

Wireless!

The forces and strategies that shaped a revolution



Lecture 24: Bonds:

The other way to finance companies

Lecture 24- Classwork

1. Please summarize in 3-4 sentences the Pre-Lecture reading for Lecture 24. What are some important takeaways from your reading?
2. What is the advantage of financing with bonds for companies? What is the disadvantage?
3. What is the advantage of bonds for investors? What is the disadvantage?
4. Why might the service providers suddenly have so much debt? Why might they have been reluctant to issue more stock?
5. What is the purpose of planning “cash flow” for companies and individuals?

Creating a simple “public” business: We Bulldoze, inc.

- ❑ A business that owns bulldozers and does contract work on construction, mostly for developers.
- ❑ We want to buy 10 bulldozers at \$1M each
 - Depreciated over 10 years
- ❑ We will charge \$250 / hour, and expect 2000 working hours/bulldozer/year
- ❑ We will rent a building for \$50K /year
- ❑ We will employ one manager @ \$150K, 10 operators @ 120K, one office manager @ 30K, one maintenance person for \$70K, fuel/parts at \$100K
- ❑ To raise the money for our bulldozers, we sell 1M shares of stock at \$10 / share

The “business plan” financials for the 1st year

Balance Sheet
after Purchase of
equipment

Assets \$10M

Cash	\$0
Equipment	\$10M

**Shareholders’
Equity \$10M**

Results of 1st year
operations

Revenue \$5.00M

Expenses \$3.50M

Salaries	\$1.450M
fuel	\$0.80M
Maintenance	\$0.20M
Rent	\$0.05M
Depreciation	\$1.00M

BT Earnings \$1.50M

Tax \$0.50M

AT Earnings \$1.00M

**Divd \$1/share \$1.00M
(10% return on shares)**

Balance Sheet
after 1st year

Assets \$10M

Depr acct	\$1M**
Equipment	\$9M*

**After 10 years, we
will have \$10M in a
“depreciation
account” to buy new
bulldozers, so the
company can go on!

*10 Bulldozers
(depreciated)

**Shareholders’
Equity \$10M**

We Bulldoze, inc. Housing boom ends

Revenues well below plan

- ❑ Housing market poor; little new construction
- ❑ Revenues fall to \$2M

What would you do?

- ❑ We lay off 4 operators
- ❑ Maintenance and fuel reduced

We Bulldoze, inc. Housing boom ends Operations well below plan

Oper Revenue \$2.00M

Expenses \$2.48M

Salaries \$.97M

Fuel \$.32M

Maintenance \$.14M

Rent \$.05M

Depreciation \$1.00M

BT Earnings \$ (- .48M)

Tax* \$ (- .16M)

AT Earnings \$ (- .32M)

*No tax, and a loss that could
reduce future taxes

Resulting Balance sheet

Assets \$9.68M

Cash (depr acct) \$0.52M

Equipment \$9.00M

Tax loss* \$.16M

* An asset

Liabilities and

Paid-in Equity \$ 9.68M

Paid-in Equity \$ 10.00M

Retained loss **\$(-0.32)M***

**Nothing for stockholders, so they aren't happy, and
we aren't fully funding our depreciation account,
but we have cash and can go on for quite a while**

What are Bonds?

- ❑ Bonds are financial instruments that represent a debt that an issuer owes to an investor
- ❑ There are several rules that govern bonds, including those related to issuance, interest rates, and redemption
- ❑ Bonds are typically issued by governments (Treasury bonds), corporations, or municipalities
- ❑ The issuance process involves setting the bond's face value, maturity date, coupon rate (interest rate), and other terms
- ❑ Bonds pay interest to investors at regular intervals
 - ❑ Interest rates can be fixed or variable
- ❑ Bonds have a maturity date: the date when the issuer is required to pay back the principal amount to the investor

Financing with Bonds-1

- ❑ Bonds guarantee interest payments
- ❑ Bonds also guarantee redemption at the end of a predetermined period (failure to redeem means bankruptcy)
- ❑ Failure to pay interest also means bankruptcy
 - Our bulldozers will be taken and sold
 - They may not cover the debt
- ❑ Bonds are “safer” than stocks for investors
 - So bondholders settle for a lower return (5%?)
 - What factors determine the interest rate on bonds?

