FINANCIAL DERIVATIVES

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Solution 1:

For IG, which is quoted in terms of rate, the IG can be treated just like a single name CDS and we can use the formula:

$$V(\Phi; \varphi) = (\varphi - \Phi) \int_t^T e^{-r(s-t)} \left(1 - H(s; t)\right) ds$$

Where Φ is the coupon fee and φ is the current fair fee. Here, integral term is just the same as the sum of the risky discount factors. These won't be too different from riskless discount factors because IG bonds are all pretty safe.

According to Bloomberg, Φ=100bp, and φ is calculated as the average of the price(or rate) of the beginning of the month and the end of the month. According to Bloomberg, we have the following price and rate for the period from Jan 1,2012 to Mar 31,2012:

CDX IG CDSI S9 5Y	average rate(bp)	CDX IG CDSI S9 10	average rate(bp)
Jan	112	Jan	135.5
Feb	87	Feb	117.5
Mar	76.5	Mar	112.5
CDX HY CDSI S17 5Y	average price		
Jan	95.15		
Feb	97.665		
Mar	98.055		

We use the monthly treasure rate as our discounted rate. Jan: 1.97%; Feb 1.97%; Mar 2.18%. the integral term is exp(-0.0197*1)=0.9805 ; exp(-0.0197*2)=0.9614 ; exp(-0.0218*3)=0.9367.

So for CDX IG CDSI S9 5Y, the payoff is 25*[(0.0112-0.0100)*0.9805+(0.0087 0.01)*0.9614+(0.00765-0.01)*0.9367]= -0.05686163;

For CDX IG CDSI S9 10, the payoff is -35*[(0.01355-0.0100)*0.9805+(0.01175-0.01)*0.9614+(0.01125-0.01)*0.9367]=0.2216935;

For CDX IG CDSI S9 10 (100 billion during Feb and Mar, assume that it was bought on Feb 1st), the payoff is -100*[(0.01355-0.01)*0.9614+(0.01125-0.01)*0.9367]= 0.4583845

For CDX HY CDSI S17 5Y, we used the method in Markit Credit Indices Primer, and got the following results:

month	coupon payment	mtm	total	
Jan-12	-0.129166667	-1.4201183	-1.549285	
Feb-12	-0.120833333	-0.1941448	-0.3149782	
Mar-12	-0.129166667	-0.0459277	-0.1750944	-2.0393576

As a result, the total profit for the first quarter of 2012 is -3.05614123 billion.

According to JPM's report, it suffered 1.4 billion losses in the first quarter, which is lower than our estimation. One possible reason is that we take January 1st, 2012 as the beginning of the position. But when JPM started to build up the real position remain unknown. Based on the historical price trend, the price of HY increased tremendously in January, which is part of the reason for the huge loss. Such steep price increase made the actual date to build the position an important factor to estimate the actual loss.

Solution 2

The data downloaded from Bloomberg is as shown:

CDX IG CDSI S9 5Y	rate	CDX IG CDSI S9 10Y	rate
Apr-12	68	Apr-12	115
May-12	74	May-12	143.5
Jun-12	76.5	Jun-12	162

CDX HY CDSI S17 5Y	price
Apr-12	98.06
May-12	95.955
Jun-12	95.79

We use the monthly treasure rate as our discounted rate. Apr: 2.05%; May 1.80%; Jun 1.63%. the integral term is exp(-0.0205*1)=0.9797; exp(-0.0180*2)=0.9646; exp(-0.0163*3)=0.9523.

