

Deal or No Deal?

Suppose that you are offered two alternative options for buying an item: (1) an immediate discount of certain amount, say \$X, or (2) special financing option with zero or low interest rate. Which deal is better? The answer to this question depends on the amount the discount, the standard interest rate, and the alternative interest rate that the seller offers. Below we show the technical details of the calculations involved. The general reader can use our “Deal or No Deal” calculator, to easily find out the value of the financing option.

Technical Appendix

In this appendix we demonstrate the financial calculations that enable you to find the present value of a special financing option.

Notation:

L – Loan amount

N – Number of payments

r_s – Standard interest rate

r_d – Special financing (deal) interest rate

In general, the payment per period for a loan characterized by (L, N, r) is calculated by solving:

$$L = \sum_{t=1}^N \frac{PMT}{(1+r)^t} = PMT \sum_{t=1}^N \left(\frac{1}{1+r} \right)^t$$

This assumes that the first payment is due one month from signing, which is the typical case.

Let $R = \sum_{t=1}^N \left(\frac{1}{1+r} \right)^t = \frac{1}{1+r} - \left(\frac{1}{1+r} \right)^{N+1} \bigg/ 1 - \left(\frac{1}{1+r} \right)$, where R is the Present Value factor. In the special case of

$r = 0$, we set $R = N$, to avoid division by zero. Thus, $PMT = \frac{L}{R}$. The present value of stream of payments at the amount of PMT can be written as $PMT \cdot R$. Suppose now that you have a special low interest financing option, with interest rate r_d . The payment in this case is

$$PMT_d = \frac{L}{R_d},$$

where R_d is the present value factor corresponding to r_d . The present value of these special payments is

$$PV(\{PMT_d\}) = \frac{L}{R_d} \cdot R_s,$$

where R_s is the present value factor corresponding to the standard interest rate r_s . Finally, the present value of the special financing option is

$$PV(Deal) = L - \frac{L}{R_d} R_s$$

If this number is greater than the discount offered in option 1, then the consumer should choose the special financing. If this number is smaller than the discount, the consumer should choose the discount over the special financing.