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Maximum principle for partially observed risk-sensitive optimal control problems of mean-field type *

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Abstract: This paper deals with a class of partially observed risk-sensitive optimal control. By virtue of the Girsanov's theorem and the standard spike variational technique, we establish the maximum principle for the partially observed control problems. Moreover, the sufficient condition is also obtained for the special case by using some concavity conditions. As an application, a linear-quadratic system is presented to demonstrate our results.

Keywords: Maximum principle; Risk-sensitive optimal control; Partial information; Girsanov's theorem; Spike variational technique.

AMR Subject Classification (2010): 60H10; 49N10; 93E10; 93E20.

1 Introduction.

Since the early work of Jacobson [10], the subject of risk-sensitive optimal control problems has attracted many researchers, see, for example, Whittle [24, 25, 26], Charalalmbous and Hibey [4] and Lim and Zhou [14]. The main reason is that it has close connection with exponential linear-quadratic Gaussian problems [1] and differential games [7] and [20] and can be widely used to study some mathematical financial problems. Initially, dynamic programming principle is the tool predominantly used to study the risk-sensitive stochastic control problem. In 1990, Whittle [25] first derived the Pontryagin's maximum principle basing on the theory of large deviation for a risk-sensitive stochastic optimal control problem. From then on, a great deal of research about risk-sensitive stochastic control problem has been devoted to the Pontryagin's maximum principle. Especially, in 2005, Lim and Zhou [15] established a new risk-sensitive maximum principle, based on the logarithmic transformation and the relationship between dynamical programming and the maximum principle, which requires that the value function is smooth. And then, motivated by a kind of portfolio choice problem in certain financial market, using the classical convex variational technique, in 2007, Wang and Wu [21] obtained the maximum principle and

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