

# Complementary Material for Learning and Hedging the CVA

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## 1 Introduction

This is complementary material to the article Learning and Hedging the CVA, gathering the ensemble of hedging performance and sensitivity results.

## 2 Baseline Results

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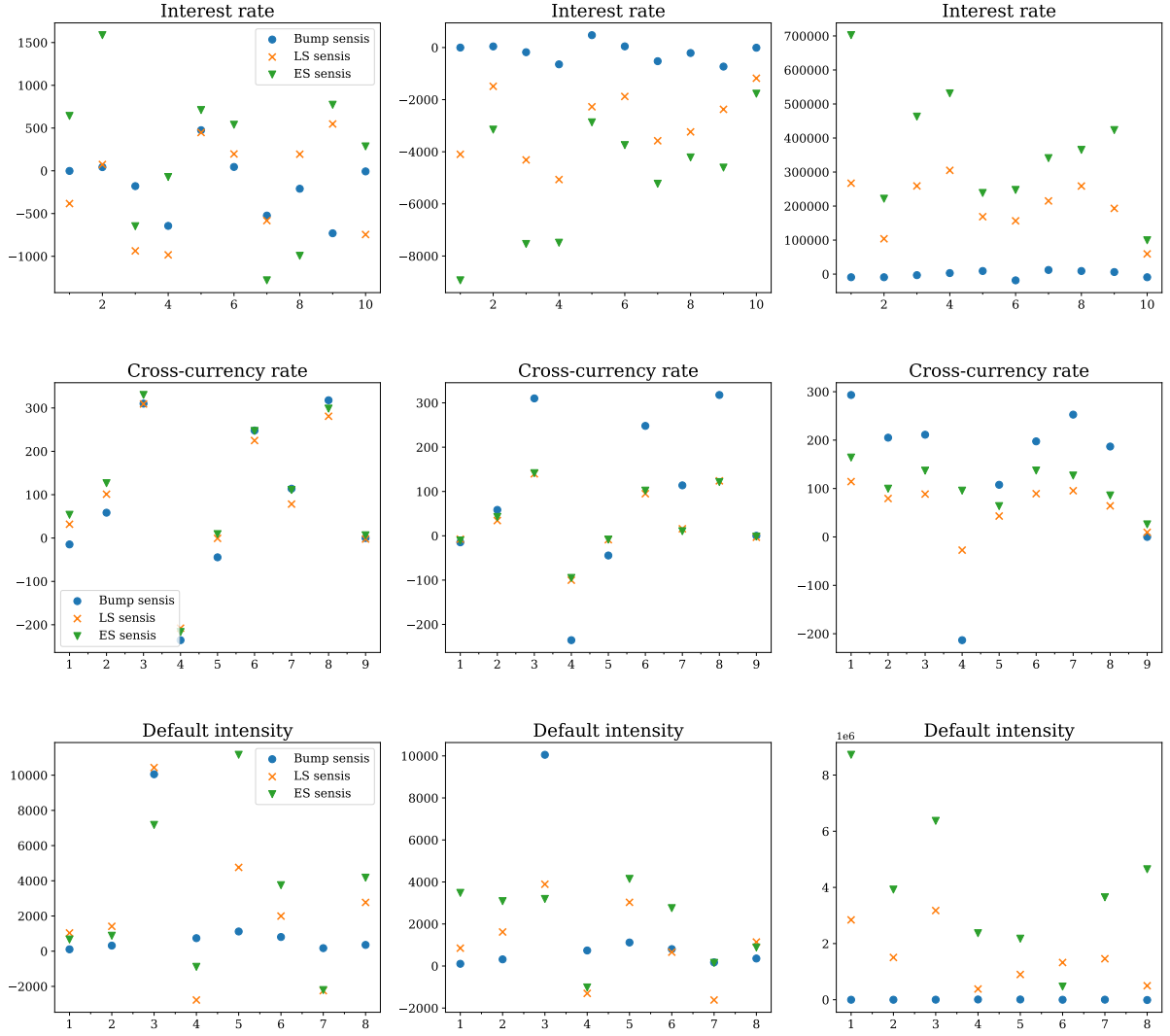


Figure 1: Call options and 1yr case: Baseline estimated  $\Delta$  when hedging without (left column) or with (center column)  $\Gamma$  features and (right column) the corresponding diagonal  $\Gamma$  estimates in the latter case.

