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**CAT-BONDS AND PPP**

**An interesting financing idea  
in times of recession**

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## 1. ABSTRACT

This article outlines an idea with respect to how to use Catastrophe Bonds (short: Cat-Bonds) in a Public-Private-Partnership (PPP) environment, in order to finance new infrastructure or the general-purpose expenses of the relevant country, in an efficient manner.

Firstly, an introduction to Cat-Bonds and the existing market for such instruments will be provided, then the concept of PPP will be very briefly refreshed, in order to merge, in part three of this article, the two concepts in a new context. Finally, a short summary will be provided\*.

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## 2. Introduction

### 2.1. What is a Cat-Bond?

Essentially, Cat-Bonds are financial markets instruments that include an extra feature - an insurance element. Cat-Bonds are more generally called Insurance Linked Securities (ILS), which is an umbrella term for all securities with an insurance aspect. The main idea behind ILS is to transfer risk; in the case of Cat-Bonds, as conceived initially, the risk transferred is that of a natural catastrophe. However, the underlying risks have become broader and I will refer to any bond with characteristics of an insurance contract as a Cat-Bond.

In short, the issuer of a Cat-Bond issues to investors securities, which pay regular interest and return principal at the end of their lifetime. The normal maturity of Cat-Bonds lies at around three years.<sup>1</sup> However, these principal re-payments are conditional on certain events caused by pre-defined triggers (see 2.3 below). If, for example, in an earthquake-linked Cat-Bond, the trigger is defined as seismic activity of a magnitude of more than X on the Richter Magnitude Scale, then – in the case that the event materialises, the principal will not be paid back or will be reduced at the end of the lifetime of the bond. The flexible structure of Cat-Bonds allows the linking of the event (or even several events) to the repayment of the principal, interest payments or both. It is also possible to include staggered events. For example, if the magnitude reaches X but not Y on the Richter Magnitude Scale, then only 75% of the principal will be paid back, if it exceeds Y but not Z, 50% will be paid back and so on.

Cat-Bonds are different to insurance-linked derivatives in that the insured amount is collected upfront, whereas in derivatives the amount is raised once the event has materialised. The benefits of Cat-Bonds include multi-year risk transfer, collateralised exposure (depending on the structure, this can eliminate the counterparty credit risk, see 2.4 below), diversification of sources of cover and clearly defined payout scenarios.<sup>2</sup>

Cat-Bonds are also different from asset-backed securities (ABS) amongst other things in that the insurer in a Cat-bond structure retains a considerable amount of risk, especially peak risks, which have less of a moral hazard problem. Secondly, there is no duration mismatch in Cat-bond or sidecar structures.<sup>3</sup>

Reinsurance differs from Cat-Bonds in that reinsurance contracts cover normally a period of only one year, whereas Cat-Bonds cover several years. Also, since they are fully collateralised, Cat-Bonds show only a limited counterparty credit risk, as opposed to reinsurance. Cat-Bonds which are not based on indemnity triggers (see 2.3.1 below) allow for a quicker recovery and Cat-Bonds, in general, do not include reinstatement. Reinsurance provides a more complete cover, since there is no basis risk, and it does not require any specific structures, making it more cost efficient in comparison to Cat-Bonds.<sup>4</sup>

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<sup>1</sup> Since 2006, the lifespan of Cat-Bonds has slowly increased to three-and-a-half-years. Some now even have a maturity of six years. Cfr. World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

<sup>2</sup> *The Banker*, 4 March 2008, *Cat Bond market catches on*.

<sup>3</sup> World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

<sup>4</sup> World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

Current Cat-Bonds are generally linked to the following risks: US hurricanes and earthquakes, Japan typhoons and earthquakes, and European windstorms. In recent years there has also been additional coverage issued to cover areas such as the Mediterranean, Central America and Mexico from earthquake and some UK areas from floods. Additionally, Cat-Bonds that transfer liability, credit, motor and reinsurance recoverable risks have been issued.<sup>5</sup> However, Cat-Bonds may also be issued to cover other catastrophes such as drought, hail, tsunamis, bush fires etc., as well as man-made-disasters, such as nuclear fallout, aviation, space, shipping, rail and mining accidents, electricity blackouts, and even terrorism and social unrest. Nevertheless, man-made-disasters have so far not been widely covered by Cat-Bond issuers. The main players in the market up to now have been sovereigns, insurers, re-insurers and some corporate entities.<sup>6</sup>

In summary, “each Cat-Bond is, in effect, an entire reinsurance company, set up to run automatically, with essentially no human judgement for its operation”.<sup>7</sup>

## 2.2. The Market

The number of natural catastrophes and its consequences vary wildly from year to year. In 2005, 397 catastrophes caused more than 97,000 casualties and total losses exceeded USD 230bn.<sup>8</sup> Last year, the insured losses were lower, reaching USD 28bn and more than 20,000 casualties.<sup>9</sup> Insured losses tend to be higher in developed countries than elsewhere; North America absorbed in 2005 87.1% of all losses and Europe accounted in 2007 for more than 45% of the losses.<sup>10</sup> These figures show that insurance companies have a huge demand for reinsurance, which could be also channelled through Cat-Bonds.

