We consider a risky asset $S(t)$ defined as $S(t) = \exp(x_2(t) + f(t))$ with riskless asset $B(t) = B_0 \exp(rt)$. The risky asset $S(t)$ consists of a non-seasonal non-linear stochastic process $x_2(t)$ which has a non-linear stochastic mean level $x_1(t)$ and a non-stationary stochastic volatility functional. We derive a continuous-time analogue of GARCH(1,1) model having two different sources of Wiener process for the non-stationary volatility functional. We showed that the expected square volatility under the risk-neutral measure is a deterministic delay differential equation and then constructed a numerical solution for the model. In addition, by developing a moving average-type model for a volatility process, an attempt is made to compare the merits and demerits of these to approaches. (Received September 21, 2012)