith Hawkins, *On Legal Decision-Making*, in *Wash. & Lee L. Rev.*, 43, 1986, p. 1161.

judgments, but all the actors involved: parties to contracts, litigants, lawyers, and notaries, who have to make decisions concerning the legal effects of their actions .

Data analytics techniques are distinguished into several types:

1. Descriptive analytics is the simplest type of analytics. It allows us to derive trends from raw data and describe what happened or is going to happen. Descriptive analytics answers the question “What happened?”

2. Data visualisation consists in communication by means of charts, graphs, and maps to show trends in data in a clear, easily understandable way.

3. Diagnostic analytics helps in finding a causal nexus and answers the question “Why did this happen?”

4. Predictive analytics is used to make predictions about future trends or events and answers the question “What might happen in the future?” It operates by analysing historical data in order to make informed predictions about what the future could hold for a company.

5. Prescriptive analytics answers the question “What should we do next?”

Prescriptive analytics takes into account all possible factors and designs the future scenario while suggesting actionable takeaways. It helps decision-makers to consider all aspects of current and future scenarios and plan actionable strategies. This type of analytics can be especially useful when making data-driven decisions.<sup>11</sup>

These four types of data analysis should be used in tandem to make informed decisions.<sup>12</sup>

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<sup>11</sup> F. Acito, V. Khatri, *Business Analytics: Why Now and What Next?*, in *Business Horizons*, 57 (5), 2014, pp. 565-570; V. Dhar, *Data Science and Prediction*, in *Communications of the ACM*, 56 (12) (2013), pp. 64-73.

<sup>12</sup> H. Chen, R.H.L. Chiang, V.C. Storey, *Business Intelligence and Analytics: From Big Data to Big Impact*, in *MIS Quarterly*, 36 (4), 2012, pp. 1165-1188; A. McAfee, E. Brynjolfsson, *Big Data: The Management Revolution*, in *Harvard Business Review*, 90 (10), 2012, pp. 60-68; Bange, C. and N. Janoschek, *Big Data Analytics 2014 - Towards a Data-Driven Economy*, BARC Institute, Würzburg, May 2014, p. 9 ff.; H. Kościelniak, A. Puto, *Big Data in Decision Making Processes of Enterprises*, in *Procedia Computer Science*, 65, 2015, pp. 1052-1058; M.G. Guillemette, M. Laroche, J. Cadieux,

3. With regard to contract law matters, we have to consider that civil cases which reach formal adjudication in the courtroom are statistically highly exceptional.

Legal decisions are not only solemn adjudications by judges, but are also decisions made mostly by individuals: parties to a negotiation, lawyers, notaries, administrative officials, etc. The decisions made are usually not the product of adjudication, but rather mostly of negotiation.

In contrast with adjudication, negotiation is a means of solving problems and reaching decisions in the absence of an authoritative imposition. It is a flexible system of decision-making relying upon bargaining. Negotiation does not involve an authoritative decision-maker because there is at least some degree of consensus and commitment to the outcome of the decision-making process felt by both parties.

In decision-making by negotiation, individuals find “a solution to an interest conflict that is based on the reciprocal adjustment of needs” and, as Aubert said, negotiation “is ill-suited to the promotion of predictability”.<sup>13</sup> In negotiation processes there is not only a flow of information to each decision maker, but also the possibility of a variety of interactional effects between them which need to be addressed.

Some assume that “[t]he law is a problem solving mechanism, but in order to do its work it must compact reality into manageable molds. Hence the law prefers to address the world with the rigors of a system of binary logic. Thus one is in law married or not, unemployed or not; or one does, or does not, have a right or a duty. In reality,

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*Defining Decision Making Process Performance: Conceptualization and Validation of an Index*, in *Information & Management*, 51 (6), 2014, pp. 618-626.

<sup>13</sup> V. Aubert, *In Search of Law*, WileyBlackwell: Hoboken, 1984 and P. Gulliver, *Case Studies of Law in Non-Western Societies*, in L. Nader (ed.), *Law in culture and society*, 1969, p. 11.

of course, people would often find it difficult to describe their position in such uncompromising categories. Binary logic is particularly evident in the way in which the law provides answers to problems—that is, in the way in which it produces decisions—but it also emerges in the reasoning which allows those decisions to be produced.”<sup>14</sup> It may be that the process is more complex than a binary logic and that categories, especially in civil law countries, are more “liquid”.<sup>15</sup>

The binary logic is consistent with a conflict-based perspective, while presently most legal problems are settled by bargaining.<sup>16</sup>

Predictive analytics uses machine learning and artificial intelligence as tools to parse data and predict possible outcomes. The most important difference between AI and predictive analytics is that AI can be autonomous and learn on its own. Predictive analytics often relies on human interaction to help query data, identify trends, and test assumptions. This difference is important, but it is not an obstacle to the interaction between predictive analytics and AI, as we are going to see with regard to insurance.

With regard to negotiation and contracts, data analytics, together with AI, is able to reduce the uncertainty that dominates contracts, and this can be observed particularly in one of the types of contracts that see “risk” as an essential element: the insurance contract in the new InsurTech perspective.

Data analytics also impacts on the information flow and the problem of information asymmetry, which usually finds a solution in the concept of informed consent.

Informed consent was introduced into our European civil law systems, especially in the medical area, because of the influence of the Anglo-Saxon world, in

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<sup>14</sup> Keith Hawkins, *On Legal Decision-Making*, in *Wash. & Lee L. Rev.*, 43, 1986, p. 1161.

<sup>15</sup> N. Lipari, *Le categorie del diritto civile*, Milan: Giuffrè, 2013.

<sup>16</sup> M. Henssler - S. Landini, Introduction, *Lawyers in Italy. Challenge the change*, Martin Henssler, Sara Landini (eds.), *DeutscherAnwaltVerlag*, 2020.

which case studies on this topic began in the 18th century, with a focus solely on the patient's right to give their consent to healthcare action, and then developed conceptually through case-law until arriving in the 20th century at the principle of informed consent, which combines patient autonomy and information.<sup>17</sup>

In the Italian context, by contrast, deep-rooted cultural traditions, moral ideas and religious beliefs prevailed which were not at all conducive to the acceptance of the notion of a patient's autonomy over his or her own health and life; patients' consent was considered included in their request for care.