Financing with Bonds-2

- ❑ What factors determine the interest rate on bonds?
 - Market Forces (Supply and Demand)
 - “Creditworthiness” of company
 - Term to Maturity
 - Fed (Central Bank Policy)
 - Inflation

Financing with Bonds-3

□ Market Forces (Supply and Demand)

- Like any market, the price (and therefore the yield) of bonds is influenced by how many bonds investors demand and how many borrowers are offering them.
- If there's high demand for bonds but not enough supply, prices will rise, and yields will fall. Conversely, if there's high supply and low demand, prices will fall, and yields will rise.

□ “Creditworthiness” of company

- Higher-rated bonds, issued by financially strong entities, generally offer lower interest rates.
- Lower-rated bonds, from less financially secure companies or governments, will need to offer higher rates to attract investors due to the increased risk of default.

Financing with Bonds-4

□ Term to Maturity

- Longer-term bonds generally have higher interest rates than shorter-term bonds, as investors demand higher returns for bearing the risk of holding the bond for a longer period.

□ Fed (Central Bank Policy)

- Central banks can influence the overall interest rate environment through their monetary policy, which primarily affects short-term interest rates.
- E.g. if a central bank raises interest rates, it can lead to higher borrowing costs for businesses and individuals, which can increase the overall demand for bonds and push yields down.

□ Inflation

- Rising inflation can lead to lower bond prices and higher yields,

Summary: Financing with Bonds-5

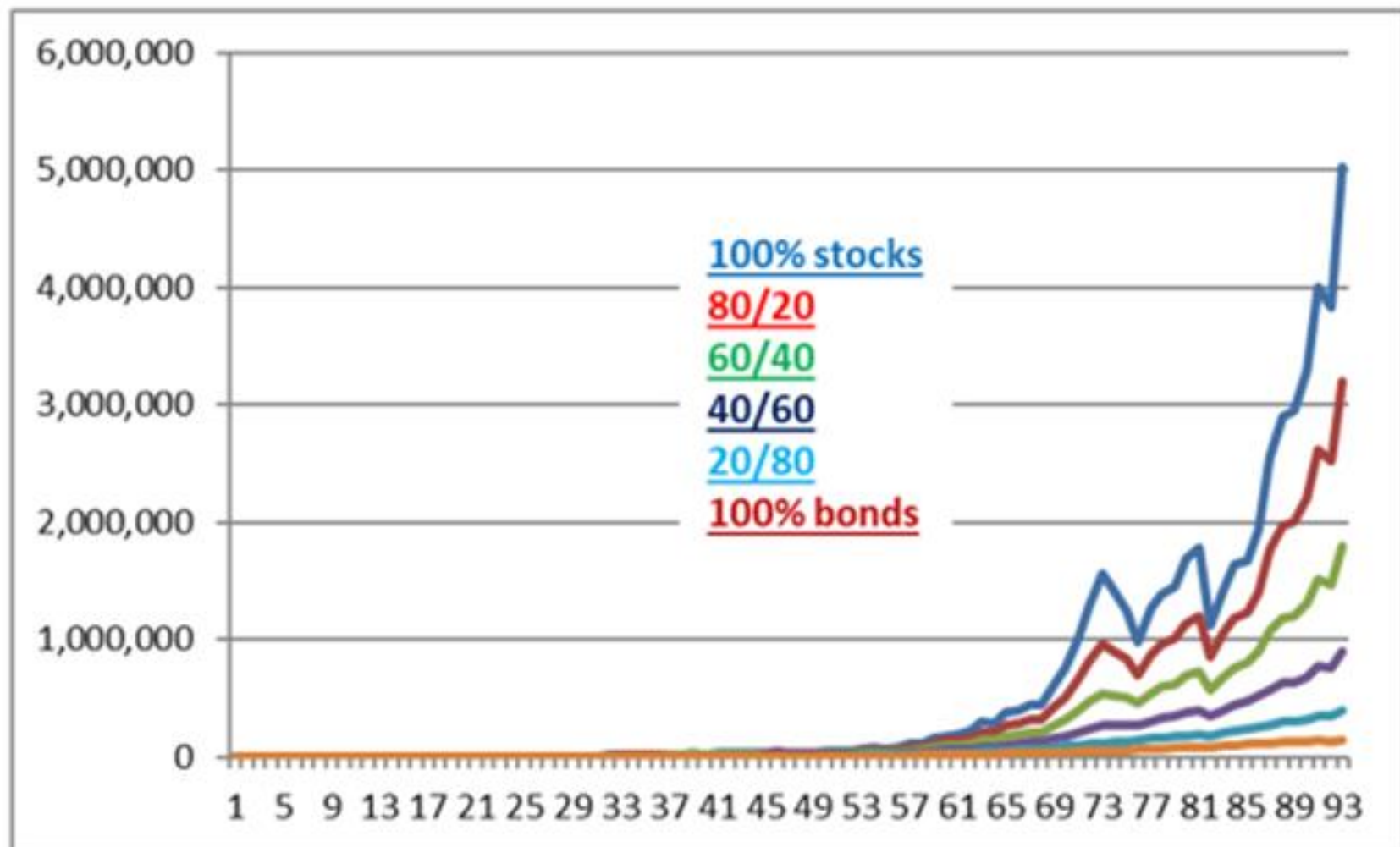
- Market Forces (Supply and Demand)
- “Creditworthiness” of company
- Term to Maturity
- Fed (Central Bank Policy)
- Inflation
- Bond interest is an expense for the company, paid with pretax dollars
- Financing with bonds is called “leveraging” (like a mortgage)

