As we have seen in the fundamental Chap. 2 (see Sect. 2.1.2.4) the modelling of a term structure framework in general and the Interest Rate (IR) derivatives environment in particular, cannot fall into the simple context developed in Part I for a single asset. Therefore the tools we have been developing so far would equally prove insufficient. Evidently, one could consider each underlying individually (e.g. each forward swap or forward Libor rate) and would then be facing a term-by-term or “point-by-point” calibration approach, thereby forfeiting most of the inter-maturities dependency. Alternatively, what we envisage now is a way to model the shape and joint dynamics\textsuperscript{1} of the whole caplet or swaption surface.\textsuperscript{2}

To illustrate this point, let us consider two different swap underlyings—say 1Y5Y and 2Y7Y—each with an associated swaption smile (i.e. the implied volatility for all strikes, at the unique expiry). Then the results of Part I would allow us to approximate separately, and under two different measures, the shape and dynamics of these two smiles. Hence these results would provide no information on how the smiles move together. However, in order to price and hedge a structured product dependent on both forward swap rates (and/or their volatilities) the determination of these joint dynamics is essential.

This is typically the type of problem addressed by Part II. We introduce a new level of complexity to ACE, by considering a term structure as underlying. In an abstract framework we establish the new ZDC and compute the first layer, analysing how the multi-dimensional equations are altered.

Then we apply these results to an interest rate framework, more specifically some generic Stochastic Volatility HJM and LMM (Libor Market Model) setups. In particular, we show how the input chaos dynamics of these models allow us to approximate the implied volatility surface of bond options, caplets and physical swaptions.

\textsuperscript{1} The choice of measure will be discussed later.

\textsuperscript{2} By swaption surface we usually understate the swaption cube for all strikes and expiries, but for a given fixed tenor. Whether it be in the caplet or swaption case, the accrual—say 3M, or 6M Libor—also has to be fixed.