It was not until the twentieth century that Italian legal scholars began to analyse the issue more carefully, especially in relation to the compliance with legal requirements in terms of informed consent.

4. The term InsurTech refers to the application of digital technologies to the insurance world. In particular, InsurTech is marked by an innovative use of big data and predictive analytics. The areas of application range from production to distribution to insurance governance itself.

From the production point of view, digital technologies have affected the insurance world due to the new coverage needs mainly tied to data security. Here the real novelty concerns the application of blockchain technology to insurance contracts. An innovative frontier on the production side could be represented by open insurance.

The insurance industry 4.0 includes all the technologies that have led to a digitisation of relationships, thereby facilitating automation processes, thanks also to the use of algorithms, and accelerating the conclusion and fulfilment of contracts.<sup>18</sup>

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<sup>17</sup> V. Millard, *Le origini del consenso informato*, in *Acta otorhinolaryngol Ital*, 25, 2005, p. 320

<sup>18</sup> With regard to contracts, Savelyev, *Contract law 2.0: 'smart' contracts as the beginning of the end of classic contract law*, in Higher School of Economics Research, Paper No. WP BRP 71/LAW/2016; Bertani, Butkute, Canessa, *Smart Flight Insurance InsurETH*, at [www.mkvd.s3.amazonaws.com](http://www.mkvd.s3.amazonaws.com); Huckstep, *What does the future hold for Blockchain and insurance?*, in *Daily Fintech*. September 15, 2016, at [www.dailyfintech.com](http://www.dailyfintech.com); Gatteschi, Lamberti, Demartini, Pranteda, Santamaria, *Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?*, in *Future Internet*, 10, 2018, p. 20;

In the insurance sector, digitalisation has allowed the exploitation of data collected from customers together with big data to perform clustering operations capable of profiling customers and improving the adherence of products to their insurance needs.

The use of big data becomes important in the insurance industry. As is well known, the term “big data” indicates an enormously large, complex set of data that can be used to form new knowledge through the relationships between knowable data. This is information that, due to its volume and speed of acquisition, has a heuristic value as it represents the starting point for identifying correlations that may be relevant for future developments.<sup>19</sup>

There are different techniques used:

1- “Data mining” is the process of analysing data from different points of view in order to obtain useful information. It is the process of searching for correlations or patterns between data collected in relational databases.

2- “Data fusion” is the process of integrating multiple data and knowledge. The expectation is that the “merged” data will contain information that is superior to the original data.

3- The “clustering” procedure aims to group data and organise them into groups so that the data contained in the same cluster are more similar to each other than those contained in different “clusters”.

4- “Regression analysis” is used to estimate the strength and direction of the relationship between variables that are in a linear relationship to each other.<sup>20</sup>

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Chekriy, Mukhin, *Blockchain Platform for Insurance-related Products*, 2018, at [www.icosbull.com](http://www.icosbull.com).

<sup>19</sup> Ashton, *That ‘internet of things’ thing*, in *RFID journal*, 2009; Atzori, Iera, Morabito, *The internet of things: A survey*, *Computer networks*, 2010; A.C. Nazzaro, *L’utilizzo dei Big data e i problemi di tutela della persona*, in *Rass. dir. civ.*, 2018, p. 1239 ff.

<sup>20</sup> J. Manyika, M. Chui, B. Brown, J. Bughin, R. Dobbs, C. Roxburgh, and A. Byers, *Big data: The next frontier for innovation, competition, and productivity*, The McKinsey Global Institute 2011; A. McAfee and E. Brynjolfsson, *Big Data: The Management Revolution*, in *Harvard Business Review*, 2012, p. 13.

In the overall conclusion to its “Report on Best Practices on Licensing Requirements, Peer-to-Peer Insurance and the Principle of Proportionality in an InsurTech Context” (Luxemburg 2019)<sup>21</sup>, EIOPA (European Insurance and Occupational Pensions Authority) stressed that “«InsurTech have an impact across all steps of the value chain in the insurance and pension sectors, including through the emergence of start-ups, often in cooperation agreements with incumbent undertakings. The business models of undertakings and the consumer experience are being transformed as a result of the proliferation of financial innovations and technology. Based on the evidence gathered, the EU InsurTech market is at an early stage, but evolving. Most NCAs [national competent authorities] have limited experience with InsurTech companies, or they do not differentiate those with ‘digital’ business models from others. However, the ITF’s [InsurTech task force’s] work on Innovation Facilitation found that 24 NCAs have implemented an innovation facilitator. This implies that most NCAs within the EU are well aware of the importance of innovative technologies and new market players, and the need to understand well risks and benefits.”

EIOPA focuses on the importance of regulation, as facilitating innovation is not about de-regulation. A key word in regulation is technological neutrality in legislation. The principle of technology neutrality has been enshrined as one of the key principles of the European regulatory framework for electronic communications, first introduced in 2002 and reinforced in the 2009 telecom package.

According to this regulatory framework, Member States must ensure that national regulatory authorities take utmost account of the desirability of making regulation technologically neutral, that is to say, it should neither impose nor discriminate in favour of the use of a particular type of technology.

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<sup>21</sup> See more recently the Eiopa Discussion paper on blockchain and smart contracts in insurance, 2021, at [www. Eiopa.europa.eu](http://www.Eiopa.europa.eu)

Another key aspect is the application of a proportionate approach in the assessment of conformity with the conditions for authorisation (e.g. in terms of expectations regarding governance processes, systems and controls requirements, which take into account the specificities and risks inherent to InsurTech).

For these reasons the use of best practices is important. In its report EIOPA maps out some best practices, namely that: “1. NCAs, taking into account their exact mandate, are encouraged to use available measures to facilitate general consumer awareness (e.g. through publishing circular letters and issuing notices or warnings etc.) on non-supervised P2P insurance platforms, where possible. 2. NCAs could encourage pure P2P insurance platform providers to disclose to consumers clearly and prominently that they are not providing or selling any insurance cover and hence are not under insurance regulation and to clearly disclose to consumers on their lack of access to the usual consumer safeguards such as independent dispute resolution and protection scheme, if applicable. 3. NCAs exchange views on treatment of different P2P business models and national licencing approaches to those business models.”

