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Climate Transition Risk – A Quantitative Impact Study for ORSA Scenarios

Since the Paris Agreement, climate change is gaining attention by the day. In the financial sector, legislative and regulatory bodies are at the forefront of developments. EIOPA recently published its Supervisory Convergence plan 2021 stating '*EIOPA will be taking step-by-step measures for integrating the assessment and management of Environmental, Social and Governance (ESG) risks into prudential and conduct supervision*'. EBA, EIOPA and ESMA have drafted the Regulatory Technical Standards (RTS) under the Sustainable Disclosure Regulation (SFDR) and Klaas Knot (president of DNB) recently told an audience at Bruegel that '*for economic transformation to take hold, you need to have relative prices that reflect the true scarcity of economic resources. In this case, by pricing in the climate cost of greenhouse gas emissions*'.

Climate risk at least includes *physical risks* stemming from changing climate itself, and changes in investment conditions due to the transition towards a low-carbon economy (*transition risk*). In its research '*Tijd voor Transitie*' (2016), DNB already indicated a potential material impact of transition risk for insurers and pension funds. In this article, we explore this effect further and present a case study with a practical approach to address and quantify climate change related asset risks within an ORSA setting.

Quantification of climate-change related risks faces a major challenge: The absence of empirical data on which such risk models are typically calibrated. For transition risks particular, future development almost exclusively depends on political decisions, leading to vastly different possible economic trajectories ('endogeneity'). The presence of deep uncertainty and strong tail events further complicates the matter. As a consequence, the essential ingredient of any quantitative approach towards the evaluation of climate-related risks has to be a forward-looking valuation based on established climate change scenarios.

The general approach[1] upon which this case study is based follows the conceptual framework of the CLIMAFIN-methodology by Battiston et. al.[2]. While recent regulatory opinions and guidelines were taken into account, our particular focus lies on an effective implementation. Our approach is divided into 3 steps, with the construction of a suitable climate risk scenario as a preparatory step.

1. Translation of a given climate risk scenario into shocks on quantitative economic KPIs, such as profit margins, market shares or growth prospects.

2. Using the shocks on the economic KPIs as input for appropriate asset valuation methods to obtain shocks on relevant risk factors.

3. Aggregation of risk factor shocks to portfolio level, possibly taking into account second-order effects from indirect holdings via, e.g., financial institutions.

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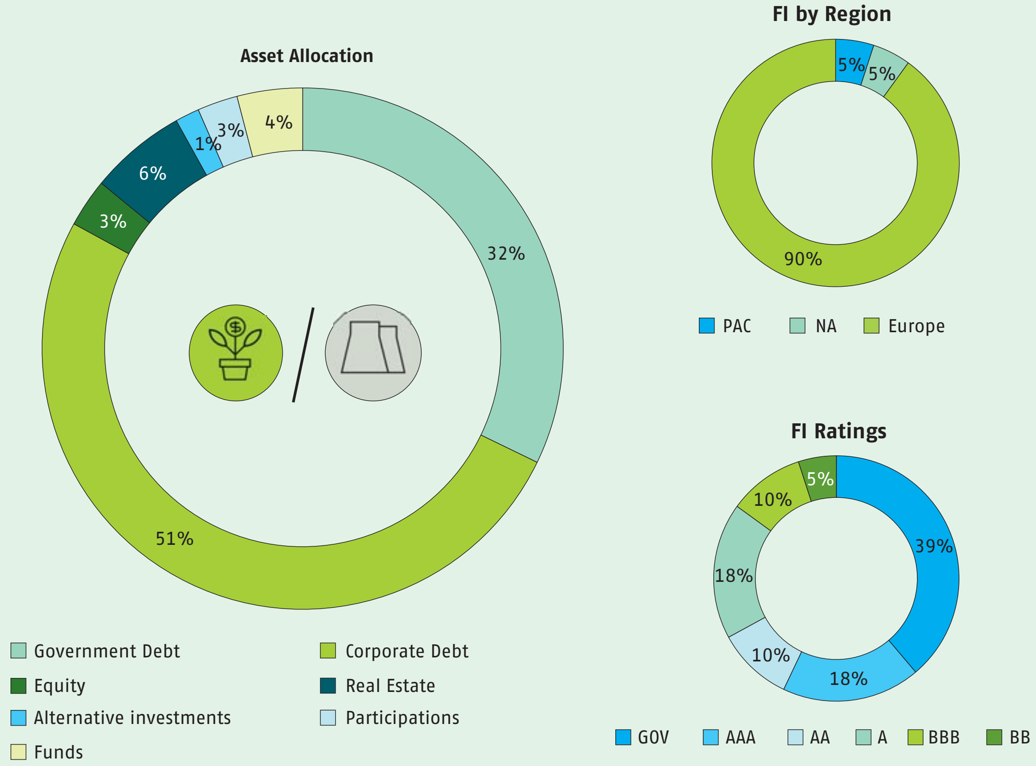

