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Paper 4791-2020

CECL / IFRS9 Implementation: What Is Driving My Quarter-Over-Quarter Change in Allowance?

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ABSTRACT

Ford Motor Credit Company collaborated with SAS Institute Inc. to develop a quantitative process to explain the drivers in variability of issue-to-issue change in Expected Credit Loss (ECL), based on the Current Expected Credit Loss (CECL) / International Financial Reporting Standards 9 (IFRS9) framework. The underlying methodology performs attribution of the ECL change at the contract level. Results from this framework are compared to other ECL attribution approaches. This paper provides an analysis of the findings and compares the benefits and downsides of each of the approaches investigated.

INTRODUCTION

As part of IFRS9 and CECL regulatory reporting requirements, Ford Motor Credit Company calculates and reports Expected Credit Loss (ECL) on a quarterly basis. The ECL calculation methodology primarily uses expected cash flow, forecasted probability of default and probability of pay off (PDPO) curves, and forecasted Loss Given Default (LGD) curves. While the cash flow is based on an amortized cost basis discounted for the ECL calculation, PD and LGD curves are modeled using loan-specific characteristics and macroeconomic factors.

As a portfolio evolves and economic outlook varies from quarter to quarter, the reported ECL changes. This ECL variance remains a major area of interest for stakeholders. Therefore, it is imperative to explain the underlying factors that contribute to the ECL variance. However, the major challenge lies in deconstructing a rather complex ECL formulation into a simpler form. The challenge is complicated by the need to explain the directional impact of the risk factors and ensure that the monetized value of the attribution is consistent with the change in raw value of the risk factor. Furthermore, as Ford Credit's global business is expanded over many countries, the methodology and its implementation need to be generic enough to seamlessly fit into the portfolio of any given market.

These concepts became central to a methodology developed with SAS' US Professional Services division (US PSD). In addition, the collaborative efforts led to more interesting findings when this approach was compared with two other available approaches, discussed further in subsequent sections.

OVERVIEW

Three different ECL variance attribution methods were compared to explain the change in ECL reported between two quarters. This section covers the description of each of the three approaches:

- Step by Step
- Contract Level
- Weighted Average

STEP BY STEP APPROACH

The Step by Step approach, in its most basic form, moves one factor at a time from the prior quarter's value to the current quarter's value successively, while keeping all other factors constant, and recalculating ECL each time one factor is changed (Figure 1). The incremental change in ECL at each step is attributed to the factor that is allowed to change. While this approach is generic and widely popular among risk practitioners, it is computationally very intensive.

