Tuesday 22 September 2009

Weekly IRF Review

Hedge effectiveness of IRFs

This week, we analyse the hedge effectiveness of Interest Rate Futures observed since its launch on 31st August. We chose two securities for the above analysis, 7.94% GS 2021, and 6.90% GS 2019. We chose the former as it is the CTD, which the IRFs are tracking, and the latter because it is the ten year benchmark as well as the most liquid stock. A portfolio of 7.94% GS 2021 as well as 6.90% GS 2019 with face value Rs. 1 Crore each was hedged using the Dec '09 Interest Rate futures Contract.

To calculate the daily MTM on the cash and future portfolios, the daily Volume Weighted Average Prices (VWAPs) of the bonds, as well as the Dec '09 IRF contracts were selected. Though the daily closing prices are usually used across the markets for MTM calculations, it will be inappropriate to use the daily closing prices for IRFs, as the cash markets and futures markets are not co-terminus, leading to half an hour of wild card play. This has often caused fluctuations in the basis, like the one which was witnessed on Tuesday, 15th September, when the cash market rallied from 4:30 PM to 5:30 PM and the IRFs could not capture the rally of the last half an hour. As VWAP evens out such anomalies to a large extent, we found that this approach gave better results.

Another approach could have been taking the prices of cash and futures at the same time, for doing the MTM calculations. However, this is also subject to the risk of basis fluctuations. As we have not been able to observe a stable level for the net basis over the past couple of weeks, we found the VWAP approach attractive, as it will average out the fluctuations in net basis.

Hedge Ratio

We set up a hedge using the BPV weighted hedge ratio. See Annexure for the method
The results are as follows

Performance of a hedged portfolio of Rs. 1 Crore Face value of 6.90% GS 2019

Date	VWAP Dec '09	VWAP 6.90% GS 2019	Value of 6.90 Portfolio	Daily MTM G/L on 6.90 Portfolio	Value Of Hedge (97658 contracts)	Daily MTM G/L on Hedge	Hedge Effectiveness
31-Aug	91.8467	96.46	9646000		8969565		
1-Sep	91.8871	96.26	9626000	-20000	8973510	-3945	99.75%
2-Sep	92.0887	96.64	9664000	38000	8993198	-19688	99.94%
3-Sep	91.8961	96.26	9626000	-38000	8974389	18809	99.74%
4-Sep	91.9083	96.09	9609000	-17000	8975581	-1191	99.55%
7-Sep	92.3250	96.96	9696000	87000	9016275	-40694	100.03%
8-Sep	92.4160	96.83	9683000	-13000	9025162	-8887	99.81%
9-Sep	92.4816	97.04	9704000	21000	9031568	-6406	99.96%
10-Sep	92.3697	96.75	9675000	-29000	9020640	10928	99.77%
11-Sep	92.2150	96.58	9658000	-17000	9005532	15108	99.75%
14-Sep	92.5846	97.35	9735000	77000	9041627	-36094	100.18%
15-Sep	92.7203	97.83	9783000	48000	9054879	-13252	100.54%
16-Sep	93.6254	98.91	9891000	108000	9143269	88390	100.74%
17-Sep	93.2480	98.36	9836000	-55000	9106413	36856	100.55%
18-Sep	93.5903	98.83	9883000	47000	9139842	-33428	100.69%
			Net G/L	237000	Net G/L	-170276	
			Net G/L on 6.90% GS 2019 and hedge			66724	

