ABSTRACT

Although in Singapore, real estate is traditionally regarded as a primary direct investment, there is immense potential for a secondary mortgage market (Ong, Ooi and Sing, 2000). In the local context, ARMs is the prevalent form of mortgages (Khor and Ong, 1998). Thus, an efficient and comprehensive methodology must be developed to allow accurate valuation of ARMs in the foreseeable event of mortgage securitisation in Singapore.

Rights to prepay and default in an ARM can be observed as put and call options. The introduction of default and exogenous prepayment as options is critical in the valuation of ARMs. Unless the option to default and the option to prepay (due to exogenous reasons) are both considered, a borrower’s behaviour cannot be accurately and qualitatively described. (Kau et al, 1993).

This study will attempt to incorporate default and prepayment into the discounted cash flow (DCF) analysis to accurately measure the value of the borrower’s option to default or prepay in an ARM. The stochastic interest rates movement shall be modeled using a mean reverting process. The default option will be incorporated into the pricing model by introducing a lognormal process to represent the house value. Property value (or house price) enters as a factor because when its value falls below the mortgage balance, default occurs. Finally, the prepayment option shall be incorporated by utilizing the hazard rates for exogenous prepayment obtained from Ong (2000). The results from this option-pricing
model shall be compared with those from the discounted cash flow (DCF) approach to indicate that the DCF approach alone cannot take into account embedded options in ARMs.

The results from this study showed that using the DCF approach alone will undervalue an ARM. This implies that the embedded options have values that cannot be ignored in the valuation process. Also, it is observed that the net present value ($NPV$) of an ARM is negatively related to both the current risk-free rate and interest rate volatility. This implies that the value of a mortgage is highest in a low interest rate environment with low interest rate volatility and vice versa.