```
                        Volatility Model
=================================================================
                coef    std err         t     P>|t|    95.0% Conf. Int.
-----------------------------------------------------------------
omega         0.0680   1.805e-02     3.769   1.638e-04 [3.266e-02,   0.103]
alpha[1]      0.0929   3.617e-02     2.568   1.023e-02 [2.199e-02,   0.164]
Dep. Variable:                        ^STI   R-squared:                0.000
Mean Model:                      Zero Mean   Adj. R-squared:           0.001
Vol Model:                       GJR-GARCH   Log-Likelihood:        -1625.38
Distribution:     Standardized Student's t   AIC:                    3260.76
Method:                 Maximum Likelihood   BIC:                    3287.39
                                             No. Observations:          1519
```

```
                        Volatility Model
==========================================================================
                 coef    std err         t      P>|t|     95.0% Conf. Int.
                        Volatility Model
==========================================================================
                 coef    std err         t      P>|t|     95.0% Conf. Int.
--------------------------------------------------------------------------
omega          0.0680  1.805e-02      3.769  1.638e-04 [3.266e-02,   0.103]
--------------------------------------------------------------------------
omega          0.0680  1.805e-02      3.769  1.638e-04 [3.266e-02,   0.103]
omega          0.0680  1.805e-02      3.769  1.638e-04 [3.266e-02,   0.103]
alpha[1]       0.0929  3.617e-02      2.568  1.023e-02 [2.199e-02,   0.164]
alpha[1]       0.0929  3.617e-02      2.568  1.023e-02 [2.199e-02,   0.164]
gamma[1]       0.1436  4.503e-02      3.190  1.425e-03 [5.537e-02,   0.232]
gamma[1]       0.1436  4.503e-02      3.190  1.425e-03 [5.537e-02,   0.232]
beta[1]        0.7293  5.535e-02     13.175  1.227e-39 [   0.621,   0.838]
                          Distribution
==========================================================================
                 coef    std err         t      P>|t|   95.0% Conf. Int.
--------------------------------------------------------------------------
nu             5.6065      0.770      7.279  3.369e-13 [   4.097,   7.116]
==========================================================================


Covariance estimator: robust
99% 1-day VaR: 1.8272%
99% 1-day ES : -2.3692%
c:\Users\racky\OneDrive\桌面\Option and Futures\GARCH to Black-Scholes.py:87: FutureWarning: Calling float on a
single element Series is deprecated and will raise a TypeError in the future. Use float(ser.iloc[0]) instead
  S0 = float(sti["Close"].iloc[-1])  # ensure scalar
GJR-GARCH BS Call Price: 123.73
```

Volatility Model

	coef	std err	t	P>|t|	95.0% Conf. Int.
omega	0.0680	1.805e-02	3.769	1.638e-04	[3.266e-02, 0.103]
alpha[1]	0.0929	3.617e-02	2.568	1.023e-02	[2.199e-02, 0.164]

Dep. Variable:	^STI	R-squared:	0.000
Mean Model:	Zero Mean	Adj. R-squared:	0.001
Vol Model:	GJR-GARCH	Log-Likelihood:	-1625.38
Distribution:	Standardized Student's t	AIC:	3260.76
Method:	Maximum Likelihood	BIC:	3287.39
		No. Observations:	1519
Date:	Thu, Jan 22 2026	Df Residuals:	1519
Time:	21:09:54	Df Model:	0