Portfolio	Regression features	Train $t$ / Test $t'$	R2 score		Standard Error			Expected Shortfall				
			Bump sensis hedge	LS hedge	No hedge	Bump sensis hedge	LS hedge	ES hedge	No hedge	Bump sensis hedge	LS hedge	ES hedge
swaps portfolio	$\Delta$	1/1	0.8539	0.8633	1.0	0.3822	0.3697	0.3747	1.7361	0.6833	0.6629	0.6537
		0.1/0.1	0.6439	0.6522	1.0	0.5968	0.5898	0.5928	2.1971	1.3345	1.3217	1.3186
		0.1/1	0.8407	0.8228	1.0	0.3991	0.4209	0.4403	1.7361	0.7301	0.7930	0.8330
	$\Delta, \Gamma$	1/1	0.8297	0.8943	1.0	0.4127	0.3252	0.3335	1.7361	0.7157	0.3910	0.3689
		0.1/0.1	0.6538	0.7747	1.0	0.5884	0.4746	0.5019	2.1971	1.3044	0.9055	0.8531
options portfolio	$\Delta$	0.1/1	0.6208	-13.7382	1.0	0.6158	3.8390	4.9250	1.7361	1.1606	7.1435	8.9904
		1/1	0.6932	0.7211	1.0	0.5539	0.5281	0.5396	2.1751	1.2274	1.1560	1.1299
		0.1/0.1	0.4776	0.4903	1.0	0.7228	0.7139	0.7180	2.1773	1.5646	1.5370	1.5294
		0.1/1	0.6400	0.6195	1.0	0.6000	0.6168	0.6490	2.1751	1.3410	1.3935	1.4510
		1/1	0.7302	0.8527	1.0	0.5195	0.3837	0.3997	2.1751	0.8944	0.6035	0.5852
	$\Delta, \Gamma$	0.1/0.1	0.4853	0.6365	1.0	0.7174	0.6029	0.6335	2.1773	1.5396	1.2730	1.2290
		0.1/1	0.6489	-21.9163	1.0	0.5926	4.7871	5.6709	2.1751	1.0304	8.9656	10.5216

Table 1: Baseline results (cf. Figures ?? and ??).

