

REFINANCING & RETURNS

You took out a 30-year mortgage (monthly payments) for \$130,000 at 8.90% and payment number 35 is due today. You are deciding whether you should refinance the outstanding principal by borrowing at today's lower rate of 6.70% an amount that just pays off the old loan. The new loan is for 30 years as of today. The total fees for getting the new loan equal 3.1% of the borrowed principal, and you will pay the fees today with funds from your savings account. What is the NPV of the refinancing opportunity if your personal discount rate is 10%?

ANSWER: First find the PAYMENT on the original loan from the present value relation:

$130,000 = PMT \times \{ 1/(1+.0890/12)^1 + \dots + 1/(1+.0890/12)^{360} \}$; on calculator, PV=130,000; I/Y=8.9 (P/Y=12), N=360, so find that PMT=\$1,037 . If you sent in 35 payments, then there remain 325 payments. Solve PV in the following equation.

$$PV = 1037 \times \{ 1/(1+.089/12)^1 + \dots + 1/(1+.089/12)^{325} \}.$$

On calculator, set N=325 {and still I/Y=8.9 (P/Y=12) & PMT=\$1,037}. Find that PV= 127,115. That's the loan's outstanding principal. Find the fees of \$3,941 by multiplying (\$127,115 x 0.031).

The new loan's payment satisfies

$$127,115 = PMT \times \{ 1/(1+.067/12)^1 + \dots + 1/(1+.067/12)^{360} \}$$

On calculator, PV=127,115; I/Y=6.7 (P/Y=12), N=360, so find that PMT=\$820 . Your monthly savings is \$216.43 (= \$1,037 - \$820).

The refinancing immediately costs you \$3,941. It saves you \$216.43 monthly for the next 325 months. That is followed by the last 35 payments of \$820 from your new loan. Solve this NPV equation:

$$NPV = 216.43 \times \{ 1/(1+.10/12)^1 + \dots + 1/(1+.10/12)^{325} \} - 820 \times \{ 1/(1+.10/12)^{326} + \dots + 1/(1+.10/12)^{360} \} - \$18608$$

On your calculator enter CF0 = -3941, CF1= 217, F01= 325, CF2= -820, F02= 35.

Punch the NPV button, set I = 10/12, and compute that NPV is \$18,608. The refinancing increases your market value by \$18,608.