CHAPTER 5

Margin & M2M

5.1 – Things you should know by now

Margins clearly play a very crucial role in futures trading as it enables one to leverage. In fact, margins are the one that gives a 'Futures Agreement' the required financial twist (as compared to the spot market transaction). For this reason, understanding the margins and many facets of margins is extremely important.

However before we proceed any further, let us list down a list of things you should know by now. These are concepts we had learnt over the last 4 chapters, reiterating these crucial takeaways will help us consolidate all the learning. At this, if you are not clear about any of the following points you will need to revisit the previous chapters and refresh your understanding.

1. Futures is an improvisation over the Forwards

2. The futures agreement inherits the transactional structure of the forwards market

3. A futures agreement enables you to financially benefit if you have an accurate directional view on the asset price

4. The futures agreement derives its value from its corresponding underlying in the spot market

a. For example TCS Futures derives its value from the underlying in the TCS Spot market

5. The Futures price mimics the underlying price in the spot market

a. The futures price and the spot price of an asset are different, this is attributable to the futures pricing formula. We will discuss this point at a later stage in the module

6. The futures contract is a standardized contract wherein the variables of the agreement is predetermined – lot size and expiry date

a. Lot size is the minimum quantity specified in the futures contract

b. Contract value = Futures Price * Lot Size

c. Expiry is the last date up to which one can hold the futures agreement

7. To enter into a futures agreement one has to deposit a margin amount, which is calculated as a certain % of the contract value

a. Margins allow us to deposit a small amount of money and take exposure to a large value transaction, thereby leveraging on the transaction

8.When we transact in a futures contract, we digitally sign the agreement with the counter party, this obligates us to honor the contract upon expiry

9.The futures agreement is tradable. Which means you need not hold on to the agreement till the expiry

a. You can hold the futures contract till you have a conviction on the directional view on the asset, once your view changes you can get out of the futures agreement

b. You can even hold the futures agreement for a few minutes and financially benefit if the price moves in your favor

c. An example of the above point would be to buy Infosys Futures at 9:15 AM at a price of 1951 and sell it by 9:17AM at 1953. Since Infosys lot size is 250, one would stand to make Rs.500/- (2 * 250) within a matter of 2 minutes

d. You can even choose to hold it overnight for a few days or hold on to it till expiry.

10. Equity futures contracts are cash settled

11. By virtue of leverage a small change in the underlying, results in a massive impact on the P&L

12. The profits made by the buyer is equivalent to the loss made by the seller and vice versa

13. Futures Instrument allows one to transfer money from one pocket to another, hence it is called a "Zero Sum Game"

14. The higher the leverage, the higher the risk

15. The payoff structure of a futures instrument is linear

16. The futures market is regulated by Securities and Exchange Board of India (SEBI). Thanks to the watchful eye of SEBI, there have been no incidence of counterparty default in the futures market

If you can clearly understand the points mentioned above then I'd assume you are on the right track so far. If you have any questions on any of the above mentioned points then you need to re-visit the previous four chapters to get the concept right.

Anyway, assuming you are clear so far let us now focus more on concept of margins and mark to market.

5.2 – Why are Margins charged?

Let us now rewind back to the example we quoted in the forwards market (chapter 1). In the example quoted, 3 months from now ABC Jewelers agrees to buy 15Kgs of Gold at Rs.2450/- per gram from XYZ Gold Dealers.

We can now clearly appreciate that any variation in the price of gold will either affect ABC or XYZ negatively. If the price of gold increases then XYZ suffers a loss and ABC makes a profit. Likewise, if the price of gold decreases ABC suffers a loss and XYZ makes a profit. Also we know that a forwards agreement works on a gentleman's word. Consider a situation where the price of gold has drastically gone up placing XYZ Gold Dealers in a difficult spot. Clearly XYZ can say they cannot make the necessary payment and thereby default on the deal. Obviously what follows will be a long and grueling legal chase, but that is outside our focus area. The point to be noted here is that, in a forwards agreement the scope and the incentive to default is very high.

Since futures market is an improvisation over the forwards market, the angle of default is carefully and intelligently dealt with. This is where the margins play a role.

In the forwards market there is no regulator. The agreement takes place between two parties with literally no intermediary watching over their transaction. However, in the futures market, all trades are routed through an exchange. The exchange in return takes the onus of guaranteeing the settlement of all the trades. When I say 'onus of guaranteeing', it literally means the exchange

makes sure you get your money if you are entitled. This also means they ensure they collect the money from the party who is supposed to pay up.

