

CECL Methodologies: Discounted Cash Flow Approach

Sohini Chowdhury PhD | Senior Economist & Director,
Moody's Analytics

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DCF in FASB Guidelines

§ 326-20-30-4 If an entity estimates expected credit losses using methods that project future principal and interest cash flows (that is, a discounted cash flow method), the entity shall discount expected cash flows at the financial asset's effective interest rate. When a discounted cash flow method is applied, **the allowance for credit losses shall reflect the difference between the amortized cost basis and the present value of the expected cash flows**

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Discounted Cash Flow Approach

- ❑ CECL reserves = Amortized Cost – Discounted expected value of all future cash flows
- ❑ DCF models will differ based on how the expected value of future cash flows are calculated
 - Probabilities of default, prepayment and recovery could be calculated from simple assumptions or from a rigorous model
- ❑ Not recommended for pool level or portfolio level analysis
- ❑ Future cash flows to be discounted by the asset's effective interest rate at the evaluation period (not a forecast of the interest rate)

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Future Cash Flows

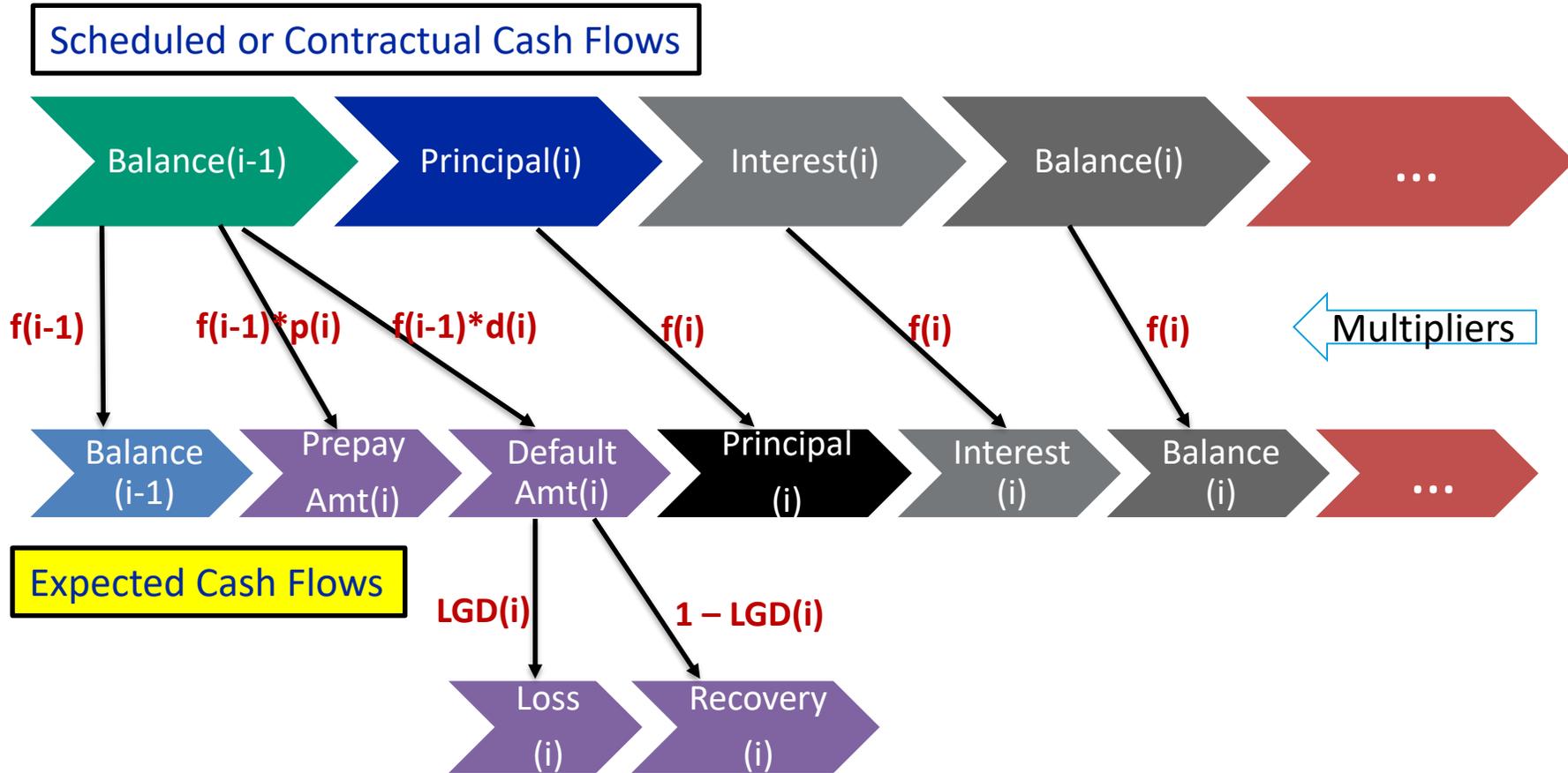
Scheduled or Contractual Cash Flows



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Future Cash Flows



$d(i)$ = Default probability, $p(i)$ = Prepayment probability,

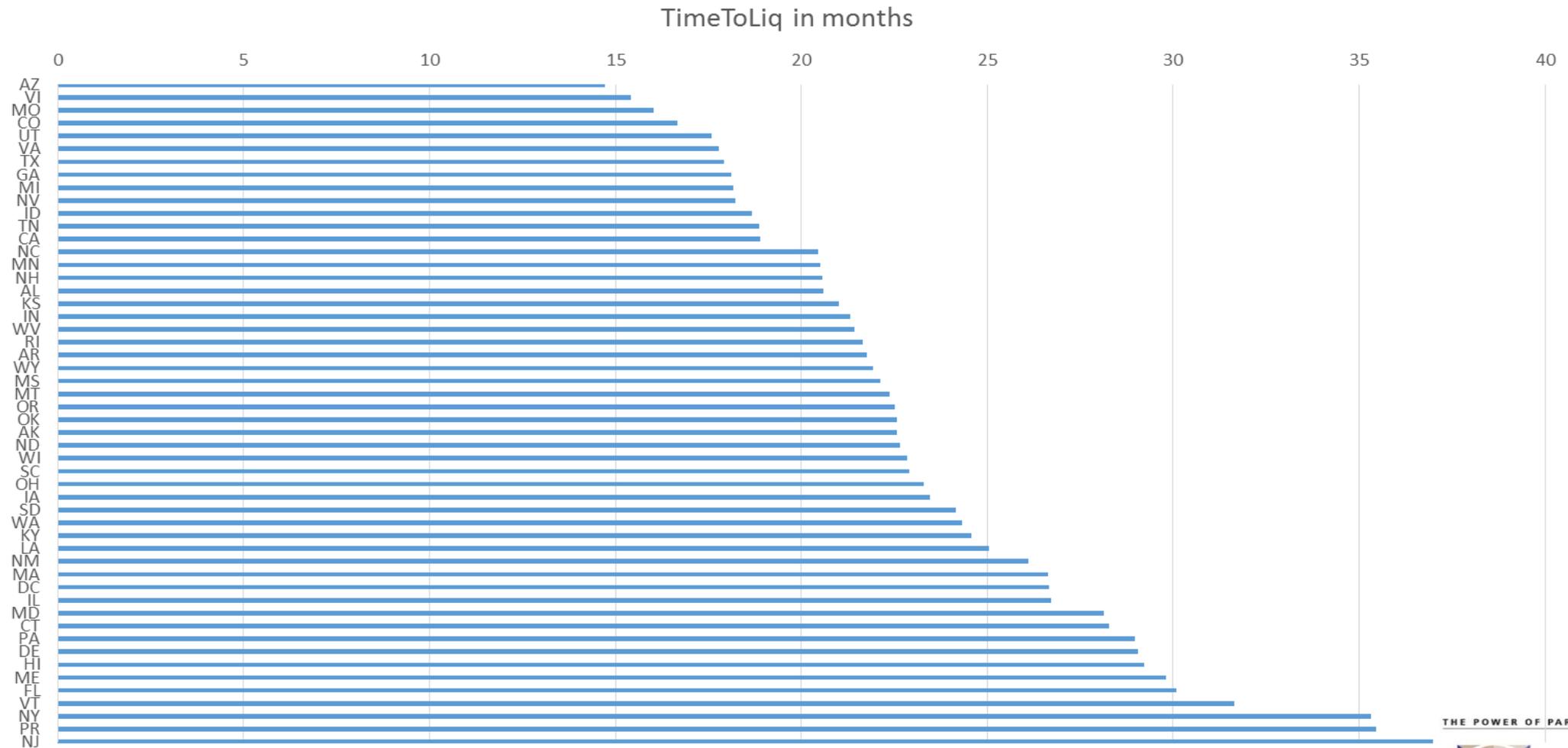
$LGD(i)$ = Loss Given Default, $f(i)$ = Survival probability after period i

