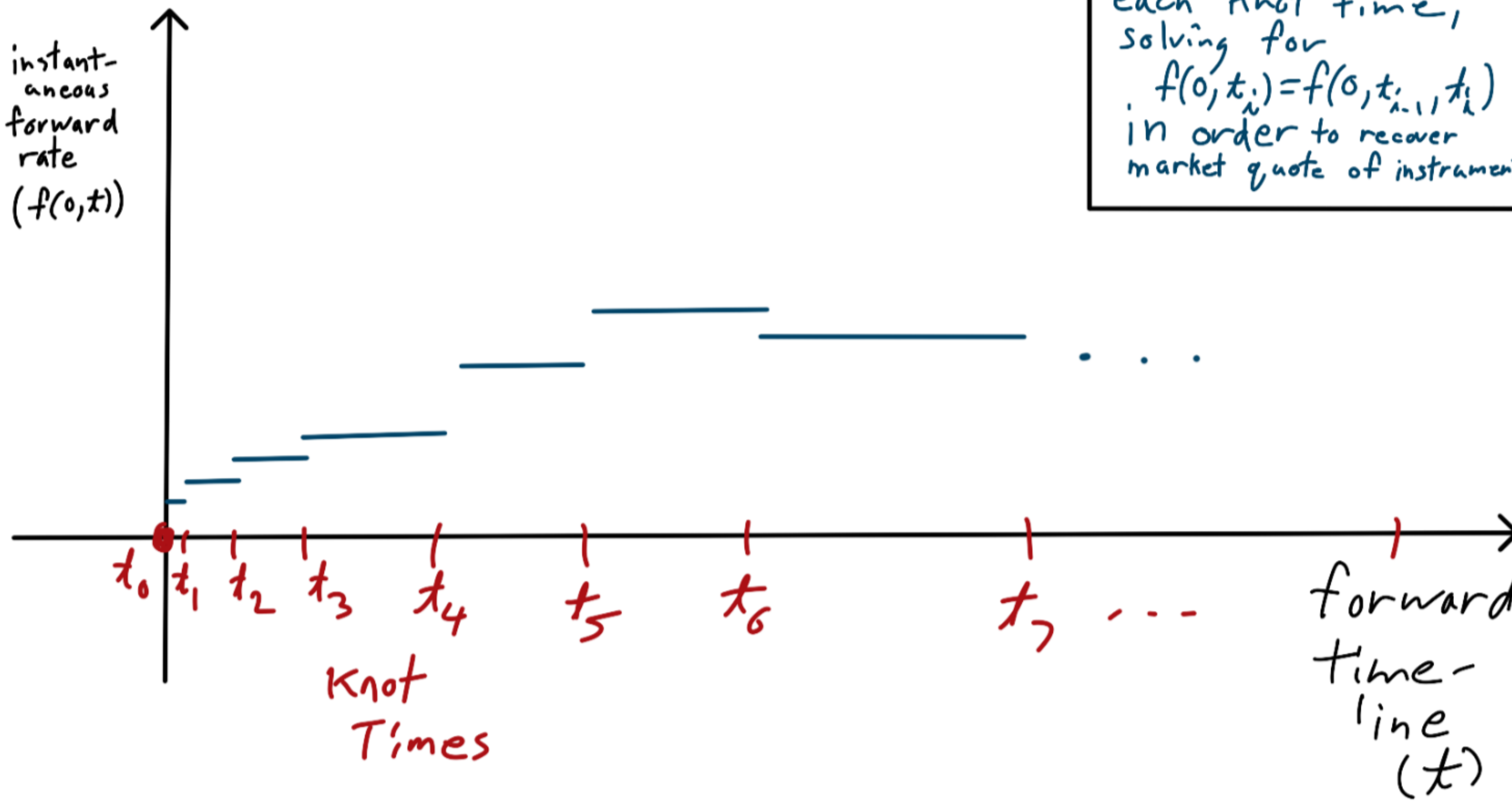