These figures show the huge potential for Cat-Bonds. 2007 was a record year in ILS issuance, with Cat-Bonds reaching an issuing volume of USD 7bn in 27 transactions that were publicly disclosed. Since 1997, more than 100 Cat-Bonds have been issued, accounting for a risk capital outstanding at the end of 2007 of almost USD 14bn. This growth is spectacular considering that, as recently as in 2003, the outstanding risk capital was a mere USD 3.5bn.<sup>11</sup> In 2008, the issuance remained high in the first half of the year (reaching almost USD 6bn), although not reaching levels of the previous year.<sup>12</sup> In the second half of the year, new Cat-Bond issues have almost dried up due to a lack of credit in the markets and, especially due to cheaper reinsurance costs, which again are due to two years of low catastrophe payouts.<sup>13</sup>

Another interesting development has been the setting up of several special exchanges to support trading in index-based insurance risks. The New York Mercantile Exchange (NYMEX) has founded an exchange based on an index of total losses in the US insurance sector (excluding earthquake and terrorism). The Chicago Mercantile Exchange (CME) has established an exchange for hurricane

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<sup>5</sup> World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

<sup>6</sup> Guy Carpenter, *The Catastrophe Bond Market at Year-End 2007*.

<sup>7</sup> Testimony before the United States House of Representatives, Subcommittee on Housing and Community Opportunity, Subcommittee on Capital Markets, Insurance, and Government Sponsored Enterprises; Statement of Dr. John S. Seo.

<sup>8</sup> Swiss Re, sigma no. 2/2006.

<sup>9</sup> Swiss Re, sigma no. 1/2008.

<sup>10</sup> Swiss Re, sigma no. 2/2006. Swiss Re, sigma no. 1/2008.

<sup>11</sup> Guy Carpenter 2007.

<sup>12</sup> AON Capital Markets, *Insurance-Linked Securities 2008*.

<sup>13</sup> *Börsen-Zeitung*, Nr. 202, 18. Oktober 2008.

insurance derivatives. Trading in catastrophe event-linked futures has begun on the Chicago Climate Futures Exchange. Additionally, several specific Cat-Bond-indices have recently been introduced. Aon Capital Markets publishes the quarterly Aon Cat-Bond Indices. These indices follow conventional market segments such as Asia-Pacific, Europe, multi-peril, North America earthquake and North America wind. The indices are also divided into investment grade and non-investment grade bonds.<sup>14</sup> Swiss Re has been publishing its Cat-Bond-index-basket since 2007, based on sub-baskets of Single-Peril US Wind Cat-Bonds, Single-Peril California Earthquake Cat Bonds and BB Cat Bonds (rated by Standard & Poor's).<sup>15</sup>

### 2.2.1. Selected Cat-Bond examples

- In 2007, Allianz Global Corporate & Specialty issued a USD 150m Cat-Bond to insure earthquakes in the USA and Canada (excluding California) and floods in the UK. The bond offers a spread of LIBOR + 3.15% and was rated BB+ by Standard & Poor's.<sup>16</sup>
- USAA – the United Services Automobile Association for military personnel - has already issued 11 Cat-Bonds. The last one on hurricanes in 2007 amounted to USD 600m. The long track record and good reputation of USAA has led to substantially reduced risk spread premiums for its bonds.<sup>17</sup>
- Nephila Capital, a Bermuda-based asset manager, has issued a USD 260m Cat-Bond, based on an actively managed CDO (Collateralised Debt Obligation) structure. This means that the reference pool of assets is not defined at the time of funding.<sup>18</sup>
- SwissRe has issued Vita I to III, the last in 2007, which are mortality catastrophe bonds, covering the risk of an increased mortality rate.<sup>19</sup>
- Disneyland Tokyo issued the first ever corporate Cat-Bond in 1999. What would have triggered the Bond was not damage to the Disneyland property itself, but an earthquake that measured 6.5 or more on the Japanese Meteorological Agency Scale. It was aimed primarily at protecting against income expected to be lost as a result of fewer tourists visiting Japan in the aftermath of such an earthquake.<sup>20</sup>
- In 2006, Hannover Re issued a Cat-Bond (USD 150m) covering certain wind speed thresholds in various Western European countries. This particular Bond was also tradable on the secondary market through certificates. It was priced at LIBOR + 625 bps and had a maturity of 32 months, extendable for another 6 months. Standard & Poor's calculated the probability of a loss event at 6.85%.<sup>21</sup>

### 2.3. Triggers

As mentioned above, the exact moment when a loss will be covered by a Cat-Bond by paying out part or all of the principal to the insured company is determined by pre-established triggers. There are a variety of different trigger classes available and each trigger class has different effects on the

<sup>14</sup> [www.storminvestor.com](http://www.storminvestor.com), Searching for values.

<sup>15</sup> <http://www.swissre.com/pws/media%20centre/news/news%20releases%202007/swiss%20re%20launches%20the%20first%20catastrophe%20bond%20indices.html>.

<sup>16</sup> [www.allianz.com](http://www.allianz.com)

<sup>17</sup> Guy Carpenter 2007.

<sup>18</sup> Guy Carpenter 2007.

<sup>19</sup> So far, mortality bonds have been based on mortality indices, however longevity and morbidity as well as obesity bonds are imaginable. If mortality stays within the expected parameters, the payout is similar to a normal bond. If mortality increases substantially according to the pre-set trigger, the investor will suffer a loss in principal, interest or both. Swiss Re, sigma no. 7/2006.

<sup>20</sup> Quinn, Time for The Corporate Cat Bond, [www.findarticles.com](http://www.findarticles.com).