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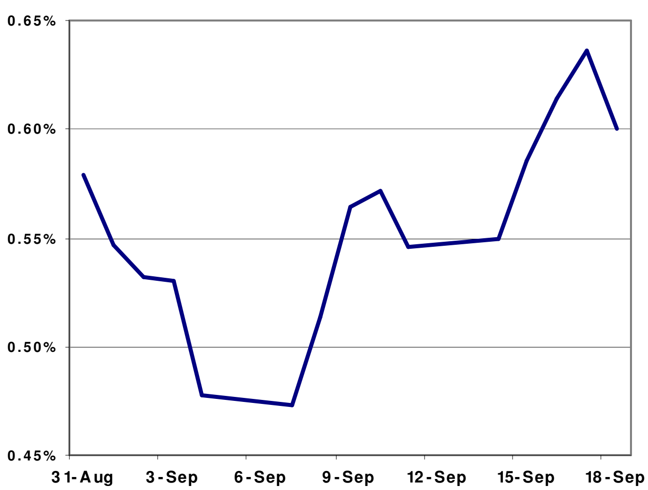
Performance of a hedged portfolio of Rs. 1 Crore Face value of 7.94% GS 2021

Date	VWAP Dec '09	VWAP 7.94% GS 2021	Value of 7.94 Portfolio	Daily MTM G/L on 7.94 Portfolio	Value of Hedge (107220 contracts)	Daily MTM G/L on Hedge	Hedge Effectiveness
31-Aug	91.8467	99.61	9961000		9847803		
1-Sep	91.8871	99.63	9963000	2000	9852135	-4332	99.98%
2-Sep	92.0887	100.16	10016000	53000	9873750	-21616	100.29%
3-Sep	91.8961	99.75	9975000	-41000	9853100	20651	100.09%
4-Sep	91.9083	99.96	9996000	21000	9854408	-1308	100.29%
7-Sep	92.3250	100.97	10097000	101000	9899087	-44679	100.85%
8-Sep	92.4160	100.51	10051000	-46000	9908844	-9757	100.29%
9-Sep	92.4816	100.36	10036000	-15000	9915877	-7034	100.07%
10-Sep	92.3697	99.98	9998000	-38000	9903879	11998	99.81%
11-Sep	92.2150	99.99	9999000	1000	9887292	16587	99.99%
14-Sep	92.5846	100.82	10082000	83000	9926921	-39629	100.42%
15-Sep	92.7203	101.08	10108000	26000	9941471	-14550	100.54%
16-Sep	93.6254	102.06	10206000	98000	10038515	-97045	100.55%
17-Sep	93.2480	101.28	10128000	-78000	9998051	40465	100.17%
18-Sep	93.5903	102.07	10207000	79000	10034752	-36701	100.59%
			Net G/L	246000	Net G/L	-186949	
			Net G/L on 7.94% GS 2021 and hedge			59051	

Definition of a highly effective hedge
According to the RBI, a hedge will be deemed "highly effective" if at inception and throughout the life of the hedge, changes in the marked to market value of the hedged items with reference to the marked to market value at the time of hedging are "almost fully offset" by the changes in the marked to market value of the hedging instrument and the actual results are within a range of 80% to 125%. By this definition, we find that IRFs can be called highly effective hedges, from their launch, till date.

We also ran a correlation of Dec '09 IRF prices with 6.90% GS 2019 and 7.94% GS 2021 prices.
Correlation between 6.90% GS 2019 and IRF Dec '09 - .985
Correlation between 7.94% GS 2021 and IRF Dec '09 - .951

An interesting observation here is that ***the IRF turned out to be a better hedge for 7.94% GS 2021, but the VWAP price movements of IRF were more correlated to those of 6.90% GS 2019***. We believe this is because majority of the activity in IRFs is view based trading, and not basis trading. As a result the IRFs track the movements in 6.90, and the basis corrections with the CTD could have happened with a lag. As a result in a short interval of time, the IRFs seemed to track 6.90% GS 2019 better than the CTD, but our analysis over the past three weeks clearly indicate that in longer time horizons, the CTD is tracked. Also, the rally in 6.90% GS 2019 was not completely captured by other securities in the curve. This lead to a widening of the spread between 7.94% GS 2021 and 6.90% GS 2019. As a result, the hedge effectiveness of IRFs against 6.90 GS 2019 was reduced



