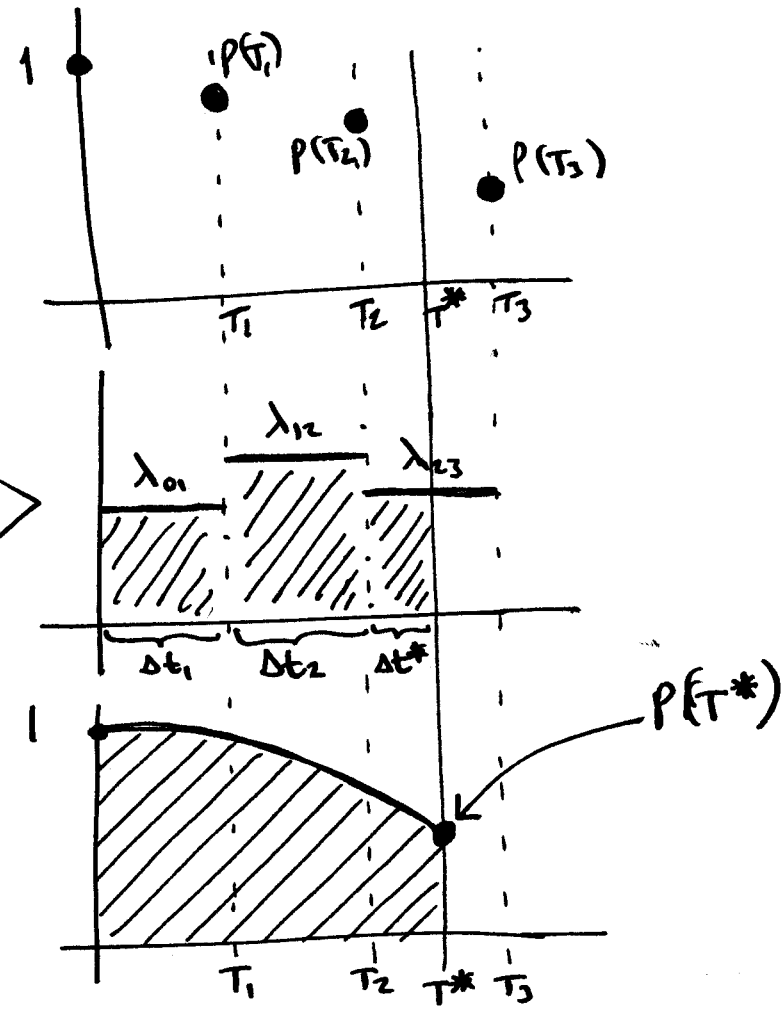
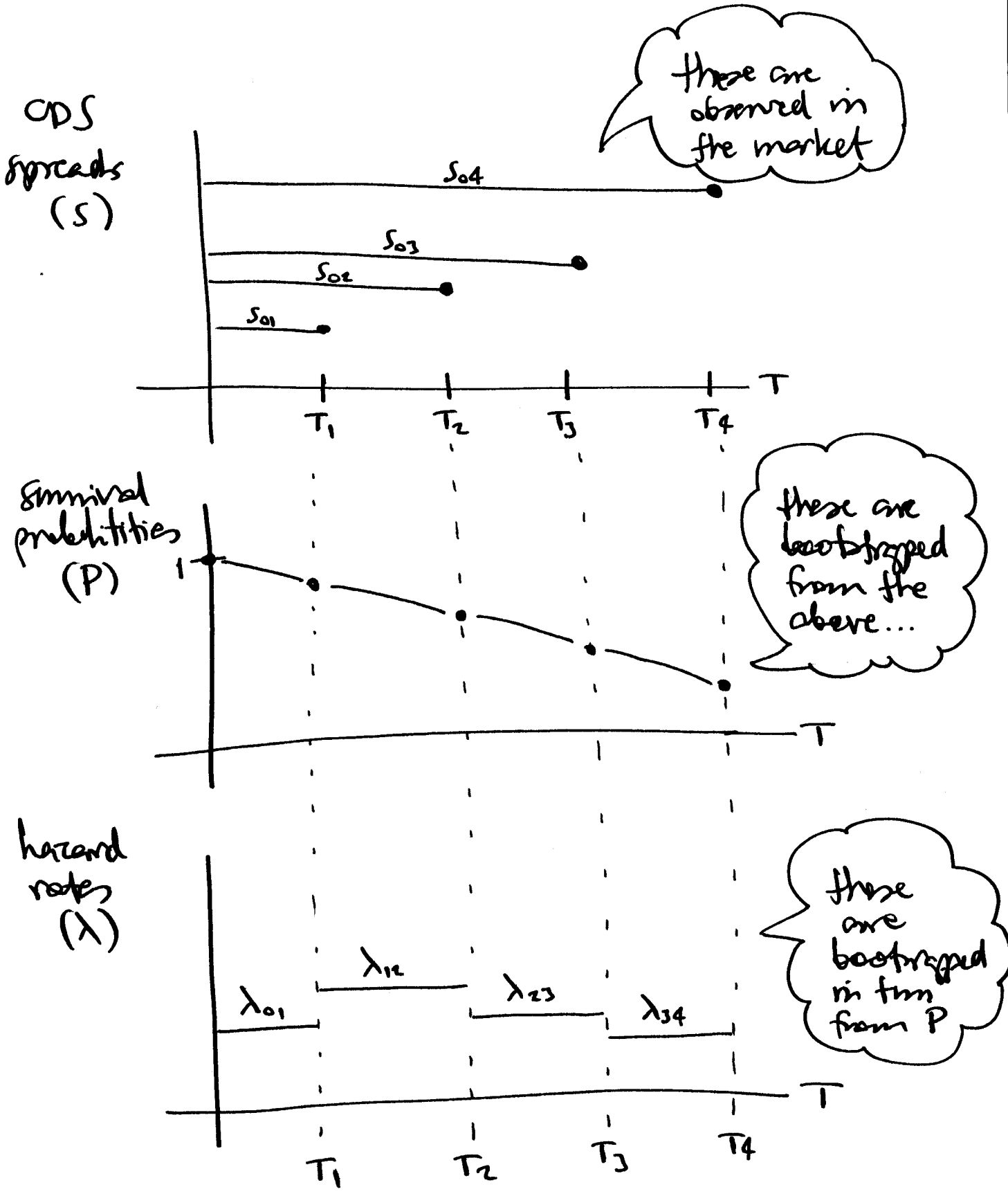
When we price derivatives we need the survival probabilities are particular dates in the future. If these are not one of the fixed dates $T_1, T_2, \ldots$ then we need to <u>interpolate</u>. We cannot interpolate directly on the $P(T_i)$ because they are discrete (points). However the hazard rates are a function (piece-wise continuous), so <u>we can</u> arrive to any point in time we want (T^*).