So how does the exchange make sure this works seamlessly? Well, they make this happen by means of –

1. Collecting the margins
2. Marking the daily profits or losses to market (also called M2M)

We briefly looked into the concept of Margin in the previous chapter. The concept of Margin and M2M is something that you need to know in parallel to fully appreciate the dynamics of futures trading. However since it is difficult to explain both the concepts at the same time, I would like to pause a bit on margins and proceed to M2M. We will understand M2M completely and come back again to margins. We will then relook at margins keeping M2M in perspective. But before we move to M2M, I would like you to keep the following points in the back of your mind –

1. At the time of initiating the futures position, margins are blocked in your trading account
2. The margins that get blocked is also called the "Initial Margin"
3. The initial margin is made up of two components i.e. SPAN margin and the Exposure Margin
4. **Initial Margin = SPAN Margin + Exposure Margin**
5. Initial Margin will be blocked in your trading account for how many ever days you choose to hold the futures trade
    a. The value of initial margin varies daily as it depends on the futures price
    b. Remember, Initial Margin = % of Contract Value
    c. Contract Value = Futures Price * Lot Size
    d. Lot size is a fixed, but the futures price varies every day. This means the margins also vary everyday

So for now, remember just these points. We will go ahead to understand M2M and then we will come back to margins to complete this chapter.

5.3 – Mark to Market (M2M)

As we know the futures price fluctuates on a daily basis, by virtue of which you either stand to make a profit or a loss. Marking to market, or mark to market (M2M) is a simple accounting procedure which involves adjusting the profit or loss you have made for the day and entitling you the

same. As long as you hold the futures contract, M2M is applicable. Let us take up a simple example to understand this.

Assume on 1st Dec 2014 at around 11:30 AM, you decide to buy Hindalco Futures at Rs.165/-. The Lot size is 2000. 4 days later on 4th Dec 2014 you decide to square off the position at 2:15 PM at Rs.170.10/-. Clearly as the calculation below shows, this is a profitable trade –

Buy Price = Rs.165

Sell Price = Rs.170.1

Profit per share = (170.1 – 165) = Rs.5.1/-

Total Profit = 2000 * 5.1

= Rs.10,200/-

However, the trade was held for 4 working days. Each day the futures contract is held, the profits or loss is marked to market. While marking to market, the previous day closing price is taken as the reference rate to calculate the profit or losses.

Day	Closing Price
1st Dec 2014	168.3
2nd Dec 2014	172.4
3rd Dec 2014	171.6
4th Dec 2014	169.9

The table above shows the futures price movement over the 4 days the contract was held. Let us look at what happens on a day to day basis to understand how M2M works –

On **Day 1** at 11:30AM the futures contract was purchased at Rs.165/-, clearly after the contract was purchased the price has gone up further to close at Rs.168.3/-. Hence profit for the day is 168.3 minus 165 = Rs.3.3/- per share. Since the lot size is 2000, the net profit for the day is 3.3*2000 = Rs.6600/-.

Hence the exchange ensures (via the broker) that Rs.6600/- is credited to your trading account at the end of the day.

1. But where is this money coming from?

a. Obviously it is coming from the counterparty. Which means the exchange is also ensuring that the counterparty is paying up Rs.6600/- towards his loss

2. But how does the exchange ensure they get this money from the party who is supposed to pay up?

a. Obviously through the margins that are deposited at the time of initiating the trade. But more on this later.

Now here is another important aspect you need to note – from an accounting perspective, the futures buy price is no longer treated as Rs.165 but instead it will be considered as Rs.168.3/- (closing price of the day). Why is that so you may ask? Well, the profit that was earned for the day has been given to you already by means of crediting the trading account. So you are fair and square for the day, and the next day is considered a fresh start. Hence the buy price is now considered at Rs. 168.3, which is the closing price of the day.

On **day 2**, the futures closed at Rs.172.4/-, clearly another day of profit. The profit earned for the day would be Rs.172.4/ – minus Rs.168.3/- i.e. Rs.4.1/- per share or Rs.8,200/- net profit. The profits that you are entitled to receive is credited to your trading account and the buy price is reset to the day's closing price i.e. 172.4/-.

On **day 3**, the futures closed at Rs.171.6/- which means with respect to the previous day's close price there is a loss to the extent of Rs.1600 /- (172.4 – 171.6 * 2000). The loss amount will be automatically debited from your trading account. Also, the buy price is now reset to Rs.171.6/-.

