

Supplementary Material

Reservoir Performance and Hedging Parameters at 80% demand level – Comparison of time-varying and constant hedging policies

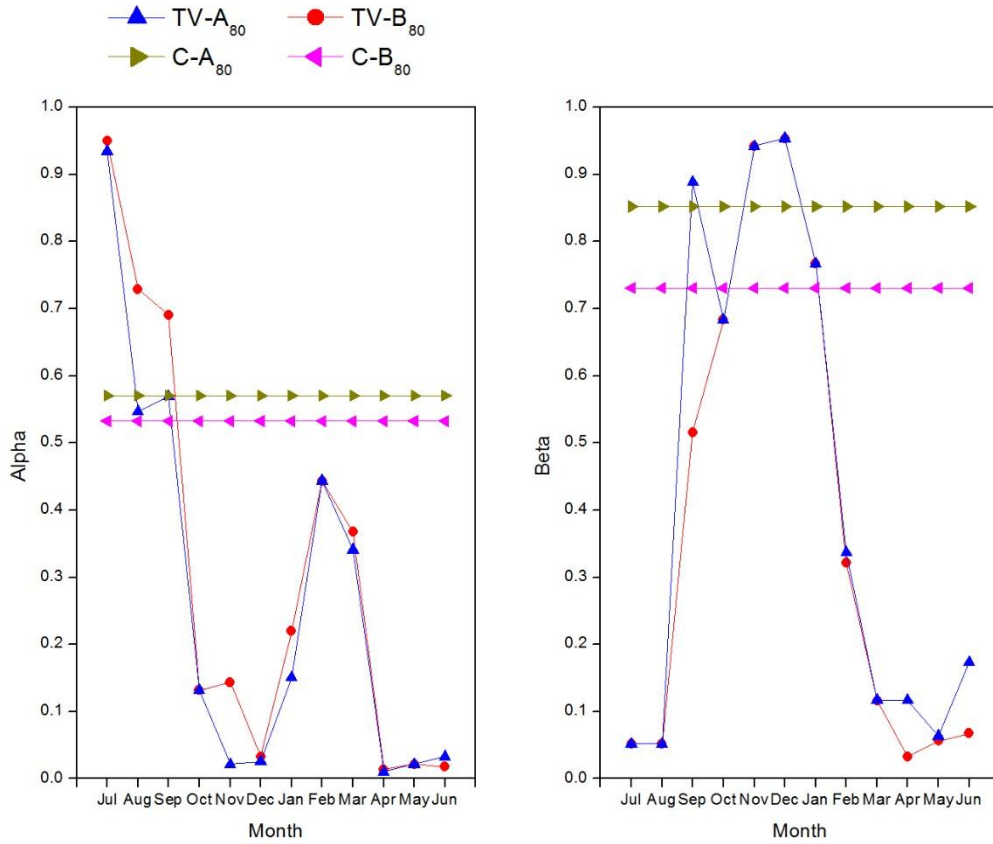


Fig.S1 Time varying and constant hedging parameters (alpha and beta) for two-point hedging policy – a comparison between the selected pareto-optimal solutions for 80% demand level

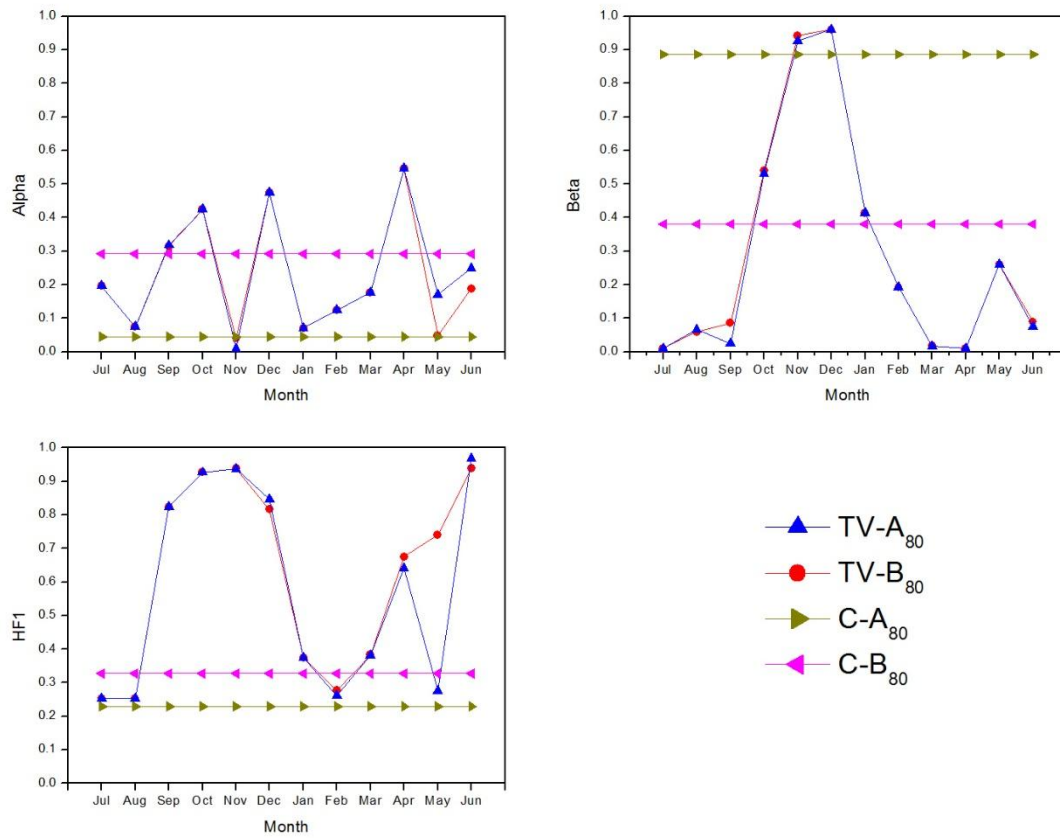


Fig.S2 Time varying and constant hedging parameters (alpha, beta and hedging factor) for modified two-point hedging policy – a comparison between the selected pareto-optimal solutions for 80% demand level

