Let $(\Omega, \mathcal{F}, \mathbb{P})$ be a probability space, $(X, \mathcal{B}_X)$ be a Borel $\sigma$-algebra induced by a $\sigma$-compact Hausdorff space, and $\pi$ be a marked Poisson random measure (r.m.) on $F \otimes \mathcal{B}_X$ directed by a Borel measure $\mu$. Then, $\mathbb{E} e^{-i\theta \pi} = e^{\mu[F(\theta)-1]}$ ($F$ is the Fourier-Stieltjes transform of the marks) is the Fourier-type functional of r.m. $\pi$. Suppose now that $\pi$ is perturbed by a $\Sigma$-measurable semi-Markov process $\eta$ that makes $\pi$ change its parameters subject to the evolution of $\eta$. We denote such modulation by $\pi_\eta$. Previously, we proved that such a new construction is also a r.m. We obtain an associated Fourier-type functional $\mathbb{E} e^{-i\theta \pi_\eta}$ reminiscent of that for conventional Poisson r.m. Among other related ramifications of this analysis, is a geometric Poisson r.m. modulated by $\eta$. This find applications to the stock market. Of further interest, is the exponential intensity of the process representing the mean exponential return rate of a stock modulated by $\eta$. We find a closed-form expression for this functional. (Received January 29, 2019)