Future Discounting

Introduction:
Is a dollar today worth the same as a dollar tomorrow?
What about next week or next year?

A way that we value things in the future has an implied discount.
For example, my enjoyment of $100 may give me 100 utility today, while that same $100 in a year gives me 90 utility today.

$U(\$) = \$ * \beta$

Where β is the discount rate.

Discounting:
This is the process of converting a value received in a future period to an equivalent value received immediately.

Discounting through multiple periods

What if we have to wait for multiple periods?
The best way to show this is to create a discount for a standard amount of time (a year) and discount the value by each year that passes.

1 year: $U(\$) = \$ * \beta$

2 years: $U(\$) = \$ * \beta^2$

3 years: $U(\$) = \$ * \beta^3$

Examples with different discount rates and years:

Implied Discount Rate

We can use the interest rate people borrow money at to calculate their implied discount rate. The easiest way to do this is in terms of APR.

APR: Annual Percentage Rate. (Interest rate by the year.)

Example 1:
The average return on the S&P 500 is about 7% APR.
This gives us a return of R= 1.07

If I have $100 today, I can invest it.
The dollars received from spending it today: $100.
Dollars received from spending it in a year: $107.

If I invest my $100 instead of spending it, what does that say about my discount rate?
The fact that we chose to invest shows that:
$U(100, t = 0) \leq U(107, t = 1)$
$100 \leq 100 * 1.07 * \beta$

Assumption, assume this holds with equality.
$100 = 100 * 1.07 * \beta$
Therefore, $\beta = 0.93$
That's pretty high.

Example 2:
A possible interest rate for a credit card if you hold over a balance is 14 APR%
This gives us a return of R= 1.14

I don't have any money today, so I borrow some.
The dollars received today: $100.
Dollars amount that must be repaid: $114.

I chose to borrow the money today; what does that say about my discount rate?
The fact that we chose to borrow shows that:
$U(100, t = 0) \geq U(100, t = 1)$
$100 \geq 100 * 1.14 * \beta$

Assumption, assume this holds with equality.
$100 = 100 * 1.14 * \beta$
Therefore, $\beta = 0.87$
That's pretty high.