<sup>21</sup> Frankfurter Allgemeine Zeitung, Eurcat-Bond bietet Natur-Optimisten Renditechance.

transparency to investors and on the level of basis risk, which is the risk the insured still has to bear despite the reinsurance cover.

#### *2.3.1. Indemnity trigger*

This trigger family is based on the actual loss suffered by the insured entity as a result of the covered event. It is the trigger that most closely resembles a traditional insurance policy. Possible scenarios could be that the loss will be borne by the Cat-Bond in certain intervals, e.g. each USD 10m in losses will be deducted from the principal. Nothing will be deducted until such threshold or its multiples are reached. Other reference parameters might be the number of losses, total losses, partial losses or any other figure derived thereof. If issued by an insurance company, this trigger involves moral hazard risk, which means that due to the pass-through effect of the Cat-Bond, the insurance company might not be as stringent as necessary when underwriting its policies. For investors, indemnity triggers might lead to longer payout periods under the bonds. This is due to the fact that actual damage only is assessable after a certain period of time, which might conflict with the schedule set out in the bond documentation.

#### *2.3.2. Industry index trigger*

Here the event is referenced to an estimation of damages to an industry in a catastrophic event. The sponsor of a Cat-Bond receives a percentage of the estimated industry damages, which lies between a minimum and maximum amount, measured with the help of an index, which mirrors the entire insurance portfolio of the relevant industry. Such indices are provided by various market participants.

#### *2.3.3. Pure parametric trigger*

Pure parametric triggers refer to pre-established physical parameters in case of a catastrophe. Such parameters could be wind speed, geographic location of hurricanes or magnitude of earthquakes. It is also possible to refer to other physical factors, such as high-water marks in floods, rain shortages in certain areas, etc.

#### *2.3.4. Parametric index trigger*

This is a further refinement of the previous trigger family. The same applies as above, but different grid squares in a certain area are weighted differently and then assembled to an index. For example highly populated areas could be over-weighted and lower populated areas underweighted.

#### *2.3.5. Modelled loss trigger*

After a catastrophe, a specialised modelling firm would – based on the physical parameters of the catastrophe – estimate the expected losses. In such a case, the basis risk for the insured entity is higher, as the model might understate the actual damages and losses suffered. However, the contrary might also be possible.

### 2.3.6. Hybrid triggers

This last family of currently used triggers may combine two or more of the above mentioned other trigger classes. An example is the GlobeCat Bond issued by Swiss Re in December 2007, which provides for a payout based on the size of population exposed to a specified earthquake.<sup>22</sup>

### 2.4. Structure of Cat-Bonds

Any Cat-Bond transaction includes several parties, who are:

- *Sponsor*: the entity that is protected by the relevant Cat-Bond and shifts the risk to the capital markets. Sponsors include sovereigns, insurance and re-insurance companies or some other corporate issuers.
- *Investors*: the persons and/or entities buying the Cat-Bonds.
- *Modelling company*: the company that calculates the insurance risk and fine-tunes the triggers.
- *SPV*: a special purpose vehicle which issues the Cat-Bonds and which might require an insurance licence.
- *Trustee*: an independent party that is in charge of investing the proceeds from the Cat-Bond sale during the life of the bond and the repayment of principal at maturity, or delivery of the sales proceeds to the Sponsor in case of the specified event being triggered.
- *Rating agency*: Cat-Bonds are normally rated. Sometimes a so-called monoline is also involved, which provides additional insurance to the bond by guaranteeing the payment of principal and interest, and therefore increases the rating. The issuing company pays the monoline a premium for providing such credit enhancement.<sup>23</sup> However, monolines have recently been troubled by the credit crunch.
- *Swap-counterparty*: as the proceeds of the sale of the Cat-Bonds are invested and normally receive a varying interest payment or return (depending on the investments), the SPV will enter into a swap agreement with a swap-counterparty, in order to swap a variable return against a fixed payment. This secures regular payments of interest to Cat-Bond holders.

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<sup>22</sup> Swiss Re Focus Report 2008: Disaster risk financing.

<sup>23</sup> Swiss Re, sigma no. 7/2006.

