



QUALCO

White Paper

Credit Portfolio Valuation: A Comprehensive Approach

ANALYTICS

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INTRODUCTION

The contemporary credit ecosystem is wide, deep and complex. It encompasses many industry sectors, each of which issues and manages different types of credit at different stages with widely varying risk profiles and returns.

Credit portfolio management can span long periods of time, during which new policies, credit cycles and other external events take effect. It requires a range of processes: from day-to-day management of calls, letters, credit applications, billing and payments, to strategic decision making, carve-outs and securitisations.

Portfolio valuation has suffered because of these complexities. Traditionally, it has only received attention at major milestones in a credit portfolio’s lifecycle – typically when it is about to change hands.

In the past, valuation has been achieved through a collection of mostly empirical methods, usually focusing on the

macroscopic, portfolio-aggregate level, and decidedly lacking in consistency -and verifiability.

Our claim is that contemporary data-driven analytics can be combined with business experience to improve the valuation process by taking a customer-level, microscopic approach. Such an approach can automatically adapt to varying conditions and portfolio characteristics, and can produce running estimates of a portfolio’s value, both for transaction purposes and while it is under management.

Here we present an overview of such a valuation process in its entirety.



KEY CONTENTIONS

Our methodology is based on a number of contentions regarding portfolios and their valuation:

A portfolio's value is not an intrinsic characteristic: Portfolios are worth different amounts to different organisations, depending on their specialisation, range and capacity of available treatment approaches. This is why a successful valuation often reduces to a simulation of the treatment processes to be applied, using models of varying sophistication to estimate their outcomes. It follows that the treatment processes available should be clearly understood. This can be a problem in new portfolio markets, or when new processes are being tried out.

Portfolio value is not a single number: the behaviour of a portfolio over time determines investment, cashflow and effort profiles that are critical to the managing organisation's decision making.

No portfolio is homogeneous: value derives from different segments responding in different ways to

different types of treatment. Traditional empirical segmentation makes assumptions about behavioural drivers, such as product type, balance, vintage and aging, and risks missing newly emergent drivers that can be identified by analysing data on individual behaviour.

A portfolio's value may be dependent on external factors. While macroeconomic variation is often given as an example, the effect of regulatory frameworks, legal processes and third-party capacity constraints are likelier to have an immediate impact on our eventual methodology.

Ultimately, every portfolio is unique. We can often adapt past data to deal with future portfolios, but our methodology will need to be general enough to deal with the variation involved and allow for empirical adjustments when no suitable data are available.

THE VALUATION TOOLBOX

METHOD TOOLBOX

A valuation process needs to combine multiple approaches:

Process modelling determines the step-by-step process describing how a portfolio's value is to be extracted, allowing value to be calculated for each step. This is most suitable where portfolio value is dependent on complex processes with little uncertainty. It can be made to work when no suitable past performance data are available.

Data-driven modelling relies on the use of past performance data – whether from the portfolio in question or other portfolios. Drivers of customer behaviour are automatically identified and quantified using statistical or machine learning methods, so that knowledge can be transferred between portfolios of overlapping, but differently proportioned components.

Empirical modelling is a catch-all term for any adjustments performed based on business experience, to deal with situations where the processes to be applied are unclear or unquantifiable, and no prior data are available. This approach can still achieve a high-quality result, but its quality is difficult to quantify.

PROCESS TOOLBOX

Depending on the nature of the portfolio and the organisation's capabilities, specialisations and appetite for engagement, it will deploy a mix of processes: collections, legal, liquidation/asset realisation and debt sale. The processes actually used will need to be modelled within the valuation process. A modelling approach will need to be chosen for each process, depending on its characteristics and the data available.