Spread in bps 7.94% GS 2021 over 6.90% GS 2019

Weekly Trends

IRF volumes and prices mirrored the movements in the underlying cash market in the week under consideration. An interesting trend was on Tuesday, 15th of September when the cash market witnessed a rally which lasted post the close of futures market. The bullish trend in cash was reflected in futures with spiking volumes, OI and prices, towards the day's close. However the rally was not completely captured, leading to a gap up opening the next day. This is the reverse scenario for a wild card play, or a scenario in which the wild card option goes out of money in a delivery month. The rally continued, and finally died out towards the end of day on Wednesday. This fall also, was not completely captured by IRFs, causing what would have been a wild card option going in the money in a delivery month. A gap down opening ensued the next day, and as a result the prices, as well as the OI fell with spiking volumes, indicating long covering. The bearish sentiment continued on Thursday, till the trend reversed on Friday morning, with increasing volumes, decreasing OI and increasing prices, tracking a bullish sentiment in the cash. But after the auction results, this trend also reversed and the futures ended the day on a bearish note.

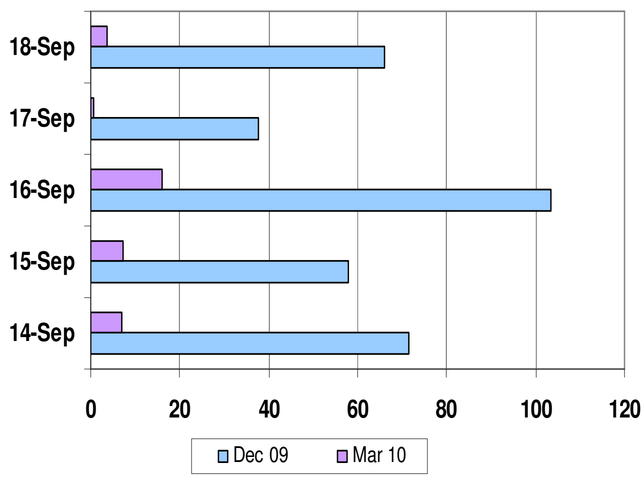
Statistics

December '09 Contract

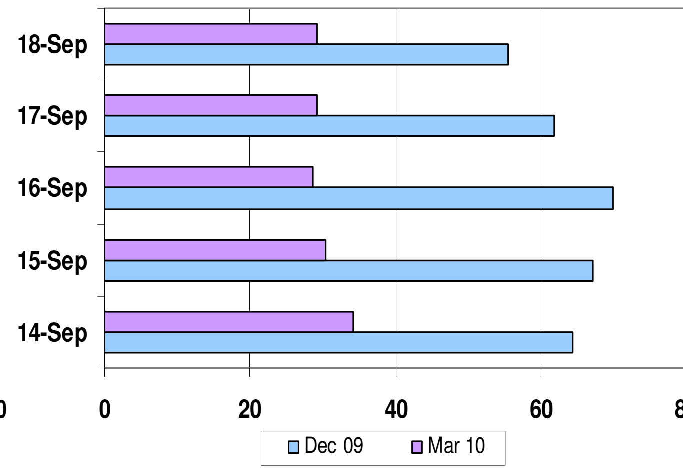
Date	Open	High	Low	Close	OI (Crores)	Volume (Crores)	OI Change	Volume Change
14-Sep	92.4200	92.6900	92.4000	92.6200	64.30	71.40	-12.86	-37.21
15-Sep	92.7000	92.8500	92.5400	92.7725	67.16	57.79	2.86	-13.61
16-Sep	92.9500	94.5500	92.9500	93.5950	70.00	103.49	2.84	45.70
17-Sep	93.2000	93.3500	93.1500	93.2000	61.82	37.67	-8.18	-65.82
18-Sep	92.4200	93.8125	92.4000	93.6300	55.52	66.13	-6.30	28.46

