

Pool Party – How to model low default portfolios by taking advantage of a Pool Approach for internal credit risk models

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1 Abstract

Modelling low default IRB-portfolios by using internal credit risk models dates back to the implementation of Basel II in 2007. Since then, internal models had to deal with fairly challenging times. As regulatory expectations continuously increase, costs are set to rise and the trend towards convergence between banks seems to be unstoppable. The ECB guide to internal models (October 2019) is offering a way out of this dilemma, by taking the opportunity to use rating models developed from pooled data into consideration. Relatively unknown throughout Europe, this so called Pool Approach has existed in Germany for over 15 years and has been performing impeccably for several of the largest German IRB banks. The following article provides further insights on the idea of the Pool Approach and the mechanics of how this approach works for banks, supervisors and service providers.

Keywords: low default portfolios, credit risk modelling, internal credit risk models, credit risk,

Key messages:

- Modelling low default IRB-portfolios is an expensive and time consuming business for European IRB-banks
- The lack of data available for modelling purposes strikes as the most troubling issue
- The Pool Approach is taking advantage of the opportunity to use rating models developed from pooled data
- Exceptional modelling quality and economies of scale lead to an alternative for outsourcing modelling activities

2 Introduction

Back in 2007 the Basel II framework was implemented, it requires banks to hold a certain amount of capital to compensate for unexpected credit losses. Since the implementation of Basel II, internal models had to deal with fairly challenging times. Being a source of competitive advantage in the early years, internal models were shaken by the financial crisis and since then they have been a main focus for supervisory bodies around Europe. Recurring points of criticism were not only the increasing complexity of internal models, but also the perception of a high variability of the individual results calculated by different banks for homogeneous portfolios.

Although internal models may have escaped restrictive earlier proposals of the Basel III consultation, opportunity costs for modelling a bank's own credit risk are set to rise. The potential benefits – in terms of capital savings compared to the standardised approach – are fading. Nevertheless, banks as well as regulators still see various advantages and are therefore willing to keep internal models alive. At this point, it is crucial that, in view of the changed conditions, banks in particular are prepared to carefully review their options when it comes to modelling their own risks.

As regulatory expectations continuously increase, costs are set to rise and the trend towards convergence between banks seems to be unstoppable. The ECB guide to internal models (October 2019) is offering a way out of this dilemma, by taking the opportunity to use rating models developed from pooled data into consideration. Relatively unknown throughout Europe, this so called Pool Approach has existed in Germany for over 15 years and has been performing impeccably for several of the largest German IRB banks. The following article provides further insights on the idea of the Pool Approach and the mechanics of how this approach works for banks, supervisors and service providers.

3 Internal models – status quo

Ever since, internal models have been under close supervision by the regulatory authority. Recently, the European Banking Authority (EBA) has launched ground-breaking initiatives such as the Europe-wide targeted review of internal models (TRIM) or the implementation of the new guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures. All these efforts lead to a situation in which the banks are forced to invest heavily into their model landscape without any guarantee that the return will justify the expenses.

3.1 TRIM – targeted review of internal models

By the end of 2015, the ECB - in close cooperation with the national competent authorities that are part of the Single Supervisory Mechanism (SSM) - launched this multi-year project. Key objectives of the TRIM exercise are to reduce unwarranted variability of the results of different models used by significant institutions (SI) in the SSM for homogenous risk profiles, and to ensure convergence of supervisory practices across the euro area.

While the TRIM exercises are mostly finished, interim results as of November 2019¹ show that there are a wide range of topics being addressed by the ECB. Some of the prominent general issues relate to shortcomings that depend on the implementation of a model risk framework, an insufficient model validation or lack of a strict separation between staff performing validation activities and staff involved in model development and monitoring. These issues might be directly linked to the allocation of scarce resources.

Reviewing institutions' modelling practices with regards to the relevant risk parameters PD, LGD and CCF, shortcomings, among other things, were revealed particularly relating to the calculation of long-term average PD and risk differentiation.

Data quality reviews have also been included in the TRIM exercise. Reviews focus on data management practices for the respective credit risk models as well as all historical data being used for IRB modelling. As an overall - and not surprising - result, the update states that there are data quality problems in every institution.

Some of the institutions involved have already received their final decisions and it is safe to say, that an intense follow-up work is needed and the identified shortcomings expected to be addressed.