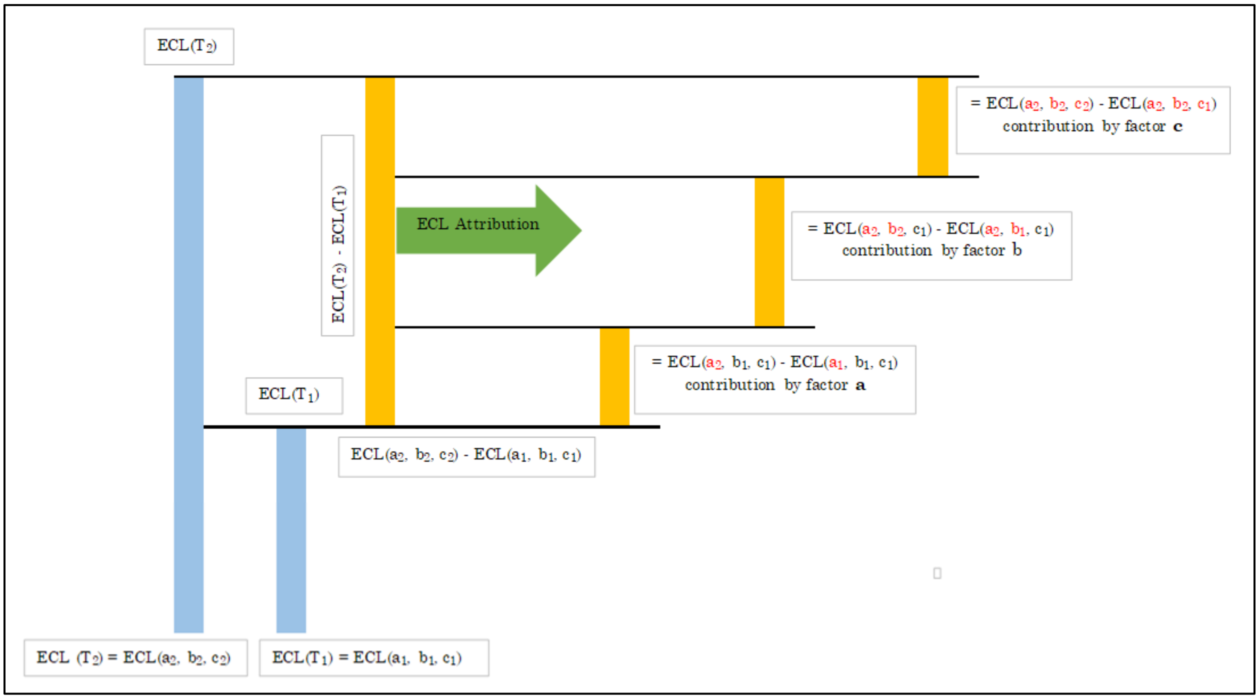

Figure 1. Step by Step Variance Methodology for ECL

CONTRACT LEVEL METHOD

The Contract Level approach developed by SAS' US PSD relies on a similar principle, but without the need to recalculate ECL. The method deconstructs the ECL as a product of all the underlying factors at the contract-calendar time horizon level and makes use of the ECL output already available from current and previous ECL calculations.

More specifically, this approach calculates ECL for every contract and for each future time horizon as a product of the contributory exposure and risk factors:

- Exposure at default (EAD)
- Discount factor (DF)
- Probability of default (PD)
- Loss given default (LGD)

See Equation 1 below.

$$ECL = EAD \times DF \times DPD \times PD \times LGD \tag{1}$$

Portfolio Factors

The total exposure at default is determined by the portfolio size and composition. Portfolio size change between two time periods is determined by the net growth of the business and can be quantitated as a change in the cash flow from one period to the next. Portfolio composition changes between two time periods can result from shorter contractual terms versus longer contractual terms, risk ranking of new contracts, and delinquency in open contracts (days past due), as well as payment schedule modifications (early payment, extensions) and aging. Aging of the shared portfolio is an important portfolio effect that tracks the ECL amounts that no longer need to be accounted for because the contractual obligations are met at each time period. Two contracts originated at different calendar dates, but with identical contractual terms, may differ in their ECL because the new contract carries a higher risk of loss than a partially aged contract that has already paid some of its contractual obligations.

The attribution for EAD is formulated in Equation 2.

$$EAD\ attribution = EAD[amt\_DF(T_2) - amt\_DF(T_1)] \times DPD(T_1) \times PD(T_1) \times LGD(T_1) \quad (2)$$

where:

T_1 and T_2 are the two reporting dates

amt_DF is the discounted amount outstanding at reporting time on each contract

Portfolio factor changes can be attributed into further categories: newly originated versus paid off contracts and changes in ECL due to aging of existing contracts from one time period to next.

Probability of Default

The long-term average historical default rates are used to predict current default expectations. The attribution due to PD risk factor is calculated as shown in Equation 3.

$$PD\ attribution = amt\_DF(T_2) \times DPD(T_2) \times [\boldsymbol{PD}(T_2) - \boldsymbol{PD}(T_1)] \times LGD(T_1) \quad (3)$$

PD can be expressed as a product of historical baseline defaults, macroeconomic adjustments (from the PD model), performance adjustment (to adjust for actual defaults currently occurring in the portfolio), and the survival factor, to account for contracts that have paid off at reporting time (see Equation 4).

$$PD = PD\_Historical \times \boldsymbol{PD\_Macroeconomic} \times PD\_Performance \times SurvivalFactor \quad (4)$$

where:

$PD\_Macroeconomic = f_1 \times f_2 \times f_3$

$f_1, f_2, \ldots$ are exponentiated values of macroeconomic variables in the PD macro model

Each PD risk factor can be attributed further into contributing risk factors. For example, the macroeconomic risk factor for PD can be attributed between two reporting times, as shown in Equation 5.