4.1. From the production point of view, digital technologies have impacted the insurance world: firstly, due to the new coverage needs mainly tied to data security.

Secondly, in the realm of production, the real novelty concerns the application of blockchain technology to insurance contracts.<sup>22</sup>

With regard to the first point, an innovative frontier on the production side could be represented by open insurance.

Awareness of cyber risk is growing and with it the search for tools to confront

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<sup>22</sup> Zhao, *The analysis of application, key issues and the future development trend of blockchain technology in the insurance industry*, in *American Journal of Industrial and Business Management*, 10(02), 2020, 305–314. About smart contracts, see Murphy, Cooper, *Can Smart Contracts Be Legally Binding Contracts?*, white paper, R3cev and Norton Rose Fulbright, 2016.

it. For their own part, insurers seem to have identified the coverage of cyber risk as an important sector of activity, but they have also taken note of some critical issues that make it difficult to apply traditional risk management models. For both policyholders and insurers, technology can be either a disruptive element or a driver for development. Everything will depend on the resilience capabilities of the market, operators and individuals.

Cyber risk is prominently on the international agenda. The accessibility, reliability and security of cyberspace were considered by the G7 Leaders' Summit in 2016 as an "essential foundation for the economy, growth and prosperity".

Insurance companies and insurance intermediaries, in relation to their management of policyholders' data, will be among the actors on which civil or administrative liability may be imposed pursuant to the GDPR.

One of the great opportunities for insurers, however, is represented by the possibility of placing on the market functional products to cover cyber risk.<sup>23</sup>

Insurance contracts can represent an answer, not only in terms of insurance coverage but also in terms of risk management tools and the implementation of prevention systems.

Due to the aspatial and atemporal context within which it develops, it will be difficult to find solutions for cyber risk when it results in the production of concrete damage that can also trigger an interminable chain of losses and prejudicial events. Damage compensation is not the answer. Cyber risk should be addressed through measures to prevent and contain the harmful effects.

The services offered by insurers for the prevention of cyberspace violations

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<sup>23</sup> Eiopa, *Cyber risks: what is the impact on the insurance industry?*, 2021 [www.Eiopa.europa.eu](http://www.Eiopa.europa.eu); Eling-Schnell, *What do we know about cyber risk and cyber risk insurance?*, in *JRF*, 17, 2016, pp. 474-491.

operate on three fronts.<sup>24</sup>

- Technical-IT security, consisting in testing information systems to verify their vulnerability through essentially two types of service:

- verification of the security status of a network by searching for and identifying system vulnerabilities, thereby allowing the identification of elements potentially subject to attacks or intrusion attempts;

- simulation of an attack against a site, portal or web application.

- Planning and scheduling of all the actions to be taken to eliminate the problems that have emerged, thereby reducing the risk; the residual risk may be offset through insurance coverage at a reduced premium.

- Organisational-managerial security achieved through the drafting of codes of conduct for staff and targeted training taking into account a company's actual needs, monitoring and reporting on the compliance of the conduct of operators with the specified guidelines, help desks, etc.

These services can be implemented thanks to technology, and not only in relation to cybersecurity. Through the processing of big data, it is possible to determine correlations that identify risks and to create preventive tools.

By digitalising the processes involved, it is possible to speed up alert procedures and the implementation of prevention tools by the insured. Let us consider the possibility of introducing smart insurance contracts thanks to blockchain technology.

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<sup>24</sup> Algarni – Malaiya , *A Consolidated Approach for Estimation of Data Security Breach Costs*, 2016 2nd International Conference on Information Management (ICIM 2016)–IEEE, EI May 7-8, 2016; Baldoni – Montanari, *Un Framework Nazionale per la Cyber Security*, 2015 Italian Cyber Security Report, February 2016. [http://www.cybersecurityframework.it/sites/default/files/CSR2015\\_web.pdf](http://www.cybersecurityframework.it/sites/default/files/CSR2015_web.pdf); Behnia, Rashid, Chaudhry, *A Survey of Information Security Risk Analysis Methods*, *Smart Computing Review* vol. 2 no. 1, February 2012; Biener, Elig, JWirfs, *Insurability of Cyber Risk: An Empirical Analysis*, in *Working Papers on Risk Management and Insurance* no. 151, January 2015; McFarland, Paget, Samani, *L'economia sommersa dei dati - Il mercato delle informazioni digitali rubate*, McAfee Labs di Intel Security Group, 2015.

A blockchain is essentially a digital ledger of transactions that is duplicated and distributed across the entire network of computer systems on the blockchain. Each block in the chain contains a number of transactions, and every time a new transaction takes place in the blockchain, a record of that transaction is added to every participant's ledger. The decentralised database managed by multiple participants is based on what is known as distributed ledger technology (DLT). A blockchain is a type of DLT system in which transactions are recorded with an immutable cryptographic signature.<sup>25</sup>

This observation allows us to analyse the application of blockchain technology to insurance contracts.

The positive effects of the application of blockchain technology to insurance contracts are varied.

Major positive effects include:

- a possible reduction in costs and potential errors related to the human and manual management of compensation claims,
- greater transparency of contracts, which may allow better comparability between the offerings of various companies, and the possibility of creating unique profiles of customers,
- a contribution to the fight against fraud, and
- a better flow of information, also for the purpose of implementing the product oversight governance procedure as per Article 25 of IDD Directive 97/2016.

Particular blockchain applications may be used in the claims settlement phase in the case of indexed policies that allow for correlating the amount of indemnity to

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<sup>25</sup> Bertani, Butkute, Canessa, *Smart Flight Insurance InsurETH* at [www.mkvd.s3.amazonaws.com](http://www.mkvd.s3.amazonaws.com); Huckstep, *What does the future hold for Blockchain and insurance?*, Daily Fintech. September 15, 2016, at [www.dailyfintech.com](http://www.dailyfintech.com)

certain indexes. The basic concept of index-based or parametric solutions is: instead of indemnifying for the actual loss incurred, parametric insurance covers the probability of a predefined event happening, and pays out according to a predefined scheme.