### 3 Bayesian-Mixture Case

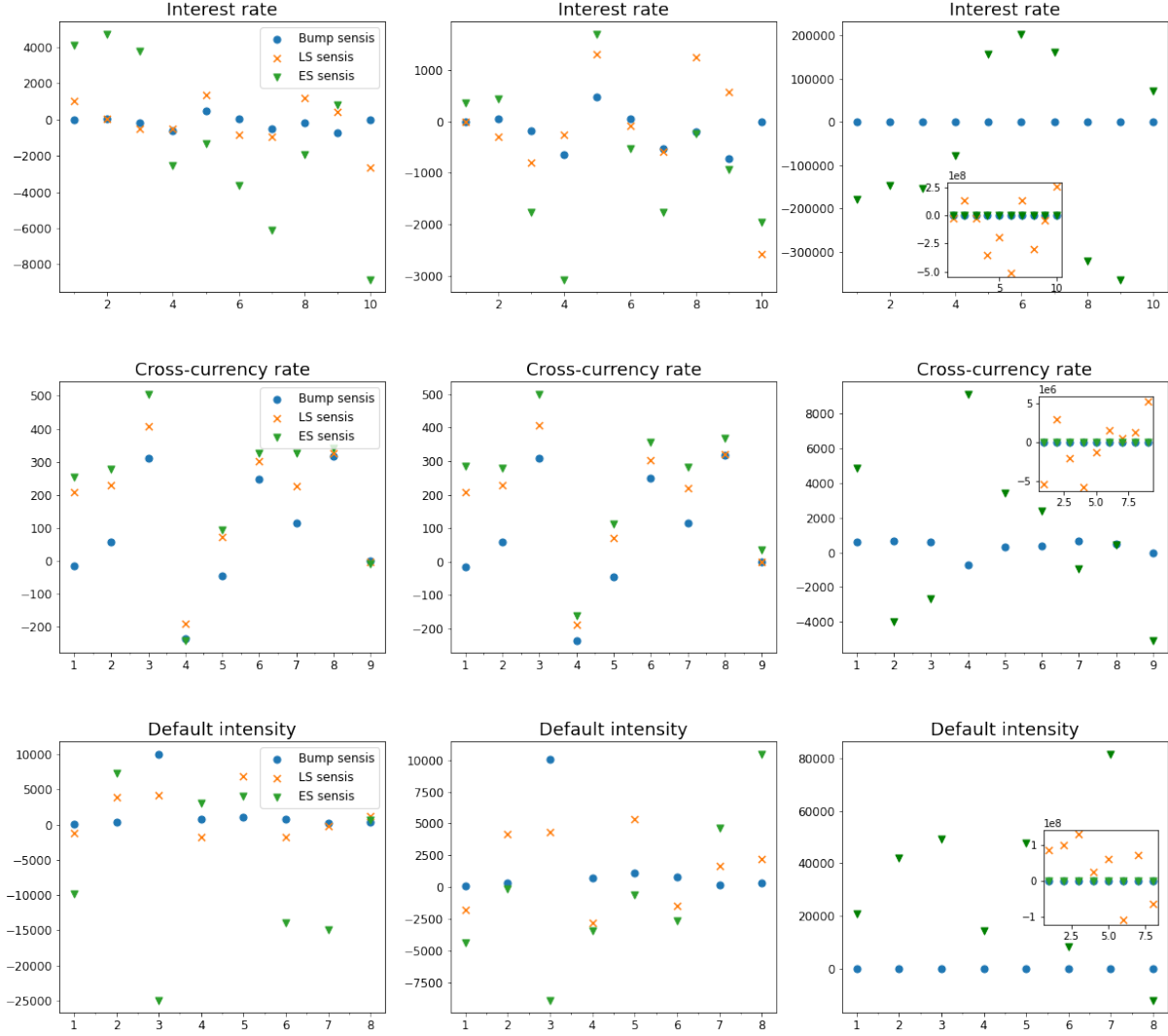


Figure 2: Call options and 1yr case: Bayesian-mixture estimated  $\Delta$  when  $\Delta$  hedging (left column) or  $\Delta, \Gamma, \mathcal{V}$  hedging (center column), and the corresponding estimated  $\mathcal{V}$  in the second case (right column).

Portfolio	Regression features	Train $t$ / Test $t'$	R2 score		Standard Error			Expected Shortfall				
			Bump sensis hedge	LS hedge	No hedge	Bump sensis hedge	LS hedge	ES hedge	No hedge	Bump sensis hedge	LS hedge	ES hedge
swaps portfolio	$\Delta$	1/1	0.7824	0.8007	1.0	0.4665	0.4464	0.4585	2.1733	1.0815	0.9984	0.9732
		0.1/0.1	0.5346	0.5401	1.0	0.6822	0.6782	0.6804	2.2010	1.4840	1.4769	1.4745
		0.1/1	0.7730	0.7702	1.0	0.4765	0.4794	0.4820	2.1733	1.0958	1.0985	1.0877
	$\Delta, \Gamma, \nu$	1/1	0.7799	0.8619	1.0	0.4691	0.3716	0.4149	2.1733	0.9210	0.7245	0.6840
		0.1/0.1	0.5562	0.6752	1.0	0.6662	0.5699	0.6076	2.2010	1.4456	1.1309	1.0847
options portfolio	$\Delta$	0.1/1	0.6146	-14.4992	1.0	0.6208	3.9369	5.4218	2.1733	1.1858	6.7172	8.9885
		1/1	0.3029	0.4093	1.0	0.8349	0.7686	0.7876	2.6577	2.3547	2.0894	2.0486
		0.1/0.1	0.2003	0.2055	1.0	0.8943	0.8913	0.9170	2.4270	2.2583	2.2465	2.2113
		0.1/1	0.2879	0.3085	1.0	0.8439	0.8315	0.8188	2.6577	2.3708	2.3166	2.1987
		1/1	0.5039	0.7672	1.0	0.7043	0.4825	0.5876	2.6577	1.2295	1.0492	0.9705
	$\Delta, \Gamma, \nu$	0.1/0.1	0.5877	0.6633	1.0	0.6421	0.5802	0.6203	2.4270	1.3804	1.2058	1.1725
		0.1/1	0.4589	-7.0056	1.0	0.7356	2.8294	3.6649	2.6577	1.3114	5.1815	5.8243

Table 2: Bayesian-mixture results (cf. Figures ?? and ??).