

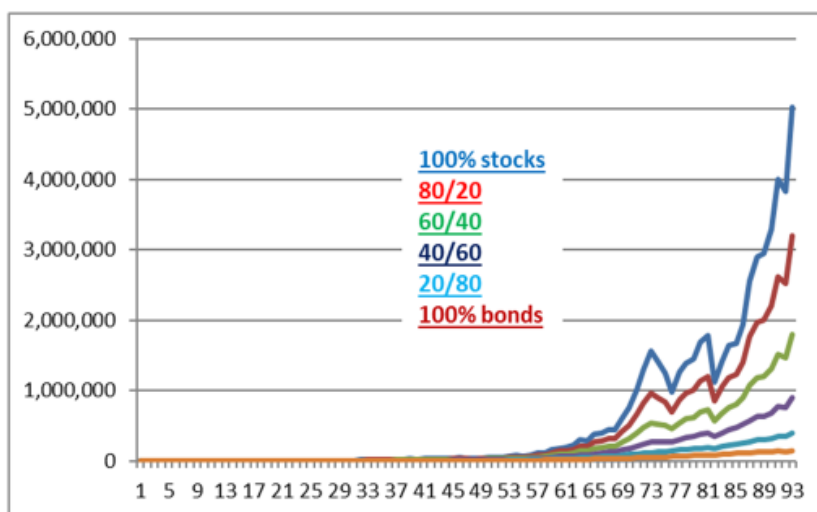
L24- Pre-lecture reading-

Bonds: The other way to finance companies

Bonds as an investment

We now turn to a subject we mentioned in Lecture 6 but have been ignoring– the use of bonds (together with stocks) to finance a new company or a new opportunity for an existing company. For investors, bonds represent a safer way to invest. Bondholders are loaning money to a company (or a government) for a period of time (usually 1-10 years), after which the original investment is returned. The only risk is that the company will be unable to pay the promised interest on time (or to return the original investment on the promised date), in which case the company must declare bankruptcy. In a bankruptcy, stockholders lose everything, but bondholders may get some of their money back (if the company has assets that can be sold). US government bonds are considered to have no risk and pay the lowest interest rate, but some countries have defaulted. Companies are rated by agencies such as S&P or Moody's (their highest rating is AAA or A3 and their lowest rating is C. Bonds rated BBB or higher are called "investment grade." Lower rated bonds are often called "junk" bonds, and pay higher interest rates, but even AAA companies can fail. Historically, AAA companies have an annual default rate of less than 0.5%. Historically they have paid about 3% on their bonds, while CCC companies have seen default rates as high as 25% and have paid much higher interest on their bonds. [At the moment, all interest rates that have been at historical lows have begun to creep up.] Stocks have no promised returns and become worthless in a bankruptcy, but that greater risk has been rewarded by that higher return of about 10% (on average, over time). This makes a huge difference over time, as is illustrated on slide 4, below, using real stock and bond returns since 1928.

How much risk can you tolerate? Results of just \$1000 invested for 90 years



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An investor with 100% stocks for those 90 years would have \$5M (with some very scary years), while 100% bonds yielded only \$150K, which is scary in other ways (you don't want to retire on \$150K). That's why most investors choose a mix of stocks and bonds, depending on "risk tolerance."

Bonds as a source of capital for companies

“Leveraging” profits with bonds

Now we will move to an entirely different viewpoint– the use of bonds, or “debt,” to “leverage” a company’s earnings. Whether a company reinvests its earnings to grow or pays them out as dividends, those earnings represent a reward for their shareholders (the owners of the company) that is paid “after tax”. In contrast, the interest they pay bondholders (who are not “owners”) is treated as an expense and is paid “before tax”. To pay the stockholders their anticipated 10% a company must create 15% pre-tax income (we have been assuming a 33% tax). To pay bondholders their promised 5%, they only need 5% pre-tax.

The reason that we use the term “leveraging” for funding a business with bonds is that it has a multiplying effect on earnings that go to shareholders. Similarly, for homeowners, a mortgage can “leverage” the profit they make on a house. Assume you buy a house for \$400K in cash and sell it for 10% more (\$440K). Your profit is \$40K, or 10% on your investment. But what happens if you put down only \$40K (10% of the price) and take out a \$360K mortgage for the rest? If you sell the house for \$440K you will make the same \$40K profit on an investment of only \$40K. You have “leveraged” your profit by a factor of $1/10\% = 10$ (from 10% to 100%).

The only problem is that leveraging also multiplies your losses. If the house falls in value by 10%, you sell it for \$360K and you still owe the bank \$360K, so you have lost your entire investment. You have leveraged a 10% loss to a 100% loss! If you sell the house for less than \$360K your mortgage is said to be “under water.” You will still owe whatever is left of the mortgage to the bank (or you will have to declare personal bankruptcy). The reason people are willing to leverage houses with 80-90% mortgages is that houses are generally a safe investment. They seldom fall in value and people who aren’t selling aren’t really affected. But people who don’t understand risk do foolish things.

In the decade before 2008, home prices had doubled. Seeing this as an investment opportunity, many people bought multiple houses or very expensive houses they couldn’t afford. They believed prices would continue to go up, and that leveraging multiple houses would make them rich. Banks made this much worse by offering mortgages with monthly payments that were deferred for a year or two. Buyers couldn’t afford the future payments, but they expected to sell the house or (houses) with a profit before they needed to pay anything. People tend to think that whatever is happening will continue, but in 2008, buying slowed and house prices stopped increasing. Many owners tried to sell their expensive houses but suddenly no one was buying. Prices fell and many mortgages were “under water.” The owners couldn’t cover the payments, so they defaulted. They accepted personal bankruptcy and abandoned the houses, causing AAA rated banks to fail and starting a huge recession. [Note that the risks taken by speculative home buyers ended up affecting all investors.]

Returning to the use of bonds by companies, let’s see how leveraging could work for a cellular company. Slide 5 shows the base case, from lecture 5, with 100% financing with equity and 10% return for stockholders. Slide 6 shows the same company, but with 25% of the investment (\$.25B) coming from bonds paying 5%. The interest has reduced profits by \$8M, but the stockholders’ “equity” has been reduced by 25%, so the profit per share has increased from 10% to 12.2%.

What if they finance 75% of their investment with bonds? Slide 7 shows that case. The bond interest is higher (say 6%) because of the increased risk of default, but with significant leveraging the profit has increased to 28%! The risk is that revenues can be variable for businesses, but bondholders must be paid on time. If they aren’t paid the company is bankrupt. Even the rumor of that happening can make stock prices crash and CEOs lose their jobs (recall Ron Sommers of Deutsche Telecom). Those rumors also make it hard to borrow the money they need.

The familiar base case: No bonds

Balance Sheet		P&L	
Users in this system	1M	Revenue/user /month	= \$50
Channels in this system	400		
Users/cell	1,000	Revenues =	\$600M
Number of cells	1,000	Expenses=	\$450M
		SG&A	= \$350M
		10% Depreciation	= \$100M
Assets (1000 cells)	= \$1B	BT Earnings	= \$150M
		33% Tax	= \$ 50M
		Profit	= \$100M
		(10% return on equity)	
Shareholders equity	= \$1B		

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25% of investment from bonds paying 5%

Balance Sheet		P&L	
Users in this system	1M	Revenue/user /month	= \$50
Channels in this system	400		
Users/cell	1,000	Revenues =	\$600M
Number of cells	1,000	Expenses=	\$462M
		SG&A	= \$350M
		10% Depreciation	= \$100M
		5% interest on bonds	= \$12M
Assets (1000 cells)	= \$1B	BT Earnings	= \$138M
		33% Tax	= \$ 46M
Total "Liabilities"	= \$ 1B	Profit	= \$92M
Shareholders equity	= \$.75B	(12.2% return on equity)	
Bonds paying 5%	= \$.25B		

