



15.516x Financial Accounting

Bonds and Long-Term Debt

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Finance at MIT

Where ingenuity drives results

Bonds

Long term debt is a key sources of firm financing:

- Alternative to financing through selling stock

Bonds are a type of long-term debt:

- Similar to a loan from a bank

Present Value concepts

To account for bonds (and to value bonds), we will use two present value concepts:

1. Present value of a future payment
2. Present value of an annuity

For some of you computing present value is second nature, but for others it is not. I will review the concepts, but those of you who know them already may jump ahead.

Present Value of a future payment

Future value Formula $FV = PV * (1 + i)^n$

How much is 1 invested today worth in a year if interest rates are 8%?

$$1 + 0.08 = 1.08^1 = 1.08$$

How much is 1 invested today worth in three years if interest rates are 8%?

$$(1 + 0.08) * (1 + 0.08) * (1 + 0.08) = 1.08^3 = 1.26$$

Present value Formula $PV = FV / (1 + i)^n$

If I receive 1 in a year, how much is that worth today if interest rates are 8%?

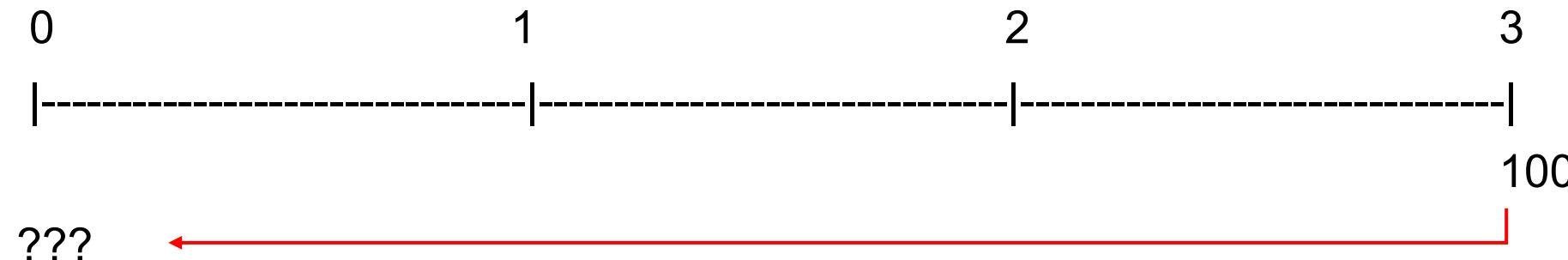
$$1 / (1 + 0.08)^1 = 0.92593$$

If I receive 1 in 3 years, how much is that worth today if interest rates are 8%?

$$1 / 1.08^3 = 0.79383$$

Present Value of a future payment

What is the PV of a lump sum of \$100 received three years from now if interest rates are 8%?