At this point, all possible options are on the table – either invest a tremendous amount of time, resources and money into fixing existing models, refrain from using internal models altogether or outsource the modelling activities and focus on the core business.

¹ Update on the Targeted Review of Internal Models (TRIM) – 21st November 2019

3.2 EBA Guidelines on PD estimation

EBA's "Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures"² (EBA GL) are probably the regulatory elements which are causing the most significant changes to the existing model landscape throughout Europe.

The scope of the EBA GL affects both model development and the calibration of the relevant risk parameters, which essentially covers the entire process of risk parameter estimation including data preparation for the respective steps. Additionally, clarification on the regular reviews of these risk parameters is provided. The EBA GL neither cover topics around internal independent validation, supervisory approval nor implementation of the respective models into the IT systems of the various institutions, since these are covered somewhere else in the jungle of guidelines and RTS.

For most of the rating systems in place, the implementation of the EBA GL leads to an "open heart surgery" followed by material model changes. As a result, pressure is on for all those involved in these multi-year projects.

Given this, is it fair enough to ask whether any institution necessarily needs to model each and every credit risk itself?

3.3 Basel III reforms

With the final Basel III reforms (BCBS 424) in place, institutions have a partially new credit risk framework. Despite all fears, the new standards do not have as much impact compared to what had first been assumed. Although EBA's idea of reducing complexity and choices in modelling was implemented, the new Standardised Approach (SA), Internal Ratings Based Approach (IRB Approach; Foundation (F-IRB) or Advanced (A-IRB)) as well as the Slotting Approach still give institutions sound alternatives when it comes to modelling their respective credit risks.

The main changes to the IRB Approach will actually arise from changes to the A-IRB Approach, more specifically the ban of modelling LGD for some types of low default portfolios, e.g. large corporates, banks and other financial institutions.

NEW: Going forward, the new framework allows banks to implement the IRB Approach for portfolios which can provide sufficient data and risk knowledge while at the same time applying the SA and/or the Slotting Approach for the remaining exposure classes. This new opportunity might lead to a situation in which institutions can selectively benefit from the more sophisticated IRB Approach given the use of IRB approved risk models.

² EBA/GL/2017/16; 20/11/2017

4 Pool Approach for internal models

After taking all the above mentioned into consideration, it is clear that banks are facing hard times running proprietary internal IRB approved credit risk models. While regulatory expectations continuously increase and costs are set to rise, capital savings are slipping. At the same time, experience gained during the TRIM exercises as well as the new EBA GL indicate that the trend towards convergence between banks seems to be unstoppable. The "ECB guide to internal models"³ is offering a way out of this dilemma, by taking the opportunity to use rating models developed from pooled data into consideration.

Relatively unknown throughout Europe, this so called *Pool Approach* has existed in Germany for over 15 years and has been performing impeccably for several of the largest German IRB banks.

The next chapters of this article will describe the general idea of a Pool Approach, and shed a light on all relevant aspects institutions need to keep in mind when they consider participating in such a Pool Approach.

4.1 General idea

When it comes to low default portfolios (LDP), the lack of data available for modelling purposes strikes as the most troubling issue when one starts to think about modelling portfolio specific risks.

Thinking outside the box! The obvious solution seems straight forward – collecting as much good quality data as possible.

As easy as it may sound, providing a sufficient amount of high quality historical and default data for LDP sounds like an impossible mission to a lot of banks. Even those banks that currently possess a sufficient amount of data could face trouble in the future, as stricter rules will apply for the counting method of the respective data sets. Going forward, data pools will most probably decrease tremendously, due to the fact that all data sets without any credit obligation are going to be partially excluded⁴ from data pools and will therefore not be part of the validation pools. Internal analyses made by one of the leading pool providers – RSU Rating Service Unit – show that this is going to hit some of the various data pools quite hard. While not much impact is expected on specialised lending portfolios, this could result in shrinking portfolios by up to minus 1/3 for corporates or financials and even much higher numbers for sovereign portfolios. Eventually, there might even be more institutions in need of additional data than there are at present.

³ Consolidated version, 1st October 2019

⁴ EBA GL: Guarantors which do not carry a credit obligation are excluded from this specification of one-year default rate calculation.

For all those institutions which already lack the necessary amount of data, the possibility of joining an existing and already IRB approved *Pool Approach* should sound quite appealing.

But joining a *Pool Approach* does not only mean joining in on a significantly bigger data pool, it also means sharing knowledge and expertise to distribute the workload efficiently.