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75% of investment from bonds paying 6%

Balance Sheet		P&L	
Users in this system	1M	Revenue/user /month	= \$50
Channels in this system	400		
Users/cell	1,000	Revenues =	\$600M
Number of cells	1,000	Expenses=	\$493M
		SG&A	= \$350M
		10% Depreciation	= \$100M
		6% interest on bonds	= \$43M
Assets (1000 cells)	= \$1B	BT Earnings	= \$107M
		33% Tax	= \$ 36M
Total "Liabilities"	= \$ 1B	Profit	= \$71M
Shareholders equity	= \$.25B	(28% return on equity)!!	
Bonds paying 5%	= \$.75B		

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A look at Verizon's debt

Traditionally, companies like Verizon and AT&T had less than 50% of their assets as debt. In its 10K report for 2003, Verizon had assets of \$76B and debts of \$16B, which is sort of normal. Things we think of as assets and costs were easy to find. When we look at the 2020 10K it's quite different. It has become difficult for the average investor to figure out what they actually owe, so what if we ask Google if Verizon has "a lot of debt." The answer that we get is "yes." See the URLs below.

<https://simplywall.st/stocks/us/telecom/nyse-vz/verizon-communications/news/is-verizon-communications-nysevz-a-risky-investment-1>

<https://www.fool.com/investing/2021/02/10/does-verizon-have-a-debt-problem/>

For example:

"as of March 2021 Verizon Communications had \$158B of debt, an increase on \$118B, over one year."

That's about 75% of the "market value" of the company How could that happen? Also:

*On an absolute basis, Verizon's debt figure is large and potentially concerning. But when we compare the company to competitors **AT&T** and **T-Mobile**, the figures aren't quite as daunting.*

We should be relieved because the other service providers are also in deep debt? But then they explain why it's all OK.

Why 5G is Verizon's next big bet

If Verizon is going to be any kind of growth stock, it'll be because of 5G connections. 4G wireless has been pretty stagnant for years with slow but unimpressive connection growth.

5G could change that, opening a number of new options for Verizon. 5G is already enabling Verizon to offer home hubs with a wireless connection, potentially bringing Verizon into millions more homes and replacing cable connections. Connected devices are also proliferating with new technologies like autonomous vehicles, virtual reality headsets, and edge computing in need of fast, reliable connections. Verizon could use these new markets to expand its business. 5G isn't just about keeping existing smartphone customers happy.

When you see tens of billions of dollars being spent on spectrum, it's this growth that should come to mind. Verizon wouldn't be spending that to maintain its current business; the idea is to expand the pie in a big way.

What do you think of this argument?

So according to Wall Street, all that scary debt is OK because it's all about 5G, and 5G is all about growth, but we know that 5G services like remote medicine are far off in time. Their spending isn't about healthy 5G growth. Dreaming aside, the cellular business is still about smart phones and 4G/LTE. We saw in CTIA-Annual-Survey-Highlights-2021 that they are still spending on base stations and spectrum to meet smart phone demand that increased 50% in 2019 and 2020, and which created no new revenues at all. The lesson is that we seem to understand what's going on better than the Wall Street analysts (which should be disturbing to the investors they are advising). Our analysis has shown that the service providers aren't investing in growth—they are investing in capacity while revenues are decreasing. This may explain why they are borrowing the money rather than issuing new stock. If they sell new shares of stock without an expectation of new profit, they are reducing the profit per share that the existing shareholders will see (this is called “diluting” the profit per share, which makes shareholders unhappy). Paying for that capacity with “debt” also has risks, of course, but they are less obvious. The analysts have noticed but aren't too worried. Perhaps they should be.

