Possible Approach to Evaluation of ESG Risks in Credit Risk Management
Discussion paper

Thomas Maul, Dr. Radoslava Mirkov

Introduction

ESG (environmental, social and governance) risks have a direct and indirect impact on creditworthiness, and thus on the evaluation, of loan portfolios in banks and financial institutions, insurance companies and funds. Due to the climate changes and, in particular, due to the increased awareness of these changes in the society, a need to quantify these effects on loan portfolios has appeared. In particular, European banks are currently confronted with explicit requirements and expectations from the EBA, ECB and the German BaFin.

Generally, available data and models used for credit risk assessment so far do not offer reliable and justifiable information on effects of ESG risks on the probability of default of borrowers, and furthermore, on the company's earnings, capital and liquidity requirements.

The authors present in this article a possible approach that allows for necessary assessment of the impact of ESG risks to PD, and invite readers to further discuss this topic. The suggested approach seems meaningful to us, until an adequate data basis has been created that will enable better description of the corresponding relationships, based on new ESG risk factors, or by adopting methods for evaluation of related risk categories.

Question

The study of ESG risks investigates the economic effects of physical and transitory risks with regard to climatic changes (E-risks, environmental risks), social aspects (S-risks, social risks) as well as influences from corporate management (G-risks, governance risks).

In this article, we initially focus on E-risks, which are often also called sustainability risks.

These risks correlate with a variety of risk factors that are used in the financial industry for risk quantification. Credit risk, by far the most common risk, is usually characterized by estimating a borrower's probability of default. One-year probability of default is one of the most important characteristics of a borrower.

Typically, the probability of default (PD) is estimated by relating historically observed defaults to various observed predictors. Once dependencies are recognized, statistically significant and causally justified, the probability of default for new borrowers can be predicted.

Linked to ESG risks, there is a latent requirement from the banking supervisory authority to include the impact of sustainability risks on credit risk, i.e. to consider the expected and unexpected losses from credit defaults due to the sustainability risks, and to consider them appropriately in risk management. Therefore, it makes sense to estimate the impact of these risks on the PD by adding new features which describe these risks. The new features can be direct, but also can be derived (created by so-called feature engineering).

The first approach would be to derive variables from the historical data, and multiplicatively or additively generate a new "ESG-PD" from the traditionally calculated PD. For this purpose, the features must be identified that would allow such a factor to be modeled. These terms would explain the proportion of ESG risk in the default rate of the borrowers.

This approach, however, assumes the availability of data for modelling ESG risk. In reality, this kind of data has not been collected long enough. In particular, from the perspective of risk management in banks, the awareness of the climate related risks has only recently got into the focus of attention. In addition, many risks of ESG kind, which influence the creditworthiness of borrowers, become evident as rare event risks, triggered by social and political decisions, like changes in the law on the nuclear and fossil-fuel phase-out.

Thinking about this, at the present moment, the authors propose another, very pragmatic, but in our opinion sufficiently effective approach to quantify the ESG risks, and adequately determine their impact on earnings, capital and liquidity under the current framework conditions.

Solution

The global process of climate change, its impact on the economy and society, as well as the sensitivity regarding social questions and issues in corporate management has increased in the recent years.

A well-known example of this in Germany is the "Grüner Punkt" label (green dot label). It was created in the nineties to promote new business ventures that expand the circular economy for scarce resources with every purchase. More recent examples are the promotion of climate-friendly mobility, such as increasing the appeal of electromobility, or making the cities bicycle-friendly. In the banking environment, negative delimitations in lending guidelines and frameworks with regard to non-ESG-compatible counterparties, or the purpose of using funds, mean that borrowers have increasingly restricted access to funding.

The currently observed historic default rates of borrowers already implicitly include the effects due to ESG risks. But it is currently difficult to identify those characteristics that specifically describe the ESG part of the default risk.

Other effects appear as an event risk, such as a storm and a flood damage, or decisions like nuclear power phase-out. However, such rare event risks are already being successfully accounted for in the financial sector, namely in the context of the operational risk and the use of corresponding risk models.

Taking all this into account, we are suggesting seemingly very simple initial approach for handling of ESG risks:

- ESG-related risks are already implicitly included in the default risk through the use of historical data, but currently cannot be mapped separately using specific features,
- Event risks are already identified using operational risk methods, and modelled accordingly by the means of extreme value theory; if necessary, this approach can be expanded accordingly
- In addition, scenario calculations that take into account both historical events (e.g. coal phase-out, flood disasters like extreme Elbe river flood 2013), and complementary hypothetical events (e.g. ban on internal combustion engines in German city centers). These scenarios are to be expanded and amended on a regular basis in order to reflect observed and coming changes in the environment, society and politics.

If the forecasting of the event risk and the scenario calculations are now appropriately included in risk controlling, we will have sufficient arguments to deal with ESG risks appropriately.

Accompanying measures

Extending the focus from the investment portfolio only, the institutions should be aware that every business activity of the institution has an impact on its own, i.e. an institution-specific ESG score. This means that, analogous to their own target rating with regard to creditworthiness, they need their own target ESG score and corresponding strategic ESG positioning. This can be achieved through introducing a special ESG policy and other internal measures.

The effects of the institute-specific ESG score are becoming apparent through the access (volume and price components) to debt and equity.

Therefore, in analogy to the liquidity costs, a mechanism for determining and offsetting opportunistic ESG costs will be required in the future. Logically, these costs are offset against every activity of the company, i.e. for example, there are surcharges or discounts in a credit in accordance with the determined ESG score of the customer or the product. At the same time, all investments and cost components of operations are given an internal "ESG label" to show the positive, neutral or negative influence on the institute-specific ESG score.

We believe that in the very near future, every board decision or investment proposal will have an appropriate "traffic light" marker so that all business activities can be assessed according to the company's ESG policy.

Aftermath and Outlook

The quantitative controller or a data scientist in a bank might not like this rather pragmatic, quite unspectacular, and less innovative approach described above. Nevertheless, from an economic point of view, correlations between loan defaults and currently observed characteristics exist and can be observed. However, the authors doubt that a sufficiently

reliable causal relationship between loan defaults and ESG risks can currently be established in most cases, due to the lack of consolidated data, in particular in European markets.

We therefore see it as one of the great challenges of the coming years, in connection with the social, economic and regulatory change that is gaining momentum, to identify those features that will justify a reliable causal relationship between credit defaults and ESG risk factors. As a result, appropriate time series must then be built and statistically significant correlations to credit events established. As a result, explanatory ESG risk factors can be included in the existing scoring process in order to account for this type of risks.

In addition, for the event-related risks, in order to train ML algorithms in such a way that they recognize the corresponding risks in a timely and reliable manner, and thus relate publicly available information to economic data of customers, new data sources will be needed. These databases are basically similar in structure and content to the known loss databases from operational risks, but also other external data sources can be used.

Examples of the application of increasingly important ML / AI methods include text mining of online contents, like news and social media. In particular for the "E" risks, additional evaluation of satellite images can be very useful. For "S" risks, a possible approach would be to use feedback from portals showing employee's satisfaction, information on working conditions, the work-life balance of employees or information about employee's engagement in the company based on results like sales, earnings, number of customers, returns and capitalization, etc. The same applies to the "G" risks when it comes to questions about corporate governance.

Even if the first pragmatic solution proposal may sound simple and not quite exciting, even naive, this is just the first approach currently possible to implement in banks. But we believe that the future belongs to the quants here, too.