The main question institutions have to answer - not only to themselves but eventually to supervisors and internal auditors as well - is, whether the pool data contributed by different institutions provides a meaningful basis for the individual institution to assess its specific portfolio, i.e. is the pool data representative for the individual institution? The rationale behind the *Pool Approach* claims that common risk drivers for homogenous segments do exist. These risk drivers generally depend on the obligor, rather than the creditor. Therefore, from a modelling point of view, there is no reason to limit the model development strictly to the portfolio of an individual institution.

4.2 Advantages of the Pool Approach

Advantages of this *Pool Approach* present themselves in different ways and areas. Obviously from a statistical point of view it is safe to say: Size matters - the bigger the data pool, the more accurate the results.

The advantages resulting from swarm intelligence and the pool provider acting as the think tank are more difficult to quantify. Procedural advantages are easy to identify and complement the areas mentioned before.

3.2.1 Data Pool – SIZE matters!

Normally, historical data for LDP's is rare and default data even more so. Experience shows that most of the larger institutions manage to model their core businesses, e.g. large corporates, on their own. Modelling sub portfolios such as specialized lending or even financials on the other hand can be quite challenging. For the respective LDP's, smaller institutions often lack sufficient amounts of data, which leaves their internal models inaccurate and vulnerable to any kind of findings.

At pool provider level, the individual data of all participating institutions is pooled into a continuously growing data pool, which reflects the basis for modelling the wholesale IRB models. This broad database of historical, and even more important default data, provides the pool providers modelling teams at pool provider level with a wider spectrum of statistical options. Whereas, a limited amount of data leads to a more general modelling approach fitting several asset classes into one model - which is the case for a high number of proprietary models - a sufficient amount of data allows highly differentiated models. Additionally, improved statistical options provide immense support when it comes to defending the models towards supervisors and auditors. Another very important and obvious aspect is the fact that only a certain amount of good quality data leads to a high stability of the internal models.

3.2.2 Model quality – who got the POWER?

Model quality can be measured in several ways. One could look at the model scope, the ranking of obligors produced by the model or the predictive quality of identifying defaults in advance, known as the discriminatory power or Gini coefficient. Without a sufficient amount of data, model performance usually lags behind in terms of identifying defaults in advance, meaning these models show a low discriminatory power or Gini coefficient.

The Pool Approach enables banks that possess only small amounts of data to use models which are developed and validated based on a multitude of data compared to what the individual institution contributes to the Data Pool. Thus, the participating banks gain access to models of a high quality IRB standard, which they would most likely not be able to set up by themselves – at least not cost efficiently.

At pool provider level, one of the many validation dimensions compares the overall performance of the pool, measured as a discriminatory power with the performance of the individual institution. The following examples will give some insight to the model performance for Corporates and Project Finance.

Table 1 shows the power over time on a pool basis for the Corporates model. Throughout the whole period between 2006 and 2017 the measured power had been very stable at a high level. The narrow upper and lower bound (dotted-line) indicates a high predictive quality of the measured power.

