Non-life insurance and economic development

(part 2)

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The following is the second part of the article about "Non-life insurance and the economic development", written by the Generali's R&D Department and outlining the development and ***diffusion of insurance*** *activity in order to provide a better understanding of the purpose of the insurance sector and of the factors underlying its growth in the economy.*

In its first part we have seen first of all the various types of insurance coverage that a person – be them rockstars, football pros or family people - might need, both standard and exotic. We have considered that the main reason for people buying insurance is that they (we all) are generally ***risk-averse*** *in the sense that most of us prefer to count on a given amount of wealth with certainty, rather than on an "equivalent" random amount. Basically* ***insurance transfers uncertainty*** *from risk-averse individuals (the customers)* ***to*** *risk-neutral ones, the* ***insurers****, who professionally pool many similar risks (or classes of risks) together and manage them efficiently. Up to a certain level, small firms as well as large ones behave like individuals, when referred to their risk portfolio. The basic intuition is that, for one reason or another, all these "insureds" are risk-averse. Of course there are also economic and financial aspects to consider, but all this justifies relying on* ***risk management professionals****. Let's then see why "we sell insurance".*

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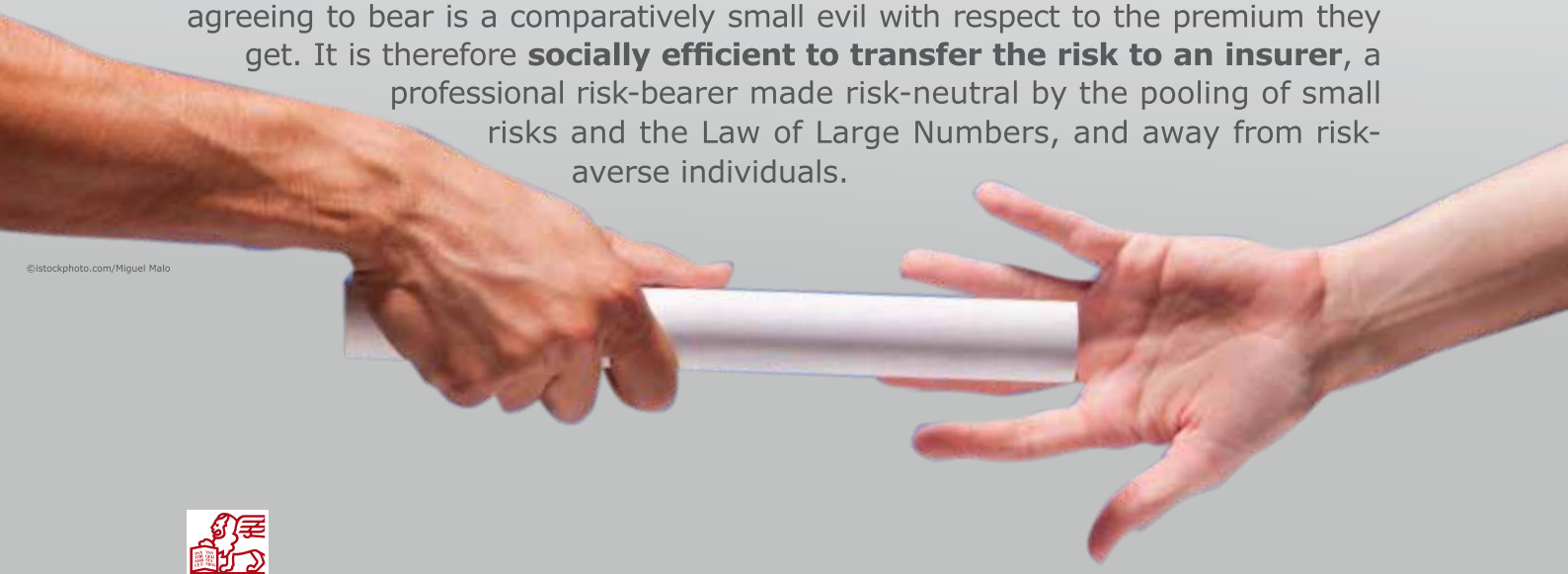
Why we sell insurance: the role of insurers in the economy

An **insurer**, on the other hand, can afford to be risk-neutral because, in most situations, he is **pooling a large number of relatively small and relatively uncorrelated risks**. Think of homeowners' insurance: the likelihood of your dog biting your neighbour's calf, or of your child accidentally dropping a vase on his head does not depend on what other dogs and other children do to other people's neighbours, so that those many small risks can be confidently averaged reducing the randomness and ultimately treating them as a close equivalent of their expected value. If I insure 100,000 heads against the fall of the flowers, or 100,000 calves against dog bites, and the likelihood to be hit, or bitten, is 1/10,000 – i.e. this is what statistically emerges from previous evidence - then I can confidently expect to pay for about 10 injuries, heads or calves, a year.

