What exactly do we mean by **Liabilities Waterfall Model?**

**Definitions of Terms**

In their consultation documents:

- The EBA talks about a “**liability cash flow model**” and then “**a cash flow model related to the liabilities of the securitisation**”.
- BCBS/IOSCO talks about “**a liability cash flow model**”.

It is first of all important to point out that the term ‘**cash flow model**’ used with reference to the ABS market over recent decades has not had an entirely consistent definition.

Normally, the term ‘cash flow model’ when referring to a third-party produced model provided on commercial terms, would consist of two quite distinct elements:

1. a **Asset Model** and
2. a **Liabilities Waterfall Model**

I shall, for clarity, refer to the combination of these two elements as a ‘**Full Cash Flow Model**’.

See Figure 1 below.

**The Asset Model:**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Subjective Assumptions</th>
<th>Processing</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective Facts</strong></td>
<td>These could vary a great deal in complexity and granularity, but would</td>
<td>Based on the inputs provided, the asset model predicts the future</td>
<td>Calculated assumption values for each future period e.g.</td>
</tr>
<tr>
<td>From transaction documentation and</td>
<td>include the user’s assumptions relating to economic variables that could affect the</td>
<td>behaviour of the asset pool.</td>
<td>• Principal cash flow</td>
</tr>
<tr>
<td>most recent investor reports or</td>
<td>performance of the loan pool such as borrower income, economic</td>
<td></td>
<td>• Interest cash flow</td>
</tr>
<tr>
<td>loan level data e.g.</td>
<td>activity measures, employment rates, interest rates, house price or vehicle</td>
<td></td>
<td>• Loan default rates</td>
</tr>
<tr>
<td>• Number and value of</td>
<td>valuation fluctuations, etc. High level inputs could be:</td>
<td></td>
<td>• Losses, etc.</td>
</tr>
<tr>
<td>loans,</td>
<td>• CPR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• credit scores,</td>
<td>• CDR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• loan terms,</td>
<td>• Recovery Lag</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• interest margins and indexes,</td>
<td>• LIBOR Curve, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• property values and location, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This element is **Subjective**.
The **Liabilities Waterfall Model:**

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Subjective Assumptions</th>
<th>Processing</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objective Facts</strong></td>
<td><strong>Subjective Assumptions</strong></td>
<td>Allocates cash flows of principal and interest to the beneficiaries of the transaction according to the liabilities waterfall documentation</td>
<td>• Interest to the notes • Principal to the notes</td>
</tr>
<tr>
<td>From transaction documentation e.g.</td>
<td>Outputs from Asset Model and User controlled inputs representing events outside of the asset pool – e.g.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Note sizes,</td>
<td>• counterparty rating events,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• priority of payments,</td>
<td>• call options, counterparty termination events,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• fixed rates, indexes and margins for interest on notes,</td>
<td>• revolving pool options, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• rules and initial values of funds and reserves,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• fixed rates, indexes and margins for swaps,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• trigger definitions, etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This element is **Objective.**

**Asset Model + Liabilities Waterfall Model = Full Cash Flow Model**

An important reference point to this meeting is agreement of the definition of what a Liabilities Waterfall Model is.

All assumptions associated with the cash flow model are inputs to the Liabilities Waterfall Model. These input values are the full responsibility of the Liabilities Waterfall Model user.

In a commercially available **Full Cash Flow Model,** the provider will include an **Asset Model** which will, given some typically high level assumption inputs, provide/generate for each future payment period a series of predicted values which are then passed into the Liabilities Waterfall Model.

It is only the Liabilities Waterfall Model that is in scope for these discussions.

For the purpose of the meeting, here is a suggested definition of Liabilities Waterfall Model:

> “The mathematical or computer code representation of the rules for the allocation of the cash flows of interest and principal of an Asset Backed Security to the beneficiaries of that security as stated in its written legal documentation.”

**N.B.** An essential feature of a Liabilities Waterfall Model is for it to provide opportunity for input values for every scenario the liabilities waterfall written documentation states consequences for. This serves two purposes:

- To provide the Liabilities Waterfall Model with everything it needs to drive it and give the correct cash flow outputs subject to the input assumptions the user provides and
- To show the user of the Liabilities Waterfall Model the **full list of inputs** the Liabilities Waterfall Model needs to allow it to operate properly and apply all of its rules.
Figure 1. Diagram of a Full Cash Flow Model, showing the Liabilities Waterfall Model in green and example inputs.

Investor/User Assumptions:
- Borrower behaviour, interest rates, unemployment rates, house price appreciation, etc.

Asset Model – Generating Future Assumptions:
- Interest Flow
- Principal Flow
- Losses
- Interest Rates
- Exchange Rates

Liability Waterfall Model - Objective Rules of Waterfall:

**Features**
- Principal Deficiency Ledgers
- Reserve Fund
- Liquidity Reserve
- Interest and currency swap arrangements
- Fees and Expenses

**Priority of Payments**
- Senior Fees
- A1 Note Interest
- A2 Note Interest
- A1 Note Principal
- A2 Note Principal
- Class A PDL
- Class B PDL
- B Note Interest
- B Note Principal

Events outside of the asset pool – e.g. counterparty rating events, call options, counterparty termination events, revolving pool options, etc.

Objective Facts:
- Number and value of loans, credit scores, loan terms, interest margins and indexes, property values and location, etc.
- Note sizes, priority of payments, fixed rates, indexes and margins for interest on notes, rules and initial values of funds and reserves, fixed rates, indexes and margins for swaps, trigger definitions, etc.

Model Output: