# Term Structure Models with Negative Interest Rates

PRELIMINARY DRAFT

Yoichi Ueno[1]

September 6, 2016

**Abstract**

This paper proposes a new term structure model which generalizes the Gaussian affine model and the Black model with an efficient and accurate solution method. Estimation results using data on government bond term structures in Switzerland, Germany, and Japan show that the new model outperforms the Gaussian affine model and the Black model. Applying the new model, the effects of forward guidance, quantitative easing, and the negative interest rate policy in the three countries are quantified. In the new model, the power of arbitrage between money or reserves and government bonds is variable. Moreover, it is found that the power of arbitrage moves in tandem with basis swap spreads.

[1] The views expressed in this paper are those of author and do not necessarily reflect those of the Bank of Japan or the Institute for Monetary and Economic Studies.