$$P(T^*) = \exp\left(-\int_0^{T^*} \lambda(s)\, ds\right)$$

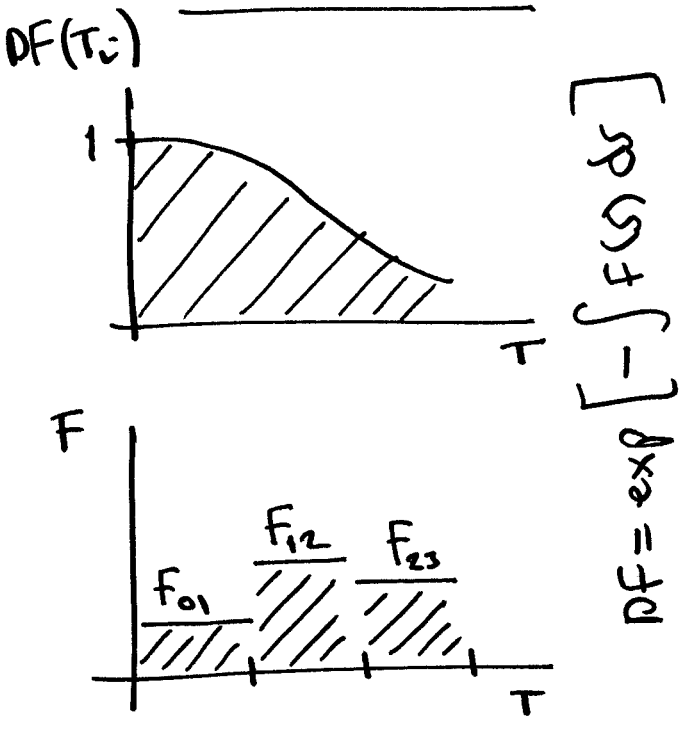
$$P(T^*) = \exp\left(-\sum_k \lambda_k \Delta t_k\right)$$

$$P(T^*) = \exp\left(-\lambda_{01}\Delta t_1 - \lambda_{12}\Delta t_2 - \lambda_{23}\Delta t^*\right)$$

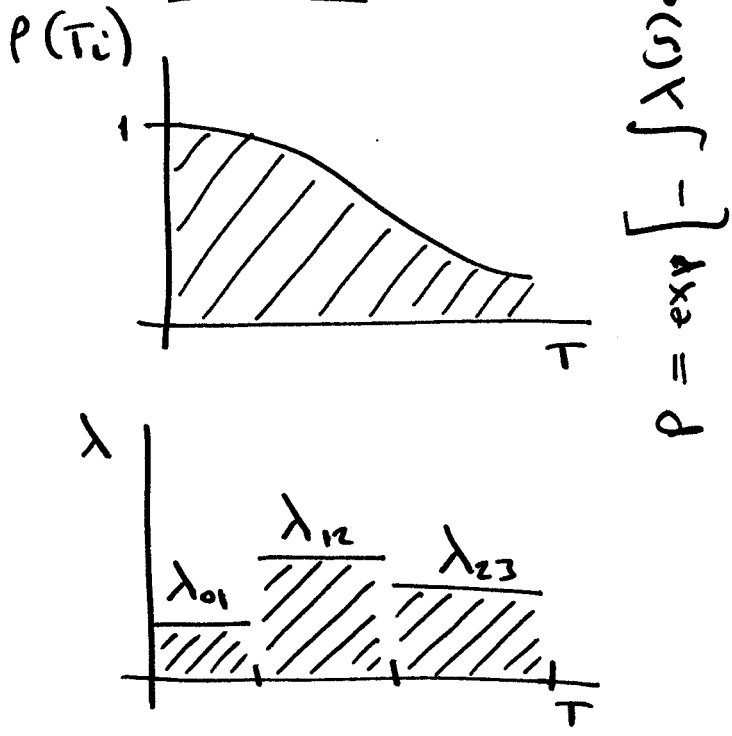



these are observed in the market
CDS spreads (S)
S_{04}
S_{03}
S_{02}
S_{01}
T
T_1
T_2
T_3
T_4
survival probabilities (P)
1
T
these are bootstrapped from the above...
hazard rates (λ)
λ_{01}
λ_{12}
λ_{23}
λ_{34}
T
T_1
T_2
T_3
T_4
these are bootstrapped in turn from P

Interest Rates.



Credit



discount factors $DF(T_i)$ $\Longleftrightarrow$ survival probabilities $P(T_i)$

forward rates $f(T_{i-1}, T_i)$ $\Longleftrightarrow$ hazard rates $\lambda(T_{i-1}, T_i)$