Mortgage leveraging

- Buy a \$200K house
 - Put down 10% (\$20K)
 - Mortgage 90% (\$180K)
- If house value increases 10% (to \$220K)
 - Our gain is 100% (\$20K on a \$20K investment)
 - We have “leveraged” our profit ten times
- Houses usually don’t fall in value
 - But they can, as in 2008 and 2009
 - Losses are leveraged as well
 - If the house value drops 10% to \$180K, we lose 100% (below that our investment is “under water”)

How much risk can you tolerate?

Results of just \$1000 invested for 90 years



Back to Cellular Example

The familiar base case: No bonds

Balance Sheet

Users in this system	1M
Channels in this system	400
Users/cell	1,000
Number of cells	1,000

Assets (1000 cells) = \$1B

Shareholders equity = \$1B

P&L

Revenue/user /month = **\$50**

Revenues = \$600M

Expenses = \$450M

SG&A = \$350M

10% Depreciation = \$100M

BT Earnings = \$150M

33% Tax = \$ 50M

Profit = \$100M
(10% return on equity)

25% of investment from bonds paying 5%

Balance Sheet

Users in this system	1M
Channels in this system	400
Users/cell	1,000
Number of cells	1,000
Assets (1000 cells)	= \$1B
Total "Liabilities"	= \$1B
Shareholders equity	= \$.75B
Bonds paying 5%	= \$.25B

P&L

Revenue/user /month	= \$50
Revenues =	\$600M
Expenses=	\$462M
SG&A	= \$350M
10% Depreciation	= \$100M
5% interest on bonds	= \$12M
BT Earnings	= \$138M
33% Tax	= \$ 46M
Profit	= \$92M
(12.2% return on equity)	

The power of leveraging!

75% of investment from bonds paying 6%

Balance Sheet

Users in this system 1M
Channels in this system 400
Users/cell
1,000 Number of cells
1,000

Assets (1000 cells) = \$1B

**Total "Liabilities" = \$
1B**

Shareholders equity = \$.25B
Bonds paying 5% = \$.75B

P&L

Revenue/user /month = **\$50**

Revenues = \$600M

Expenses= \$493M

SG&A = \$350M

10% Depreciation = \$100M

6% interest on bonds = \$43M

BT Earnings = \$107M

33% Tax = \$ 36M

Profit = \$71M
(28% return on equity)!!

