Leverage Using Debt

> "My partner Charlie says there are only three ways a smart person can go broke: liquor, ladies and leverage… Now the truth is — the first two he just added because they started with L — it's leverage."
>
> Warren Buffett quoting Charlie Munger, 26 Feb 2018

Debt liabilities allow firms or investors to 'lever up' or 'amplify' returns on equity. This is because debt holders are only paid the coupon and principal payments that they're promised, not more.

Equity holders have a residual claim on the firm's assets and own everything that's left after the debt holders are paid. If the firm has a good year, equity holders share in the high profits but debt

holders do not. Debt holders are only paid what they're owed. Equity holders are paid the rest.

This is a double-edged sword because on the one hand, during good times having debt makes equity returns very high. But during bad times, debt makes equity returns very negative.

Calculation Example: Personal Finance and Leverage

Question 1: Bob has a:

- $600,000 house.
- $400,000 mortgage loan on the house.
- $1,000 in his deposit account at the bank.
- $6,000 in credit card debt.

Question 1a: What is Bob's net wealth?

Answer: Looking at Bob as if he is a business with assets (V), equity (E) and debt (D), then net wealth is the same as equity. Note that in this case equity does not mean shares, it means net wealth. Bob's net wealth (E) can be calculated:

$$V = D + E$$

$$(600k + 1k) = (400k + 6k) + E$$

$$E = (600k + 1k) - (400k + 6k)$$

$$= 195k$$

So if Bob sold his house and paid all of his debts then he would have $195k left. Note that the $1k deposit, which is lending to the bank, can be seen as a positive asset or as a negative liability, it doesn't matter for the calculation of net wealth.

Question 1b: What is the weight of the asset class real estate in Bob's net wealth?

Answer: $x_{Real\ Estate} = \frac{600k}{195k} = 3.0769 = 308\%$

Question 1c: What is the weight of the asset class debt in Bob's net wealth?

Answer: The asset class debt is not just the liability D as in V=D+E. In that equation, D is the debt used to fund the assets V. But the assets might contain debt assets (lending), such as in Bob's case since he has a deposit account which is lending to the bank.

The asset class debt is all types of borrowing and lending which have the characteristics of debt. This includes the:

- mortgage loan owed (borrowing, writing debt, drawing down debt, debt sold, short debt),
- bank deposit lent (lending, investing in debt, debt bought or long debt) and
- credit card debt which is borrowing.

Therefore the weight in debt is:

$$x_{Debt} = \frac{-400k + 1K - 6k}{195k} = -2.076923077 = -208\%$$

This is a negative weight so we're net sellers of debt (borrowers).

To remember that lending is buying and borrowing is selling debt, think about what happens to the cash at the start.

Lenders: Buy debt, Long debt, Invest in debt.

Lending is buying debt since you give cash at the start and receive the debt contract which contains the promise to pay you back. This is investing in debt since the investor pays money at the start in exchange for the contract.

Borrowers: Sell debt, Short debt, Issue debt.

Borrowing is selling debt since you receive cash at the start and give the debt contract to the buyer which contains your promise to pay her back. This is also where the term 'writing' or 'drawing' debt comes from. The borrower writes the debt contract and exchanges it for cash at the start of the loan.

Question 1d: If house prices fall by 25% this year, what will be Bob's **dollar** and **percentage** change in net wealth?

Answer: If house prices fall, the bank will not cut the amount owing on the mortgage loan, it will remain the same.

Therefore Bob's new net wealth (E_1) will be:

$$V_1 = D_1 + E_1$$

$$(600k \times (1 - 0.25) + 1k) = (400k + 6k) + E_1$$

$$E_1 = 45k$$

Bob's Balance Sheet
Now (t=0) and later (t=1), in $k

Time	V	D	E
0	601	406	195
1	451	406	45

Bob's net wealth is only 45k, \$150k less than \$195k. This is because the house is worth \$150k less.

As a percentage, his change in net worth or equity is:

$$r_E = \frac{E_1 - E_0}{E_0} = \frac{45k - 195k}{195k} = -0.769230769 \approx -77\%$$

So a 25% fall in house prices leads to a 77% fall in net wealth. This shows the power (and danger) of leverage from debt liabilities and how it amplifies the returns to equity.

Notice that the fall in net wealth is 3.0769 times the fall in the house price since the weight of net wealth in the house is 3.0769.

A quote from Warren Buffett's 2017 letter to shareholders:

> "Our aversion to leverage has dampened our returns over the years. But Charlie and I sleep well.
>
> Both of us believe it is insane to risk what you have and need in order to obtain what you don't need.
>
> We held this view 50 years ago when we each ran an investment partnership, funded by a few friends and relatives who trusted us.
>
> We also hold it today after a million or so "partners" have joined us at Berkshire."

24 Feb 2018, Berkshire Hathaway 2017 Letter to Shareholders

Questions: Leverage and portfolio returns

http://www.fightfinance.com/?q=377,379,94,301,406,