MARKING TO MARKET

Imagine a futures contract that has been written at time $t = 0$, which obliges a party to supply an asset or a commodity at time τ for a settlement price of $F_{\tau|0}$. This party, which takes the short position, might currently own the asset or they might be in the process of producing a commodity to bring to market at a future date. Then, their purpose in holding the contract would be to guarantee a price for their product. Alternatively, the contract holder might be a speculator with no essential interest in the underlying asset.

In any case, the contract holder will be required to deposit with the brokers a sum of money described as the margin, which will be calculated at a percentage of the current spot price S_0 of the asset. At the end of each day of trading on the futures exchange, the margin will be adjusted to reflect the gains or losses of the contract holder. Should the cumulated losses reduce the margin to below a certain threshold level, described as the maintenance margin, then extra funds will be called for to maintain its level.

The process of adjusting the margin account is described as marking to market, and its effect is to ensure that, at the end of any day of futures trading, when the daily settlements have been made, there will be no outstanding obligations. This will allow the position of the contract holder to be closed without further losses or gains, thereby virtually eliminating the risk of a default on the contract. These circumstances are symbolised in the following table:

Day	*Futures Price*	*Gain or Loss*
t	$F_{\tau\|t}$	δ_t
0	$F_{\tau\|0}$	—
1	$F_{\tau\|1}$	$\delta_1 = F_{\tau\|1} - F_{\tau\|0}$
2	$F_{\tau\|2}$	$\delta_2 = F_{\tau\|2} - F_{\tau\|1}$
$\vdots$	$\vdots$	$\vdots$
τ	$F_{\tau\|\tau} = S_\tau$	$\delta_\tau = S_\tau - F_{\tau\|\tau-\|1}$

It can be assumed safely that $F_{\tau|t} \to S_\tau$ as $t \to \tau$, which is to say that the futures price converges to the spot price as the delivery time approaches. In that case, the settlement on the final day, which is $\delta_\tau = S_\tau - F_{\tau|\tau-1}$, will be a negligable amount. At that time, the cumulated total of the adjustments is

$$\sum_{t=1}^{\tau} \delta_t = S_\tau - F_{\tau|0},$$

which is the difference between the contract price and the spot price on the date of delivery. Observe, however, that the contract could be closed at any time t prior to the delivery date. Then the cumulated total of the adjustments would be

$$\sum_{j=1}^{t} \delta_j = F_{\tau|t} - F_{\tau|0}.$$

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