# From Excel Scaffold to Bloomberg-Driven CCS Pricing: BDP Wiring, Drag-Down Mechanics, and Interpretation

## Purpose

This note explains how to take the provided Excel scaffold (*MarketData* + *Calc* sheets) and connect it to Bloomberg via `BDP` formulas, so that spot FX, forwards, and discount curves update from the terminal. We also describe how the drag-down design works across arbitrary tenors, how to interpret the outputs ($x$, $x_{\text{basis}}$, $B$, $\phi$), and a minimal sequence of next steps (plots and diagnostics) to show the mathematical power of the method.

**Pre-requisites:**

- Bloomberg Excel Add-In enabled and logged in.
- The refined workbook scaffold with:
  - `MarketData`: tables `tblPd` $(T, P_d)$, `tblPf` $(T, P_f)$, `tblFwd` $(T, \text{Fwd})$, named range `Spot`.
  - `Calc`: drag-down block in columns A:N, summary in Q:R.

## Step 1: Wire *MarketData* to Bloomberg

The goal is to fill `Spot`, `tblFwd`, `tblPd`, and `tblPf` with Bloomberg-driven values.

### 1.1 Spot FX

In `MarketData!B1` (named `Spot`), insert a `BDP` for the spot level. For example:

```
=BDP("EURUSD Curncy","PX_LAST")
```

(Use the Excel *Bloomberg Formula Builder* to choose your preferred bid/mid/ask field.)

### 1.2 FX forwards (outrights or points)

Populate `tblFwd` with outright forwards $\{F_t(T)\}$ at the tenors listed in its `Tenor` column.

**Method A (one cell per tenor; recommended for clarity).** Place the cursor in `MarketData!H5` (first `Fwd` cell), open the Bloomberg Formula Builder (*Create*), select the FX pair (`<ccy1><ccy2> Curncy`), select a forward field (outright or points), and add a tenor override that points to the cell with the tenor label from `tblFwd[Tenor]`. The Formula Builder will emit a `BDP` with the correct override syntax. The pattern looks like:

```
=BDP($B$<pairCell> & " Curncy",
     "<FIELD_FOR_FWD_OUTRIGHT>",
     "Tenor", [@[Tenor]])
```

*Note:* Exact field names/overrides vary by entitlement and convention. Use the Formula Builder to select the canonical field (outright vs points) for your venue/source, and point the override to the `Tenor` cell in the same row so it drags.

**Method B (bulk-to-range).** Some FX fields expose a full forward curve as a bulk field (array). Use the Formula Builder to return the forward curve into an unused range, then *link* the appropriate tenors into `tblFwd` with `XLOOKUP`:

```
= XLOOKUP([@[Tenor]], BulkCurveTenors, BulkCurveOutrights)
```

### 1.3 Discount factors

`tblPd` and `tblPf` hold discount factors at the *same* tenors as `tblFwd`. You have two common routes:

**Route 1: Pull zero/swap/OIS rates and convert to DFs.** Fetch a term structure of rates $\{r(T)\}$ via `BDP` or `BDS` (bulk), then convert with the compounding convention you choose. For continuous compounding:

$$P(t,T) = e^{-r(T)\,T}.$$

In Excel (inside `tblPd`):

```
= EXP( - [@[Tenor]] * XLOOKUP([@[Tenor]], tblPdRates[Tenor], tblPdRates[ZeroRate]) )
```

Repeat analogously for the foreign curve (`tblPf`). If you pull simple/annual rates, adjust the formula for the correct day-count/compounding.

**Route 2: Pull discount factors directly.** Certain curve tickers/fields return discount factors per tenor. Use the Formula Builder to return those values directly into `tblPd`/`tblPf` matching `Tenor` row-by-row.

**Practical tip.** Keep the *tenor labels* in `tblPd`, `tblPf`, and `tblFwd` identical (e.g. `1`, `2`, `3`, `5`, ...years or `1Y`, `2Y`, ...). This makes `XLOOKUP` exact and the `Calc` sheet drag-down seamless.

## Step 2: Drag-down mechanics on *Calc*

Column A (*Tenor (yrs)*) is the driver: type any ladder $(1, 2, 3, 5, 10, 15, 20, 30)$ and drag formulas down.

- Accruals: $\Delta_i = T_i - T_{i-1}$ and $\delta_i = \Delta_i$ (or point to a foreign accrual rule).
- Lookups: $P_d(t,T_i)$, $P_f(t,T_i)$, $F_t(T_i)$ via `XLOOKUP` into the three `MarketData` tables.
- Forward-floating rates:

$$L_{d,i} = \frac{P_d(T_{i-1}) - P_d(T_i)}{\Delta_i P_d(T_i)}, \qquad L_{f,i} = \frac{P_f(T_{i-1}) - P_f(T_i)}{\delta_i P_f(T_i)},$$

  implemented by referencing the prior row's DF values.
- FX conversion factor: $C(t,T_i) = F_t(T_i)/S_t$ (uses named `Spot`).
- Period PVs: $\text{DomLeg}_i = \Delta_i P_d(T_i) L_{d,i}$, $\text{ForLeg}_i = \delta_i P_d(T_i) C(t,T_i) L_{f,i}$.
- Basis diagnostics: $B(t,T_i) = \dfrac{C(t,T_i)}{P_f/P_d}$, $\phi = \log B$, and $\text{BasisAdj}_i = \delta_i P_f(T_i)(B-1)L_{f,i}$.