$$f(i) = f(i-1) * (1 - p(i) - d(i))$$

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Time to Liquidation in Mortgages by States



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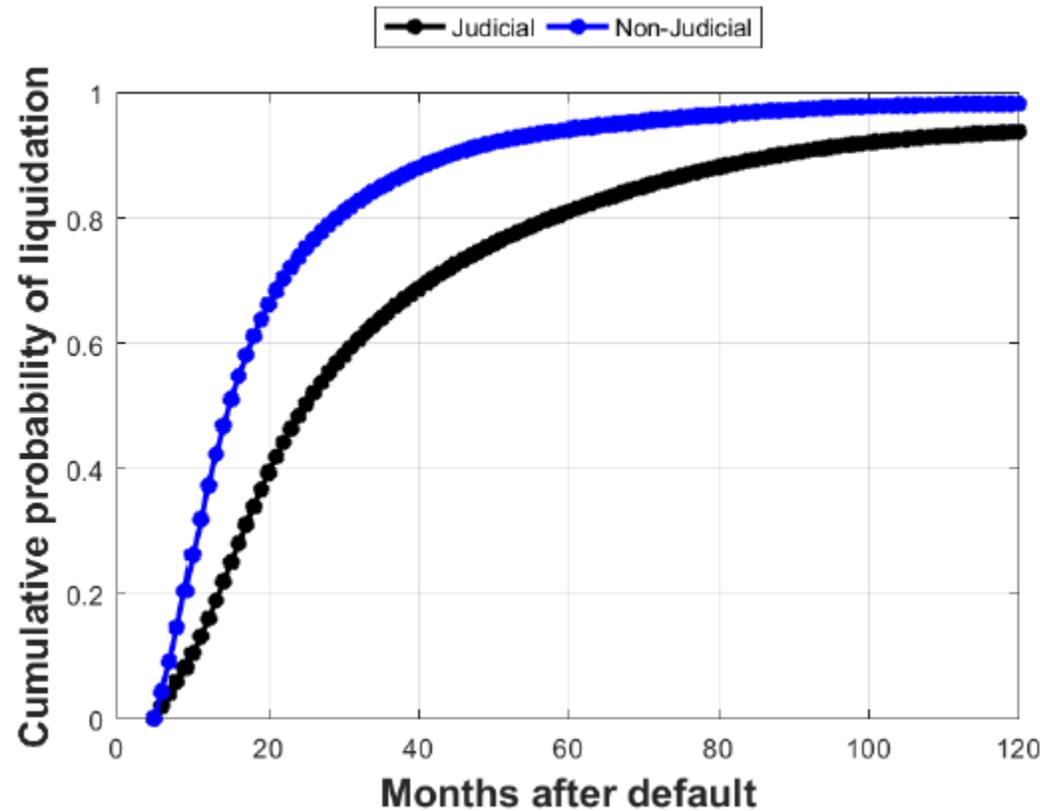
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Timing of Recoveries is Critical in DCF

