Pavlov I. V., Tsvetkova I. V. (Rostov-on-Don, Russia) **Interpolating deflators and interpolating martingale measures.**

It is well known that on non-arbitrage financial (B,S)-markets with a fixed physical probability Q, there is a one-to-one correspondence between martingale measures (m.m.) equivalent to Q and martingale (relative to Q) deflators (m.d.). If (B,S)-market is defined on no more than a countable probabilistic space $(\Omega, \mathcal{F}, Q)$, then for construction of hedge portfolios it turned out to be useful to consider the "most fair" m.m., which we called interpolating m.m. [1,2]. We also call the corresponding deflators interpolating ones. Let us clarify this definition in a one-step model.

Let $(\mathcal{F}_k)_{k=0}^1$ be a filtration on Ω such that $\mathcal{F}_0 = \{\Omega, \emptyset\}$ and $\mathcal{F}_1$ is the set of all subsets of countable Ω that have (except for $\emptyset$) strictly positive Q -probability. Let $Z = (Z_k, \mathcal{F}_k, Q)_{k=0}^1$ be a discounted stock price, and $H = (H_k, \mathcal{F}_k, Q)_{k=0}^1$ be a strictly positive m.d. with $H_0 = 1$. We fix a family of interpolating filtrations $\mathbf{F} = \{\mathbf{F}^\alpha\}$ indexed by a parameter α, where $\mathbf{F}^\alpha = (\mathcal{F}_n^\alpha)_{n=0}^\infty$ and for each index α the equalities $\mathcal{F}_0^\alpha = \mathcal{F}_0$, $\mathcal{F}_\infty^\alpha = \mathcal{F}_1$ hold. Consider the following martingale interpolations of the deflator H: $H_n^\alpha = E^Q[H_1 \mid \mathcal{F}_n^\alpha],\ n = 0, 1, 2, \ldots.$ On the other hand, let P be a $\mathbf{F}$ -interpolating m.m. of the process Z, that is, for each α the process $Z_n^\alpha = E^P[Z_1 \mid \mathcal{F}_n^\alpha],\ n = 0, 1, 2, \ldots,$ admits a unique m.m. (namely, only the measure P). If in the model under consideration the measure P corresponds to H (i.e. $dP = H_1 dQ$), then the generalized Bayes formula implies that $H_n^\alpha Z_n^\alpha = E^Q[H_1 Z_1 \mid \mathcal{F}_n^\alpha]$ for any α, i.e. H_n^α is a m.d. of the process Z_n^α. Since P is the unique m.m. of the process Z_n^α, then H_n^α is the unique m.d. of this process. From the above reasoning the following proposition follows.

Proposition. M.d. H of the process Z, corresponding to the m.m. P, is an interpolating m.d. if and only if it satisfies the following uniqueness property: $\forall \alpha$ the process H_n^α is the unique martingale deflator of the process Z_n^α.

In our talk, in terms of the parameters of the process Z and the properties of the physical measure Q, the conditions for the existence of interpolating deflators will be given.

REFERENCES

1. *Pavlov I. V., Tsvetkova I. V, Shamrayeva V. V.* On the existence of martingale measures satisfying the weakened condition of noncoincidence of barycenters in the case of countable probability space. Theory Probab. Appl., 2017, Vol. 61, Issu 1, pp. 167-175.
2. *Pavlov I. V.* New family of one-step processes admitting special interpolating martingale measures. Global and Stochastic Analysis, 2018, vol. 5, № 2, pp. 111-119.

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