In the agricultural sector, for instance, index-based insurance is spreading and is parameterised on the basis of meteorological indexes.<sup>26</sup>

The peculiarity of the agricultural sector is determined by the increase in the rate of losses occurring in this sector, largely derived from the catastrophic damage caused by climate change.<sup>27</sup> In such circumstances, the agricultural insurance contract is in danger of ceasing to be attractive for insurance companies, as compensation payouts are higher than premium income, resulting in a financial imbalance. This technical imbalance discourages insurance and reinsurance companies from taking on new lines of insurance and is a factor that has led to a progressive adjustment of the contractual conditions and the price of the premiums. Farmers end up being harmed as a consequence, despite the existence of premium subsidies. At the same time, recourse to reinsurance has become more complicated and companies are forced to establish more restrictive contractual conditions that are detrimental to the insured and, ultimately, to the insurance system.<sup>28</sup> To this one should add the limitations on

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<sup>26</sup> Cevolini, Esposito, *From pool to profile: Social consequences of algorithmic prediction in insurance*, in *Big Data Society*, 7 2020, p. 2; Corlosquet-Habart, Janssen (eds.) *Big Data for Insurance Companies*, 2018, London; Wiley; Ewald, *Assurance, Prévention, Prédiction Dans L'univers du Big Data*, Paris: Institut Montparnasse, 2012; McFall, Moor, *Who, or what, is InsurTech personalizing? Persons, prices and the historical classifications of risks*, in *Distinktion Journal of Social Theory*, 19(2), 2018, pp. 193–213

<sup>27</sup> On the increase in damage claims, see, for example, in Spain, p. 21, “Memoria de Enesa. Principales indicadores del seguro agrario en 2022”, published by Enesa at [https://www.mapa.gob.es/es/enesa/memoria\\_enesa\\_2022\\_web\\_tcm30-656077.pdf](https://www.mapa.gob.es/es/enesa/memoria_enesa_2022_web_tcm30-656077.pdf) (Date of consultation: 04/10/23). The same is true in Italy, see p. 6 “Rapporto sulla gestione del rischio in agricoltura 2023” dell’Istituto di Servizi per il Mercato Agricolo Alimentare (ISMEA) <https://www.ismea.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/12434> (Date of consultation: 04/10/2023).

<sup>28</sup> See p. 5 of the abovementioned “Rapporto sulla gestione del rischio in agricoltura 2023”. This situation is described by Del Caño Escudero, F., *Derecho español de seguros*. T. II, Madrid, 1983, p.

public expenditure to cover premium contributions. It is therefore appropriate to reflect on agricultural insurance as a tool and analyse the extent to which technology makes it possible to foresee or even prevent risks in the farming sector. The issue is relevant because it should be remembered that the agricultural insurance contract has been considered as a product that allows crops and livestock to be protected from the risks inherent to the sector. It is a way of transferring risk by preventing it from being borne solely by the farmer. This measure has been part of the financial instruments supported by the EAFRD, thus consolidating insurance as a passive defence tool that favours rural development.<sup>29</sup> In fact, recital 82 of Regulation (EU) 2021/2115 refers to the need to maintain and extend support for farmers to manage their production and income risks under the EAFRD, referring, in particular, to the use of subsidies for the payment of insurance premiums.

In this context, in order to mitigate or avoid the damage caused within the agricultural sector, it is important to adopt active defence measures to adapt crops or agricultural activity to the current climate situation. The use of big data can help to ensure that the most correct measures are taken to this end. And such data can also play a role in determining the type of defence measures and requirements that the Member States of the European Union, through their ministries of agriculture, establish for the agricultural sector as conditions for granting aid. Similarly, it is easier for insurance companies to obtain adequate information for drawing up the requirements that the insured must meet in order to take out an insurance policy.<sup>30</sup> In other words, in this area predictive analytics can help to assure the success of the

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121; only farmers whose crops are highly exposed to risk resort to insurance, which means that the rate of claimed losses is very high and, consequently, premiums become more expensive. At the same time, given the high cost of premiums, many farmers do not resort to insurance and adverse selection is becoming more and more prevalent and leads to high premiums.

<sup>29</sup> The importance of this type of measure in the sector is pointed out by Landini, *Assicurazioni del rischio in agricoltura*, in *Rivista di Diritto Agroalimentare*, 2021 (3), pp. 539-555.

<sup>30</sup> In this regard, see Landini, *Assicurazioni del rischio in agricoltura*, cit., pp. 539-555.

decision-making process in reducing risk and contribute to eliminating information asymmetry in insurance. In short, as already mentioned in relation to cyber risk, insurance contracts can represent an answer also in terms of risk management tools and implementation of prevention systems in the agricultural sector.

Along with the importance that the use of big data can have in the process of adopting active defence measures, it is worth highlighting its impact on passive defence measures, and, in particular, on the new types of insurance contracts created to adapt to the needs of the agricultural sector. A specific area in which there are automatic contract term adjustment systems is that of policies whose financial conditions (in particular the premium) are linked to a specific target connected to the behaviour of the insured. This model is already applied in the auto insurance sector, with PAYD (pay as you drive) policies in which the amount of the premium depends on the use of the car.<sup>31</sup>

At this point, it is worth highlighting parametric insurance, which —although not among the types of insurance contracts for which the premium is subsidised by the State in accordance with EU Regulation— has aroused interest in the agricultural sector.<sup>32</sup> This type of policy was introduced in response to the need to limit the impact of adverse meteorological events on the agricultural sector.<sup>33</sup> The peculiarity of parametric policies is that the amount of compensation is fixed in the insurance

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<sup>31</sup> Lüttringhaus, *Mehr Freiheit wagen im Versicherungsrecht durch daten- und risikoadjustierte Versicherungstarife – „Pay-as-you-drive“-, „Pay-as-you-live“- und „Smart-Home“-Tarife als Herausforderung für das Versicherungsvertragsrecht – (Risking More Freedom: Data and Risk-based Insurance Tariffs – “Pay-as-you-drive, “Pay-as-you-live” and “Smart-Home” Tariffs as a New Challenge for Insurance Contract Law –)*, »Mehr Freiheit wagen« – Beiträge zur Emeritierung von Jürgen Basedow, Anatol Dutta and Christian Heinze, eds., Mohr Siebeck, 2018, Max Planck Private Law Research Paper No. 17/181, pp. 55-72.