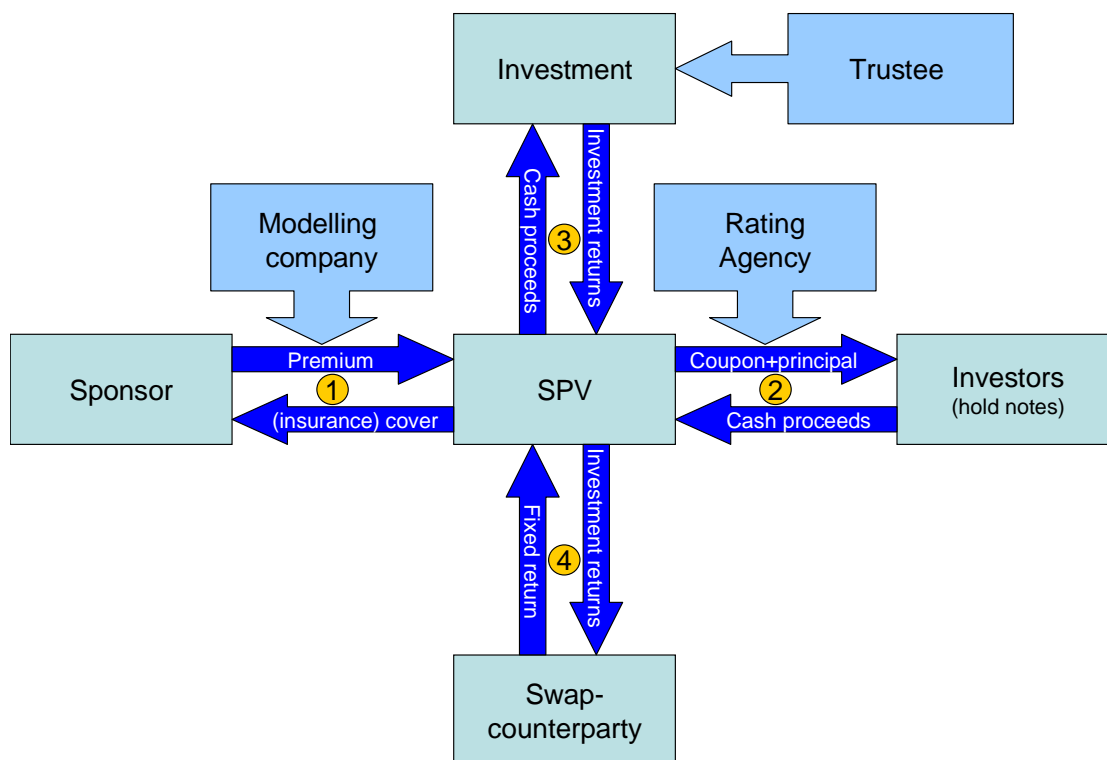


Figure 1: Typical Cat-Bond structure.

Figure 1 explains a typical Cat-Bond structure. The sponsor sets up an SPV as an issuer of the Cat-Bond and a source of (re-)insurance. The SPV will issue bonds to the capital markets and the proceeds collected from the sale to investors will be put in a collateral account managed by an independent trustee. Normally, investment of the proceeds will be in government bonds. As long as no event has triggered the insurance, the SPV pays normal interest to the investors. Since the payments of the government bonds may not match exactly with the payments of the Cat-Bond, the SPV will swap the returns of the government bonds for a fixed payment with a swap-counterparty. Finally, the sponsor enters into an insurance or derivatives contract with the SPV, and pays the SPV a premium.<sup>24</sup>

If the insurance event is not triggered during the lifetime of the bond, at maturity the trustee will sell all the assets held in the collateral account and pay back the principal to the investors. If the loss event occurs, the collateral will be sold in the specified amount and be paid-out to the sponsor.

Cat-Bonds may also be issued in different tranches, each of which transfers a different risk, and which result in different interest payments and repayment options. New structures include the addition of call features to notes with longer maturity and the inclusion of small amounts of unmodelled risk or risk modelled on proprietary models, without the need to use a modelling company.<sup>25</sup>

<sup>24</sup> Härdle/Cabrera, Discussion Paper 2007-037. Swiss Re, sigma no. 7/2006. Swiss Re Focus Report 2008.

<sup>25</sup> Guy Carpenter 2007.

## 2.5. Cat-Bond economics

### 2.5.1. Sponsors

From an (re-) insurance company point of view, Cat-Bonds are attractive as they provide for the transfer of risk from the (re-) insurer's balance sheet, which is in largely supported by equity capital, to the financial markets. Similarly to traditional re-insurance, issuing a Cat-Bond adds to rating agency's capital adequacy requirements and may even improve ROE. Since the proceeds of the bond sale are being kept in a collateral account managed by a trustee, there is normally no counterparty credit risk, which leads to structures that are insolvency remote.<sup>26</sup>

Cat-Bonds pay normally a higher interest rate than rated corporate debt and other MBS (mortgaged backed securities). The spread can be divided into the following subgroups: (i) risk free rate, (ii) basis spread, (iii) risk premium and (iv) novelty and/or liquidity premium. However, the novelty premium is reduced over time, as mentioned above in the case of USAA bonds. Overall, the spreads have narrowed substantially since the first Cat-Bonds were issued, from 400 – 800 basis points over LIBOR to 200 – 400 basis points.<sup>27</sup>

The disadvantages of Cat-Bonds therefore are a higher cost of finance and, depending on the chosen trigger, a higher basis risk. Issuing an ILS is also more cost-intensive than merely contracting for normal re-insurance. On the other hand, Cat-Bonds may be issued for otherwise un-insurable risks. Correctly used, Cat-Bonds can, therefore, be cost effective instruments for insurance cover. The GlobeCat structure, backed by Swiss Re, proved that USD 1m in government funds could be used to secure contingent disaster relief funds of USD 45m.<sup>28</sup>

### 2.5.2. Cat-Bond buyers

Buyers prefer Cat-Bonds due to their diversification features (see 2.6 below) and because they yield reasonable returns, usually with less volatility than corporate bonds. The major buyers of Cat-Bonds are now dedicated Cat-Bond funds, hedge funds, money managers and, to a lesser extent, life insurers.<sup>29</sup> The most active investors can be found in the US (47%), Bermuda (19%) and the UK and Switzerland (12% each).<sup>30</sup>

### 2.5.3. Costs of a Cat-Bond

The costs of issuing a Cat-Bond can be divided into capital costs and structuring costs. The capital costs are the costs at which the issuing company is able to raise capital, generally at LIBOR plus a spread that includes the subgroups mentioned under 1.5.1 above. The risk premium will be proportional to the probability of the Cat-Bond being triggered.