Figure 1: Asset Allocation of the Sample Insurer

In our study, we focus on upward shocks of CO_2-prices as a primary target of climate policies, changing asset values adversely. The associated transition risk is estimated for two sample insurers with a typical asset allocation for European insurers as seen in Figure 1. The distinctive feature of the second insurer is its ESG-oriented investment strategy. While we assume the standard insurer to invest in broad market indices, the ESG-oriented insurer's portfolio only allows for such issuers which are classified as 'ESG-leaders' by index providers.

Similar to previous studies assessing effects of climate policies, we draw on existing research on climate risk and select scenarios from the WP1-LIMITS database[3]. The working package WP1 explores *global mitigation pathways for limiting global temperature increase below 2°C*. In particular, we consider two scenarios that vary along policy targets and assumptions about decisiveness and cooperation of policymakers.

- RefPol-500 assumes a more lenient policy and hence a lower level of disruptiveness to the status quo. The policy target is an atmospheric CO2 concentration of 500ppm in the year 2100, which is commonly associated with a rough 50:50 chance of reaching the 2°C target.
- StrPol-450 assumes stronger policy action in the near-term and targets a concentration of 450ppm in the year 2100. This is usually associated with a 2:1 chance of reaching the 2°C target from the Paris agreement. Consequently, the carbon price level is substantially higher compared to the weaker RefPol-500 scenario.

We assume an instantaneous and disorderly transition from the status quo towards one of these policy scenarios. Although in general an impact assessment at a sectorial level is feasible, we differentiate here only a regional level for presentational simplicity.

In the first step, we calculate the impact of the CO_2 price shock on the profitability of an average issuer from either Europe, North America or Asia Pacific. We assume a zero short-run price elasticity, i.e. increased costs due to the policy are carried by the business. This assumption is justified as a first approximation, since consumer prices are typically not adjusted in the short-term and the cost is hence incurred somewhere along the supply chain. The following impacts are observed:

- Since currently CO_2-prices in North America or Asia Pacific are effectively very limited, the profitability shocks on both regions are relatively high.
- The profitability shock on the European issuer is substantially smaller. Moderate CO_2-prices are already in place within the EU. Consequently, the CO_2-price shocks are smaller and translate to smaller profitability shocks in this region.
- Since ESG leaders on average operate in a more environmentally friendly way, the profitability shocks on those are generally lower due to overall lower emissions.

In the second step, we calculate resulting shocks on equities and credit spreads. For equity shocks, we assume a Gordon-Growth Model with constant payout ratio. Secondary exposures via financial institutions are reflected by a shock on the financial sector assuming an equity beta of one.

For fixed income, we use a Merton Model enhanced with an additional, deterministic climate risk shock derived from the previously calculated equity shock. Spread widenings are then calculated based on implied changes in migration and default probabilities.