<sup>32</sup> In Italy, the premium for taking out these policies is not included in the list of eligible expenses. However, there are other sources of funding, such as Italian agricultural producer organisations (POs), which provide an incentive for their adoption.

<sup>33</sup> Santagata, “*Polizze assicurative parametriche (o index-based) e principio indennitario*”, *Rivista di Diritto Civile*, 2022, 1, p. 134 (commento alla normativa), p. 1; De Luca, *Stima accettata, polizza stimata e assicurazione parametrica. Spunti di riflessione*, in *Assicurazioni* 2023, p. 432.

contract; thus, if a claim is made, the insurer must pay out the agreed compensation. Parametric policies are characterised, firstly, by the fact that they are activated when the fulfilment of certain external and objective conditions previously established in the contract is verified.<sup>34</sup> Therefore, when various parameters are met and a certain threshold is reached, the insured will be entitled to receive the agreed compensation. Secondly, they reduce or eliminate the part of the damage assessment carried out by experts, thus reducing the costs and time that such an assessment entails. Accordingly, the insurer must pay compensation when specific circumstances are verified, such as, for example, the existence of a drought lasting a certain number of days or a certain amount of rainfall.

It is doubtful whether these contracts can actually be considered insurance contracts in the traditional sense, as the indemnification is based on an index.<sup>35</sup> However, it should be noted that most of these policies include a provision relating to the specific damage that needs to have occurred in order for payment of compensation to be made. Consequently, the damage can be presumed on the basis of a statement submitted by the insured or based on the achievement of certain indexes. In the legal literature some argue that the inclusion of this provision makes it possible to safeguard the indemnification principle inherent in insurance contracts, since, without the existence of the damage, the insurer can refuse to pay compensation.<sup>36</sup> In this regard, national insurance contract regulations reflect the

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<sup>34</sup> Abril, Badrinas, Biurrun, “*La revolución de las insurtech en el seguro*”, *Boletín de Estudios Económicos*, 2020, T. 75, n. 230, p. 240, They refer to smart or parametric policies: through a combination of IoT devices and blockchain technology, insurance companies can know whether or not the conditions of the contract are being met (for example, if drugs are being correctly transported, guaranteeing the cold chain at all times) and automatically activate (without human supervision) a series of business rules previously defined and agreed in the contract.

<sup>35</sup> Thourot, Folly, *Big Data: Opportunité ou Menace Pour L'assurance?*, Paris: RB Édition, 2016.

<sup>36</sup> See Landini, “*Assicurazioni del rischio in agricoltura*”, cit., pp. 539-555, in conjunction with Article 1905 of the Italian Civil Code. In Spain, Article 26 of the Insurance Contract Law. See also Girgado Perandones, *El principio indemnizatorio en los seguros de daños. Una aproximación a su significado*, Comares, Granada, 2005, p. 32 ff.

indemnification principle by stating that the insurer is obliged to compensate, in the manner and according to the terms provided for in the contract, the damage suffered by the insured as a result of the loss. Indeed, parametric insurance is characterised by the fact that there is automatic entitlement to the previously agreed compensation should the damage-causing event occur.<sup>37</sup> This does not mean eliminating the aforementioned principle of insurance contract law, but rather implies an automatic determination of compensation taking into account the individual indexes and the damage that is estimated to have been caused.<sup>38</sup> Big data and algorithms can be used to calculate such damage with the aim of facilitating its quantification and reducing the margin of human error and fraud as much as possible. Accordingly, it is possible to individualise losses in an abstract way that is at the same time effective and realistic. Digital transformation in insurance makes it possible to improve efficiency or reduce costs, automate tasks and enable effective decision-making.<sup>39</sup>

Indeed, it is necessary to start from the concept of the insured interest, understood in terms of the economic relationship between a person (the insured) and a thing, right or property. The value of the insured interest limits the maximum amount of damage that the loss may cause to the insured, since the principle of compensation governs, which limits compensation to the ratio between the value of the interest and the value of the damage actually suffered and prevents unjust enrichment. In the case of parametric insurance, the sum insured and the compensation to be paid by the insurer for each claim are predetermined in order to simplify the management and

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<sup>37</sup> See Article 1905 of the Italian Civil Code, or Article 26 of the Spanish Insurance Contract Regulation.

<sup>38</sup> As is well known, and as is underlined by Veiga Copo, *Infraseguro, sobraseguro, seguro pleno. Pólizas tasadas o estimadas, Tratado del contrato de seguro*, Aranzadi, Pamplona, 2009, consulted online: “el asegurado espera la reparación de ese daño sufrido, cuestión distinta es el alcance de la misma así como la satisfacción total o parcial del asegurado, que no siempre se auspiciará por la indemnización sino por lo efectivamente contratado y delimitado en las coberturas del riesgo”.

<sup>39</sup> Abril; Badrinas, Biurrun, *La revolución de las insurtech en el seguro*, cit., p. 227-228.

costs of assessing the damage once the claim has been submitted.<sup>40</sup>

The problem in the development of the parametric insurance market is not a legal one, but rather a technical one related to the identification of a certain, objective index that allows a determination of damage consistent with reality. In agricultural insurance, for example, the problem is to determine the correlation between events (for example rain and wind) which can affect the extent of the damage.

