Valuation of mortgage-backed securities based on unobservable prepayment costs

Hidetoshi Nakagawa[1] and Tomoaki Shouda[2]

[1] Center for Research in Advanced Financial Technology, Tokyo Institute of Technology, 2-12-1 Ookayama, Meguro-ku, Tokyo, 152-8552, Japan
(email: nakagawa@craft.titech.ac.jp)

[2] MTB Investment Technology Institute Co., Ltd., 2-5-6 Shiba, Minato-ku, Tokyo, 105-0014, Japan
(email: shoda@mtec-institute.co.jp)

Abstract. Mortgage-backed securities (MBS) have been rapidly increasing in issued total amount recently in Japan.

In this paper, we consider the model where each loan borrower (mortgager) is specified only by a single variable called prepayment cost which is not directly observable in the secondary market. It is assumed that every mortgager does prepayment reasonably at the first time when the market interest rate decreases to the level that she or he thinks more advantageous to prepay the loan in consideration of her or his peculiar prepayment cost.

We study the theoretical MBS price in the arbitrage-free framework and present a procedure to estimate parameters of a distribution function of prepayment cost based on the history about riskless interest rate and actual prepayment events in terms of the Bayesian scheme.

Key words: mortgage-backed securities, prepayment risk, Bayesian model.