March '10 Contract

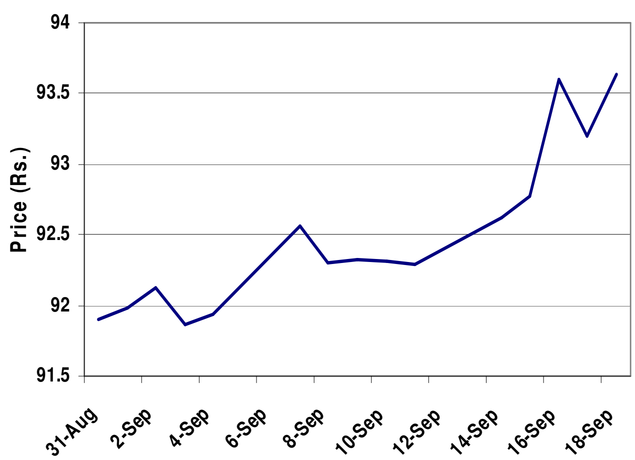
Date	Open	High	Low	Close	OI (Crores)	Volume (Crores)	OI Change	Volume Change
14-Sep	91.1500	91.3250	91.1500	91.2700	34.26	7.06	-1.18	-11.37
15-Sep	91.3000	91.3750	91.2850	91.3725	30.50	7.34	-3.76	0.28
16-Sep	91.8500	92.3400	91.8500	92.1000	28.66	15.93	-1.84	8.59
17-Sep	91.5100	92.0000	91.5100	91.7900	29.18	75.22	0.52	59.29
18-Sep	91.7900	92.2400	91.7500	92.0500	29.18	3.68	0	2.93



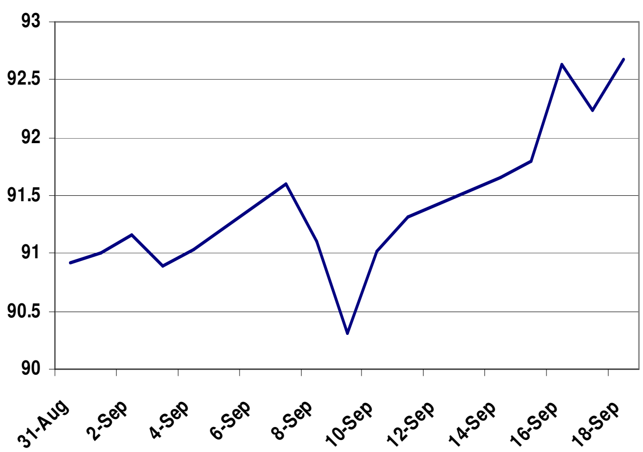
Volumes in Rs. Crores



Open interest in Rs.Crores



IRF Dec '09 Contract



IRF Mar '10 Contract

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Annexure: Calculating the Hedge Ratio

Hedge Ratio = ∂ Cash Price/ ∂ Futures
Price of CTD = Futures Price * Conversion Factor of CTD + Accrued Interest (1)
Partially differentiating both sides of (1), we have
∂ Price of CTD = ∂ Futures Price * Conversion Factor of CTD (2)
⇨ ∂ Price of CTD/ ∂ Futures = Conversion Factor of CTD
We used Conversion Factor of 1.0722 as our hedge ratio, which means we short 107220 IRF contracts to hedge a portfolio of 100000 Bonds (or Rs. 1 Crore Face Value)

For hedging 6.90% GS 2019 we proceeded as below
Hedge Ratio = ∂ Price of 6.90/ ∂ Futures (3)
From (2), we know that ∂ Futures = ∂ Price of CTD/ Conversion Factor of CTD
Combining (2) and (3) and rearranging, we have
Hedge Ratio = (∂ Price of 6.90/ ∂ Price of CTD)* Conversion factor of CTD
But ∂ Price of 6.90/ ∂ Price of CTD = PV01 6.90/PV01 CTD

Hence, Hedge Ratio = (PV01 6.90/PV01 CTD)* CF of CTD

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