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BRETT HAMMOND
CHIEF INVESTMENT
STRATEGIST

LEO KAMP
CHIEF ECONOMIST

DOUGLAS FORE
DIRECTOR OF PORTFOLIO
ANALYTICS

THE ABCs OF RMBS **UNDERSTANDING RESIDENTIAL MORTGAGE BACKED SECURITIES**

The basic idea underlying the concept of structured securities is quite simple: assets of a similar type are acquired, pooled together and sold to a third party. The payoff function is determined by the cash flows of the underlying assets. Many types of assets are acquired, pooled together and offered to investors as structured securities. Among the most common types of structured securities are those backed by residential mortgages (RMBS). In addition there are asset backed securities (ABS) collateralized by assets such as credit card receivables as well as commercial mortgage backed securities (CMBS) collateralized by mortgages on commercial properties.

The financial innovation known generically as structured securities is not new; it is in fact decades old. In the case of structured securities where the underlying assets are individual home mortgages the process begins when a mortgage is sold by the originator of the mortgage, such as a bank or a mortgage broker. A representative structure would consist of a pool of mortgages of similar credit quality, diversified geographically for additional credit protection. The issuers pay one or more of the credit rating agencies to assess the credit quality of the structure and assign a credit rating. Structured securities consist of tranches, or slices of risk, and these tranches are assigned individual credit ratings, supposedly reflecting the probability of repayment. Investors desiring the highest degree of credit protection purchase only the highest rated tranches. In return for



accepting additional risk, investors purchasing lower-rated tranches receive extra return. The lower rated tranches, however, absorb initial losses if the underlying mortgages go into default, while the highest rated tranches continue to receive cash flows. The principal advantage of this financial innovation is that risks can be identified, packaged and sold to the investors who most want to hold them.

The payoff function for RMBS is somewhat more complicated than the corresponding “plain vanilla” payoff function for a government bond. In the case of a — non callable — government bond the payoff function is derived from the coupon interest rate on the bond as well as the face value or principal of the bond. If the bond were a ten-year U.S. treasury bond, an investor would receive semi-annual coupon payments and if the bond were held to maturity a final payment of principal at maturity. Hence the cash flows of the bond can be described as a set of 21 individual bonds; the 20 coupons and the principal. These 21 individual cash flows are priced and traded individually by market participants.

Individual homeowners have the option to change the cash flows of their mortgages, and these options complicate RMBS pricing. Individual homeowners have the option to pay additional principal (curtailment) and also have the option to pre-pay their mortgage. The timing of these curtailment and prepayment options is not known in advance and can only be approximated by the models used in RMBS pricing. In formal terms there are no closed-form solutions for RMBS pricing. The payoff function for RMBS consists of two separate streams of cash flows. One stream of cash flows consists of the monthly interest payments on the underlying mortgages. The second stream of cash flows consists of the principal on the underlying mortgages. If the individual homeowners do not exercise their curtailment or prepayment options then the cash flows composed of the principal of the underlying mortgages are amortized over time. If the curtailment and — especially — the prepayment options are exercised then the RMBS is paid off early at an uncertain date before maturity. As should be obvious, the probability of prepayment increases when interest rates fall and homeowners are more likely to re-finance their mortgages. In return for accepting the curtailment and prepayment options investors are compensated with additional yield.

There are several types of RMBS issuers in the U.S. Some are household names such as Fannie Mae, Freddie Mac and Ginnie Mae. Fannie Mae was originally chartered during the Great Depression and began operations in 1938. Its original purpose was to purchase, hold and sell mortgages insured by the Federal Housing Administration (FHA). After the war Veterans Administration (VA) guaranteed mortgages were added. In 1968 Fannie Mae was split into two parts: Fannie Mae and Ginnie Mae. Ginnie Mae is an agency of the federal government and its securities are backed by the full faith and credit of the U.S. government. Fannie Mae is a government sponsored enterprise (GSE), stockholder owned. Fannie Mae does not have an explicit federal government guarantee. In 1970 Freddie Mac was created for the purpose of creating a secondary market in conventional mortgages. The authority to purchase, hold and trade in conventional mortgages was also given to Fannie Mae. Like Fannie Mae, Freddie Mac does not have an explicit federal government guarantee. Mortgage backed securities issued by Fannie Mae, Ginnie Mae and Freddie Mac are referred to as agency securities.

The other major issuers of RMBS are private sector financial services firms such as the major sell-side Wall Street firms. Mortgage backed securities issued by these firms are referred to as non-agency securities. The recent turmoil in the RMBS market is primarily located within non-agency securities. This includes rapidly escalating concerns about credit quality. There is particular concern in the case of RMBS backed by sub-prime mortgages. In particular, there is concern that the credit quality of RMBS backed by sub-prime mortgages deteriorated significantly as the housing boom neared its top, and that the credit quality of the 2005 “vintage” of sub-prime RMBS is worse than the credit quality of the 2004 vintage, with the credit quality of 2006 sub-prime RMBS in turn still worse than the 2005 vintage. Hence while tens of billions of dollars of losses have been incurred to date in the sub-prime RMBS space, there is widespread consensus that more losses will yet be borne.

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Brett Hammond, Leo Kamp and Douglas Fore are available to comment on economic data. If you wish to speak with them, please contact Chad Peterson, Media Relations, 212-916-4808 or email cpeterson@tiaa-cref.org.

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