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PAYDOWN RETURN

FLAMETREE TECHNOLOGIES PTY LTD

Introduction

The simplest way to explain paydown return is by using an example.

Suppose a bond allows the issuer to pay back part, or all, of its principal during its lifetime. This is in contrast to conventional Treasury bonds, where the amount lent remains constant until the bond's principal is repaid at maturity.

At the start of a given month, the bond is trading at a price of \$105 per \$100 face value. The bond's issuer then repays 20% of the bond's capital.

- Before the repayment, the investment is worth \$105.
- After the repayment, the investment is worth $0.8 \times \$105 = \84 , plus the cash repayment of \$20. The total value is $\$84 + \$20 = \$104$.

The repayment has resulted in a loss of \$1 to the bond holder. The return due to prepayment is

$$r = -\frac{1}{105} = -0.952\%$$

General treatment

In general, paydown return is calculated using the following process.

Suppose that the prices of a security at the start and end of an interval $[t, t + 1]$ are P_t and P_{t+1} , and that its paydown factors at the same times are B_t and B_{t+1} , respectively. The face values of the security is F . Then the change in value of the investment over the interval is given by

$$\delta P = B_{t+1}P_{t+1} - (B_{t+1} - B_t)F - B_tP_t \quad (1)$$

and return r is

$$r = \frac{\delta P}{B_tP_t} \quad (2)$$

Discussion

The most common securities with this type of prepayment feature are mortgage-backed bonds (MBS), which are based on pools of residential and commercial mortgages. Such mortgages typically have an early prepayment feature, allowing the borrower to prepay part or all of their loan as additional cash becomes available, and thereby to reduce overall borrowing costs. Amortizing bonds will pay down their principal over the lifetime of the security, but do not allow prepayment; therefore they do not generate paydown return.

The degree of prepayment is measured by the bond's paydown factor. This is a number between 0 and 1, representing the fraction of the MBS that is still live. A bond factor of 1 implies that no prepayment has taken place. A bond factor of 0 implies that the bond is fully repaid.

The bond factor is determined by the market and must be supplied externally.

The PSA model uses a forecast of prepayment rates in order to generate a set of cash flows used to price the MBS. However, this *ex ante* forecast cannot be used to calculate bond factors, which are an *ex post* measurement of actual prepayments.

Paydown return is negative if the bond is trading at a premium, and positive if it is trading at a discount.