As has been pointed out in the Italian legal literature, the presence of the principle of compensation and the necessary existence of damage make it possible to distinguish this concept from a very different one that raises other problems from the point of view of the applicable regulation, namely where the product goes outside the scope of insurance law and is configured as a derivative financial product.<sup>41</sup> In other words, when the speculative function is prioritised over that of coverage, it should not be considered insurance, because insurance against damage cannot be used for speculative purposes.<sup>42</sup> Such a situation would arise in the event that a product was used for speculative purposes and the investor received the amount set according to the rules established in the contract regardless of the existence of an insured interest

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<sup>40</sup> It is interesting to consider the relationship between a parametric policy and an estimated value policy, although this question is beyond the scope of this paper. In Italy, account should be taken of the analysis made by Partesotti, *La polizza stimata*, Padova, 1967. In Spain, on the estimated value policy regulated under Article 28 of the Insurance Contract Law, already cited, see Díaz Moreno, *La disciplina de la póliza estimada en la Ley de Contrato de Seguro*, Aranzadi, Madrid, 2008, p. 40 ff., or Girgado Perandones, *La póliza estimada. La valoración convencional del interés en los seguros de daños*, Marcial Pons, Madrid, 2015, p. 51 ff. In Italy, this distinction is addressed by emphasising the difference between the difficult verification of value in the absence of a reference market and valuation by means of indices or objective external parameters; De Luca, *Stima accettata, polizza stimata e assicurazione parametrica. Spunti di riflessione*, cit., pp. 436 and 446.

<sup>41</sup> See the interesting considerations made at <https://www.intermediariassicurativi.it/iass-distribuzione-assicurativa/iass-news/iass-insurtech/insurtech-cosa-sono-le-polizze-parametriche.html> (Date of consultation: 20/10/23). About financial products, see Corrias, *I prodotti assicurativo-finanziari: genesi ed evoluzione*, in *Assicurazioni*, 2021-4, pp. 581-593. In reference to Italy, see Angelici, *Alla ricerca del "derivato"*, Giuffrè Editore, Milan, 2016, pp. 7 ff.

<sup>42</sup> Recently, De Luca, *Stima accettata, polizza stimata e assicurazione parametrica. Spunti di riflessione*, cit., pp. 434.

and, therefore, the occurrence of damage. A product of this type could be considered a derivative because it does not respect the indemnification principle, which is a defining characteristic of insurance: the payment made by insurers needs to replace what has been lost, thereby restoring the insured to where they were financially prior to the loss, without rewarding or penalising the insured for their loss. In order to determine whether a parametric policy is actually an insurance contract, we think that it is important to consider whether the index is based on data and correlation, which, thanks to an algorithm, enable the amount of damage to be determined. In this case, the indemnification principle is respected. Moreover, it is possible to avoid human errors and frauds. Thus, this kind of indemnification is more effective and respectful of the principle of indemnification than current manual assessment procedures.

The problem is particularly relevant in the agricultural sector. The current increase in catastrophic events linked to climate change and the reduction of public resources to deal with major damage lead us to consider the possibility of finding private sources of funding and systems to prevent or reduce damage, in particular damage to production. Catastrophic events in agriculture are one of the major causes of over-indebtedness of farmers, as emerged from the report “Risk Management and Agricultural Insurance Schemes in Europe” (2009) of the Joint Research Centre of the EU Commission.

Funding and prevention are the two primary needs in the case of catastrophic environmental events. An efficient answer to such needs may be found in insurance contracts. The insurers will indemnify the insured party in the event of losses. At the same time, in order to avoid moral hazard and reduce risk, the insurer will contractually impose rules of conduct on the insured party with the aim of reducing or avoiding such losses. In this way, insurance contracts could play a relevant role both in funding and in prevention. But a fall in the demand for insurance has emerged in the

agricultural sector.

Insurance coverage is inadequate in relation to farmers' needs, and unsustainable in terms of the cost of coverage. The causes of high premiums are basically: adverse selection problems (only those who are more exposed to risks are interested in concluding an insurance contract) and the high cost of loss assessment. Even where state subsidies are available to help cover the cost of premiums, there are strong bureaucratic obstacles to the development of insurance coverage.

The main goal should be to implement contractual coverage of damage arising from environmental catastrophes by identifying contractual terms of insurance that represent an answer to the above-mentioned problems.

With regard to the contractual coverage of damage caused by disasters, different solutions have been proposed in the agricultural sector.

1) Index-based insurance, where the amount of compensation is predetermined on the basis of the certain target indexes, such as climate or weather indexes.<sup>43</sup>

The advantages of this mechanism are well known: reduction of settlement costs; greater chance of predetermining losses, and therefore better reinsurance capabilities; correction of adverse selection problems; all insured parties are subject to the same terms and conditions, which virtually eliminates the problem of adverse selection for insurers.

These contracts need to be qualified to determine whether they are insurance contracts or derivative contracts for the purposes of the applicable law.<sup>44</sup>

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<sup>43</sup> Skees, Collier, *New Approaches for Index Insurance: ENSO Insurance in Peru. 2020 Vision for Food, in Agriculture, and the Environment*, Focus 18 Innovations in Rural and Agriculture Finance. Kloeppinger-Todd, and Sharma, eds. Washington, DC: International Food Policy Research Institute, 2010.

<sup>44</sup> Stout, *Betting the Bank: How Derivatives Trading Under Conditions of Uncertainty Can Increase Risks and Erode Returns in Financial Markets*, in *J. CORP. L.*, 1995, 21, p. 53; Stripple, *Securitizing the Risks of Climate Change*, in *IIASA*, IR- 98 098 December, Laxemburg (Austria), 1998

From the legal point of view, there are also issues tied to the qualification of contracts for purposes of authorisation in the national public insurance market under EU directives in this field and, most recently, in consideration of Directive 138/2009/EC (Solvency 2).

