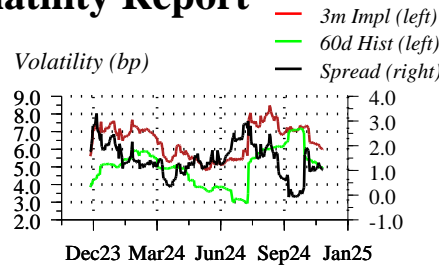
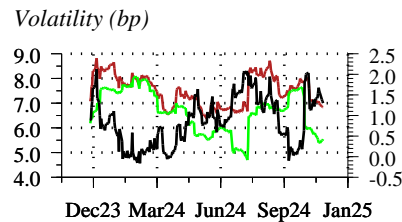


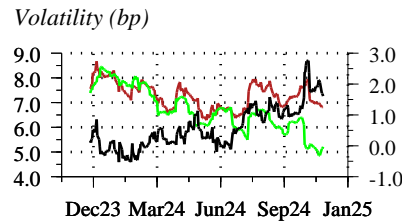
	<u>Implied Vol.</u>		<u>5d</u>	<u>20d</u>	<u>90d</u>	<u>Historical BP Vol.</u>		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
1m	20.28	5.37	-0.28	-2.26	-1.44	2.44	3.36	5.00
3m	23.31	6.02	-0.27	-1.22	-1.47			
6m	27.13	6.79	-0.23	-0.66	-1.35			
12m	30.64	7.34	-0.13	-0.34	-1.03			



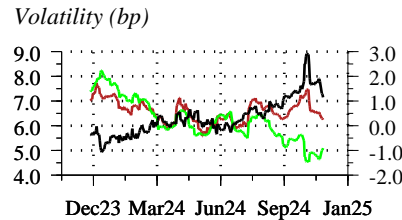
	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
1m	26.29	6.62	-0.33	-2.11	-1.34	3.64	4.33	5.54
3m	27.65	6.84	-0.23	-1.06	-1.51			
6m	29.36	7.12	-0.16	-0.50	-1.23			
12m	31.00	7.30	-0.09	-0.19	-0.48			



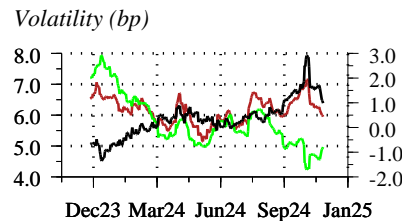
	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
1m	28.47	6.79	-0.26	-1.90	-0.79	4.71	5.39	5.21
3m	28.83	6.82	-0.16	-0.86	-1.19			
6m	29.23	6.85	-0.12	-0.46	-0.81			
12m	29.58	6.85	-0.11	-0.25	-0.07			



	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
1m	25.62	6.07	-0.46	-2.28	-0.71	5.22	6.07	5.09
3m	26.43	6.24	-0.30	-1.00	-1.18			
6m	27.07	6.37	-0.20	-0.51	-0.71			
12m	27.30	6.40	-0.15	-0.27	-0.05			



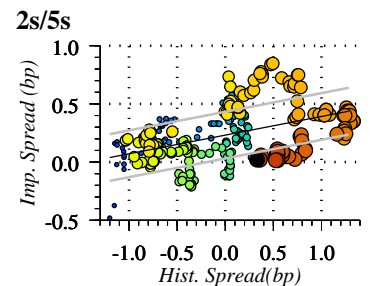
	<u>Implied Vol.</u>		5d	20d	90d	<u>Historical BP Vol.</u>		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
1m	24.28	5.80	-0.47	-2.24	-0.65	5.09	6.19	4.97
3m	24.98	5.95	-0.32	-1.01	-1.15			
6m	25.46	6.04	-0.22	-0.55	-0.77			
12m	25.28	5.97	-0.17	-0.30	-0.23			



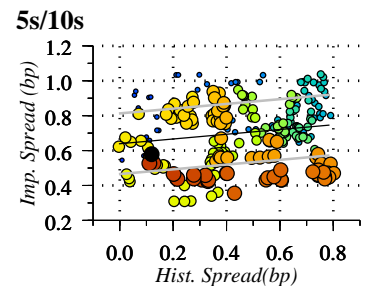
Volatility (bp)

Time Horizon	Imp (bp)	Hist (bp)
3M	4.6	3.0
6M	4.7	3.5
1Y	6.1	5.1
2Y	7.0	5.7
5Y	7.0	5.3
10Y	6.4	5.2
20Y	6.1	5.1
30Y	5.8	5.1

