

Understanding Mortgage Prepayments

1. **Call Valuation** (60 points): Wachovia has recently hired you as part of their Structured Finance group. The first assignment that your boss gives to you is to value the embedded call option in mortgages. The current spot interest rate¹ is 6.125%. Assume that Wachovia uses a 1.025 factor for interest rate increases and a .975 factor for interest rate decreases and that the probability for up (down) is 50% e.g. $\pi_u = \pi_d = .5$ and periods are 1 year in length. If

Contract Interest Rate: 6.125% Refinancing Costs (Points on New Loan): 0 points
Principal: \$415,000 Payments Per Annum: 1 payment per year
Term of Loan: 4 years

Using the spreadsheet labeled RECM_MBS_Prepay2008.xls:

- Generate the five period (Years 0-4) Interest Rate Tree
- Value the Non-Callable Mortgage Bond.
- Value the Prepayment (Call) Option on the Callable Mortgage.
- Value the Callable Mortgage.



2. **Cash Flows based on PSA Speed** (40 points): Calculate the cash flows for the first 30 months on the following mortgage pass-through:

Original Mortgage Balance	\$415,000 (in 000s)	Term	360 months
Interest Rate	6.125%	PSA	100%
Servicing Fee ²	0.5%		

- What would the cash flows for the first 30 months be if the PSA is 100%?
- What would the cash flows for the first 30 months be if the PSA increased to 205%?
- What would the cash flows for the first 30 months be if the PSA decreased to 90%?
- Graph your cash flows for various PSAs (100%, 205%, 90%) on the same chart. The y-axis is the cash flows and the x-axis is the months.
- What would the cash flows for the first 30 months be if you used the following PSA vector:

Month : 1 - 15	205% PSA
Month : 16 - 30	90% PSA

¹<http://mortgagedirect.wachovia.com/cgi-bin/world/start.pl?opt=login&dbvia=bls&source=2&nojs=false&script=bestRates.pl> (as of 12/27/07)

²The servicing fee includes GNMA timing insurance