On **day 4**, the trader did not continue to hold the position through the day, but rather decided to square off the position mid day 2:15 PM at Rs.170.10/-. Hence with respect to the previous day's close he again made a loss. That would be a loss of Rs.171.6/- minus Rs.170.1/- = Rs.1.5/- per share and Rs.3000/- (1.5 * 2000) net loss. Needless to say after the square off, it does not matter where the futures price goes as the trader has squared off his position. Also, Rs.3000/- is debited from the trading account by end of the day.

Now, let us just tabulate the value of the daily mark to market and see how much money has come in and how much money has gone out –

Day	Ref Price for M2M	Closing Price	Daily M2M
1st Dec 2014	165	168.3	+ Rs.6,600/-
2nd Dec 2014		172.4	+Rs.8,200/-
3rd Dec 2014	168.3	171.6	-Rs.1,600/-
4th Dec 2014	171.6 & 170.1	169.9	– Rs.3,000/-
Total			**+Rs.10,200/-**

Well, if you summed up all the M2M cash flow you will end up the same amount that we originally calculated, which is –

Buy Price = Rs.165/-

Sell Price = Rs.170.1/-

Profit per share = (170.1 – 165) = Rs.5.1/-

Total Profit = 2000 * 5.1

= **Rs.10,200/-**

So, the mark to market is just a daily accounting adjustment where –

1. Money is either credited or debited (also called daily obligation) based on how the futures price behaves

2. The previous day close price is taken into consideration to calculate the present day M2M

Why do you think M2M is required in the first place? Well, think about it – M2M is a daily cash adjustment by means of which the exchange drastically reduces the counterparty default risk. As long a trader holds the contract, the exchange by virtue of the M2M ensures both the parties are fair and square on a daily basis.

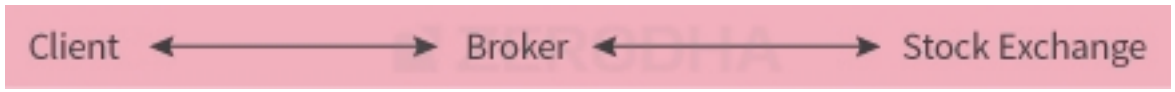
Now, keeping this basic concept of M2M, let us now move back to relook at margins and see how the trade evolves during its life.

5.4 – Margins, the bigger perspective

Let us now relook at margins keeping M2M in perspective. As mentioned earlier, the margins required at the time of initiating a futures trade is called "Initial Margin (IM)". Initial margin is a certain % of the contract value. We also know –

Initial Margin (IM) = SPAN Margin + Exposure Margin

Each and every time a trader initiates a futures trade (for that matter any trade) there are few financial intermediaries who work in the background making sure that the trade carries out smoothly. The two prominent financial intermediaries are the broker and the exchange.



Now if the client defaults on an obligation, obviously it has a financial repercussion on both the broker and the exchange. Hence if both the financial intermediaries have to be insulated against a possible client default, then both of them need to be covered adequately by means of a margin deposit.

In fact this is exactly how it works – 'SPAN Margin' is the minimum requisite margins blocked as per the exchange's mandate and 'Exposure Margin' is the margin blocked over and above the SPAN to cushion for any MTM losses. Do note both SPAN and Exposure margin are specified by the exchange. So at the time of initiating a futures trade the client has to adhere to the initial margin requirement. The entire initial margin (SPAN + Exposure) is blocked by the exchange.

Between the two margins, SPAN Margin is more important as not having this in your account means a penalty from the exchange. The SPAN margin requirement has to be strictly **maintained** as long as the trader wishes to carry his position overnight/next day. In fact for this reason, SPAN margin is also sometimes referred to as the **"Maintenance Margin".**

So how does the exchange decide what should be the SPAN margin requirement for a particular futures contract? Well, they use an advance algorithm to calculate the SPAN margins on a daily basis. One of the key inputs that goes into this algorithm is the 'Volatility' of the stock. Volatility is a very crucial concept; we will discuss it at length in the next module. For now just remember this – if volatility is expected to go up, the SPAN margin requirement also goes up.

Exposure margin, which is an additional margin, varies between 4% -5% of the contract value.