The structuring costs are composed of fees to advisors (modelling company, lawyers, auditors, rating agencies, etc.), underwriting costs, costs for setting up the different SPVs and other such costs. Normally, the SPV is set-up in a tax efficient jurisdiction, since it should not add a tax burden and

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<sup>26</sup> Swiss Re, sigma no. 7/2006.

<sup>27</sup> World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

<sup>28</sup> Swiss Re Focus Report 2008.

<sup>29</sup> Swiss Re, sigma no. 7/2006.

<sup>30</sup> Aon Capital Markets, *Insurance-linked Securities* 2008.

should therefore be a tax transparent, mere run-through item. Sometimes it may be necessary that the SPV also be licensed as insurance company, which can be provided for in several insurance friendly jurisdictions in the Caribbean or Europe.

In order to make a Cat-Bond economically feasible, the transaction should amount to at least USD 200m for life-bonds and for others to around USD 100m. Nonetheless, as the markets mature, smaller transactions may become economically interesting. Banking fees have decreased substantially in 2007.<sup>31</sup> Another development in this direction is shelf registration Cat-Bonds. These are structured in a way that very large amounts may be issued, but draw-downs happen only gradually. The structuring costs are therefore distributed over a larger amount of bonds, which provides for economies of scale and, more importantly, new issues under the shelf programme can be done very quickly.<sup>32</sup> One might think of it as similar to a medium term note programme.

#### *2.5.4. Cat-Bond Rating and Valuation*

Standard & Poor's dominates the Cat-Bond ratings market and most Cat-Bonds are rated BB. However, in 2007, issuances of USD 1.3bn have been rated A or better<sup>33</sup>, although some rating agencies may cap the rating for Cat-Bonds at a certain level, e.g. AA.<sup>34</sup> Other rating agencies in the Cat-Bond sector include Fitch and A.M Best.

Valuation of Cat-Bonds is a very complex matter. The main driver of Cat-Bond prices is the loss probability, which normally is modelled by one of the independent modelling companies and not, as in the capital markets, supply and demand. Currently, investors compare new issues with previous Cat-Bond issues that have similar expected losses, peril exposure, geographic exposures and issue amounts, etc. but also with pricing in the secondary market. Another useful benchmark for Cat-Bond pricing is traditional reinsurance prices for similar risk profiles. In general, the pricing of Cat-Bonds shows some similarities to a defaultable bond, but Cat-Bonds offer higher returns due to the unfixed, binary nature of the catastrophe risk<sup>35</sup>. A point which might negatively affect Cat-Bond prices is the fact that a newly issued note covers the same or similar risks to those that have been covered by previous issues on the market. Since investors seek diversification of their portfolio, an additional concentration in the same risk is not desirable.<sup>36</sup>

Several authors, rating agencies, independent modelling firms and even investors have developed various models to adequately value Cat-Bonds and their inherent risks. The valuation of indemnity-triggered bonds differs considerably from that of non-indemnity bonds, since the rating agencies must also spend time and resources on understanding the indemnity transaction.<sup>37</sup> A small list of texts, which include valuation models, is included under Annex I, as explaining these mathematical and actuarial concepts would be far beyond the scope of this article.

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<sup>31</sup> Guy Carpenter 2007.

<sup>32</sup> Swiss Re, sigma no. 7/2006.

<sup>33</sup> Guy Carpenter 2007.

<sup>34</sup> World Economic Forum, The Convergence of Insurance and Capital Markets, 2008.

<sup>35</sup> Härdle/Cabrera, Discussion Paper 2007-037.

<sup>36</sup> Guy & Carpenter, The Catastrophe Bond Market at Year-End 2006.

<sup>37</sup> Aon Capital Markets. Insurance-Linked Securities 2008.

## 2.6. Cat-Bonds and the markets

Cat-Bonds tend to be a valuable portfolio addition, since they reduce the standard deviation of returns and also improve the Sharpe-Ratio. This is due to the fact that they are less volatile than, for example, corporate bonds with the same rating, and because they are uncorrelated with the financial markets carrying the catastrophe risk, as opposed to credit risk and interest rate risk<sup>38</sup> in corporate bonds. Also, individual perils of different calamities are uncorrelated to each other – a bond covering Japanese earthquakes is completely uncorrelated with another one covering European windstorms.<sup>39</sup> However, it is not clear if the correlation between the stock and the fixed income market with Cat-Bonds is a zero-beta event, since natural catastrophes of a large magnitude tend also to impact on traditional financial markets.<sup>40</sup>

Additionally, whilst corporate bonds have an almost normal probability distribution, Cat-Bonds show very high tail risks.<sup>41</sup> This leads to another question: are higher returns relative to a benchmark generated by investments in ILS in general due to alpha capabilities of the relevant portfolio manager? It seems clear that higher returns are due more to alternative beta and not alpha. Alpha may show in the Cat-Bond-picking capabilities of the relevant manager.

