



GENERATING BANKING AND FINANCIAL SERVICES IMPACT

Finance major reimagines credit loan loss forecasting to achieve higher accuracy



Client

Major financial institution's Australian consumer business

Industry

Financial services

Business need addressed

Implemented an efficient credit loan loss forecasting and reserving model that determines forward-looking reserve requirements in line with Allowance for Loan and Lease Losses (ALLL) regulations

Genpact solution

Developed a transactional credit loan loss forecasting and reserve process by incorporating dual-time dynamics as the core modeling methodology. The solution included development of an individual obligor-level loss probability forecasting model and a loss severity forecasting model with embedded macroeconomic links to forecast forward-looking obligor as well as portfolio-level gross and net losses. The triangulation of probability, severity, and potential loss exposure had been achieved using the expected loss (EL) framework

Business impact

The client achieved an IFRS 9-compliant strong challenger model for the existing loss and reserve process. With the new model, the client can arrive at forward-looking loss and reserve forecasts that are sensitive to the economy and portfolio dynamics and can ensure adequate and accurate reserves under varied levels of potential market stresses

The increased regulatory scrutiny of the estimation of Allowance for Loan and Lease Losses (ALLL) forced the client to reimagine its credit losses forecasting model for its consumer business in Australia. The client realized that the inability to accurately forecast an overall portfolio debt profile and potential losses arising from impairments were creating a dent in profit margins and limiting growth prospects in the Australian market.

Business challenge

The key challenges with the client's existing reserve computation model were the following:

- The model was archaic and was not blending BASEL risk parameters, such as probability of default (PD), loss given default (LGD), and exposure at default (EAD)
- The reserve computation process was insensitive to economic variations
- Projections were a priori and see-sawed with numerous incidences of over- and under-predictions
- The existing reserve computation process was non-compliant with impending IFRS 9 requirements

In addition to these challenges, the client faced difficulty gaining visibility into its credit risk exposure as the operations were managed using multiple financial reporting systems and dissimilar processes.

Genpact solution

Genpact offers a multidimensional time series-based approach, called dual-time dynamics (DtD), for credit loan loss forecasting across the consumer finance industry. DtD is a next-generation loan loss forecasting methodology that incorporates two-time series dimensions in the forms of macroeconomic impact and portfolio performance. The client contracted Genpact to build a credit loan loss forecasting infrastructure using the DtD methodology for the personal loan

portfolio for the client's Australian consumer business. Since the personal loan portfolio was amortizing and the credit lines did not have a revolving facility, the current outstanding of a credit line was considered exposure at loss, following a conservative route.

The expected loss (EL)-based modeling procedure was adopted to develop:

- Probability of loss models (two models - one each for the current customer base and the delinquent customer base)
- Severity of loss model

Implementation

DtD-driven models were developed based on six years of loss information and validated on the most recent one year of out-of-time (OOT) data. The individual components of the model were triangulated using an iteratively defined non-parametric equation, to compute the loss probability and loss severity. Loss probability, loss severity, and exposure were combined in the EL framework to compute the projected gross and net losses for a 12-month forward-looking window.

The DtD relationship integrated the maturity function (figure - 1), exogenous function (figure - 3), and vintage effect (figure - 2) (the quality function) on time and maturity to determine the variable. These components were estimated from numerous iterations that were performed to identify the ideal relationship from a suite of non-parametric relationships that resulted in minimum error and the convergence of a solution.

The movement of individual DtD components against age, time or vintage, provided the quantitative sense of risk across age groups, vintage buckets, and timestamps. The DtD process synthesized these relationships while predicting customer-level future behavior.

The DtD-driven models are equation based. Although some components of the DtD model are

constant (i.e., vintage constants and age constants), generated during the model development phase, other components are based on a predictive equation (the macroeconomic model in this case). The constant values are generally database driven, and actual macroeconomic values are fed into the predictive system to forecast $fg(t)$ numbers, which then are used (according to the defined relationship) with constant values to predict customer-level loss components.