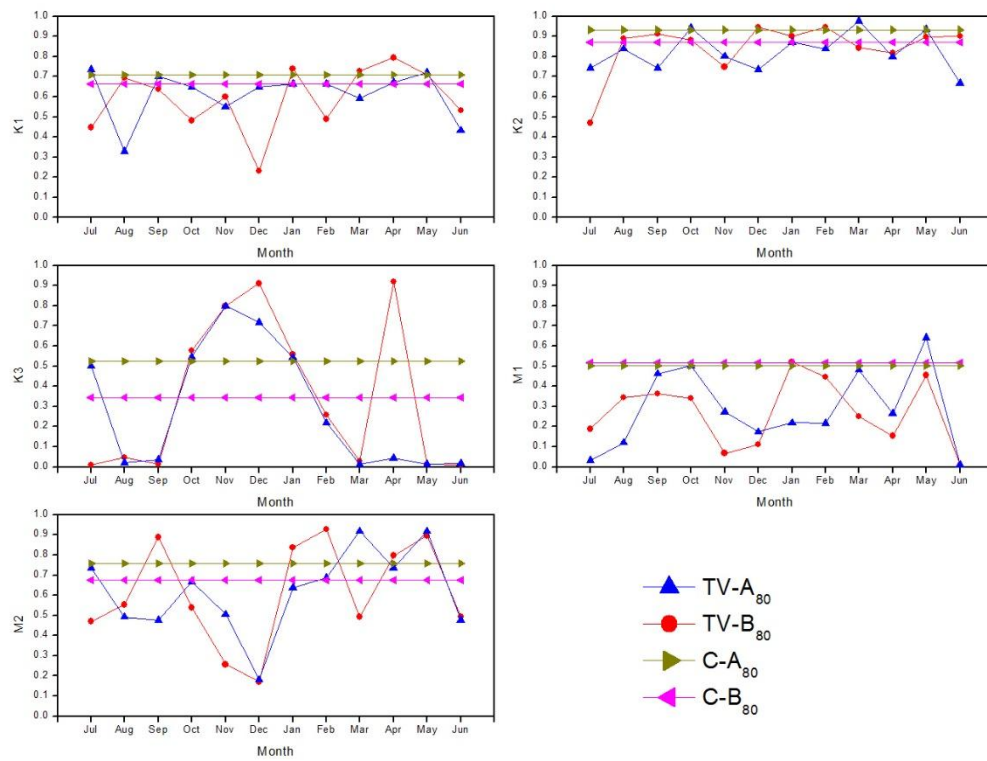


Fig. S3 Time varying and constant hedging parameters (K_1 , K_2 , K_3 , HF_1 , HF_2) for discrete hedging policy – a comparison between the selected pareto-optimal solutions for 80% demand level

Table S4 Comparison of Time Varying and Constant Hedging at 80 % Demand Level for Two Point Linear

	Period Vulnerability	Shortage Ratio	Volume Reliability	Occurrence Reliability	Resilience	Mean Event Deficit	Number of Period Deficits	Number of Event Deficits
SOP	287.48	0.055	0.945	0.869	0.484	148.30	85	41
Time Varying Hedging								
TV-Max S/R	90.89	0.107	0.893	0.451	0.154	213.19	359	55
TV- Max Vul	158.10	0.055	0.945	0.734	0.211	167.49	174	37
TV-A ₈₀	119.23	0.032	0.968	0.829	0.479	62.47	119	57
TV-B ₈₀	130.60	0.059	0.941	0.648	0.282	100.11	230	65
Constant Hedging								
C- Max S/R	111.88	0.142	0.858	0.378	0.129	299.03	407	53
C- Max Vul	287.48	0.055	0.945	0.849	0.391	159.20	99	38
C-A ₈₀	118.26	0.139	0.861	0.381	0.128	297.44	405	52
C-B ₈₀	129.35	0.133	0.867	0.392	0.130	286.01	397	52

Table S5 Comparison of Time Varying and Constant Hedging at 80 % Demand Level for Modified Two Point Linear

	Period Vulnerability	Shortage Ratio	Volume Reliability	Occurrence Reliability	Resilience	Mean Event Deficit	Number of Period Deficits	Number of Event Deficits
SOP	287.48	0.055	0.945	0.869	0.484	148.30	85	41
Time Varying Hedging								
TV-Max S/R	101.59	0.074	0.926	0.773	0.589	93.27	148	87
TV- Max Vul	133.50	0.060	0.940	0.818	0.520	106.93	119	62
TV-A ₈₀	119.44	0.062	0.938	0.757	0.450	95.92	159	71
TV-B ₈₀	130.34	0.060	0.940	0.806	0.519	101.72	127	66
Constant Hedging								
C- Max S/R	90.56	0.148	0.852	0.388	0.134	306.05	400	54
C- Max Vul	286.72	0.055	0.945	0.849	0.390	159.56	99	38
C-A ₈₀	120.48	0.142	0.858	0.385	0.131	298.40	402	53
C-B ₈₀	130.55	0.133	0.867	0.527	0.179	266.04	309	55

Table S6 Comparison of Time Varying and Constant Hedging at 80 % Demand Level for Discrete

	Period Vulnerability	Shortage Ratio	Volume Reliability	Occurrence Reliability	Resilience	Mean Event Deficit	Number of Period Deficits	Number of Event Deficits
SOP	287.48	0.055	0.945	0.869	0.484	148.30	85	41
Time Varying Hedging								
TV-Max S/R	124.44	0.068	0.932	0.782	0.586	89.78	143	84
TV- Max Vul	140.61	0.057	0.943	0.813	0.431	119.46	122	53
TV-A ₈₀	124.44	0.067	0.932	0.780	0.588	88.78	144	84
TV-B ₈₀	131.75	0.068	0.932	0.779	0.578	89.62	145	84
Constant Hedging								
C- Max S/R	87.83	0.145	0.855	0.385	0.131	304.78	402	53
C- Max Vul	269.29	0.055	0.945	0.849	0.390	159.33	99	38
C-A ₈₀	119.78	0.125	0.875	0.460	0.154	255.05	353	54
C-B ₈₀	129.59	0.120	0.880	0.547	0.184	243.61	296	54