Maturity	ol (bp)	ct (bp)
3M	5.6	2.6
6M	5.7	3.8
1Y	6.8	5.6
2Y	7.2	6.4
5Y	6.8	6.0
10Y	6.3	5.7
20Y	6.1	5.4
30Y	5.8	5.3

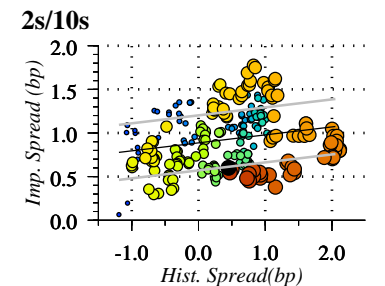


$$Y = 0.1605 X1 + 0.2316 \text{ (adjR2 = 0.2030)}$$

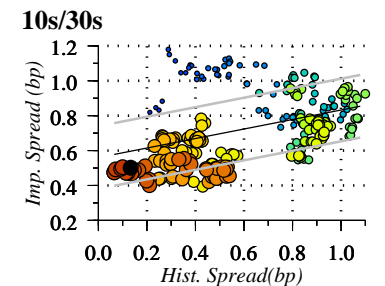


$$Y = 0.1359 X1 + 0.6392 \text{ (adjR2 = 0.0235)}$$

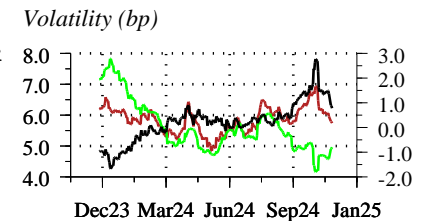
	<u>Implied Vol.</u>		5d	20d	90d	<u>Historical BP Vol.</u>		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
1m	24.54	5.60	-0.48	-2.21	-0.59	5.01	6.27	4.96
3m	25.23	5.74	-0.33	-1.02	-1.10			
6m	25.64	5.81	-0.24	-0.58	-0.78			
12m	25.84	5.82	-0.19	-0.34	-0.33			



$$Y = 0.0914 X1 + 0.8867 \text{ (adj}R^2 = 0.0439\text{)}$$



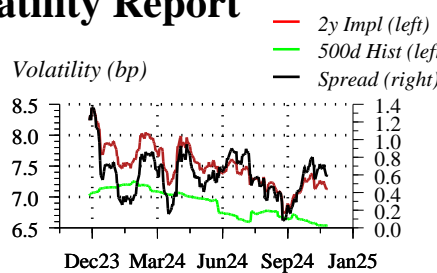
$$Y = 0.2724 X1 + 0.5601 \text{ (adjR2} = 0.1467\text{)}$$



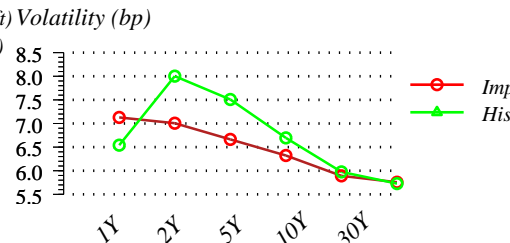
USD Long-Dated Swaption Volatility Report

Options on 1yr Swaps

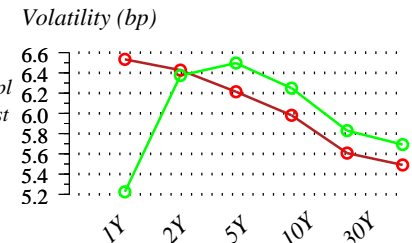
	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
2y	30.81	7.13	-0.10	-0.17	-0.21	2.44	3.36	5.00
3y	30.05	6.85	-0.09	-0.11	0.04	250d	500d	750d
5y	28.35	6.53	-0.05	-0.03	0.36	5.16	6.54	6.50
10y	24.05	5.89	-0.02	-0.01	0.42			



Maturity Structure of 2Y Vol.

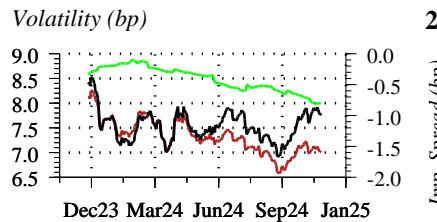


Maturity Structure of 5Y Vol.