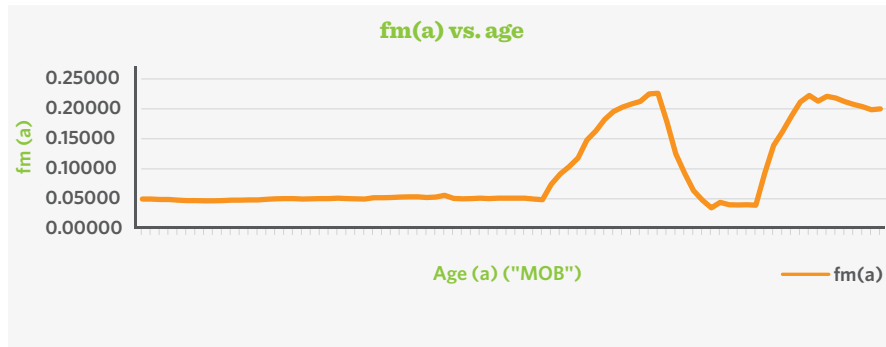


Figure - 1

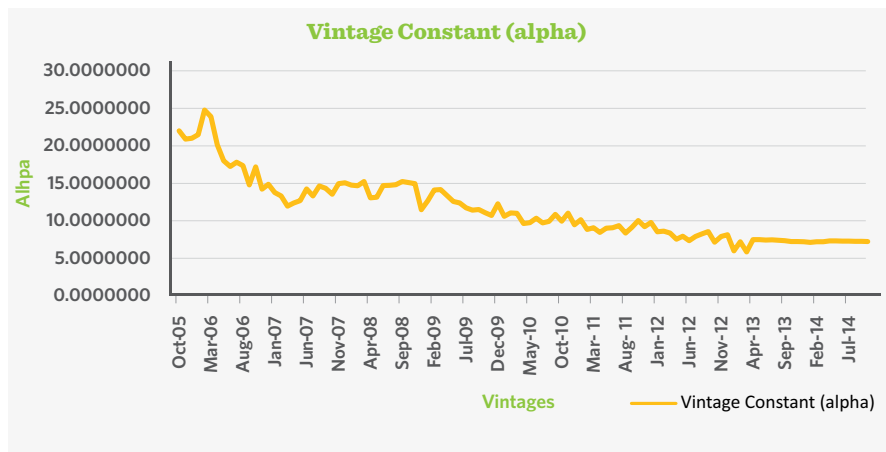


Figure - 2

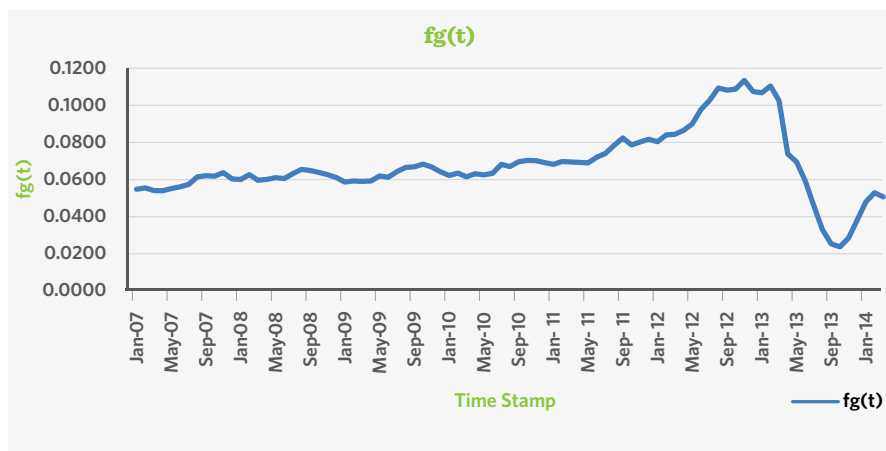


Figure - 3

Validation

A robust validation exercise was adopted to verify the accuracy and stability of the models, on in-sample and out-of-time data, and to avoid inaccurate prediction and low model stability.