Q2, Q3

So bonds reduce risk for investors and increase risk for companies

- For investors, bonds are more predictable
 - They are “relatively sure” to be paid
 - But the “probable return” is less
- For the company, bonds increase risk
 - Unlike shareholders, bondholders have to be paid
- What would happen if Verizon tried to raise \$100B by issuing new shares of stock to increase capacity?
 - What would happen if Verizon tried to raise \$100B by issuing new shares of stock for “5G”?

Does Verizon have a lot of debt?

What did the analysts say?

“as of March 2021 Verizon Communications had US\$158.1b of debt, an increase on US\$118.1b, over one year.” Why did this huge borrowing happen?

*“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.”* Does this make sense?

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. Does this make sense? 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. But where did the money actually go?

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. Does this make sense? Could they have issued stock instead?

Cash Flow for Companies (and individuals)

- ❑ Cash flow: Making sure the cash is available to pay important debts when they are due
- ❑ E.g. important bills (like salaries and interest on loans) due on specific days
- ❑ 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
 - ❑ Not desirable, but possible in hard times

What have you learned about the corporate world in general?

☐ Stocks

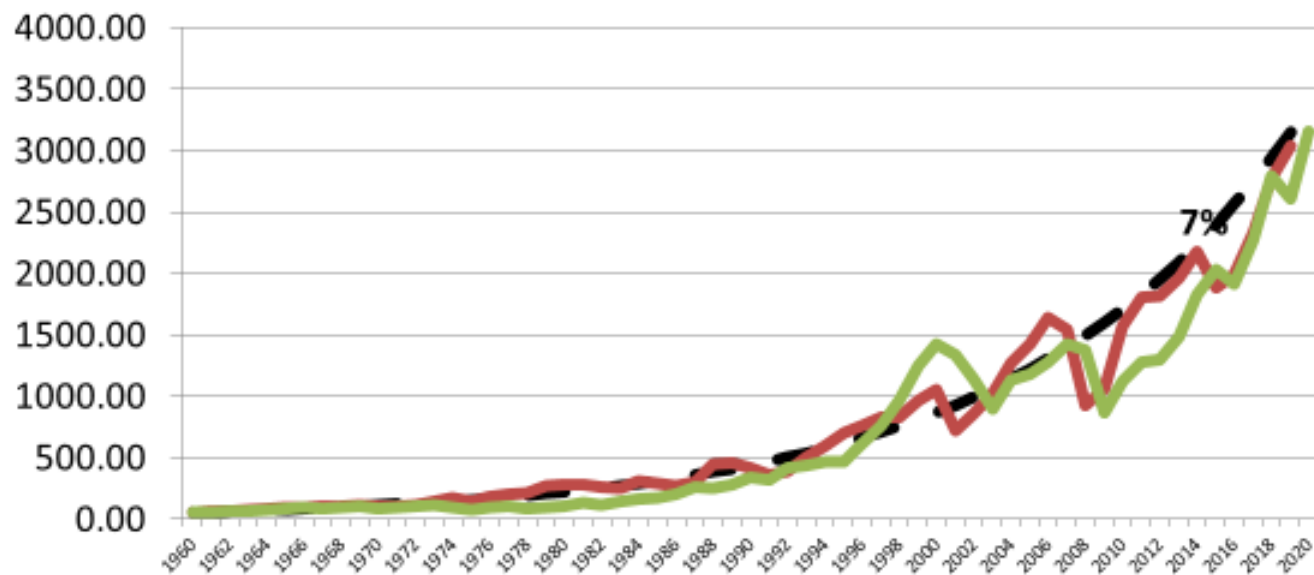
☐ Bonds

☐ Cash Flow

☐ Growth

That scary stock market (as a whole and over a lifetime) makes wealth possible

And **stock Prices** follow **Earnings** in the long term but with even bigger variations in the short term.



**7% annual growth over the long-term
(10% with reinvested dividends)
but some scary moments**