Cumulative probability of liquidation in any month after the default date for a mortgage loan



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DCF Pros and Cons

PROS	CONS
<ul style="list-style-type: none">▪ Intuitively best aligns with the CECL requirement of estimating lifetime losses while considering the timing and prepayment behavior▪ Considers various cash flow schedules, loan maturity, and diverse array of loan terms such as balloon payments▪ Considers the time value of money for the projected losses▪ Can work off contractual life. Don't need to make assumptions about life of loan	<ul style="list-style-type: none">▪ Most complex from a data requirements perspective▪ Requires more instrument-level input parameters (e.g. EIR, prepayment rates, spreads, etc.) than other methods▪ Best done using a software because of the large amount of data it produces.▪ Double counts credit risk through recognition of credit risk in both the expected cashflow and the discount rate

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DCF Double Counts Credit Risk

The amendments in this Update were adopted by the affirmative vote of five members of the Financial Accounting Standards Board. Messrs. Kroeker and Smith dissented.

Messrs. Kroeker and Smith recognize that –

...when performing a present value calculation of future cash flows, it is inappropriate to reflect credit risk in both the expected future cash flows and the discount rate because doing so effectively double counts the reflection of credit risk in that present value calculation.

If estimates of future cash flows reflect the risk of nonpayment, then the discount rate should be closer to risk-free. If estimates of future cash flows are based on contractual amounts (and thus do not reflect a nonpayment risk), the discount rate should be higher to reflect assumptions about future defaults. However, when a discounted cash flow method is used, the amendments in this Update require expected cash flows (that is, contractual cash flows that are adjusted for expected defaults) to be discounted at the loan's original borrowing rate (which by definition reflects assumptions about future defaults).

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Where DCF is Most Applicable

1. Where there is a lack of reliable historical data. Industry benchmarks can be used to guide PD, LGD, Prepayment assumptions to generate expected cashflows.
2. Where cashflow timings are irregular. Eg. balloon payments.
3. Where there are individual loans with exotic payment patterns
4. Where the expected life of the loan (diff from contractual life) assumption is not straightforward
5. Where there are TDRs
6. Where there are AFS securities (DCF must be used, as per CECL guidelines)

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Other Advantages of DCF

The timing-adjusted loan level cash flows produced in DCF has applications beyond CECL

- Discounting the future cash flows using different interest rates (eg. cost of funds, ROA, ROE, opportunity cost) produces the NPV for pricing, Exit price etc.
- Can be used to estimate profitability of the loan
- Can be used in pricing, hedging etc.

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DCF Example

C&I Term Loan Example

Assumptions	Formula
<ul style="list-style-type: none">» Amortized Cost = \$986,732» Remaining maturity = 5 years» Fixed Coupon Rate = 5%» Amortization type = Linear» EIR = 5.5%» Prepayment = 2.0%» PD1=0.5% ; PD2=0.7%; PD3=0.9%; PD4=1.1%; PD5=1.7%;» LGD1=50%; LGD2=52%; LGD3=54%; LGD4=56%; LGD5=58%	<p>Loss Allowance = Amortized Cost – Present Value of Expected Cash Flows discounted by EIR</p> <p>Expected Cash Flows = Amortization +Prepayment +(1-PD* LGD) * EAD + Expected Interest</p>

DCF Example

C&I Loan Example

Period	Performing Balance	Prepayment Amount (A)	Principal Recovery Amount (B)	Expected Principal Payment (C)	Expected Interest Payment (D)	Total Expected Payment (A+B+C+D)	Discounted Cash Flows
2018	1,000,000	15,989	2,498	199,001	49,716	267,204	253,283
2019	780,014	11,724	2,626	193,636	38,807	246,792	221,715
2020	569,183	7,584	2,354	188,021	28,184	226,144	192,580
2021	368,459	3,682	1,781	182,205	18,208	205,877	166,187
2022	178,523	0	1,346	175,319	8,760	185,425	141,880
Total							975,646

$$\text{Loss Allowance} = 986,732 - 975,646 = \$ 11,087$$

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