To gauge the prediction quality of the credit loan loss forecasting infrastructure, the DtD-driven model

outputs were aggregated to compute the overall portfolio-level predicted gross loss for a period of seven years. After the predicted and actual loss numbers (as graphically show below in Figure - 4 and 5.) were compared, the overall loan loss forecasting process was found to be accurate.

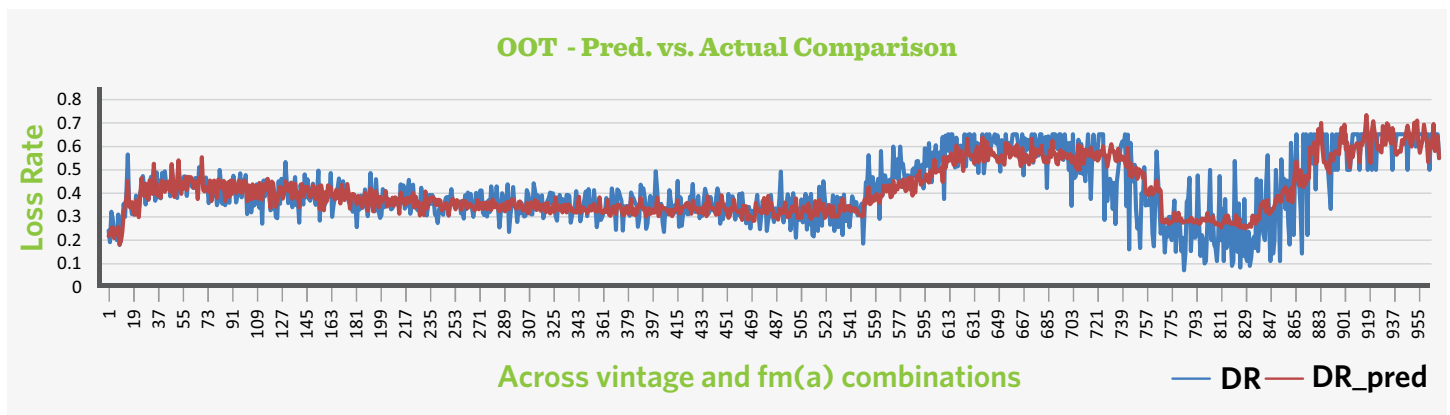


Figure - 4

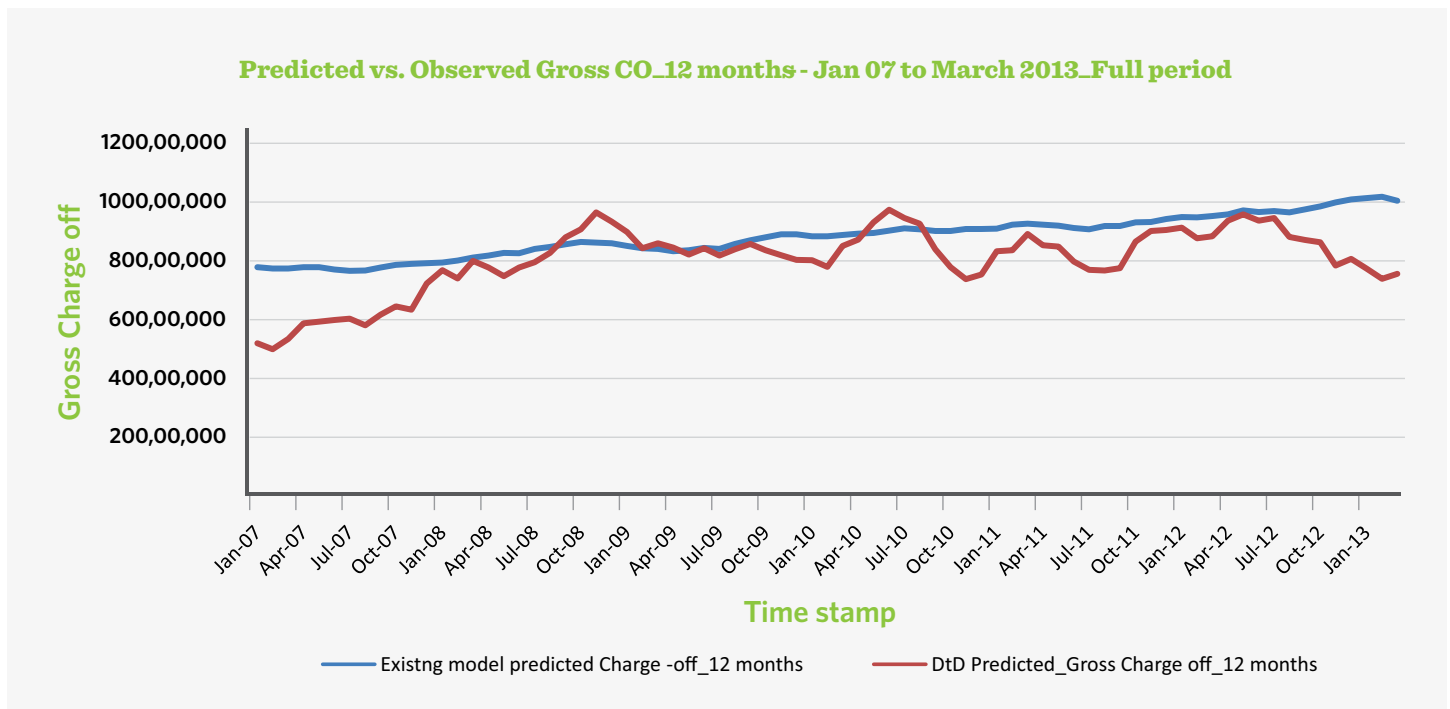


Figure - 5

The validation result (descriptive plots as well as the KPI results as shown in Table - 1) established that the DtD-driven models were extremely accurate in predicting actual losses on out-of-sample and out-of-time data.

| Sl. No. | Performance indicators | Assessment | Model development | Model Validation |
|---------|--|---------------|-------------------|------------------|
| 1 | Predicted to Observed MAPE | High Accuracy | 8.70% | 16.20% |
| 2 | R-square between Predicted and Observed | High Accuracy | 93.30% | 90.97% |
| 3 | Pearson Correlation between Predicted and Observed | High Accuracy | 96.60% | 95.38% |

Table - 1

Business impact

The client's consumer business in Australia achieved the following key benefits with the DtD methodology:

- A robust challenger model that incorporates market movements and portfolio dynamics in its prediction process
- Upgraded loss forecasting process adept at lifetime loss predictions for impending IFRS 9 requirements
- Apposite loss reserve through enhanced accuracy of the model predictions

Conclusion

The DtD is an advanced, robust, and accurate methodology that addresses the key challenge of maintaining a balance between over-reserving and under-reserving for all loss forecasting or allowance for loan and lease loss models.

The DtD is completely transparent, easy to implement, and recognized by regulators. Although DtD addresses all inherent drawbacks of contemporary loss forecasting methodologies, this methodology introduces a new dimension of risk characteristics ("portfolio dynamics") that had previously been perceived to be non-influential.

About Genpact

Genpact (NYSE: G) stands for "generating business impact." We architect the **Lean DigitalSM** enterprise through a unique approach based on our patented Smart Enterprise Processes (SEPSM) framework that reimagines our clients' middle and back offices to generate growth, cost efficiency, and business agility. Our hundreds of long-term clients include more than one-fourth of the Fortune Global 500. We have grown to over 70,000 people in 25 countries, with key management and a corporate office in New York City. We believe we are able to generate impact quickly and power Intelligent OperationsSM for our clients because of our business domain expertise and experience running complex operations, driving our unbiased focus on what works and making technology-enabled transformation sustainable. Behind our passion for technology, process, and operational excellence is the heritage of a former General Electric division that has served GE businesses since 1998.

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