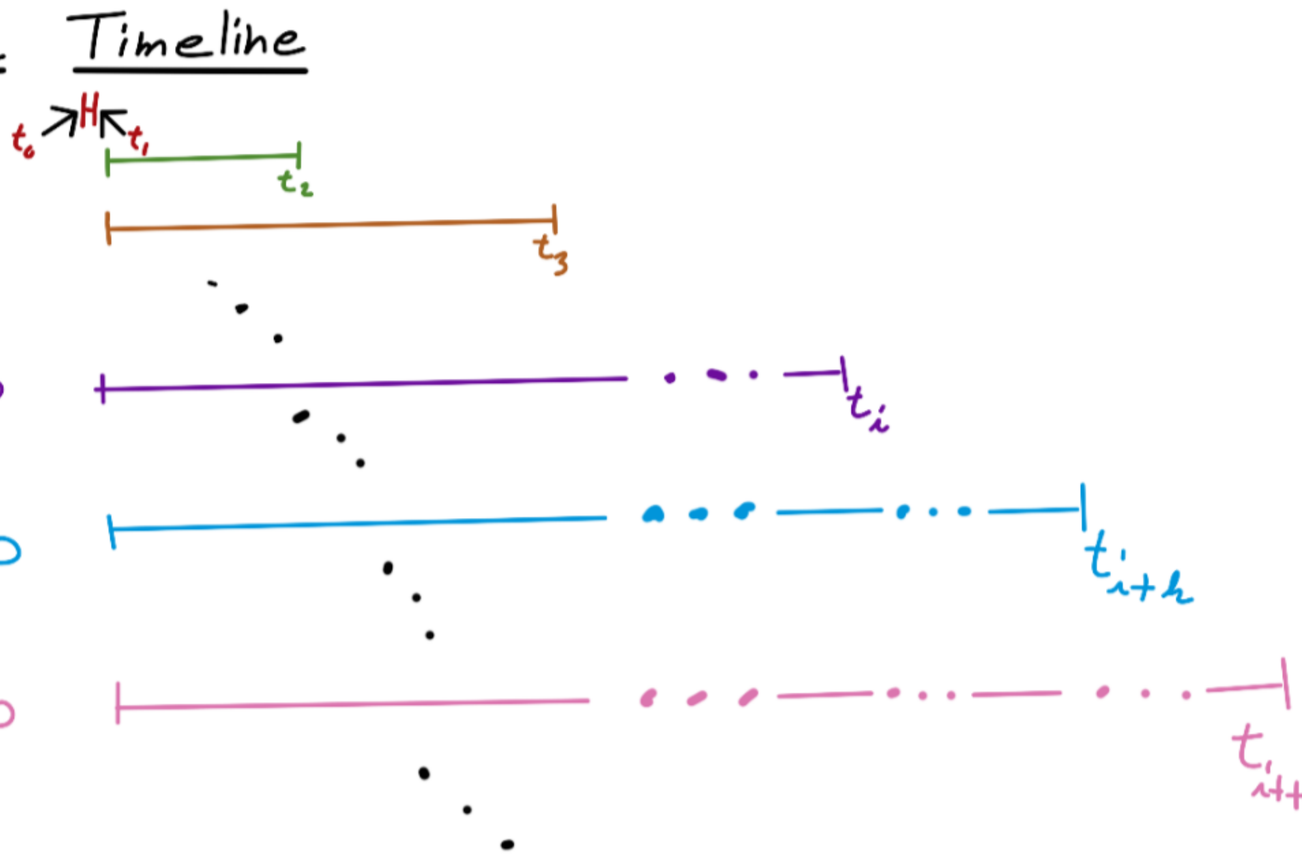
BOOTSTAP ALGO. & PARAM.