Again, due to existing climate protection measures, the impact on European securities in the more lenient RefPol-500 scenario is quite limited for both equities and fixed income – equities receive a moderate shock of around 5%, while the downgrade probability increases by a factor of 1.6 on average. In the stronger StrPol-450 scenario, this impact is considerably more substantial with a 15% shock on equities and an increase of migration probabilities by a factor of 3.3. By comparison, the impacts on North American securities are

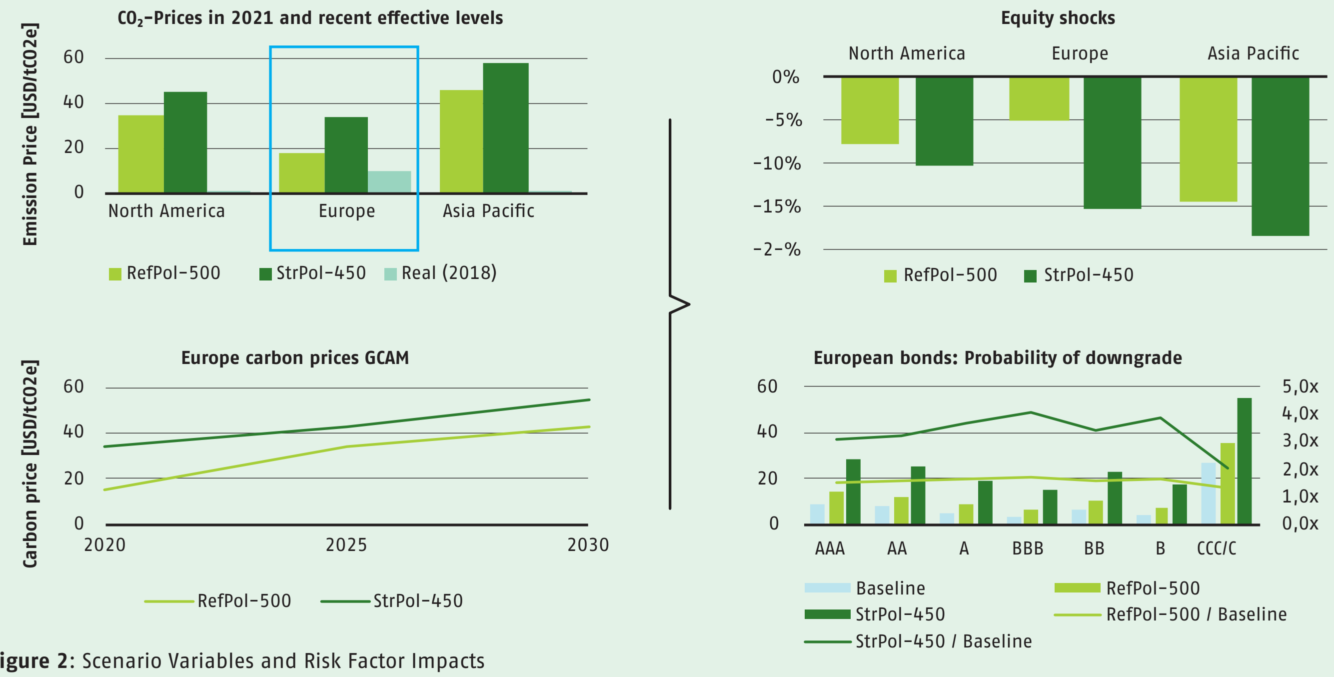

Figure 2: Scenario Variables and Risk Factor Impacts

quite limited despite strong absolute profitability shocks. The striking difference lies in the fact that North American markets are strongly dominated by profitable tech companies, that have considerably more resilience towards climate policy shocks as compared to the industrial-heavy companies that are more prevalent in Europe.

The two model insurers under consideration are based in Europe, hence their primary exposure is towards European securities. Consequently, the effects on the Solvency II ratio largely mirror the impacts on the European markets. The weaker scenario RefPol-500 has a moderate effect on the ratio, reducing the original ratio of 128% to 119% for the standard insurer and 123% for the ESG insurer.