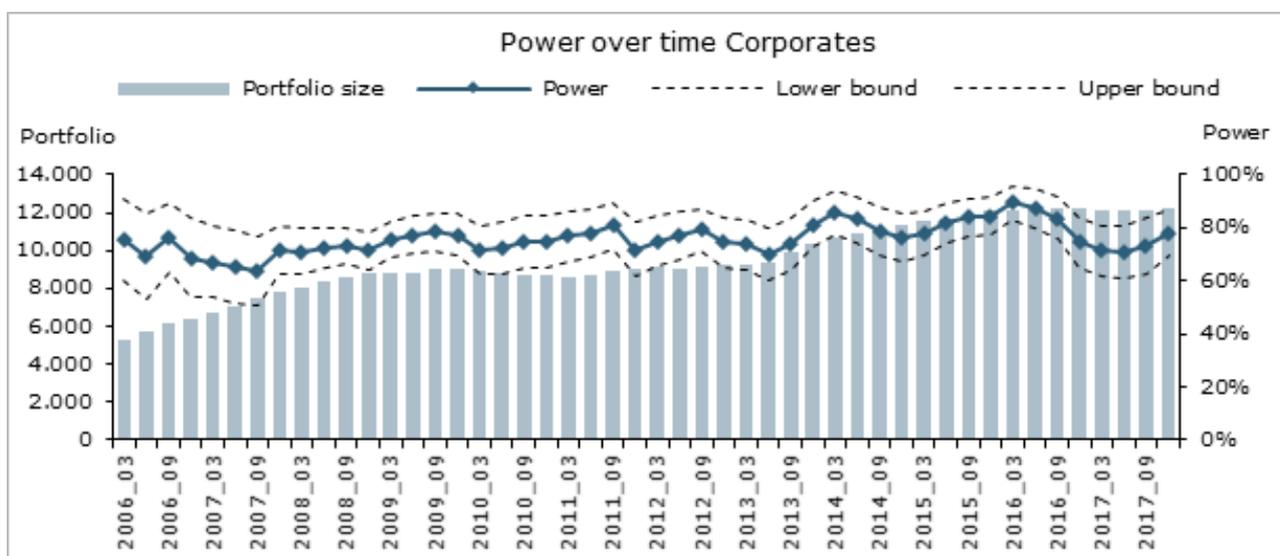


Table 1: Power over time of the Corporates model – overall Data Pool

Performing the same analyses on the basis of an individual *Data Pool* of a German (top 10; IRB) example bank gives a different picture.

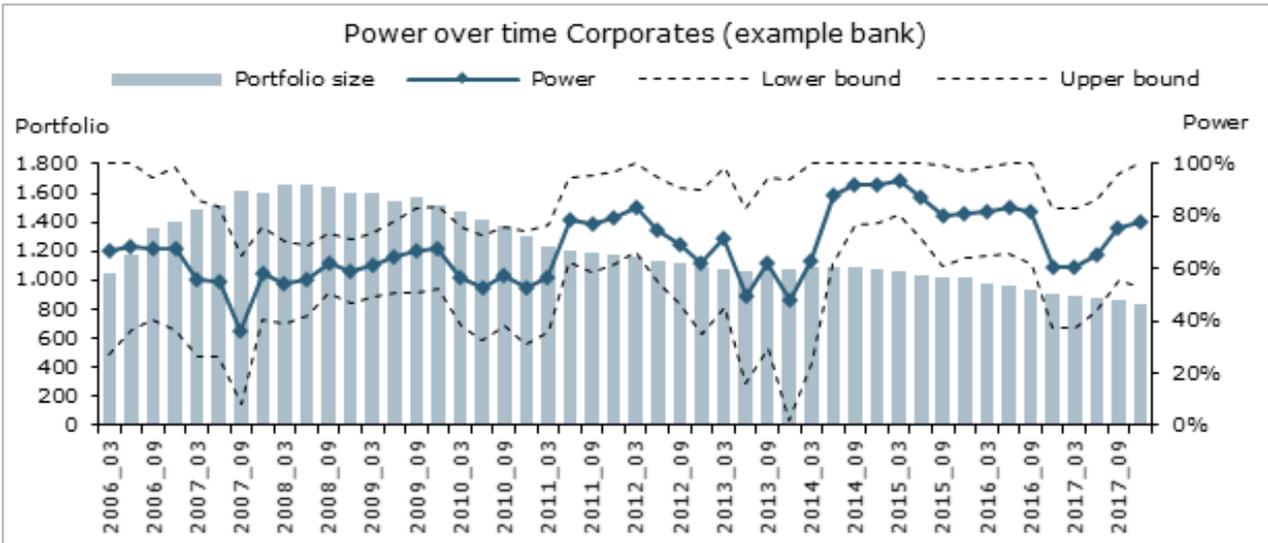


Table 2: Power over time for the Corporates model – individual Data Pool of an example bank

Although the individual Data Pool does not appear to be as small, the measured power is not as stable compared to the overall Data Pool and the prediction quality is lower compared to the overall Data Pool. Developing a model based on this smaller amount of data might be possible, but the model quality will most certainly lag behind on what the larger Data Pool can offer.

Illustrating the model quality for Project Finance, table 3 shows the power over time for the overall Data Pool, starting back from 2006 until the end of 2017.