Iterate through each knot time, solving for $f(0,t_i)=f(0,t_{i-1},t_i)$ in order to recover market quote of instrument i



BOOTSTRAP ALGO. & PARAM.

Instrument	Tenor	Quote
EONIA	O/N	−7bp
OIS	1M	−8bp
OIS	3M	−10bp
⋮	⋮	⋮
OIS	1Y	−14bp
⋮	⋮	⋮
OIS	5Y	−4bp
⋮	⋮	⋮
OIS	10Y	+27bp
⋮	⋮	⋮



Maturity dates used for knot times (Act/365):

$$0 = t_0 < t_1 < t_2 < t_3 < \cdots < t_i < \cdots$$

SOLVING FOR BREAKEVEN SWAP RATE

$$c = \frac{P(0,t') - P(0,s_m)}{\sum_{j=1}^{m} \hat{\tau}_j P(0,s_j)}$$

$\leftarrow$ float leg (matched discounting)

$\leftarrow$ annuity (fixed) leg

$\uparrow$ break-even rate

prior knot time

$$c = \frac{P(0,t')/P(0,t_{i-1}) - P(0,t_i)/P(t_{i-1})}{\sum_{j=1}^{\bar{m}} \hat{\tau}_j P(0,s_j)/P(0,t_{i-1}) + \sum_{j=\bar{m}+1}^{m} \hat{\tau}_j P(0,s_j)/P(0,t_{i-1})}$$

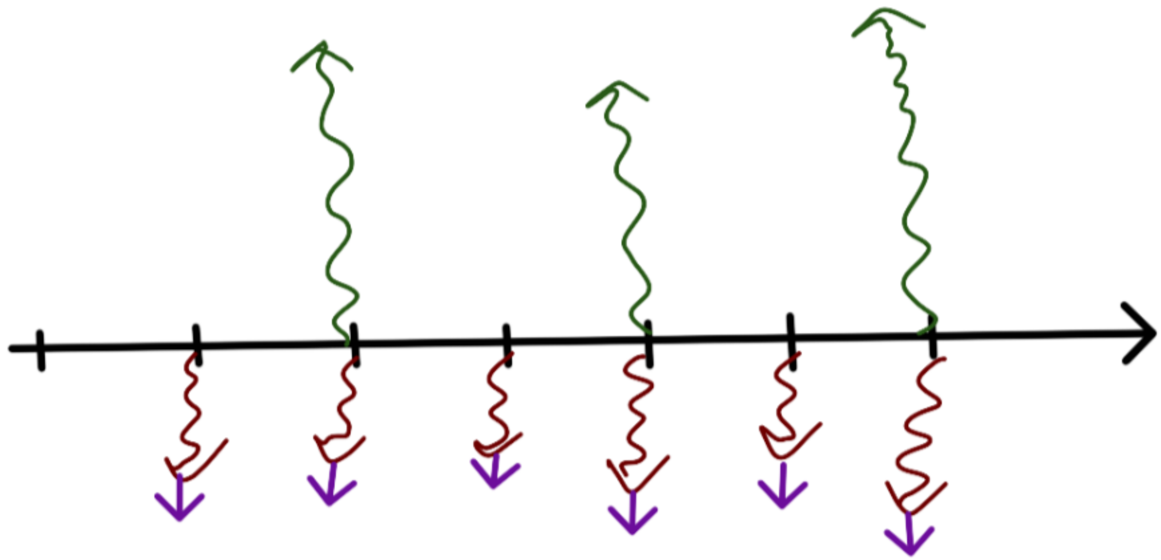
$$= \frac{P(0,t';t_{i-1})^{-1} - e^{-f(0,t_i)(s_j - t_{i-1})}}{\sum_{j=1}^{\bar{m}} \hat{\tau}_j P(0,s_j,t_{i-1})^{-1} + \sum_{j=\bar{m}+1}^{m} \hat{\tau}_j e^{-f(0,t_i)(s_j - t_{i-1})}}$$