A WORD ON DATA

In typical valuation scenarios we do not have the luxury of gathering additional data and must make use of whatever is available. This restricts our discussion of the “right” data to have for valuation, but some points still need to be made:

THE VALUATION PROCESS

Portfolio valuation is typically performed in a number of stages, most of which apply to all segments of a portfolio to different extents. The real world often presents surprises that cause stages to be repeated, reordered or omitted, so in practice maintaining flexibility is important, but the overall process still looks a lot like the following:

- **Identify Core Segments:** split the portfolio into guaranteed collectability, secured, unsecured and limited collectability categories.
- **Select pre-existing models and map data:** evaluate suitable segments by data-driven modelling, using pre-existing models and data from past portfolios..
- **Build data-driven models:** generate new models based on data from the portfolio itself, where appropriate.
- **Verify and apply process models:** this stage normally applies to secured or limited collectability segments whose value is driven mostly by statutory processes, which can be modelled on a step-by-step basis.
- **Apply experience-driven adjustments:** use business experience to estimate anything that cannot be clearly described as a process or modelled using data immediately available.
- **Estimate costs:** once the processes to be applied are clarified, the effort and other costs incurred in applying them can be estimated.
- **Due diligence and source material review:** normally carried out as a second phase of the valuation to verify and enrich portfolio data, especially when physical files are made available.
- **Review experience-driven adjustments and update cost estimates:** earlier estimates are reviewed in light of new knowledge.

IDENTIFY CORE SEGMENTS

During this initial stage, fundamental segments of the portfolio requiring different treatment processes are identified. Depending on the nature of the portfolio and regulatory framework, these may include one or more of the following categories:

- **Guaranteed collectability segments**, including loans guaranteed by a governmental organisation.
- **Secured segments**, for which collateral liquidation is an option.
- **Unsecured segments**, for which collections or legal recourse processes are the only immediate options.
- **Limited collectability segments**, constrained by practical or statutory limitations, including insolvency or other forms of legal protection, both personal and corporate.