The Cat-Bond market has so far proven efficient in that no single group of investors exerts disproportionate influence over the price or success of a particular transaction, despite the small number of investor groups. This can be attributed to the fact that sponsors have alternative ways to protect themselves, and investors may use other ways of investing their assets.<sup>42</sup>

### 2.6.1. Cat-Bonds and the Credit-Crunch

The credit crisis that began in 2007 (the Credit Crunch) was the first big test case for verifying correlations of Cat-Bonds with financial markets. Whilst spreads on credit markets widened considerably, Cat-Bond-spreads, conversely, tightened, reflecting strong recent returns and low levels of loss events. Even on a risk-adjusted basis, Cat-Bond markets evidenced a declining risk premium in 2007, trading at a compressed multiple of expected loss relative to Cat-Bonds issued in 2006.<sup>43</sup> As performance data for Cat-Bonds is not readily available (due amongst others to the quite small market and limited liquidity in secondary trading), Standard & Poor's used two proxies to compare the performance of the current market and the Cat-Bond world. It measured the Swiss Re BB Cat-Bond Index, which is comprised of BB-rated Cat-Bonds, and the market iTraxx Crossover Index, which is referenced to low investment-grade and speculative-grade issues. The result was as expected: until January 2007 the two indices were moving in parallel, subsequently the iTraxx Crossover fell and the Swiss Re BB Cat-Bond Index continued to grow.<sup>44</sup> A comparison between some Aon Cat-Bond indices and BB rated corporate bonds shows the same result, i.e. Cat-Bonds have less

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<sup>38</sup> Aon Capital Markets, Insurance-linked Securities 2008.

<sup>39</sup> Gold/Schuetze, Interview-Hannover Re sees record cat bond market issues, in Reuters on 9 Jan 2008.

<sup>40</sup> Swiss Re, sigma no. 7/2006.

<sup>41</sup> Swiss Re, sigma no. 7/2006.

<sup>42</sup> Aon Capital Markets, Insurance-linked Securities 2008.

<sup>43</sup> Guy Carpenter 2007.

<sup>44</sup> www.storminvestor.com, Non-correlated exposure, 5.9.2008.

systemic risk. In fact, it might be that the stress in corporate bonds has driven capital to the less volatile ILS-sector.<sup>45</sup>

However, due to the bankruptcy of Lehman Brothers, several Cat-Bond structures lost their swap-counterparty, which led to a ratings downgrade of the bonds by the rating agencies to junk status.<sup>46</sup> For example, the Cat-Bond-SPV Willow Re envisages that it will be able to honour its obligations to pay interest, but there is now no guarantee that the assets of the SPV will generate sufficient return to pay such interest, which otherwise would have been covered by the total return swap with Lehman Brothers. Due to the credit contraction, no replacement counterparty for Lehman Brothers has been found to date.<sup>47</sup>

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<sup>45</sup> AON Capital Markets, Insurance-Linked Securities 2008.

<sup>46</sup> Börsen-Zeitung, Nr. 202, 18. Oktober 2008; [www.storminvestor.com](http://www.storminvestor.com).

<sup>47</sup> [www.reactionsnet.com/default.asp?Page=2&PUB=866ISS=25073&SID=712638](http://www.reactionsnet.com/default.asp?Page=2&PUB=866ISS=25073&SID=712638).

### 3. Short introduction to PPP

Public private partnerships (PPPs) are arrangements typified by collaboration between the public and private sectors. In the broadest sense, PPPs can cover all types of collaboration across the interface between the public and private sectors to deliver policies, services and infrastructure. Where delivery of public services involves private sector investment in infrastructure, the most common form of PPP are Private Finance Initiative (PFI) projects.<sup>48</sup>

In some types of PPP, the government uses tax revenues to provide capital for investment, with operations run jointly with the private sector, or contracted out. Government contributions to a PPP project may also be in kind (mostly the transfer of existing assets). In some cases, the government grants subsidies in various forms, such as direct subsidies, tax breaks or guarantees.

Normally, an SPV is established to develop, build, maintain and operate the asset for the contractual period. The SPV may be owned by the private sector but also have some or even all equity held by government. The SPV is the entity that signs the contract with government to build the facility and then maintain it.

As mentioned, PFI projects are a subset of PPP. In PFI projects, contractors pay for the construction costs and then lease the finished asset back to the government. This allows the government to obtain new infrastructure such as highways, railroads, ports, hospitals, etc. without raising taxes. The contractor, for its part, is allowed to keep any cash left over from the design and construction process, in addition to the income generated by the rent.

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<sup>48</sup> [www.hm-treasury.gov.uk](http://www.hm-treasury.gov.uk).

## 4. Cat-Bonds and PPP

Now, what have Cat-Bonds to do with PPP? From a traditional point of view - not much, but looking at both concepts from another perspective shows new opportunities. Infrastructure is important to all countries, since, when deployed intelligently, it normally boosts growth. However, governments very often lack the resources to build much needed new infrastructure or are constraint by budget restrictions, such as the Maastricht Criteria. This is one of the reasons why PPP was invented - the public sector needed to outsource infrastructure financing from its stricken public finances.

The structures suggested below may – from an accounting point of view – provide for little or even zero government budget burden, will offer the private sector interesting returns and could boost an fledgling asset class in the financial markets. Cat-Bonds can be subject to favourable accounting treatment (see 4.1 below) and can provide finance for infrastructure and other projects at interesting terms. They could also be used to fund government pension liabilities (through mortality or longevity Cat-Bonds/ILS<sup>49</sup>), to cope with the rising health costs of obesity or even with climate change and other environmental impacts.<sup>50</sup> Cat-Bonds could also be structured in an “inverse” way: the bond is issued without being paid for. In the case of a trigger event, the investor will have to pay the amount stipulated and in return will receive interest starting from such date. This is a structure similar to contingent capital.

### 4.1. Accounting of Cat-Bonds<sup>51</sup>

There are two important areas of Cat-Bond accounting: (i) the private sector and (ii) the public sector. Since in both sectors various sets of accounting rules exist, the review is limited to IFRS in the private sector and to EU government accounting principles in the public sector.