$$PD\_Macroeconomic\ attribution = amt\_DF(T_2) \times DPD(T_2) \times [PD\_Macroeconomic(T_2) - PD\_Macroeconomic(T_1)] \times PD\_Base(T_2) \times PD\_Performance(T_1) \times PD\_SurvivalFactor(T_1) \times LGD(T_1) \quad (5)$$

Loss Given Default

LGD metrics are used to determine the average loss per defaulted contract (severity). Like PD, macroeconomic forecasts affect the issue-to-issue change in ECL due to LGD, per IFRS9 requirements. LGD is attributed as shown in Equation (6), similar to the PD risk factor attribution.

$$LGD\ attribution = amt\_DF(T_2) \times DPD(T_2) \times PD(T_2) \times [LGD(T_2) - LGD(T_1)] \quad (6)$$

The LGD factors can be attributed to underlying macroeconomic factors in linear fashion, because LGD employs a linear Tobit model.

WEIGHTED AVERAGE METHOD

The Weighted Average method is similar to the Contract Level approach in terms of formulation, but differs in terms of the granularity at which attribution is performed. Unlike the Contract Level approach that performs attribution at a contract-time horizon level first and then aggregates the attributed dollars, the Weighted Average method performs aggregation of the factors first to a segmentation / vintage level and then performs the attribution.

For example, the EAD is used to weight PD. Contracts at the beginning of their contractual term have a greater impact on ECL than those toward the end of their contract. Similarly, any change to forecasted PD has a greater impact on contracts in the early years compared to a change in forecasted PD in later years, due to higher EAD earlier on.

For LGD, the weighting is applied using both EAD and PD, because every dollar of loss occurs on defaulted contracts. One added metric in the WA attribution approach is the use of Weighted Average Life (WAL) which calculates how long a dollar outstanding amount will stay on the books (see Equation 7).

$$ECL = EAD \times DF \times WAL \times WAPD \times WALGD \tag{7}$$

where:

EAD is the sum total of outstanding balance

DF is discount factor

WAL is the Weighted Average Life calculated as a percentage of the principal balance left weighted by number of years; it is interpreted as the average number of years left to recover the principal

$WAPD$ is the Weighted Average Probability of Default, weighted by outstanding balance

$WALGD$ is the Weighted Average Loss Given Default, weighted by PD and balance

The attribution is then performed in a similar fashion as the Contract Level method.

FINDINGS

The three ECL attribution methods described in the Overview section were used to explain the change in ECL between two quarter end dates. The findings from this investigation follow.

STEP BY STEP METHOD VERSUS CONTRACT LEVEL METHOD

The Step by Step method captures the output of the successive process of changing one factor and holding all other factors artificially at the same level until every factor has been changed in isolation (comparative statics). The Contract Level methodology mathematically and quantitatively breaks down the ECL change of all the factors operating at a contract level granularity between two reporting times T_1 and T_2.

Table 1 compares attribution results obtained from changing one risk factor at a time to those derived under the contract-level analysis for a sample portfolio. The results indicate that both methods are directionally consistent, and the magnitudes of changes in risk factors are similar between the two.

Risk Factor	One-at-a-time	SAS - Contract Level
Due to Portfolio Mix and Ageing	-2.9	-1.8
Change in portfolio volume	3.8	4
Closed contracts	-3.2	-4
New contracts added	7	8
Ageing	-6.7	-5.8
Change Due to Economic Forecasts (PD)	-3.7	-4.9
Change in Performance of Contracts	1.2	0.8
Expected default rate	-6.6	-6
Change Due to LGD (Severity)	2.9	1.1
Movement to more risky buckets		0.2
Movement to less risky buckets		-0.2

PD macroeconomic outlook improved in T2 vs T1 reflected in the decrease of -4.9M in the ECL variance

The LGD risk factor shows an increase of 1.1 M in the ECL variance

Table 1. Step by Step and Contract Level Variance ($M) PD Macroeconomic Outlook Improved in T_2 versus T_1 Reflected in the Decrease of -4.9M in the ECL Variance

In addition to the findings noted in Table 1, the Contract Level approach provides a way to explain the contribution from each individual economic factor versus expectation. For instance, as shown in Figure 2, the near-term forecast for the unemployment rate in the current quarter was indicative of a lower unemployment rate (and therefore, better economy) when compared with its forecast in the previous quarter. This leads to a reduction in ECL in the near term, due to an improved near-term forecast of unemployment rate. Furthermore, as the long-term forecast converges back and moves over the previous period's forecast, the ECL contribution rebounds and increases the ECL.