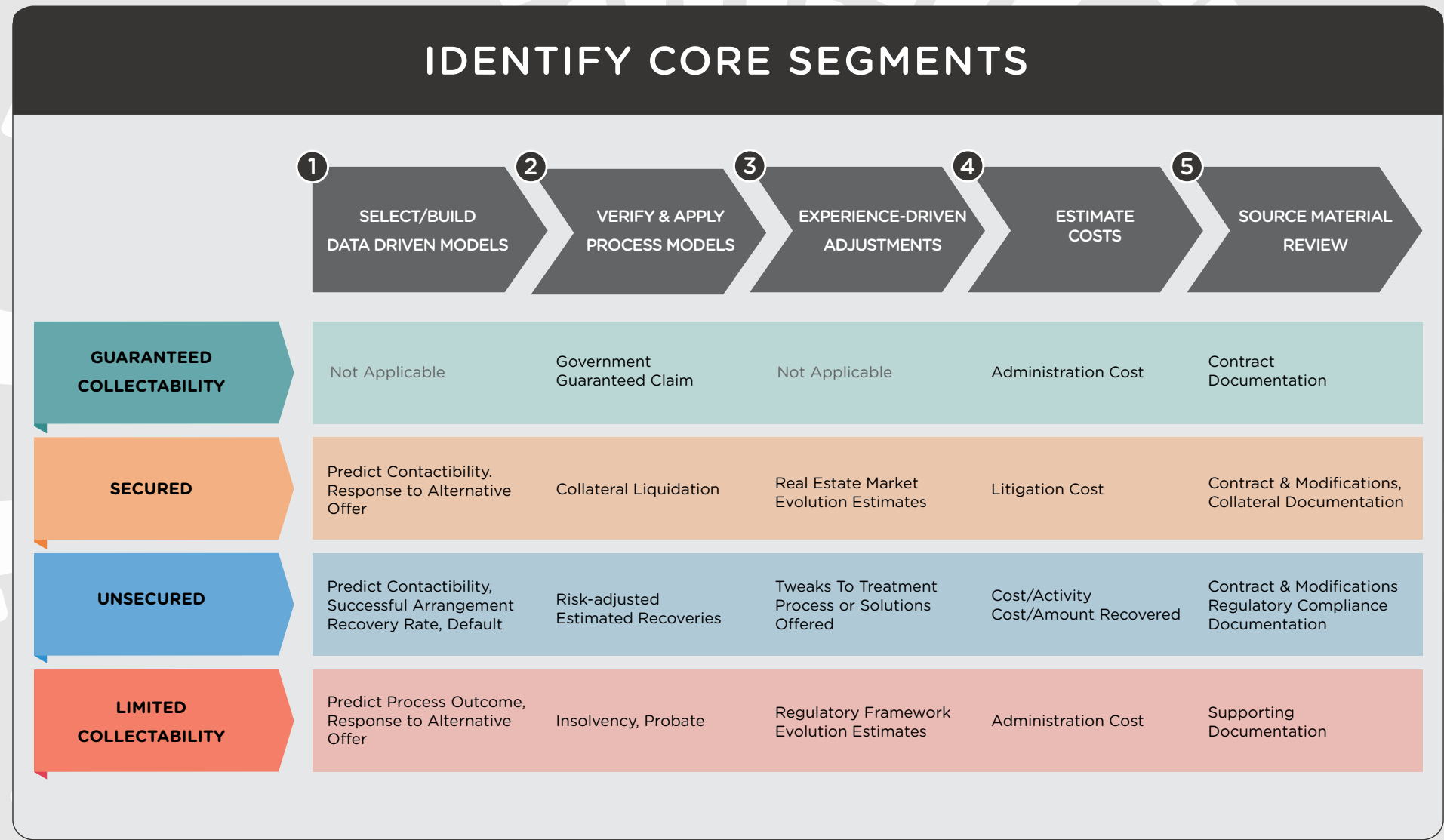


Figure 1: Valuation Process

LIMITED COLLECTABILITY SEGMENTS

Identification of such segments will depend on common sense (e.g. negative account balances) and on jurisdiction-specific rules (e.g. insolvency processes); in most cases, the necessary data will be supplied by the portfolio’s originator. Failing that, a third-party provider such as a credit bureau can be engaged, cross-referencing against an existing customer database may be possible, or the organisation may have enough data to predict which accounts are likely to fall into this category.

Data-driven models

The limited collectability category does not usually benefit from a wide range of data sets so its valuation is unlikely to use data-driven modelling processes.

The exception to this is insolvency. In jurisdictions with a high incidence of insolvency, there may be sufficient data to predict the terms of the settlement that will be reached and pre-emptively offer an arrangement that is better for the customer and the creditor. A data-driven model may also be able to predict the probability of the customer agreeing to this offer.

Process models

The behavior of limited collectability segments is generally easy to predict: for example, customers who have gone through insolvency proceedings are highly likely to honour the arrangement reached. This makes them prime candidates for process modelling.

Such process models are reusable but jurisdiction-specific, so the model’s creation needs to be factored into the

cost and effort of entering a new portfolio market, as does revision for regulatory change.

Experience-driven adjustments

In this segment, empirical adjustments mostly concern missing information and estimating the effect of changes to the regulatory framework.

Cost estimates

Cost estimates for limited collectability segments should include the cost of retrieving information, the cost of taking part in insolvency processes and money owed to the customer (identified by negative account balances).

Source material review

Once access to the relevant documentation has been granted, customer presence in this category must be verified, moving ineligible customers to the secured or unsecured categories and vice versa.

GUARANTEED COLLECTABILITY SEGMENTS

This category includes credit backed by guarantees from governmental organisations, such as subsidised housing schemes. Their collectability depends more on process than on the customer’s or the state’s creditworthiness. Fortunately, these guarantees are usually easy to identify.

Data-driven models

Given the often-haphazard nature of state subsidies, it is unlikely that even the largest portfolio datasets will offer opportunities to identify reliable predictive patterns, so data-driven modelling is unlikely to be of use in this case.

Process models

The process of claiming a state guarantee is specific to the type of guarantee, but typically consists of going through the necessary bureaucratic motions. Process modelling is thus the recommended approach.

Experience-driven adjustments

Given the usually small size of this category and the bureaucratic nature of its processes, the impact of experience-driven adjustments on the overall valuation is unlikely to justify the effort.

Cost estimates

Costs are usually limited to monitoring of the claim process for the guarantee and provided documentation.

Source material review

Just as for the limited-collectability category, this focuses on verifying the customer’s presence in the category.

UNSECURED SEGMENTS

Identifying unsecured segments

With the “special case” categories of guaranteed and limited collectability out of the way, the major remaining question is whether any collateral exists. This usually has a straightforward answer although, depending on the jurisdiction, property that has not been registered as collateral may also be claimable. The more difficult question of whether the collateral has value can also complicate matters, leading to some “secured” accounts needing to be treated as unsecured. In the general case, a simple process model will be needed to classify accounts in these two categories.