$$100 * 1/(1.08)^3 =$$

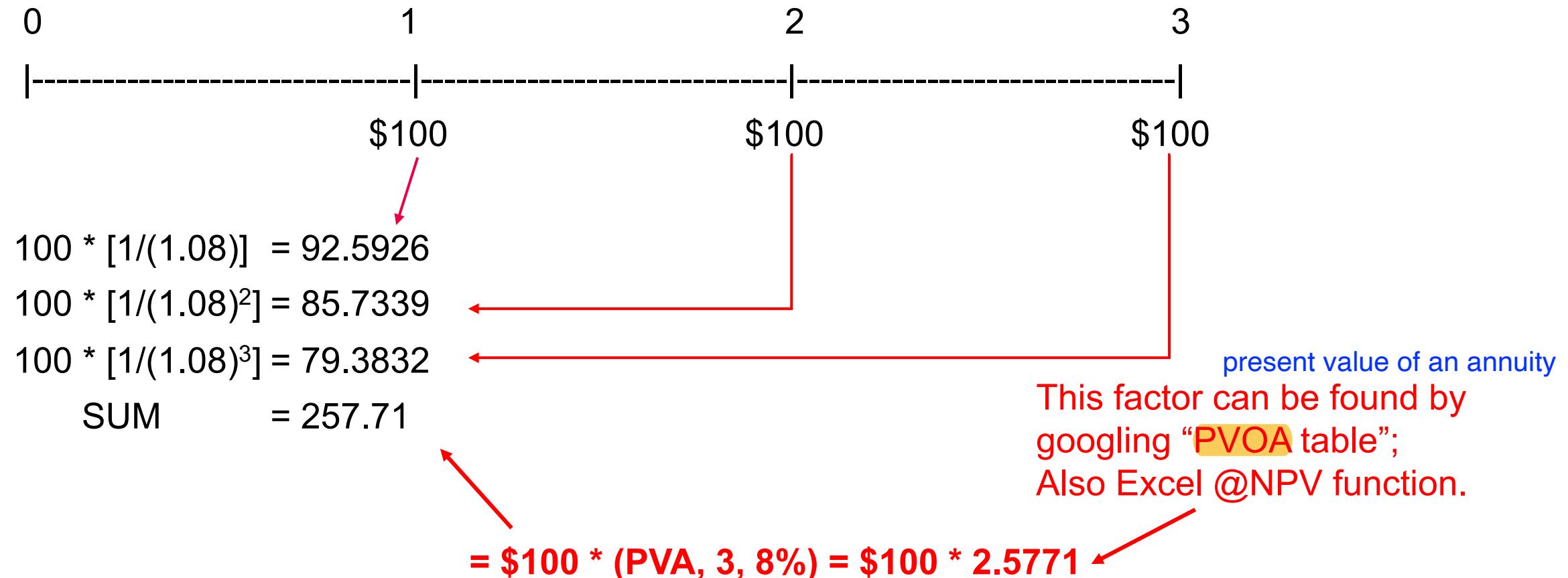
$$100 * .79383 =$$

$$79.38$$

This factor can be found by googling “Present value table”; Also, can compute formula above using calculator or Excel.

Present Value of an annuity

What is the PV of a 3 year \$100 ordinary annuity at 8%?



Bonds – Terminology

Par Value

Stated or face value of the bond; the amount due at maturity (usually \$1,000)

Maturity

The date the firm must repay the investors their principal
usually \$1,000

Coupon Rate

The interest rate stated on the face of the bond. The coupon rate is used to determine the periodic cash payments (if any)

Zero Coupon Bond

A bond that does not make periodic interest payments. Instead there is one lump sum due at maturity