#### 4.1.1. IFRS (*International Financing Reporting Standards*)

According to IFRS 4, which has not yet been implemented in all relevant countries, an insurance contract is a contract under which one party (the insurer) accepts significant (insurance) risk from another party (the policyholder) by agreeing to compensate the policyholder if a specified uncertain future event (the insured event) adversely affects the policyholder. Insurance risk is defined as a transferred risk other than financial risk, defined in IAS 39. The transfer of risk takes place by agreeing the compensation to be paid on realisation of that risk. With the introduction of IFRS 4, the IFRS definition of financial risk was amended to include non-financial variables, which are not specific to one of the parties of the contract. This is aimed at avoiding the situation where hedge funds and other investors, who trade in weather or catastrophe indices, mortality rates or similar parameters either using Cat-Bonds, other ILS or derivatives, book those assets as insurance contracts.<sup>52</sup>

<sup>49</sup> For a detailed description of the longevity and mortality market see Swiss re, sigma no. 4/2008 and World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

<sup>50</sup> It is also possible to include litigation risk or even sweepstakes that include a potential high cost for the issuer, such as Pepsi Co. raffling in 2003 the possibility of winning USD 1bn (cfr. *Calandro*, *Super Cats as Alternative Investments*, *The Journal of Alternative Investments* 2005).

<sup>51</sup> Mention must be made of the fact that the author is not an accountant, however this section was elaborated by the author's own research and informal consultation with accountants.

<sup>52</sup> KPMG, *Insurance accounting under IFRS*, 2004.

The uncertainty of the insured event can result from uncertainty over:

- the occurrence of the event;
- the timing of the occurrence of the event; or
- the magnitude of the effect, if the event occurs.

This means that under certain conditions, and if the relevant requirements under IFRS are met, in a typical Cat-Bond structure the relation between the Sponsor and the SPV may be considered an insurance contract, especially if it has a risk mitigation function and an indemnity-based trigger.<sup>53, 54</sup> In this context it is important to note that from a regulatory point of view, the SPV might be considered an insurance company providing regulated insurance services and might require the relevant insurance licence.

Under the Solvency I regime<sup>55</sup>, as currently in place in most EU Member States, Cat-Bonds may also reduce the required solvency margin of Sponsors, depending upon whether it is considered in the retention rate or not. Treatment under IFRS as a reinsurance contract is necessary, but not sufficient, for regulatory solvency requirements. The Solvency II regime, envisaged for implementation in 2012, is expected to bring a more flexible approach. Very often vehicles established under current Cat-Bonds in Bermuda or the Cayman Islands benefit from a tax and capitalization point of view, but will not always be seen by European regulators to provide adequate reinsurance supervision. For sponsors, this might affect the regulatory treatment negatively, which could be avoided by using a transforming insurer. This, however, may create additional costs.<sup>56</sup> A cheaper solution would be to use tax and insurance friendly territories in the European Union, which have not been seen to date as typical Cat-Bond jurisdictions.

When structuring a Cat-Bond transaction, it is also important to consider whether the SPV will be consolidated or not with the Sponsor.

#### 4.1.2. *European System of Accounts*

To achieve the objectives of the Treaty on the European Union, and more specifically of the Economic and Monetary Union, the EU needed uniform statistical instruments which allow for harmonised statistics.

The European System of National and Regional Accounts (ESA 95) was a major improvement on the previous version, which dated from 1979. ESA 95 is broadly consistent with the United Nations System of National Accounts (1993 SNA) with respect to the definitions, accounting rules and classifications. It nevertheless incorporates certain differences. ESA 95 was adopted in the form of a European Council Regulation.<sup>57,58</sup> This set of statistical and accounting rules administered by the

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<sup>53</sup> World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008; AON Capital Markets; *Insurance-Linked Securities 2008*.

<sup>54</sup> Subcommittee on Actuarial Standards of the Committee on Insurance Accounting, *Accounting For Reinsurance Contracts under International Financial Reporting Standards IFRS [2007]*, 26.01.2007. *International Financial Reporting Standards Compliance questionnaire*, <http://www.iasplus.com/fs/fs.htm>.

<sup>55</sup> An EU-wide harmonised regulatory capital regime for insurance companies; Directives 2002/12/EC, repealed by 2002/83/EC, and 2002/13/EC.

<sup>56</sup> World Economic Forum, *The Convergence of Insurance and Capital Markets*, 2008.

<sup>57</sup> Council Regulation (EC) No 2223/96 of 25 June 1996 on the European system of national and regional accounts in the Community.

Statistical Office of the European Communities (Eurostat) is also used to determine the so-called Maastricht Criteria included in Article 121(1) of the European Community Treaty, which set certain macro-economic limits for EU countries. These criteria are:

- inflation rate: Not more than 1.5% higher than the three lowest inflation rates of Member States of the EU.
- government finance:
  - Annual government deficit: The ratio of the annual government deficit to gross domestic product (GDP) must not exceed 3% at the end of the preceding fiscal year.
  - Government debt: The ratio of gross government debt to GDP must not exceed 60% at the end of the preceding fiscal year.
- exchange rate: The Member State must have participated in the new exchange-rate mechanism of the European Monetary System without any breaks during the two years preceding the examination of the situation and without severe tensions. In addition, it must not have devalued its currency.
- long-term interest rates: The nominal long-term interest rate must not be more than two percentage points higher than that in the three member states with the lowest inflation.<sup>59</sup>

Therefore, the Maastricht Criteria pose relatively severe, although sensible, restraints on government budgets. This has led to some governments having trouble financing new infrastructure or other projects or expenses.