We note that in 2021, Verizon was able to convert a lot of its debt to long-term debt (more than 20 years) which reduces their short-term risk, and while the revenue per user isn't growing, the overall revenues of the service providers are quite predictable, which reduces the risk of debt. We can speculate that they are unlikely to go bankrupt based on debt, but their shareholders have little to be happy about. Debt is increasing and profits are falling. AT&T recently reduced its dividends, and they aren't growing (despite all the “5G talk”). Will they continue to spend hundreds of billions of dollars on growth without revenues? When will 5G create new revenues (if ever)?

And finally, there's the issue of “cash flow”

Assets and Liabilities and revenues and expenses are not the only calculations that companies (and individuals) must keep track of. There are important bills (like salaries and interest on loans) that are due on specific days, and companies can't pay them with revenues that are due a week later. They need to plan for “cash flow” to make sure their cash accounts never “go negative”. “Negative cash” isn't really possible, of course. It just means you can't pay your bills at that moment and some bills (like bond interest and bond redemptions and employee salaries) have to be paid on time. Not paying bondholders on time means bankruptcy, so there needs to be long term planning of “cash flow” (the flow of money in and out of the company) to make sure bills can always be paid.

We learn, from cash flow, that a seemingly profitable company can be bankrupted if cash is not available at certain moments. A good example of this is what is called “accounts receivable” which is money that customers owe the company but haven't paid. Accounts receivable are an asset of the company but represent a future cash flow. They can't be used to pay salaries or bond holders today. Alternatively, the expenses for depreciation and amortization are not always spent and can be a source of cash. Money that we borrow (typically thought of as an asset) can also be used to pay salaries or interest on loans and bonds. That isn't desirable, but it's possible in hard times. On Balance sheets and P&L, we distinguish between “capital dollars” and “operating dollars” because we are trying to measure profit, but we don't distinguish between dollars we have actually received and accounts receivable, or expenses like depreciation that aren't actually spent (yet). In Cash Flow we measure dollars we actually have, and can use to pay for things, and we plan those events forward in time, perhaps for years, to make sure we will always have cash to pay our bills.

The “personal” side of cash flow

Cash flow is also an issue for personal finance, particular in the early years of a career when you may be “cash poor.” You have a regular income and can do some planning for big expenses like rent, car payments, and student loans. You can estimate your taxes and you gradually learn what you can spend on everything else. For many people, “what you can spend on everything else” is “everything that’s left.” This causes the same cash flow problem that companies have. Like a company, even if you have accurately predicted your total expenses and they are exactly equal to your total income, you can still have a cash flow problem. What if your big and important expenses occur the week before you get paid? Try telling your landlord that you will have the money next week. You need a certain amount of savings to make sure you can pay your important bills on time, so you don’t become one of those people that eats spaghetti and ketchup for the week before payday. A cash flow plan helps you figure that out.

There’s also the problem of unplanned emergencies like expensive car repairs. If you have minimal savings for expected cash flows, any unplanned expense will destroy your plan. Your budget and your savings need to allow for some unexpected events, like a major car repair. Otherwise, the obvious path is the credit card, and that path has no money to pay off the credit card balance. It remains there forever, growing with each “unexpected” event and ruining your credit rating. That’s how the average credit card debt for Americans got to be about \$6000, costing about \$125 per month just for interest, assuming annual interest rates of 25%.

In fact, the average American has \$90K in total debt (including mortgages) and little savings. The debt is mostly held by older Americans, but Gen Z (age 18-23) has an average of \$16K in debt per person (mostly student loans and car loans). For college students, this is often much higher and can make planning difficult and depressing. That’s how so many people get to retirement age with little savings and may even be overall in debt. Many people don’t have the mathematical ability to do financial planning, but engineering students can’t offer that excuse. They do need some knowledge, and that will be the topic of the last two lectures, but first there’s 2 lectures on some interesting “business cases” that let students test their strategic skills and better understand the world.