APPLICATION OF THE BROWNIAN BRIDGE PROCESS IN A TERM STRUCTURE OF INTEREST RATES MODEL

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Jesper Lund in his work analyses the effect of planned EMU membership on domestic yield curves in the potential member states [1]. In order to describe dynamics of the short-term spread (between domestic and euro interest rate) under the real probability measure, Lund applies the standard Vasiček process (Ornstein-Uhlenbeck), while extends risk-neutral process with the second factor - stochastic price of risk which also follows the Vasiček process. It is not difficult to prove that in order to avoid arbitrage opportunity, short-term spread should converge to zero by time of entering the currency area. Lund's specification does not ensure fulfillment of this condition. I develop a term structure model of interest rates for a country which will join the euro area in the future. The specification of the short-term interest rate spread dynamics is defined by the Brownian bridge process, see, e.g.,[2] for a more general case. This stochastic process has a feature to converge to zero at a specific time moment. Therefore, this specification ensures convergence of the short-term spread to zero by country's entrance to the currency area and thus avoids an arbitrage opportunity at this moment in time. An econometric counterpart of the theoretical model is also developed. Since observations are discretely sampled, it is needed to transform the continuous-time state-space system into a discrete-time form. The paper provides a framework of the econometric model using the extended Kalman filter.

REFERENCES

[1] J. Lund. Model for Studying the Effect of EMU on European Yield Curves . *European Finance Review* , **2** 1999, 321 − 363.

[2] P. E. Protter . *Stochastic Integration and Differential Equations* . Springer-Verlag, Berlin, 2005.