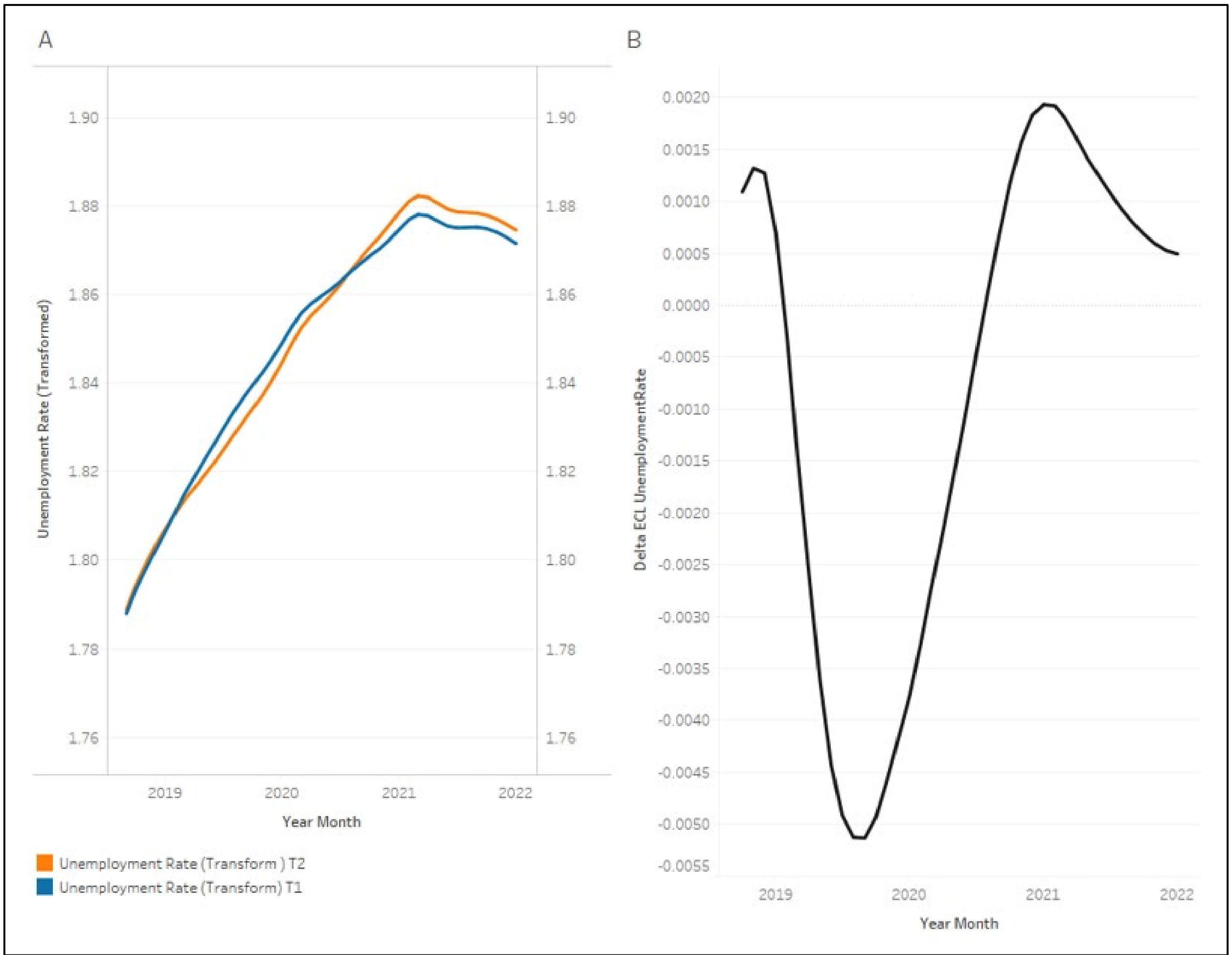

Figure 2. A) Changes in Unemployment Rate between T1 and T2. B) Resultant Change in ECL

Attribution for a Sample Portfolio

The unemployment rate has positive model parameter, implying that the higher the unemployment rate, the higher the macroeconomic effect on the PD and, therefore, higher ECL.