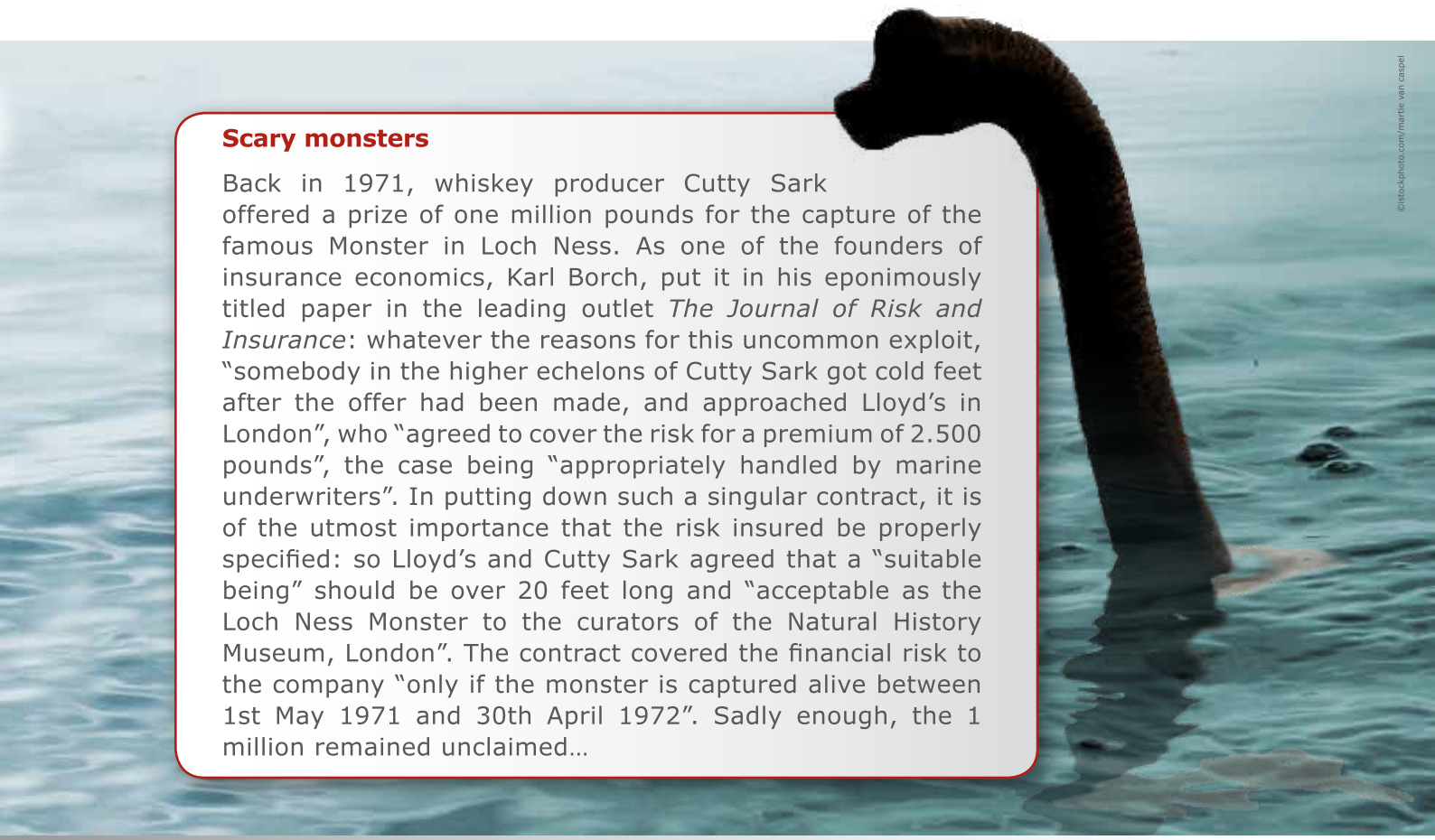
These are the wonders of a theorem called "**the Law of Large Numbers**". Perhaps the most misquoted of all mathematical theorems, the LLN states, by and large, that the more times you repeat an (independent) experiment, the closer the actual average of outcomes will be to its expected value. You can easily try, without any bloodshed, by tossing a coin 10, 100 or, with a little patience, 1000 times. The share of heads will get closer to 1/2 as the number of tries increases.

This is how the pooling of independent risks reduces the variance of outcomes. In turn, this variance (the "**risk**") is harmful for individual customers, while it becomes **manageable for the insurer**. Customers insure because they consider the insurance premium a price worth paying for removing the riskiness from their wealth; the other way round, insurers provide cover because the risk they are agreeing to bear is a comparatively small evil with respect to the premium they get. It is therefore **socially efficient to transfer the risk to an insurer**, a professional risk-bearer made risk-neutral by the pooling of small risks and the Law of Large Numbers, and away from risk-averse individuals.