The limit of this tool is that it does not allow damage prevention measures to be evaluated. It is said that index-based insurance policies reduce moral hazard as the “payout” is determined on an independent basis and on an exogenous weather parameter, irrespective of the insured’s behaviour. This aspect does not detract from the certainty of “winning”, which can represent a disincentive against the adoption of damage prevention measures.<sup>45</sup>

A solution can be found in the use of adaptation strategies when determining the pay-out, as in case of so-called “resilience bonds”.<sup>46</sup>

2) Determination of the compensation based on losses directly related to the calamitous event which are more easily verifiable and quantifiable. It is important to take into account the loss of profit (income in the case of natural persons) or loss of revenue. Both need to be structured through careful legal drafting techniques so that contracts also contain conditions for the prevention and containment of damage (see conditions for compensation arising from the adoption of prudential conduct by the claiming party) and cover the risk of a catastrophic event, not a risk of losses of wealth and income that are independent of a catastrophic event. This distinction is important

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<sup>45</sup> Landini, *From Environmental insurance to environmental derivatives?*, in *European Energy and Environmental Law Review*, 2013, 228 ff.

<sup>46</sup> Castelli, Galeotti, Rabitti, *Financial instruments for mitigation of flood risks: the case of Florence*, in *Risk Analysis*, 39,2019, pp. 462-472; A.J. Pagano, F. Romagnoli, E. Vannucci, *Implementation of Blockchain Technology in Insurance Contracts Against Natural Hazards: A Methodological Multi-Disciplinary Approach*, in *Journal of Environmental and Climate Technologies*, 2019 DOI:10.2478/rtuct-2019-0091; Pagano, Romagnoli, Vannucci, *Climate change management: a resilience strategy for flood risk using Blockchain tools*, in *Decisions in Economic and Finance*, 2019, pp. 1-14.

both for public authorisation, where coverage is provided by an insurance company, and for access to public subsidies (as in case of agricultural risk coverage). The limits to this solution are that it does not eliminate adverse selection phenomenon, as the event for which coverage is provided will be a certain type of catastrophic event. Thus, only subjects most exposed to that risk will be interested in that kind of insurance coverage.

It is evident that both solutions (index-based insurance – insurance against loss of profit) fail to reach the objective of providing adequate protection, in term of responding to farmers' needs, and sustainable coverage (in terms of costs). It is important to reduce the risk thanks to climate adaptation techniques to be adopted by farmers.

Particular blockchain applications may be used in the claims settlement phase in the case of indexed policies that allow for correlating the amount of indemnity to certain indexes. The basic concept of parametric solutions is: instead of indemnifying for the actual loss incurred, parametric insurance covers the probability of a predefined event happening, and pays out according to a predefined scheme.

In the agricultural sector, index-based insurance is spreading and is generally parameterised on the basis of meteorological indexes.

Attention should be shifted from production to distribution, with a view to a climate-sensitive distribution that enhances the climate adaptation measures adopted by farmers based on the risk assessment.

4.2. Insurance distribution sees a progression of procedural steps marked by documentation, information, registration, and communication obligations such as to ensure the suitability of insurance contracts with respect to the requests and needs of the insured party. The fulfilment of these obligations could be guided and recorded—

also for the purpose of preserving the data and as proof of correct execution—through the use of blockchains.<sup>47</sup>

Blockchain technology could also make it easier to find the most suitable products on the market and to implement a correct risk assessment, also taking into consideration new issues such as climate risk and climate adaptation, the risk of war, and catastrophic risks.

Under Article 20 of the IDD (Directive 97/2016 on insurance distribution), it is required that “any proposed contract must be consistent with the insurance requests and needs of the customer”.<sup>48</sup>

Recitals 42 to 44 of IDD Directive EU/2016/97 state: “Insurance intermediaries and insurance undertakings are subject to uniform requirements when distributing insurance-based investment products, as laid down in Regulation (EU) No 1286/2014 of the European Parliament and of the Council. In addition to the information required to be provided in the form of the key information document, distributors of insurance-based investment products should provide additional information detailing any cost of distribution that is not already included in the costs specified in the key information document, so as to enable the customer to understand the cumulative effect that those aggregate costs have on the return of the investment. This Directive should therefore lay down rules on provision of information on costs of the distribution service connected to the insurance-based investment products in question.

As this Directive aims to enhance consumer protection, some of its provisions are only applicable in ‘business to consumer’ relationships, especially those which regulate conduct of business rules of insurance intermediaries or of other sellers of

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<sup>47</sup> Marano, *Management of Distribution Risks and Digital Transformation of Insurance Distribution—A Regulatory Gap in the IDD*, in *Risks*, 9, 2021, p. 143.

<sup>48</sup> Noussia, *The IDD and Its Impact on the Life Insurance Industry*, in Marano, Noussia, (eds.) *Insurance Distribution Directive. AIDA Europe Research Series on Insurance Law and Regulation*, vol 3, Berlin: Springer, p. 140.

insurance products.

In order to avoid cases of mis-selling, the sale of insurance products should always be accompanied by a demands-and-needs test on the basis of information obtained from the customer. Any insurance product proposed to the customer should always be consistent with the customer's demands and needs and be presented in a comprehensible form to allow that customer to make an informed decision.”

As mentioned above, a blockchain works as a decentralised and encrypted register, in which, in real time, countless operations are recorded without anyone being able to change what is written centrally; any modification or update can only take place after consent has been received by all parties involved in the transaction to be registered or modified.

The blockchain could therefore be considered as a third player, potentially replacing the functions that today we usually attribute to notaries, who have been identifying ways of using it for the purpose of exercising the notary profession for some time. Blockchain technology allows the collection, verification and sharing of data of various kinds in a safe and transparent way.

These data may include the demands and needs of customers, the results of their profiling and product data.<sup>49</sup>

As for customer profiling and product adequacy determined through algorithmic processes, it is necessary to distinguish among the types of insurance. In the life business, adequacy is more measurable. In the financial market, metrics are already in place that allow for quantifying the adherence of the product to the profiles of adequacy and appropriateness with respect to the customer profile; in the non-life branch, there are still no metrics, i.e. adequacy is still determined on a non-

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<sup>49</sup> Regarding the financial market, see Perlingieri, *Mifid II. Innovazione finanziaria e rapporti con la clientela*, in *DIMAF*, 2019, pp. 1-7

quantitative basis. It is worth considering possible measurements in this area as well.