Reservoir Performance and Hedging Parameters at 85% demand level – Comparison of time-varying and constant hedging policies

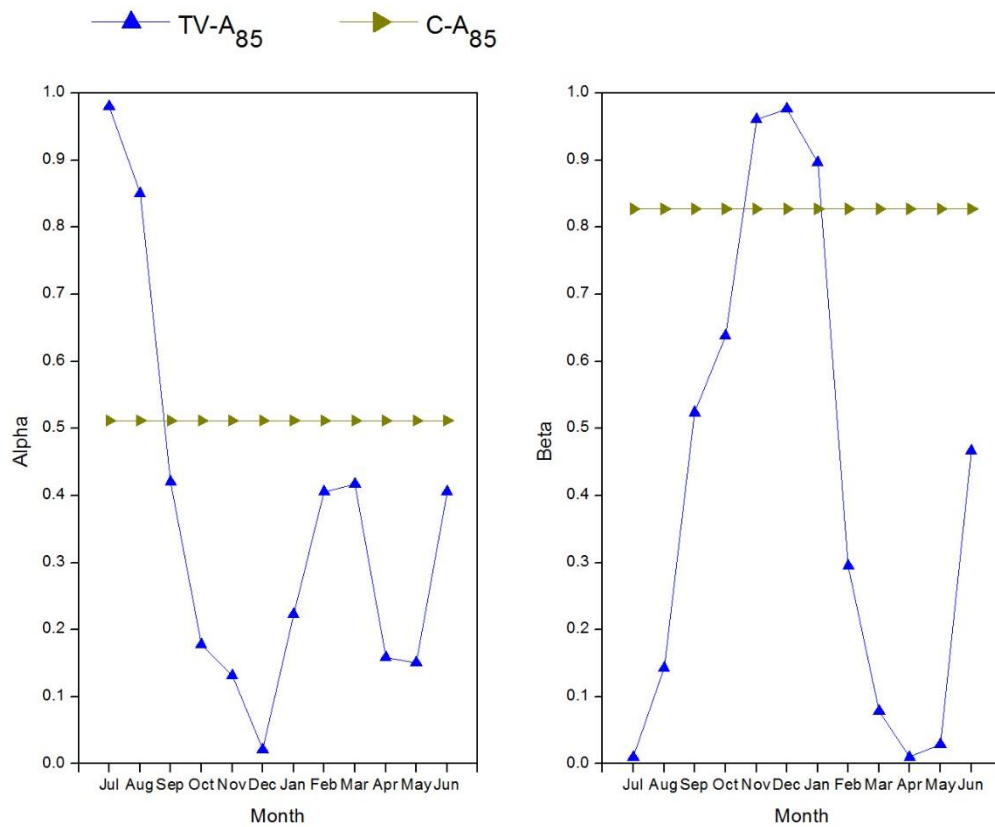


Fig.S7 Time varying and constant hedging parameters (alpha and beta) for two-point hedging policy – a comparison between the selected pareto-optimal solutions for 85% demand level