In the stronger policy scenario, the differences become quite substantial as the ratio for the non-ESG-insurer decreases by about 35%, while it decreases by about 20% for the ESG-oriented insurer. Notably, this result emphasizes the significant reduction of exposure towards climate transition risk provided by a green investment strategy. This mitigation effect becomes more pronounced the more adverse the policy scenarios.

Despite some simplifying assumptions, the case study clearly demonstrates that the impact of transition risks on the Solvency II ratio for a typical insurer is likely to be material. This risk may be substantially mitigated by shifting towards a more ESG-oriented investment approach.

The quantitative assessment of sustainability risks will play an increasingly significant role in the further development of the Solvency II regulatory requirements. Insurers should be ready to meet these requirements – with regard to both their individual risk exposure as well as process-wise integration. ■

1 – See: https://www.oliverwyman.com/our-expertise/insights/2021/jan/sustainability-risk-under-solvency-II.html

2 – Battiston, Mandel, Monasterolo, CLIMAFIN Handbook: Pricing Forward-Looking Climate Risk under Uncertainty, Working Paper, Climate Finance Alpha

3 – https://tntcat.iiasa.ac.at/LIMITSDB/static/download/LIMITS_overview_SOM_Study_Protocol_Final.pdf

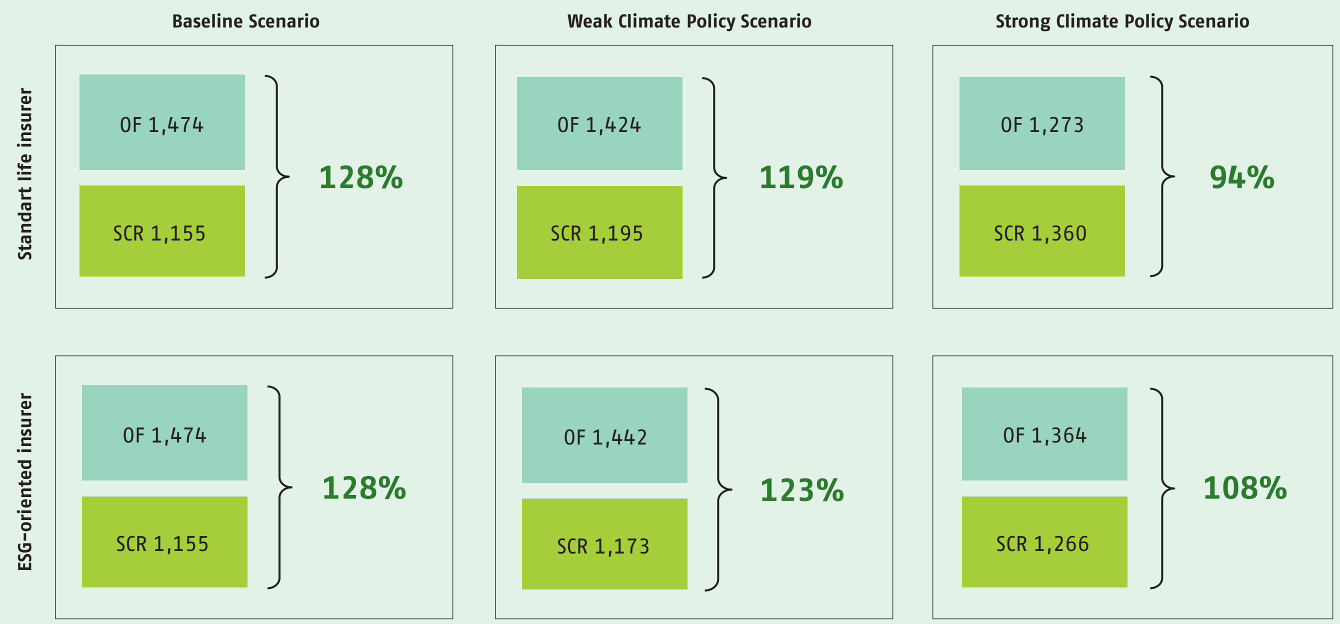

Figure 3: Impact of Policy Scenarios on Sample Insurers