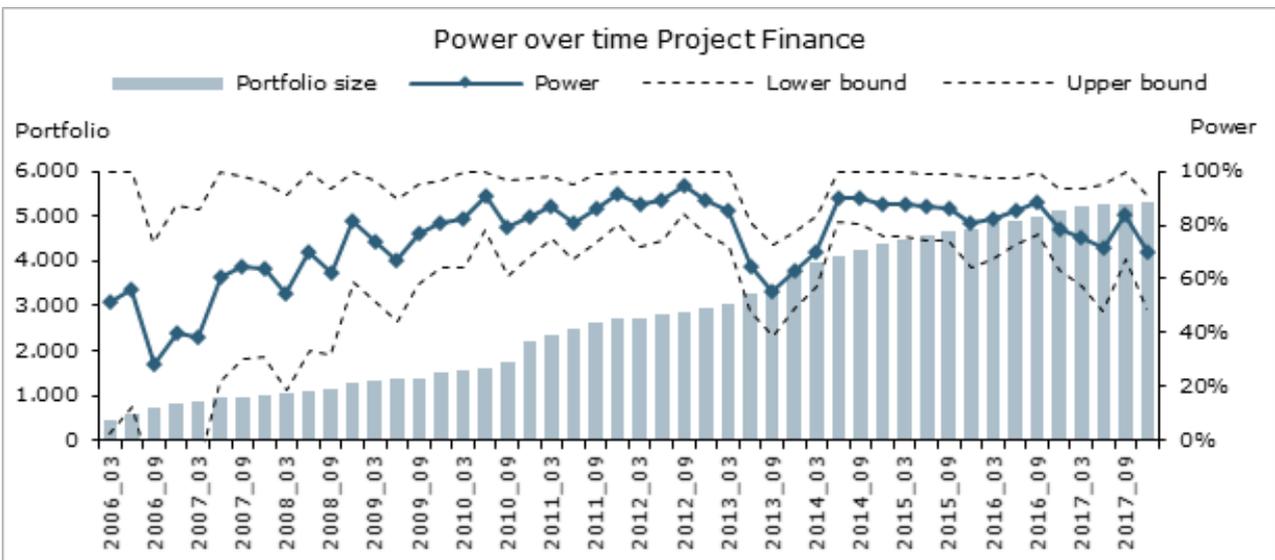


Table 3: Power over time for the Project Finance model – overall Data Pool

As the portfolio size increases - generally speaking - the power increases as well. At the same time, the prediction quality of the measured power improves, which is indicated by the narrowing upper and lower bound. Obviously, within the above shown period of time, there were several further and re-developments of the initial models. The models in place are not the models initially developed. Despite the above given portfolio size, the low two-digit number of yearly defaults makes modelling quite ambitious, even on pool level.

Comparing institution-specific figures with the Pool, table 4 shows the analyses for a German bank (top 10; IRB), as an example, using the RSU Project Finance model.

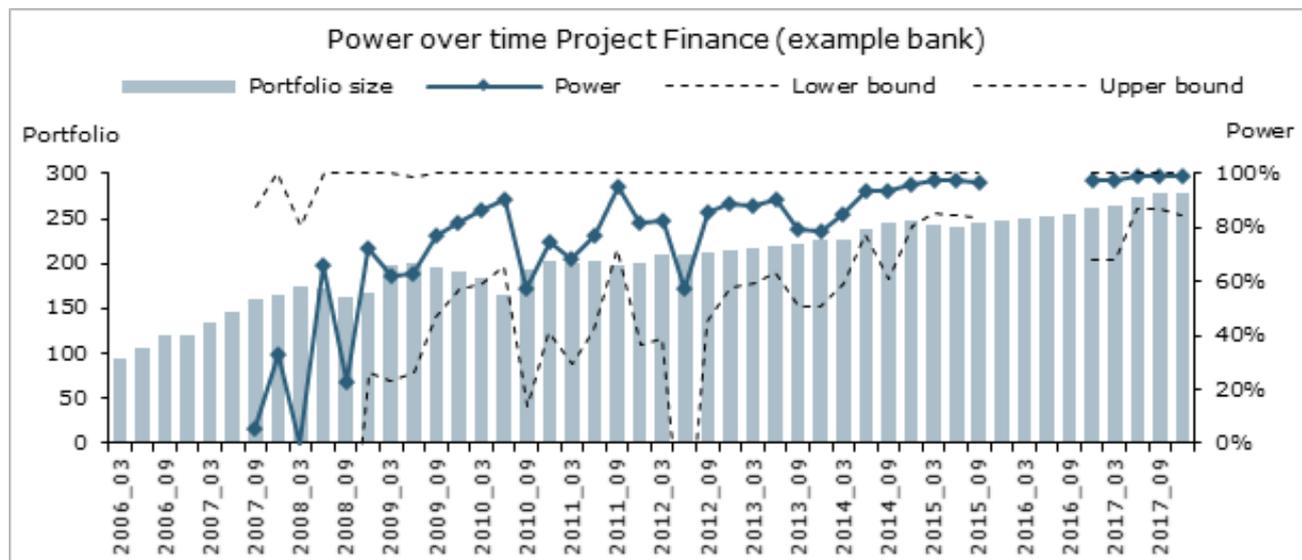


Table 4: Power over time for the Project Finance model – individual Data Pool of an example bank