Cat-Bonds are not specifically treated under ESA 95. However, subject to specific guidance by national statistics authorities or Eurostat, and provided that there is a political will in this direction, Cat-Bonds might also be accounted for as insurance contracts under ESA 95. If the proceeds of Cat-Bonds were therefore used to finance infrastructure projects, such as highways, this might potentially have a beneficial impact on government accounts. If considered as insurance contracts, interest payment could be regarded as premium payments and the bond proceeds could be considered an advance of the damages to be paid in case of catastrophe held in trust or given as a guarantee to government.

By not being considered debt, (i) the accounts of the government would not have to reflect additional deficit or government debt, (ii) the infrastructure would be financed by the private sector and (iii) it would also count with an insurance cover. The private sector would benefit from higher returns and also improved infrastructure.

#### 4.2. Structure of PPP-Cat-Bonds

Government Cat-Bonds for PPP purposes can be structured similarly to the examples given above.

The proceeds of the sale of the relevant Cat-Bond issue will obviously have to be invested in the construction of the asset that is intended to be financed. In contrast to traditional Cat-Bonds that invest in government securities, the PPP-Cat-Bond would not receive any income from its investment, but government would pay the interest on the respective PPP-Cat-Bond as an insurance premium passed from the government (optionally through an SPV) to the final investor. The government, if no loss event has been triggered, would at maturity repay (optionally through an SPV) the principal, which in this case would be considered the devolution of the advances of damages. At

<sup>58</sup> <http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/en/een00000.htm>.

<sup>59</sup> <http://europa.eu/scadplus/leg/en/lvb/l25014.htm>.

that stage, it is important to ensure adequate structuring to avoid the repayment being considered a government guarantee or similar, which would destroy the accounting assumption of an insurance contract. Another point to take into account is if issuing the Cat-Bond linked to a PPP project is a licensable insurance activity.

It might not be necessary to create an SPV, as credit risk is not an issue with most EU countries. Also, in the traditional Cat-Bond market there are two forms of issuing such a bond:<sup>60</sup>

- accounting only: the business continues to reside in the insurance company, which directly issues the Cat-Bond.
- legal separation: this is the non-recourse, bankruptcy-remote structure involving an SPV.

The risks insured by a PPP-Cat-Bond might vary considerably; however, unifying the triggers for similar projects would increase market acceptance and transparency. One might think not only of insuring natural catastrophes, which, for example, in the case of highways is not always applicable, but also of man-made-disasters, such as accidents that cut off the relevant road for X consecutive days; or, in case of railway financing, major railway accidents could be insured. These triggers will have to be adequately modelled by the relevant agencies and experts in order to make them economically attractive, and preferably standardised, so that they can be used in several Cat-Bond issues, which would also reduce costs as in shelf-registration.

A very important structuring point when using an SPV is to avoid the SPV being considered a government entity, which would add to government indebtedness.

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<sup>60</sup> Swiss Re, sigma no. 7/2006.

## 5. Summary and benefits of PPP-Cat-Bonds

Cat-Bonds are a valuable instrument both for risk transfer and as a portfolio addition, due to their non-correlation to other asset classes. Using Cat-Bonds for financing PPP projects may be beneficial for public sector finances, since PPP-Cat-Bonds would – under certain circumstances and with adequate structuring – not be considered debt and therefore not add to budget constraints.

Public entities, consciously or not, decide to retain risk by not insuring infrastructure. With PPP-Cat-Bonds both could be attained - financing and insurance. Issuing PPP-Cat-Bonds would also have additional benefits: in the past, the public sector has generally adopted a post-event approach to disaster funding by increasing taxes, re-allocating funds, accessing further credit facilities or borrowing from multilateral institutions. Diverting funds may be costly or complicated and is predominantly to the detriment of existing projects. Raising debt after a disaster has occurred may be difficult or much more expensive and raising taxes after a catastrophe might lead to a further weakening of an already stricken economy.<sup>61</sup>

PPP-Cat-Bonds can make it easier for governments to cope with disaster and help to finance new projects efficiently. The issuance of such PPP-ILS would ensure that funds are in place for recovery and rebuilding efforts (although the proceeds would be invested in the asset itself, the credit not used for building it would be available in case of a loss event, since repayment of principal as well as interest would be reduced or cancelled). It would also help to protect budgets and reduce financial volatility and have potentially positive implications on debt levels, sovereign ratings and foreign exchange fluctuation.<sup>62</sup>

Financial markets would also benefit from an increased issuance of Cat-Bonds, since substantial diversification possibilities for portfolio managers would appear, especially if shelf-registration and harmonised triggers are used. Investors would also receive a higher return on their investments (as long as the loss is not triggered). Once sovereigns have achieved a critical mass of Cat-Bonds issuance, other corporate entities could also tap the space to meet their financing needs linked to insurance and beneficial accounting rules under IFRS. Distribution via listings on regulated markets of EEA-stock exchanges or Directive 2003/71/EC (the Prospectus Directive) would allow for greater liquidity, and even retail offers.

Finally, the population would also benefit from greater and better infrastructure, macro-insurance cover, and consequently, better economic growth perspectives.

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<sup>61</sup> Swiss Re focus report: Disaster risk financing.

<sup>62</sup> Swiss Re focus report: Disaster risk financing.

## 6. Annex I

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