Now, let us look at a futures trade keeping both the margin and the M2M in perspective. The trade details are as shown below –

Particular	Details
Symbol	HDFC Bank Limited
Trade Type	Long
Buy Date	10th Dec 2014
Buy Price	Rs.938.7/- per share

Particular	Details
Sell Date	19th Dec
Sell Price	Rs.955/- per share
Lot Size	250
Contract Value	250*938.7 = Rs.234,675/-
SPAN Margin	7.5% of CV = Rs.17,600/-
Exp Margin	5.0% of CV = Rs.11,733/-
IM (SPAN + Exposure)	17600 + 11733 = Rs.29,334/-
P&L per share	Profit of Rs.16.3/- per share (955 – 938.7)
Net Profit	250 * 16.3 = Rs.4,075/-

If you are trading with Zerodha, you may know that we provide a Margin calculator that explicitly states the SPAN and Exposure margin requirements. Of course, at a later stage we will discuss in detail the utility of this extremely useful tool. But for now, you could check out this margin calculator.

So keeping the above trade details in perspective, let us look at how the margins and M2M plays a role simultaneously during the life of the trade. The table below shows how the dynamics change on a day to day basis –

Date	Close	CV	SPAN	Exposure	Total Margin	M2M	Cash Balance
10-Dec-14	940	235,000	17,625	11,750	29,375	325	29,659
11-Dec-14	939	234,750	17,606	11,738	29,344	(250)	29,409
12-Dec-14	930	232,500	17,438	11,625	29,063	(2,250)	27,159
15-Dec-14	949	237,250	17,794	11,863	29,656	4,750	31,909
16-Dec-14	933	233,250	17,494	11,663	29,156	(4,000)	27,909
17-Dec-14	925	231,250	17,344	11,563	28,906	(2,000)	25,909
18-Dec-14	938	234,500	17,588	11,725	29,313	3,250	29,159
19-Dec-14	955	238,750	17,906	11,938	29,844	4,250	33,409

Lot Size	250
SPAN	7.5% of CV
Exposure	5.0% of CV
Initial cash blocked	29,334
Cash Released	33,409
Difference	4,075
Total M2M	4,075
Profits Earned	4,075
% Return	13.9%

I hope you don't get intimidated looking at the table above, in fact it is quite easy to understand. Let us go through it sequentially, day by day.

10th Dec 2014

Sometime during the day, HDFC Bank futures contract was purchased at Rs.938.7/-. Lot size is 250, hence the contract value is Rs.234,675/-. As we can see from the box on the right, SPAN is 7.5% and Exposure is 5% of CV respectively.

Hence 12.5% of CV is blocked as margins (SPAN + Exposure), this works up to a total margin of Rs.29,334/-. The initial margin is also considered as the **initial cash blocked** by the broker.

Going ahead, HDFC closes at 940 for the day. At 940, the CV is now Rs.235,000/- and therefore the total margin requirement is Rs.29,375/- which is a marginal increase of Rs.41/- when compared to the margin required at the time of the trade initiation. The client is not required to infuse this money into his account as he is sufficiently covered with a M2M profit of Rs.325/- which will be credited to his account.

The total cash balance in the trading account = Cash Balance + M2M

= Rs.29,334 + Rs.325

= Rs.29,659/-

Clearly, the cash balance is more than the total margin requirement of Rs.29,375/- hence there is no problem. Further, the reference rate for the next day's M2M is now set to Rs.940/-.

11th Dec 2014

The next day, HDFC Bank drop by Rs.1/- to Rs.939/- per share impacting the M2M by negative Rs.250/-. This money is taken out from the cash balance (and will be credited to the person making this money). Hence the new cash balance will be –

= 29659 – 250

= Rs.29,409/-

Also, the new margin requirement is calculated as Rs.29,344/-. Clearly the cash balance is higher than the margin required, hence there is nothing to worry about. Also, the reference rate for the next day's M2M is reset at Rs.939/-

12th Dec 2014

This is an interesting day. The futures price fell by Rs.9/- taking the price to Rs.930/- per share. At Rs.930/- the margin requirement also falls to Rs.29,063/-. However because of an M2M loss of Rs.2250/- the cash balance drops to Rs.27,159/- (29409 – 2250), which is less than the total margin requirement. Now since the cash balance is less than the total margin requirement, is the client required to pump in the additional money? Not really.

Remember between the SPAN and Exposure margin, the most sacred one is the SPAN margin. Most of the brokers allow you to continue to hold your positions as long as you have the SPAN

Margin (or maintenance margin). Moment the cash balance falls below the maintenance margin, they will call you asking you to pump in more money. In the absence of which, they will force close the positions themselves. This call, that the broker makes requesting you to pump in the required margin money is also popularly called the "**Margin Call**". So, if you are getting a margin call from your broker, it means your cash balance is dangerously low to continue the position.