sums of exponentials of $f(0,t_i)$ requires root finding method

$$P(0,s_j)/P(0,t_{i-1}) = e^{-f(0,t_i)(s_j - t_{i-1})}$$

for $j > \bar{m}$

LIBOR Basis Swaps

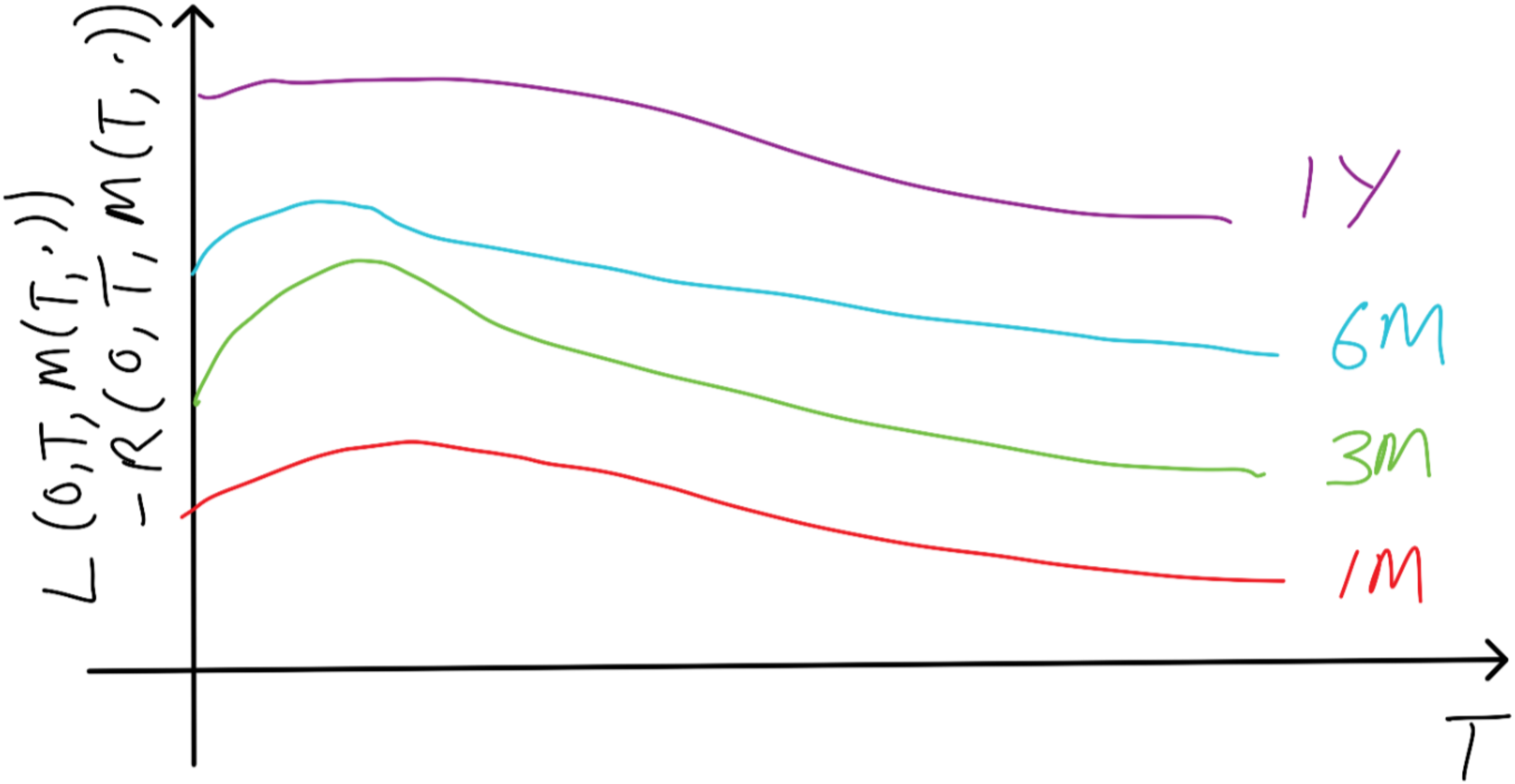


receive LIBOR of longer tenor, e.g. 6M

pay LIBOR of shorter tenor, e.g. 3M

plus a fixed spread

Multiple LIBOR term structures, one for each LIBOR tenor



LIBOR Term Structure

If we represent LIBOR term structure with discount factors the forward LIBOR is recovered with

$$1+\tau L(t,T,T+\tau) = \frac{P(t,T)}{P(t,T+\tau)}$$

as we know from arbitrage-free pricing arguments under matched discounting.
But this need not hold for LIBOR as it now operates under mis-matched OIS discounting.

Thus we would artificially constrain the possible LIBOR term structure $T \mapsto L(t,T,T+\tau)$ to be homogeneous if we insist on representing it with discount factors, zero rates, or instantaneous forward rates.

$$\underbrace{\log(1+(M-T)L(0,T,M))}_{=g(T,M)} = \underbrace{\log P(0,T)}_{=-h(T)} - \log P(0,M)$$

$$g(T,M) = h(M) - h(T)$$