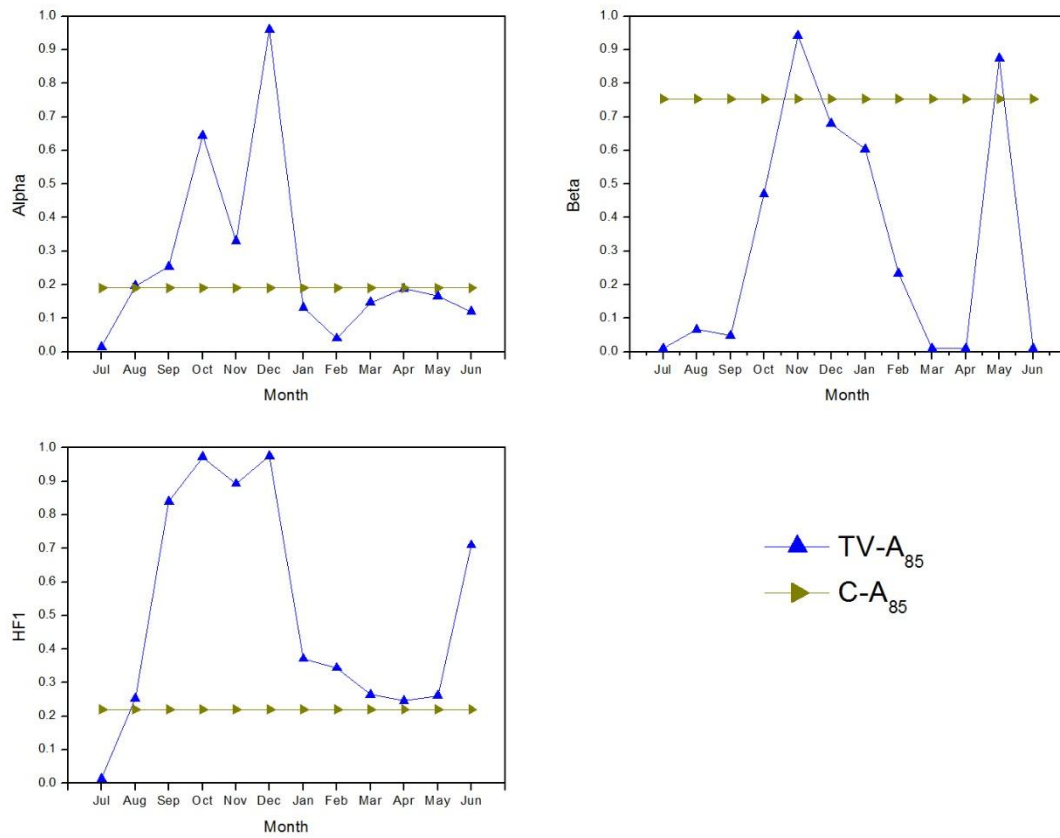


Fig.S8 Time varying and constant hedging parameters (alpha, beta and hedging factor) for modified two-point hedging policy – a comparison between the selected pareto-optimal solutions for 85% demand level