Of course, insurers use to manage **large, exotic risks** as well, where statistics are scant, and losses can be as huge and as unlikely as experienced seamen crashing one of the biggest cruise ships in the world into the rocks a few meters off an island, in home waters, with clear conditions and on a perfectly calm sea.

As insured sums grow and frequency falls, sometimes even to zero (when covering from losses never heard before) statistical diversification becomes ineffective and the capacity of one single insurer, no matter how big, can become insufficient. Yet coverage is often still available through more complicated underwriting structures. Here, risk **pooling** works at a higher level: many insurers can subscribe one big risk together, and/or retain only a minor part of it ceding the rest to **reinsurers,** who are those professionals insuring (= accepting) a portion of risks originally written by direct insurers, within specific and pre agreed parameters. Careful contract design naturally becomes a key factor as risks become more peculiar in nature and therefore less frequently observed, shifting, e.g., from ordinary car theft to large marine hulls, possibly alive (see box).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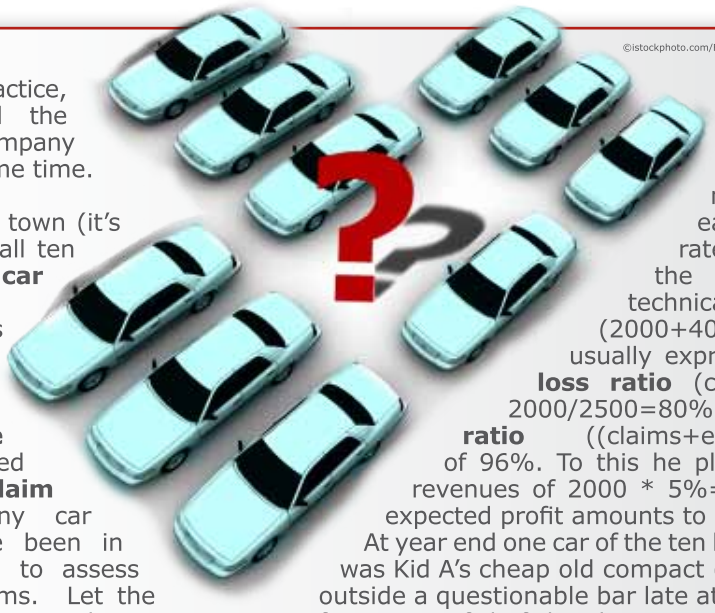
Scary monsters

Back in 1971, whiskey producer Cutty Sark offered a prize of one million pounds for the capture of the famous Monster in Loch Ness. As one of the founders of insurance economics, Karl Borch, put it in his eponimously titled paper in the leading outlet *The Journal of Risk and Insurance*: whatever the reasons for this uncommon exploit, "somebody in the higher echelons of Cutty Sark got cold feet after the offer had been made, and approached Lloyd's in London", who "agreed to cover the risk for a premium of 2.500 pounds", the case being "appropriately handled by marine underwriters". In putting down such a singular contract, it is of the utmost importance that the risk insured be properly specified: so Lloyd's and Cutty Sark agreed that a "suitable being" should be over 20 feet long and "acceptable as the Loch Ness Monster to the curators of the Natural History Museum, London". The contract covered the financial risk to the company "only if the monster is captured alive between 1st May 1971 and 30th April 1972". Sadly enough, the 1 million remained unclaimed…

Armed with the Law of Large Numbers and a collaborative attitude from the worldwide insurance and reinsurance system, insurers thus cover risks big and small, selling peace of mind in exchange for the money to economic actors of any size. As discussed in the first part of this article, backed by an insurance policy households can dispose freely of their stabilized income with a reduced need for cash buffers; entrepreneurs, on their part, can broaden the range of their activities including riskier and more lucrative alternatives.



While rather complicated in practice, the economic logic behind the functioning of an insurance company is simple and telling at the same time.

