A 3-factor Valuation Model for Mortgage-Backed Securities (MBS)

TAKEAKI KARIYA
Research Center for Financial Engineering
KIER, Kyoto University
Sakyo-ku, Kyoto 606-8501 Japan

FUMIAKI USHIYAMA
Department of Social Informatics
Kyoto University
Sakyo-ku, Kyoto 606-8501, Japan

and

STANLEY R. PLISKA*
Department of Finance
University of Illinois at Chicago
601 S. Morgan Street, Chicago, IL 60607-7124 USA

September 4, 2002

Abstract

In this paper we generalize the one-factor MBS-pricing model proposed by Kariya and Kobayashi(2000) to a 3-factor model. We describe prepayment behavior due to refinancing and rising housing prices by incentive response functions. Our valuation of an MBS is based on discrete-time, no-arbitrage pricing theory, making an association between prepayment behavior and cash flow patterns. The structure, rationality, and potential for practical use of our model is demonstrated by valuing an MBS via Monte Carlo simulation and then conducting a comparative statics analysis.

1 Introduction

Via a no-arbitrage pricing theory in a discrete time setting, Kariya and Kobayashi(2000) (abbreviated KK(2000) or simply KK below) formulated a framework for pricing an MBS (Mortgage-Backed Security) and proposed

*Professor Pliska was a chair professor of Applied Financial Engineering sponsored by Nomura Securities at the Research Center for Financial Engineering, Institute of Economic Research, Kyoto University.

The authors are grateful to Mr. Satoshi Yamanaka for his programing the basic part of calculation.