A portfolio size of less than 300 ratings equals around 5% of the overall *Data Pool*. Given the small amount of data, there are only a few defaults and even some periods without any defaults at all. In the beginning, the measured power appears quite volatile and at the same time the predictive quality of the power is mediocre. With this argument, any participating bank would always consider both the pool and the individual data to confirm the representativeness of the *Pool Model*.

In view of the insufficient data available for the above example banks, it seems obvious that adapting a proprietary model to a small database would entail a high degree of uncertainty and the risk of model instability.

3.2.3 Workload – SHARING is caring

While model quality and accuracy are essential reasons for joining a *Pool Approach*, workload sharing is another good reason that is definitely worth considering.

Acting as a think tank, the pool provider consolidates the shared know-how across institutions regarding portfolio relevant industry-specifics in terms of modelling practices and supervisory experiences. Workshops which take place on a regular basis, ensure there is a vivid exchange of information between the actual IRB institutions and the service provider in charge of modelling and running the models. About 150-300 person days, depending on the model complexity, are being invested on a yearly basis for validating each and every model. On top of that, a not negligible amount of workload is currently – and has been for the recent past - distributed to every model concerning the implementation of the EBA GL. The bottom line is that the pool provider’s core responsibility is to ensure the ongoing IRB approval for all models.

In practice there are clearly defined rules for the division of labor. The pool provider takes responsibility for central modelling and IT tasks, whereas institutions support wherever necessary and specified. Some of the pool provider's core tasks include:

- Model development
- Extensive parts of model validation
- Yearly review and validation at pool level for internal validation at institution level and demonstration of representativeness
- Full documentation
- Support of regulatory processes for issues at pool level
- Supporting the clients defending the IRB models towards regulators
- Central operation of the rating models (IT application)
- Change management
- Data pooling

Institutions support these tasks by:

- Understanding the rating model
- Performing internal validation based on the institution's portfolio and further insights gained at pool level
- Demonstrating representativeness for the respective portfolio
- Integrating the application into the institution's IT framework

Parallel to this, institutions take the lead for all aspects involved in the rating process, such as integration of the application into the internal organization, ensuring proper use of the rating models and accompanying regulatory processes for issues at institution level, e.g. model change policy issues. The pool provider supports by providing manuals, data quality checks, user trainings and by running certain areas of the support chain.

5 Pool provider – RSU Rating Service Unit

One of the leading pool providers – *RSU Rating Service Unit* – with its 100 employees is running a Pool Approach in Germany since 2003. RSU is responsible for pooling all data contributed by participating institutions and also manages model development and the major part of model validation based on this cooperative but anonymised wholesale *Data Pool*. IT operations and changes are also included – and most importantly – supporting clients in defending the IRB models towards regulators. The Munich based company not only provides IRB compliant internal rating models for twelve different wholesale portfolios, but also tools for LGD estimation and AI driven automated risk analysis to over 45 customers – mainly banks and insurance companies.

At RSU, the individual data of all participating institutions is pooled into twelve continuously growing data pools, which reflect the basis for all twelve EBA/ECB approved wholesale IRB models RSU is running: Aircraft Financing, Banks, Corporates, Funds, Insurance Companies, International Commercial Real Estate, International Regions and Municipalities, Leasing, Leveraged Finance, Project Finance, Ship Financing as well as Sovereign and Transfer Risk.

6 Summary

The *Pool Approach* clearly provides results of exceptional modelling quality, accompanied by economies of scale leading to a cost efficient alternative for outsourcing modelling activities for sub portfolios as well as for core businesses. Conclusively, modelling teams at institutions are relieved from having to implement new time consuming regulatory standards as previously mentioned and thus, are able to focus on their core business.

7 Declarations of Interest

The author is employed at RSU Rating Service Unit GmbH & Co. KG