Contract Level Method versus Weighted Average Method

Figure 3 compares the results from the Contract Level variance analysis and the WA method performed on a sample portfolio and with the same macroeconomic forecasts. The two variance analysis methodologies add up to similar total numbers (within rounding off errors).

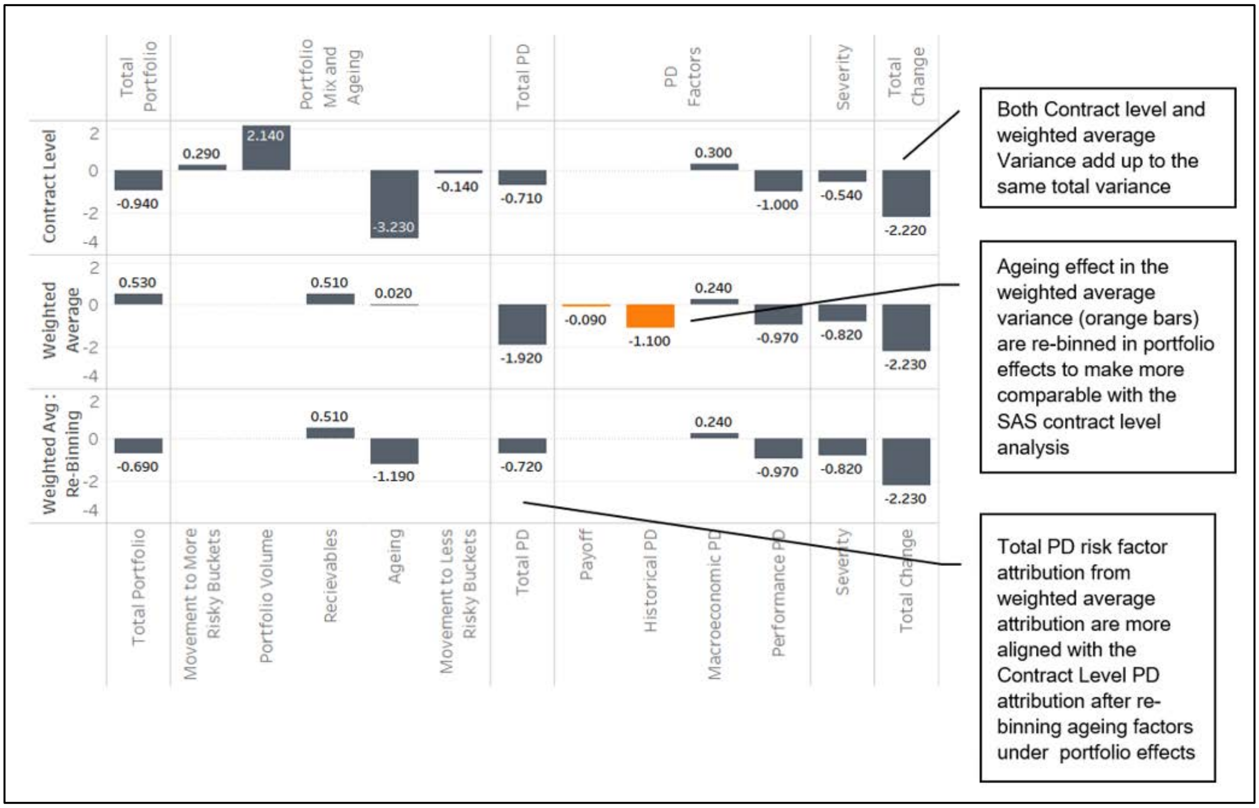

Figure 3. ECL Variance: Comparison of Contract Level and Weighted Average Portfolio Level Analyses

When comparing the first two rows in Figure 3, note that the Total PD risk factor attribution between the Contract Level and Weighted Average methods are not close, in terms of magnitude. One reason for this difference is that the Contract Level variance due to PD and LGD is performed primarily on the shared contracts between two quarters. ECL of newly originated contracts and paid off contracts (active only in the prior time period) are binned under portfolio effects as portfolio volume changes. Hence, they are not considered for other risk factor attribution (like PD, LGD, macroeconomic factors, and so on). Aging of the portfolio is also attributed only within shared contracts under portfolio factors. It is attributed to contractual payoffs that occurred between the two periods as the shared contracts mature.