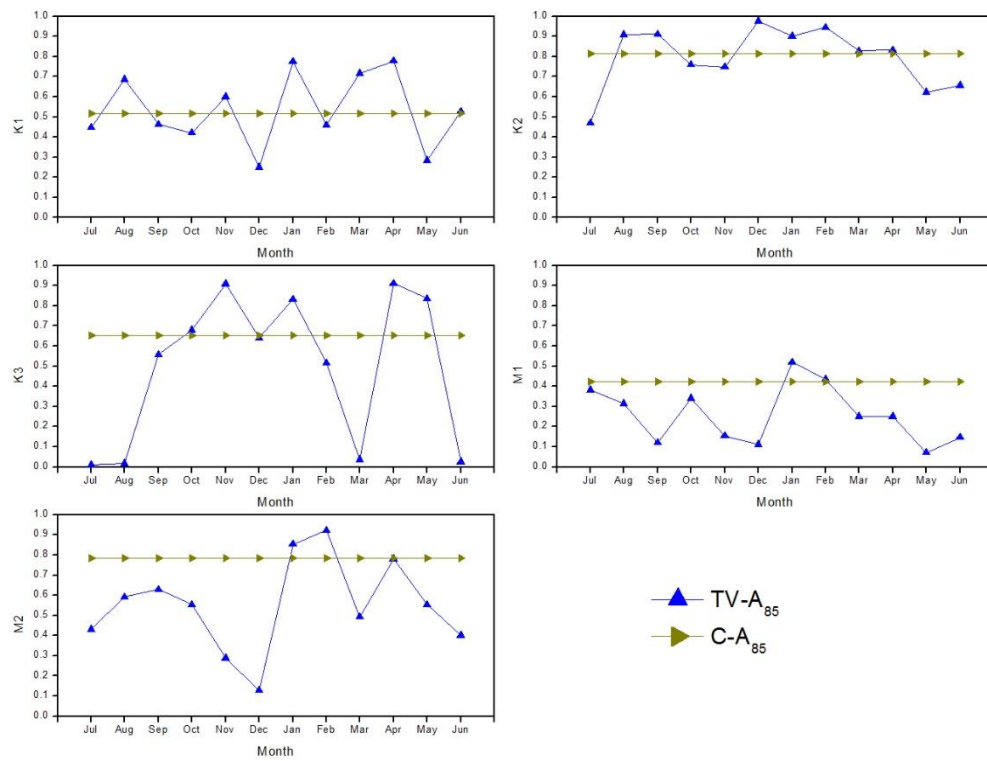


Fig. S9 Time varying and constant hedging parameters (K_1 , K_2 , K_3 , HF_1 , HF_2) for discrete hedging policy – a comparison between the selected pareto-optimal solutions for 85% demand level

Table S10 Comparison of Time Varying and Constant Hedging at 85 % Demand Level for Two Point Linear

	Period Vulnerability	Shortage Ratio	Volume Reliability	Occurrence Reliability	Resilience	Mean Event Deficit	Number of Period Deficits	Number of Event Deficits
SOP	381.49	0.085	0.915	0.787	0.486	147.84	131	64
Time Varying Hedging								
TV-Max S/R	108.42	0.151	0.849	0.375	0.124	351.32	384	48
TV- Max Vul	198.17	0.085	0.915	0.654	0.241	183.68	213	51
TV-A ₈₅	151.54	0.089	0.911	0.540	0.231	150.50	283	65
Constant Hedging								
C- Max S/R	143.19	0.169	0.830	0.364	0.126	378.37	391	49
C- Max Vul	380.45	0.085	0.915	0.751	0.382	161.39	153	58
C-A ₈₅	150.88	0.164	0.835	0.371	0.126	374.28	387	49

Table S11 Comparison of Time Varying and Constant Hedging at 85 % Demand Level for Modified Two Point Linear

	Period Vulnerability	Shortage Ratio	Volume Reliability	Occurrence Reliability	Resilience	Mean Event Deficit	Number of Period Deficits	Number of Event Deficits
SOP	381.49	0.085	0.915	0.787	0.486	147.84	131	64
Time Varying Hedging								
TV-Max S/R	114.20	0.109	0.891	0.690	0.671	94.45	191	128
TV- Max Vul	151.84	0.087	0.913	0.723	0.580	97.73	171	99
TV-A ₈₅	149.15	0.087	0.913	0.724	0.589	97.00	170	100
Constant Hedging								
C- Max S/R	118.32	0.182	0.818	0.394	0.133	406.74	373	49
C- Max Vul	376.89	0.085	0.915	0.751	0.382	161.77	153	58
C-A ₈₅	150.12	0.148	0.852	0.374	0.124	343.60	385	48

Table S12 Comparison of Time Varying and Constant Hedging at 85 % Demand Level for Discrete

	Period Vulnerability	Shortage Ratio	Volume Reliability	Occurrence Reliability	Resilience	Mean Event Deficit	Number of Period Deficits	Number of Event Deficits
SOP	381.49	0.085	0.915	0.787	0.486	147.84	131	64
Time Varying Hedging								
TV-Max S/R	133.57	0.117	0.883	0.563	0.447	107.84	269	120
TV- Max Vul	238.84	0.095	0.905	0.647	0.382	126.44	217	83
TV-A ₈₅	150.09	0.102	0.898	0.586	0.458	96.79	254	117
Constant Hedging								
C- Max S/R	110.25	0.173	0.827	0.389	0.129	394.60	376	49
C- Max Vul	356.54	0.086	0.914	0.744	0.360	168.02	157	57
C-A ₈₅	149.89	0.141	0.859	0.389	0.129	322.29	376	49