Data-driven models

Data-driven modelling is the most powerful tool available for dealing with unsecured portfolios. It can model customer responses at an individual level, identifying relevant characteristics automatically, without preconceptions, and allowing us to make aggregate predictions without relying on aggregate characteristics of the entire portfolio.

The quality of a data-driven model depends on the quantity, quality and relevance of the data used to train it, and the interplay of these factors determines whether it is better to build a model specifically for the portfolio in question or to use a pre-existing one.

In most cases, using pre-existing models is the best option: The portfolio being evaluated may be too small for a specific model to be built; its current management is likely to be suboptimal or

not representative of our own approach; data on exactly what treatment has been deployed may not be forthcoming, or data on the portfolio may be subject to selection bias.

However, there are cases where new models are more appropriate: when dealing with a new market, jurisdiction or industry sector, past experience may not be relevant, and, if a so-called “pilot” approach has been tried on part of the portfolio, the response to that should be modelled, if only as a baseline. Past models may also require data that the new portfolio lacks.

Combining models

Of course, valuation is not restricted to a single predictive model. Predictions of contactability, probability of offer acceptance, and the amount of cash collected (whether as an absolute amount or as a percentage of the book value) may be combined using a simple process model representing a rough outline of our collections processes. There is, of course, a balance to be struck between modelling the process in detail and building too many special-case models of low predictive power. The exact nature of the combination – whether based on weighting by the probabilities or using cutoffs for low-probability recoveries – also needs to consider the quality of each model involved.

Dealing with time

Our approach so far does not deal with recoveries over time, but this is a key feature of any valuation methodology.

introduce it, multiple variants of the same models may be built, focusing on events (e.g. contacts or offer acceptances) within a specific time range after the start of the portfolio’s management, and on recoveries after those events. Care needs to be taken with the temporal resolution of such models to allow sufficient data for each of them, and to keep the models aligned in terms of predictive factors for the sake of simplicity and understandability. We also need to be clear about any capacity constraints that will defer the treatment of subsets of the portfolio, and the logic by which these will be prioritised.

Carrying out sensitivity analyses

No data-driven approach can produce perfect predictions, so we need to devise ways to extract a range of estimates from our process model. This is critical for convincing business stakeholders of the quality of the valuation, and estimating the risk taken on. Such analyses can easily be carried out by varying the parameters by which the individual models are combined: for example, varying the probability thresholds mentioned above, or any capacity constraints determining the spread of recoveries over time.

Experience-driven adjustments

The combination of data-driven and process modelling reveals as much as possible about the portfolio’s prospects, assuming a similar customer response to past efforts. As long as we have amassed enough past information about customers similar to the ones in the portfolio in question, the portfolio’s overall characteristics do not matter.

However, novel variations in strategy and changes in customer response – whether due to these variations or due to external factors – require empirical adjustments. These incorporate: innovative changes in treatment, timing or intensity; change to the resources available; cost structure changes; and characteristics not covered in the available data.

Cost estimates

Having decided on an approach, the cost of applying each action can be considered. Cost estimates feed back into the recoveries models and modify the intended strategy for customers whose expected recoveries are outweighed by cost, so they should be regarded as an integral part of the valuation process, not as an independent estimation of the management overhead.

Source material review

Unsecured segments may be subject to regulatory constraints, which can determine the way a portfolio is handled and increase risk if they have not been properly adhered to in the past. Referring to the source material may be the only way to verify any claims about past compliance.

SECURED SEGMENTS

Determining value for secured segments

The existence of collateral is normally easy to determine but the value of such collateral is a completely different matter, and one that significantly affects the decision of how to treat the debt.

Collateral value can be diminished by various factors:

- Collateral databases may be out of date to the point where they list non-existent collateral.
- Collateral value changes over time, but the date and methodology of collateral valuation may not be obvious from the data.
- Other claims on the same collateral may diminish its recoverable value.
- The chances, amount and timeframe of a successful claim may be dependent on the vagaries of a legal process with additional costs and constraints.
- Extracting value from collateral may be non-trivial, even after it has been claimed.

Our estimates will need to take all of the above into account, as constrained by our collateral management capabilities and strategy, and tie them together using a process model.

Data-driven models

There is a single obvious application of data-driven predictive modelling to the

secured category: in attempting to predict the probability and expected timeframe of the process running successfully to completion. Such models can only be built reliably in very large and mature markets where we have access to a lot of historical data.