So for CDX IG CDSI S9 5Y, the payoff is 25*[(0.0068-0.0100)*0.9797+(0.0074-0.01)*0.9646+(0.00765-0.01)*0.9523]=0.1970226;

For CDX IG CDSI S9 10, the payoff is -35*[(0.0115-0.0100)* 0.9797+(0.01435-0.01)*0.9646+(0.0162-0.01)*0.9523]=- 0.4049437;

For CDX IG CDSI S9 10, the payoff is -100*[(0.0115-0.0100)* 0.9797+(0.01435-0.01)*0.9646+(0.0162-0.01)*0.9523]= -1.156982;

For CDX HY CDSI S17 5Y, we used the same method as question 1, and got the following result:

month	coupon payment	mtm	total	
Apr-12	-0.125	0.04280037	-0.0821996	
May-12	-0.129166667	1.24604551	1.11687885	
Jun-12	-0.125	-1.1946337	-1.3196337	-0.2849545

As a result, the total profit for the second quarter of 2012 is -1.6498576 billion.

As per JPM's report, the actual loss in the second quarter was 4.4 billion, which is higher than our estimation. This is because JPM stopped building their position and unwound their trade as of 3/23/12. However, the spreads increased tremendously during the second quarter. If JPM had not given up their positions, they should not have lost less. However, our estimation was based on the assumption that JPM had still held their positions. That was the reason why our estimation was lower than the loss from JPM's report.

Solution 3:

First of all, JP Morgan looks to make money. However, looking at various risks they are facing, they will try many different ways to diverse the risks and reduce the possible loss of their company. On this principle, traders and risk managers can try different approaches to reach this target.

In this case, since the risk of trading has to be hedged, the portfolio manager in the Risk Management department found out a way to solve the problem, which is to long the Synthetic Credit Portfolio. At the beginning, on the traders and portfolio managers' point of view, the Synthetic Credit Portfolio managed by CIO was intended generally to offset some of the credit risk that JP Morgan faces, including in its CIO investment portfolio and in its capacity as a lender.

At the beginning of 2012, since the senior management and CIO both had a promising outlook of the future economy, they hoped to reduce the proportion of Risk-Weighted Asset (RWA) in their portfolio. To do so, one of their traders came up with an idea to increase the proportion of Synthetic Credit Portfolio(SCP), such that it will relatively decrease the weight of RWA. In order to increase the size of SCP, traders kept purchasing additional long credit derivatives to offset its short derivative position and lower the CIO's RWA that way.

As JP Morgan's report shows, there are at least 6 area they did poorly in this case

1. CIO management established competing and inconsistent priorities for the Synthetic Credit Portfolio without adequately exploring or understanding how the priorities would be simultaneously addressed;
2. The trading strategies that were designed in an effort to achieve the various priorities were poorly conceived and not fully understood by CIO management and other CIO personnel who might have been in a position to manage the risks of the Synthetic Credit Portfolio effectively;
3. CIO management (including CIO's Finance function) failed to obtain robust, detailed reporting on the activity in the Synthetic Credit Portfolio, and/or to otherwise appropriately monitor the traders' activity as closely as they should have;
4. CIO personnel at all levels failed to adequately respond to and escalate (including to senior Firm management and the Board) concerns that were raised at various points during the trading;
5. Certain of the traders did not show the full extent of the Synthetic Credit Portfolio's losses; and
6. CIO provided to senior Firm management excessively optimistic and inadequately analyzed estimates of the Synthetic Credit Portfolio's future performance in the days leading up to the April 13 earnings call.

From the report above, we might be able to draw a simple conclusion that it is "badly designed" to achieve their objective. Although they did successfully reduce the RWA, meanwhile in order to get a higher benefit, they add too much risk in their portfolio through SRP. And this is the main and deadly reason why such London Whale happened. On the one hand, we could say they are unlucky because the market doesn't go as they wished, and because of such bad luck, they have lost millions of dollars. But on the other hand, we could also say that if JP Morgan management group and their CIO doesn't approve such strategy or be more careful about their portfolio, this thing might not happen at all.

If JP Morgan doesn't long that many SRP, the whole credit market would not be influenced that much. Because of their behavior, cased the whole credit market frightened, and due to

such frighten, JP Morgan lost even more money. In that case, we believe JP Morgan is responsible for what happened namely London Whale case.