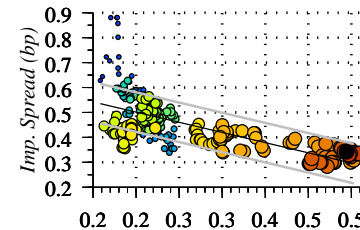


Options on 2yr Swaps

	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
2y	30.50	7.01	-0.09	-0.14	0.07	3.64	4.33	5.54
3y	29.63	6.75	-0.07	-0.08	0.21	250d	500d	750d
5y	27.78	6.43	-0.03	-0.01	0.51	6.51	8.00	7.97
10y	23.61	5.81	-0.02	-0.00	0.59			

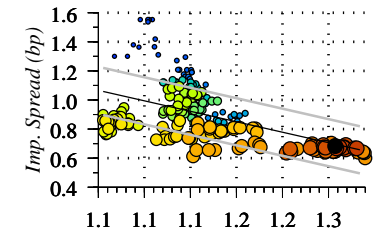


2s/5s



$$Y = -0.8170 X1 + 0.7056 \text{ (adjR2 = 0.4332)}$$

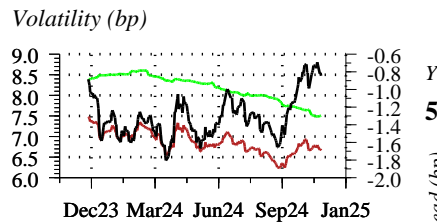
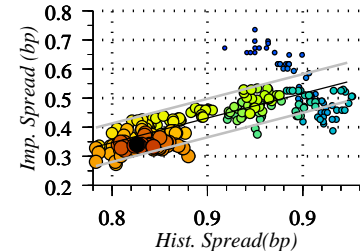
2s/10s



$$Y = -1.4392 X1 + 2.5773 \text{ (adjR2} = 0.2734)$$

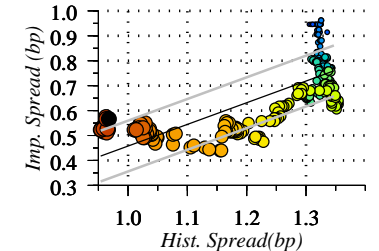
Options on 5yr Swaps

	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
2y	28.98	6.66	-0.09	-0.19	0.22	4.71	5.39	5.21
3y	28.14	6.49	-0.08	-0.10	0.36	250d	500d	750d
5y	26.44	6.21	-0.04	-0.02	0.57	6.41	7.51	7.78
10y	22.66	5.60	-0.03	-0.02	0.84			

**5s/10s**

$$Y = 1.6916 X1 - 1.0064 \text{ (adjR2 = 0.4728)}$$

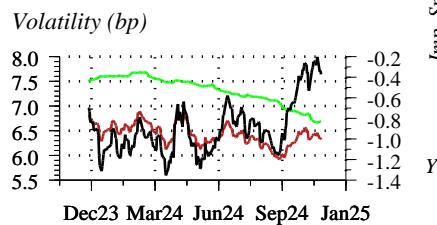
10s/30s



$$Y = 0.8694 X1 - 0.4118 \text{ (adjR2 = 0.4953)}$$

Options on 10yr Swaps

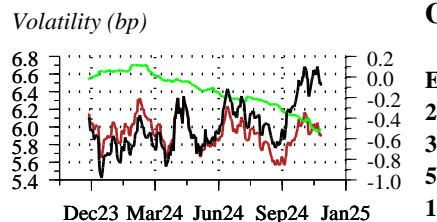
	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
2y	26.92	6.32	-0.10	-0.18	0.31	5.22	6.07	5.09
3y	26.20	6.19	-0.09	-0.11	0.42	250d	500d	750d
5y	24.88	5.98	-0.06	-0.04	0.69	5.99	6.70	7.04
10y	22.13	5.34	-0.06	-0.03	0.69			



1. Regression of difference in 2Y implied vs difference in 2Y historical.

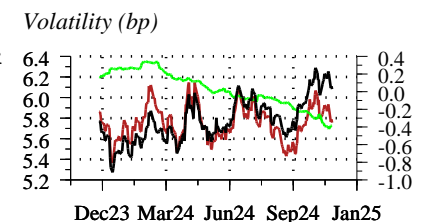
Options on 20yr Swaps

	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
2y	25.07	5.89	-0.12	-0.18	0.13	5.09	6.19	4.97
3y	24.70	5.78	-0.10	-0.12	0.27	250d	500d	750d
5y	24.15	5.61	-0.06	-0.05	0.62	5.57	5.98	6.24
10y	22.62	5.00	-0.06	-0.03	0.58			



Options on 30yr Swaps

	Implied Vol.		5d	20d	90d	Historical BP Vol.		
Exp	%	bp	Chg	Chg	Zsc	10d	20d	60d
2y	25.81	5.76	-0.14	-0.20	0.01	5.01	6.27	4.96
3y	25.58	5.66	-0.12	-0.13	0.16	250d	500d	750d
5y	25.27	5.49	-0.06	-0.06	0.52	5.41	5.73	5.95
10y	24.31	4.92	-0.06	-0.04	0.45			

[illegible]