Suppose there are 10 cars in town (it's a small village actually) and all ten drivers want to insure against **car theft**.
Suppose in town there is only one insurer (which is forbidden as a monopoly, but let's keep this illustration simple). In **setting the price** for each euro of insured value, the insurer looks at **claim frequency**, i.e. how many car thefts per year have there been in "similar" villages over time, to assess the probability of future claims. Let the probability of car theft be estimated on 40 stolen cars out of 2000 potential cases, i.e. 2%. The fair premium is then the insured value times the probability of theft, i.e. 2% of the insured value of the car. The fair premium is such that both sides' expected profit is zero, because the premium income and the expected claim cost are equal: in practice, an insurer also has to cover **functioning costs** so he should increase the premium with, say, a 20% charge for each euro. Lastly, the marketing manager estimates that conditions on the market allow for a small extra charge of 5% to remunerate the **shareholders** who provided the insurer's capital. Customer Kid A, a young University student owning a small old car worth 1000 euros, therefore pays 25 euros a year for car theft insurance. Mr. B., a wealthy businessman on the contrary owns a big limousine insured for 50.000 euro at a price of 1250 euros; and so on along the alphabet up to Dr. K, an insurance employee writing scary short stories about metamorphoses in his spare time and who prefers to walk. All in all, the total insured value for all ten cars in the village is 100.000 euros and total premiums are 2500 euros. A priori the insurer expects having to pay 2000 euros in claims and to spend 400 euros for salaries and other expenses. Moreover, as he is receiving premiums at the beginning and paying claims at the end of the period, he will invest the money on financial markets until then, earning an expected rate of 5%. Therefore the insurer expects a technical profit of 2500-(2000+400)=100; this is usually expressed in terms of a **loss ratio** (claims/premiums) of 2000/2500=80% and a **combined ratio** ((claims+expenses)/premiums) of 96%. To this he plans to add financial revenues of 2000 * 5%=100, so the overall expected profit amounts to 200.

At year end one car of the ten has been stolen but it was Kid A's cheap old compact (he left it unguarded outside a questionable bar late at night). The realized frequency of theft has been 10% instead of 2%, but the overall loss is just 1000 euros, so that the loss ratio is 40%, the combined ratio is 56% and the technical profit rate on premiums is 100-56=44%. It has been a very good year for the insurer from a technical viewpoint. Financial markets, on the contrary, have been rather wobbly, with the currency union between villages under threat and big debt writeoffs from an easy-going hamlet in the South, so that despite having invested in safe fixed-income assets, the insurer has to face capital losses. Fortunately, the technical profit has been unexpectedly large and will more than cover financial losses. Across many years, both loss frequency and severity will oscillate around long-term averages and alternate between technical profits and losses. **Financial revenues**, contrary to the example, are usually positive, and tend to compensate for technical profit in bullish times, when insurers can lower the price of coverage counting on financial profit.

In any case, the insurer must be financially very solid and count on huge spare assets to be able to absorb exceptionally bad events, like in our example the disappearing of Mr B.'s huge black limousine. This is the reason why insurers count among the world's biggest institutional investors.

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Household savings and firm capital are ultimately allocated in an optimal way, improving welfare and growth, while risk is dealt with professionally by those who are best at it in what can be seen as an application of Adam Smith's principle: the division of labour.

Yet in the economy insurers do not only perform the functions of risk pooling and risk bearing sketched above. They are also engaged in **loss prevention**. Insurers do often actively pursue **risk-reducing** activities, offering price reductions to the customers who employ safe technology, as can be a state-of-the-art fireguard system, or who show evidence of risk-reducing behaviours, like a conservative driving style or keeping one's car locked in a safe place. Basically, insurers usually prefer to earn less and pay less, helping to reduce overall risk by **encouraging safe behaviour**.

Moreover, insurers provide financial intermediation services by issuing (contingent) debt contracts and investing the funds until they are needed to pay the claims. A policy is actually a very peculiar contract in that not only are its payoffs random, but they also come, if ever, at a later time with respect to the premium. It is said that insurers work in an "**inverted economic cycle**", in the sense that by definition the insurance service is to be paid in advance, and provided later, if ever. This means that in the meantime between cashing and paying for the claims - possibly spanning several years - insurance companies can count on huge financial reserves to be invested in

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the financial and real estate markets. The return on these investments is a typical source of income for insurers, and will eventually be considered when fixing the tariffs for future policies, so that, as has been observed in the literature, policies cost less per insured unit in times of high financial yields.

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For all this, insurers act just like banks and investment funds in **allocating financial resources in an optimal way**, which has been recognized as a vital function for innovation and growth as early as 1911 in Schumpeter's "The Theory of Economic Development".

Insurance, happiness and growth

Let's close with a remark from Mr. **Lorenzo Savorelli**, Head of the R&D Department: *"A sovereign client asked me once : how can insurance increase happiness? I said, by providing you and your loved ones with peace of mind against the vagaries of Fate, and letting a professional worry about their cost. Mutuality, the collective management of risks, provides a superior gain with respect to the alternative of managing risks separately and individually. A rural village can concentrate on one or two crops that optimize production, if it can insure the risks from a flood or bugs, rather than produce one hundred different crops and gain much less. Insurance favours higher productivity and growth. And it does so not via a "natural", but by a highly advanced "social" arrangement, relying on contracts, trust, and business ethics."*

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