In the Weighted Average method, ECL changes due to aging, paid off, and newly originated contracts are not binned *a priori* under portfolio effect. Rather the PD (and LGD) is calculated at the portfolio aggregate level so that PD of all active contracts at each reporting date is computed, regardless of whether the contracts are shared or unique to each period. In this framework, the Weighted Average variance method can obtain a snapshot of the macroeconomic effect on the portfolio at two different reporting time periods, regardless of whether the contract was shared between the two reporting time periods. Aging of the portfolio is accounted for by the WAL, discount factor, and by the change in the historical PD. Portfolio effects also include change in the receivables between the two time periods.

These methodological differences contribute to the differences in the interpretation of ECL attribution. The Contract Level method indicates that net portfolio effects and total PD effects contributions were somewhat similar. The net increase in portfolio volume and associated increase in ECL was counterbalanced by the aging of the portfolio. An increase in the Significant increase in credit risk observed between the two time periods suggests that the portfolio delinquency rate increased in T_2, as seen in the Movement to More Risky Buckets numbers.

In comparison, the WA method indicates that the PD effects were mostly responsible for the decrease in ECL variance brought about by the large decrease in the baseline PD expectation calculated from historical PD and countered slightly by the worsening macroeconomic forecast. The decrease in PD attributable to historical default is driven by the aging of the portfolio and/or the improved credit quality of newer contracts compared to contracts that have completed their contractual term.

By re-binning the WA results (Figure 3, Weighted Average Re-binning), alignment is achieved between the Contract Level and Weighted Average portfolio level variance results. The re-binning involves a simple addition of aging effects into portfolio risk factor and subtracting the same from PD risk factor, so the net effect on ECL variance remains unchanged. Table 2 compares the pros and cons of the Contract Level versus Weighted Average ECL attribution methods.

Features	**Contract Level**	**Weighted Average**
Comprehensiveness of attribution factors (ability to drill down further into each primary component; for example, EAD, PD, LGD)	✓	
Ability to isolate pure portfolio effects from PD and LGD factors (No change in PD and LGD curves should result in a zero contribution change in ECL from these factors)	✓	
Granularity of analysis: contract level to segment to portfolio	✓	
Ability to surface data quality issues	✓	
Flexibility to change order of attribution with minimal effort	✓	✓
Ability to attribute staging for IFRS9	✓	✓
Aging factor provides insight into portfolio maturity (all contracts and not just common contracts)		✓
Macroeconomic factors impact captured for all contracts		✓

Table 2. Pros and Cons of Contract Level versus Weighted Average Methods

CONCLUSION

The two methodologies may offer differing insights into the drivers of expected credit loss. For markets where the ECL change is large, combining the insights provided by the two analyses (Contract Level and Weighted Average) enables a more comprehensive understanding of the underlying changes. For markets where the ECL change is small or where the interim time is longer, the two analyses may differ in their interpretation of risk drivers for ECL variance. Quantifying the effect of each risk factor using both methods allows better anticipation of the expected credit loss that is likely to arise on the financial horizon. This analysis helps companies better prepare for economic downturns by tracking capital allocation to adequately cover increases in our customer defaults and delinquencies.

REFERENCES

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ACKNOWLEDGMENTS

The authors wish to acknowledge the support of the following people:

Yi Lu, Director, Credit Analytics, Ford Motor Credit Company LLC

Suzanne Mayberry, FCNA Risk Controller, Ford Motor Credit Company LLC

Margaret Mellott, Manager, Global Communication, Ford Motor Credit Company LLC

Shlomo Kleinman, Risk Supervisor, Finance, Ford Motor Credit Company LLC

Rahul Reddy Kamuru, Data Scientist, Ford Motor Credit Company LLC

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