The summary computes $A_d = \sum_i \Delta_i P_d$, $x = \dfrac{\sum_i \text{ForLeg}_i - \sum_i \text{DomLeg}_i}{A_d}$, and $x_{\text{basis}} = \dfrac{\sum_i \text{BasisAdj}_i}{A_d}$, with both decimal and bps displays.

## Step 3: Interpreting the outputs

- **Par spread $x$ (bps).** The fair domestic spread that equates legs. Positive $x$: foreign leg richer after converting via forwards; negative $x$: domestic leg richer.

- **Basis factor $B$.** $B = 1$ is CIP-consistent; $B \neq 1$ measures the wedge between observed forwards and the ratio $P_f/P_d$.

- **Log-basis $\phi = \log B$.** For small deviations, $\phi \approx B - 1$. Useful for linearised analytics and averaging.
- **Basis-only spread $x_{\text{basis}}$.** The portion of $x$ attributable purely to basis; lets you attribute moves in $x$ to basis vs. curve/rate effects.
- **Per-period reconciliation.** Inspect row-level contributions $\text{DomLeg}_i$, $\text{ForLeg}_i$, $\text{BasisAdj}_i$ to see which maturities drive the result.

## Step 4: Minimal next steps (plots & diagnostics)

These are small, high-signal additions that *show the maths working* and the method's power.

1. **CIP check: $B$ vs tenor.** Line plot of $B(t, T_i)$ across $T_i$. Add a reference line at 1.00. This visually quantifies basis across the curve.
2. **Spread decomposition: $x$ vs $x_{\text{basis}}$.** Two numbers (bars) or a stacked bar showing total $x$ and the basis-only share. Highlights whether $x$ is driven by basis or domestic/foreign curve shape.
3. **Waterfall of contributions.** Bar chart of period PV differences $\text{ForLeg}_i - \text{DomLeg}_i$. Reveals which maturities dominate the par spread.
4. **Sensitivity nibbles (optional).** Small bump tests: +1bp parallel on $C$ (or forwards), $P_d$, $P_f$ to show directional impacts on $x$. A simple three-bar "tornado" communicates robustness.

**Excel how-to (plots).** Select the data in `Calc`, insert a *Line* chart for $B$ vs tenor; insert *Clustered column* for $x$ (bps) and $x_{\text{basis}}$ (bps); insert *Column* for the per-period PV differences. Keep axis units in years and label bps explicitly.

## Operational notes and guardrails

- **Exact Bloomberg fields.** Field names and overrides depend on entitlement/source. Use the *Bloomberg Formula Builder* to pick the canonical fields (spot, forward outright or points, curve/DFs) and to inject tenor/date overrides tied to the `Tenor` cells so the `BDP` drags row-by-row.
- **Compounding conventions.** If converting rates to DFs, align day-count/compounding across domestic/foreign; mismatch will masquerade as basis.
- **Volatile recalc.** `BDP` is live; consider *Manual Calculation* during development to keep the sheet responsive.
- **Tenor alignment.** Ensure `tblPd`, `tblPf`, and `tblFwd` share the same tenor labels as `Calc!A`.

## Appendix A: Example Excel snippets (templates)

```
' Spot (named range Spot)
=BDP("EURUSD Curncy","PX_LAST")

' Forwards (per tenor row, use Formula Builder to emit field + tenor override)
=BDP("EURUSD Curncy","<FIELD_FOR_FWD_OUTRIGHT>",
     "Tenor", [@[Tenor]])

' If pulling zero rates then converting to discount factors:
' tblPdRates[Rate] holds the domestic zero rate r(T) in decimal (cont comp for example)
=EXP( - [@[Tenor]] * XLOOKUP([@[Tenor]], tblPdRates[Tenor], tblPdRates[Rate]) )

' Calc sheet (already wired in the scaffold)
C(t,T_i)    : =H(row)/Spot
B(t,T_i)    : =I(row)/(E(row)/D(row))
phi         : =LN(J(row))
DomLeg_i    : =B(row)*D(row)*F(row)
ForLeg_i    : =C(row)*D(row)*I(row)*G(row)
BasisAdj_i  : =C(row)*E(row)*(J(row)-1)*G(row)

' Summary
A_d         : =SUMPRODUCT(B:B, D:D) over active rows
x           : =(SUM(ForLeg_i)-SUM(DomLeg_i))/A_d
x_basis     : =SUM(BasisAdj_i)/A_d
```

## Appendix B: Minimal QC checklist

- $B$ near 1.00 when $\frac{F}{S} \approx \frac{P_f}{P_d}$ (CIP sanity).
- $P_d, P_f$ monotone decreasing in $T$ (typical DF shape).
- $\sum \Delta_i P_d$ (annuity) positive and of reasonable magnitude.
- Replacing forwards by $S \cdot P_f / P_d$ (i.e. forcing $B = 1$) shrinks $x_{\text{basis}}$ to $\approx 0$.

This completes the wiring from Bloomberg into the Excel engine, preserves the clean drag-down mechanics over arbitrary tenors, and provides immediate visual diagnostics ($B$-curve, spread decomposition, contribution waterfall) to demonstrate the mathematical structure and explanatory power of the method.