However, in the grey area between secured and unsecured debt, if the treatment process includes the possibility of approaching customers with alternative offers, data-driven modelling allows us to estimate the probability of agreement.

Process models

Accurate process modelling is critical for secured debts. The process is largely jurisdiction-specific, but mostly linear, and less dependent on portfolio and management approach characteristics than other categories. Briefly, the process needs to:

- Identify worthwhile collateral and deal with updates to collateral value
- Identify exceptions that cannot be realised
- Model jurisdiction-specific processes, including time, cost and probability of success
- Adjust the value if it will change before it is realised
- Apply a cut-off where the value is too small to pursue
- Consider alternative value extraction approaches in case they turn out to perform better

Experience-driven adjustments

The data formally accompanying the portfolio only tell part of the story. Depending on available experience in the liquidation and real estate market, business stakeholders are likely to provide valuable input. It is important to distinguish portfolio-specific business input that can be regarded as an adjustment, from more general best practice input that should be encoded in the process model for future use.

Cost estimates

Cost estimates are mostly linked with individual steps in the process and are best handled as part of the process description, although they should be reviewed regularly as they are likely to change more often than the process itself.

Source material review

Source material review for the secured portfolio category is critical, given the data quality issues that are likely to be encountered. Organisations should verify the basis of their claim and the documentation needed for it; the existence of privileged and senior claims; and the given valuation of the collateral, overriding the latter using their own processes where necessary.



DATA WRANGLING: INGESTION, MAPPING AND OTHER CONCERNS

Portfolio valuation may sound like an overwhelming problem. In reality, it is a complex process that needs significant effort to set up, discipline to maintain, and organisational efficiency to fit within time constraints, but it is not technically challenging.

The most complex technical issue is that of ingesting and mapping the portfolio's data in a way that allows us to use existing models. In the face of unavoidable variability in the incoming portfolio datasets, it is useful to define a normative valuation dataset, as well as a library of data transformations to force typical variations of data fields into our preferred conventions and calculate missing fields.

This may sound like a lot of additional effort just in the interest of maintaining a uniform set of data across portfolios, but it offers two significant advantages: an ever-growing base for building and validating better models, and complete decoupling of the model development process from the valuation of any single portfolio. Of course, no transformation can substitute for information that is missing completely. It is therefore useful to automatically maintain a range of models dealing with common gaps in the data.

The latter advantage provides the greatest business benefit, because it allows analysts to optimise models while guaranteeing that the best models at any given time can be used for any arising valuation need.



CONCLUSION

If only to avoid ending this paper on a technical note, let us summarise a few of our key points:

- Portfolio valuation is a complex function of many parts. Well-defined and reusable processes are critical to its effectiveness.
- Despite the variation across jurisdictions and industries, the overall “shape” of the valuation process can be generally mapped, as long as the planned treatment processes are clearly understood.
- However, the world is constantly changing, and the process needs to allow for this change, by automatically discovering new drivers of customer behaviour, adapting to regulatory changes and evolving business practices.
- Data-driven, process-based and empirical modelling all have a role to play. Deciding which approach to employ for every portfolio and category within it is key to reaching a realistic valuation.
- The flexibility, accuracy and reusability gained by performing modelling at account level far outweigh the additional data wrangling and number crunching cost, as long as appropriate automated mechanisms are used and model quality is monitored.
- The number crunching involved in a valuation is only as good as the data it feeds on; taking good care of past data pays off in the long term.

However, number crunching is judged by the effectiveness of the decisions taken based on it, and no decisions will be taken unless the numbers are also persuasive. Transparency and “understandability” of the models and process are just as important as accuracy and theoretical rigour.

Like all analytics processes, portfolio valuation can be viewed as a one-off project, but it is better considered a product – complex but general, relatively expensive to set up but cheap to run, providing well-defined capabilities to the business and guaranteeing continuous improvement in the long term..

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QUALCO DATA-DRIVEN DECISIONS ENGINE (D³E)

The QUALCO Data-Driven Decisions Engine platform operationalises portfolio modelling and drives strategy optimisation. Built on a combination of flexible data warehousing technologies, state-of-the art infrastructure, and advanced data mining and machine learning techniques, QUALCO Data-Driven Decisions Engine, gives you the opportunity to effectively bring predictive insights to your daily operational processes.

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