4.3 All the abovementioned issues can be amplified by the phenomenon of open insurance. In January 2021, EIOPA published a report on open insurance, a phenomenon of the share economy that can be seen from different perspectives, also from that of supervision. As stated in the report, there is no uniform definition of open insurance. EIOPA considers open insurance as broadly related to the accessing and sharing of personal and non-personal insurance-related data, usually via Application Programming Interfaces (APIs). An application programming interface (API) is a computing interface that defines interactions between multiple software instances or layers, including those operated by third parties.<sup>50</sup>

On the consumer data side, it could be defined as the accessing and sharing of data relating to consumer insurance services (e.g. insurance policy data such as insured item, coverage, claim history, Internet of Things data, etc.) among insurers, intermediaries or third parties for the creation of applications and services.

On the supervision side, open insurance could also open the doors to new supervisory tools. EIOPA has published a supervisory technology strategy (SupTech) explaining the use of technology by supervisory authorities to provide innovative and efficient supervisory solutions that will support a responsive supervisory system.

On the insurance industry side, the increased exchange of data through open insurance can facilitate industry-wide innovation, openness and collaboration and will likely enable the insurance industry to embrace data-driven innovation, create innovative products for consumers and increase efficiency and interaction with third parties (e.g. better interaction with insurance platforms and ecosystems).

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<sup>50</sup> EIOPA Discussion paper, Open insurance: accessing and sharing insurance-related data, 2021, [www.eiopa.europa.eu](http://www.eiopa.europa.eu)

Furthermore, it could facilitate the emergence of increased competition within the value chain, such as through the introduction of new players and new business models, which may drive down some costs by virtue of enhanced efficiency.

In the industry perspective, one should also consider the interaction between banks and insurers considering the role of the Bank-Insurance phenomenon.

Another perspective to be considered is that of international organisations interested in obtaining insurance market data for social purposes, like in the case of health data.

There are other possible uses of open insurance not considered in EIOPA's paper:

1. Index-based indemnification

Open insurance can have an important role in non-life insurance in the procedures of damage assessment. The determination of losses can take long periods of time and could be costly for both the insurer and the insured party. Index-based insurance can help here. With index-based insurance, payouts are related to an "index".<sup>51</sup>

The development of index-based insurance depends on the collection of data serving to facilitate the determination of the amount of the insurance indemnity thanks to predetermined variables (i.e. level of rainfall) correlated to a certain number of losses.<sup>52</sup>

2. Better risk mapping and preventive measures.

Insurance coverage can play a relevant role in risk mitigation. Insurance exclusions are policy provisions that waive coverage for certain types of events. They

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<sup>51</sup> Collier, Skees, Barnett. *Weather Index Insurance and Climate Change: Opportunities and Challenges in Lower Income Countries*, in *Geneva Pap Risk Insur Issues Pract*, 34, 2009, pp. 401–424.

<sup>52</sup> Lynn A. Stout, *Insurance or gambling? : Derivatives trading in a world of risk and uncertainty*, in *The Brookings Review*. - Washington, DC : Brookings Institution Press, 1996, pp. 38-41.

are an important way to introduce rules of prudential conduct for insured parties. For instance, insurance contracts usually have exclusions that void the insurance contract if the insured is attempting to recoup losses resulting from lawless behaviour or criminal actions. It is important to map the conduct risk of the insured party in order to introduce into the contract rules of conduct designed to prevent the covered event. For instance, in agricultural insurance, starting from past events, it is possible to map possible preventive measures to be adopted by the insured party in order to avoid the insured event or to limit the losses. The preventive and adaptation measures could be considered in the determination of the financial conditions of the contract and in the decision-making process.

3. Artificial intelligence can reduce human errors, but it cannot preclude damage. There is discussion as to who would be liable in the event of damage caused by artificial intelligence: the user, the owner, the manufacturer, or the programmer.<sup>53</sup>

In the case of liability insurance, in order to mitigate the risk, it is important to improve the algorithms so as to reduce the machine's mistakes and the losses in case of AI actions.

The data sharing about insurance claims can help in machine learning processes.

5. We have seen the impact of new technologies in the insurance sector: thanks to data analytics it is possible to carry out a more precise risk assessment that allows for identifying the product that best meets the customer's requests. It is also possible to determine the insurability level by rebalancing the ordinary information asymmetry in insurance contracts: the insurer usually has less information related to the

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<sup>53</sup> Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, in *Washington Law Review*, 89, 2014, p. 130.

customer's risk status. For this reason, legislators have introduced disclosure obligations for the customer. Thanks to big data, insurers can close the information gap and even obtain more information than the customer has on their risk status.

On the production side, it is possible to build more tailor-made insurance contracts that also consider risk mitigation tools that the customer must adopt to reduce or prevent the event from occurring, as in the case of agricultural insurance. The insurance coverage thus becomes a sort of last resort, where damage occurs beyond the forecasts despite the adoption of the measures provided for in the contract.

The same processes for determining the damage through parametric policies make compensation faster on the one hand, and on the other make the payout in the event of a claim better predictable and quantifiable.

InsurTech implies new challenges also for National Supervisory Authorities, which need to map the InsurTech-related risks for the market to find new supervision measures, and to be more connected.<sup>54</sup>

Uncertainty cannot be eliminated, but it can be reduced. Insurance contracts are increasingly contracts for the provision of risk management services rather than for risk coverage.

The question is, are they still insurance contracts? Perhaps it is worth remembering what Ernst Bruck said in the 1930s.

According to his theory, the function of an insurance contract is “die Gefahrtragung”, or risk bearing, which is not reduced to just the payment of the claim if a future and uncertain event occurs, but which also includes risk assessment and management.<sup>55</sup>

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<sup>54</sup> Viktoria Chatzara, *FinTech, InsurTech, and the Regulators*, in *InsurTech: A Legal and Regulatory View* Pierpaolo Marano, Kyriaki Noussia (editors), Springer, Berlin, p. 4.

<sup>55</sup> E. Bruck, *Das Privatversicherungsrecht*, Mannheim, 1930, p. 364 ff.

Following Bruck's teaching, it can therefore be said that the technological innovations that have undoubtedly impacted the insurance market have not changed the fundamental function of the insurance contract in terms of managing and transferring risk to the insurer.