Going back to the example, the cash balance of Rs.27,159/- is above the SPAN margin (Rs.17,438/-) hence there is no problem. The M2M loss is debited from the trading account and the reference rate for the next day's M2M is reset to Rs.930/-.

Well, I hope you have got a sense of how both margins and M2M come into play simultaneously. I also hope you are able to appreciate how by virtue of the margins and M2M, the exchange can efficiently tackle the threat of a possible default by a client. The margin + M2M combination is virtually a fool proof method to ensure defaults don't occur.

Assuming you are getting a sense of the dynamics of margins and M2M calculation, I will now take the liberty to cut through the remaining days and proceed directly to the last day of trade.

19th Dec 2014

At 955, the trader decides to cash out and square off the trade. The reference rate for M2M is the previous day's closing rate which is Rs.938. So the M2M profit would Rs.4250/- which gets added to the previous day cash balance of Rs.29,159/-. The final cash balance of Rs.33,409/- (Rs.29,159 + Rs.4250) will be released by the broker as soon as the trader squares off the trade.

So what about the overall P&L of the trade? Well, there are many ways to calculate this –

Method 1) – Sum up all the M2M's

P&L = Sum of all M2M's

= 325 – 250 – 2250 + 4750 – 4000 – 2000 + 3250 + 4250

= Rs.4,075/-

Method 2) – Cash Release

P&L = Final Cash balance (released by broker) – Cash Blocked Initially (initial margin)

= 33409 – 29334

= Rs.4,075/-

Method 3) – Contract Value

P&L = Final Contract Value – Initial Contract Value

= Rs.238,750 – Rs.234,675

=Rs.4,075/-

Method 4) – Futures Price

P&L = (Difference b/w the futures buy & sell price) * Lot Size

Buy Price = 938.7, Sell Price = 955, Lot size = 250

= 16.3 * 250

= Rs. 4,075/-

As you can notice, either which ways you calculate, you arrive at the same P&L value.

5.5 – An interesting case of 'Margin Call'

For a moment, let us assume the trade was not closed on 19th Dec, and in fact carried forward to the next day i.e 20th Dec. Also, let us assume HDFC Bank drops heavily on 20th December – maybe a 8% drop, dragging the price to 880 all the way from 955. What do you think will happen? In fact, can you answer the following questions?

1. What is the M2M P&L?
2. What is the impact on cash balance?
3. What is the SPAN and Exposure margin required?
4. What action does the broker take?

I hope you are able to calculate and answer these questions yourself, if not here are the answers for you –

1. The M2M loss would be Rs.18,750/- = (955 – 880)*250. The cash balance on 19th Dec was Rs. 33,409/- from which the M2M loss would be deducted making the cash balance Rs.14,659/- (Rs.33,409 – Rs.18,750).
2. Since the price has dropped the new contract value would be Rs.220,000/- (250*880)
    a. SPAN = 7.5% * 220000 = Rs.16,500/-
    b. Exposure = Rs.11,000/-

c. Total Margin = Rs.27,500/-

3. Clearly, since the cash balance (Rs.14,659/-) is less than SPAN Margin (Rs.16,500/-), the broker will give a Margin Call to the client, or in fact some brokers will even cut the position real time as and when the cash balance drops below the SPAN requirement.

Key takeaways from this chapter

1. A margin payment is required (which will be blocked by your broker) as long as the futures trade is live

2. The margin blocked by the broker at the time of initiating the futures trade is called the initial margin

3. Both the buyer and the seller of the futures agreement will have to deposit the initial margin amount.

4. The margin amount collected acts as a leverage, as it allows you to deposit a small amount of money and take exposure to a large value transaction

5. M2M is a simple accounting adjustment, the process involves crediting or debiting the daily obligation money in your trading account based on how the futures price behaves

6. The previous day closing price figure is taken to calculate the current day's M2M

7. SPAN Margin is the margin collected as per the exchanges instruction and the Exposure Margin is collected as per the broker's requirement

8. The SPAN and Exposure Margin is determined as per the norms of the exchange

9. The SPAN Margin is popularly referred to as the Maintenance Margin

10. If the margin account goes below the SPAN, the investor must deposit more cash into his account if he aspires to carry forward the future position

11. The Margin Call is when the broker requests the trader to infuse the required margin money when the cash balance goes below the required level