Bonds – Terminology

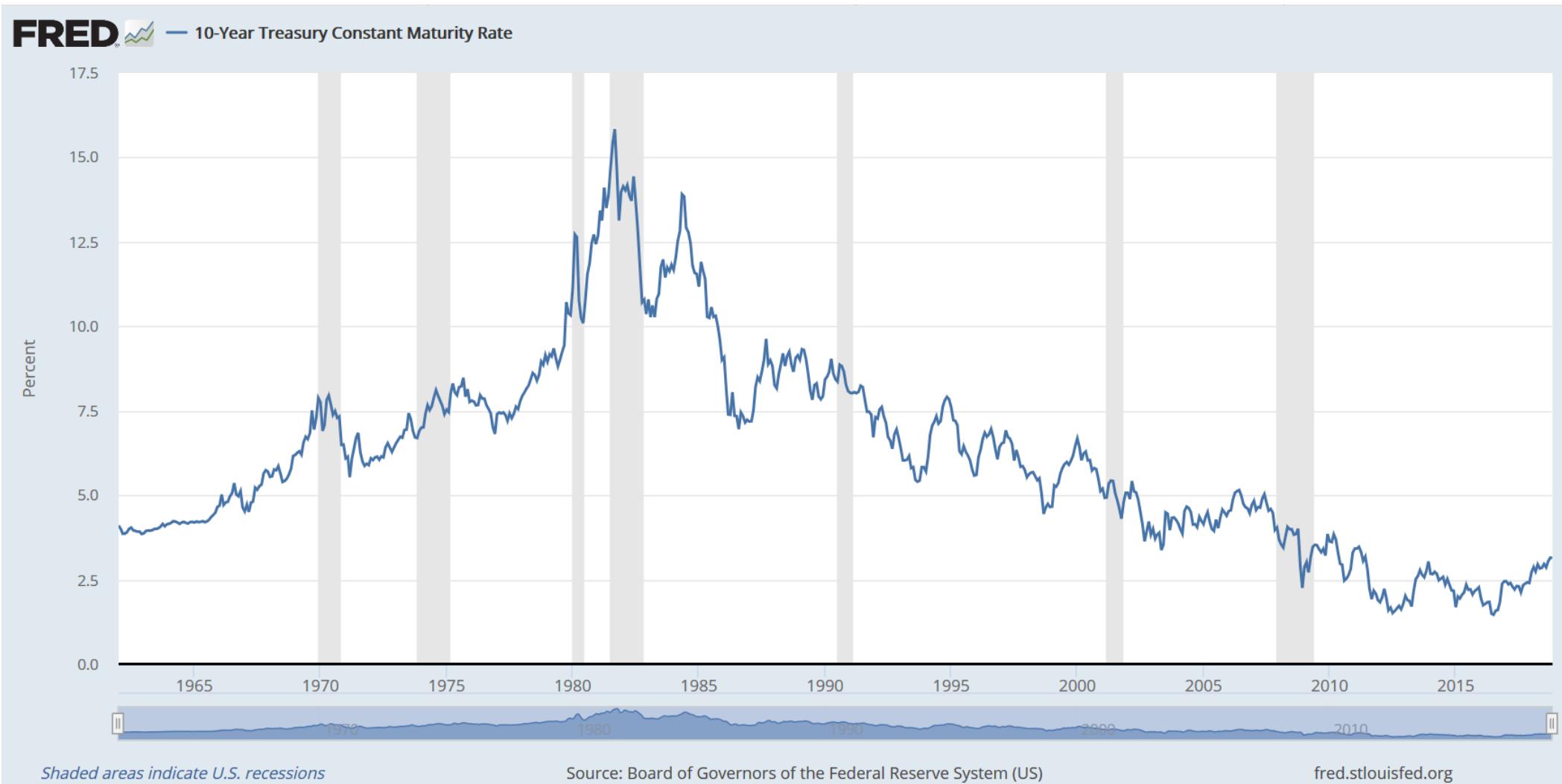
Fixed-Rate 3.85% notes with 4% Effective Interest Rate:

- coupon rate: 3.85%
- discount rate: 4%

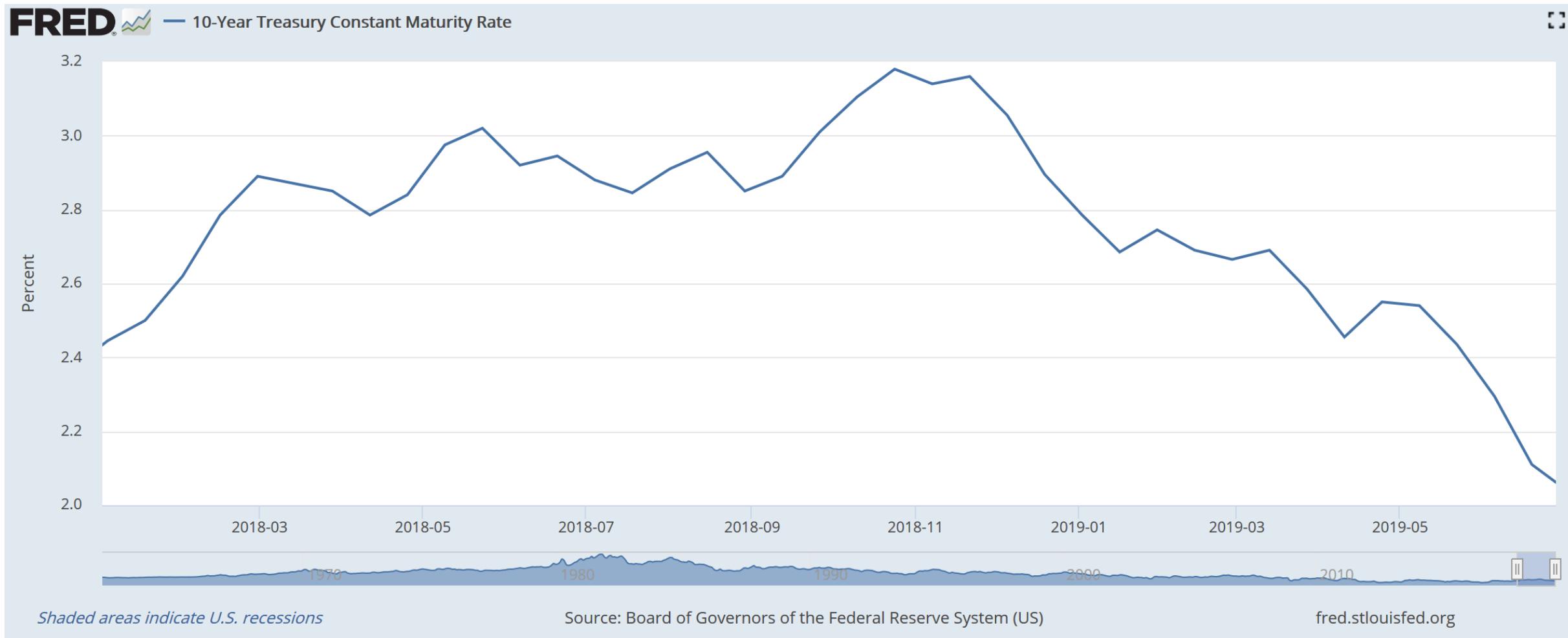
Three interest rates are relevant to bond accounting:

1. **Coupon rate** – the interest rate stated in the bond. The periodic cash payments made to investors will be the coupon rate times the par value of the bond. Coupon payments are typically semi-annual.
2. **Market interest rate (at issuance)** – the rate that determines the interest expense and the book value of the liability how much to put on balance sheet at issuance. (Also known as the effective interest rate.) Note: this rate is fixed at the time of issuance.
3. **Market interest rate (current)** – the rate that determines the current market value of the bond. This rate is based upon market conditions and risk characteristics of the borrower. Note: this rate fluctuates over time.

Movements in market interest rates: 10-year US Treasury 1962 to present



Movements in market interest rates: 10-year US Treasury January 2018 to present



Par, discount and premium bonds

If at issuance, the market rate = coupon rate then market value = par value.

The bond is said to sell at **par** (also, face value).

Sometimes the market rate is higher than (lower than) the coupon rate at the time the bond is issued.

If market rate > coupon rate → “discount bond”

If market rate < coupon rate → “premium bond”

For example, if you were purchasing a zero-coupon bond with a par value of \$1000, and the market rate for similar debt is 6%:

How much would you pay for the bond? Why?

- A. \$1000
- B. more than \$1000
- C. less than \$1000

Due to time value of money and risk of default



Bonds – Summary of accounting

For financial accounting purposes:

Interest expense = market rate at the time the bond is issued × net bond payable

Interest payable = coupon rate × par amount

The difference between interest expense and interest payable is amortized against the bond discount (premium) account.

In this class, we will do the accounting for:

- A bond issued at par value (i.e., Coupon Rate = Market Rate)
- A zero coupon bond (i.e., Coupon Rate = 0%)

Bonds – example

A bond is originated on 1/1/2015. The proceeds are \$10,000. The market interest rate is 6%, and the maturity is at the end of the third year (12/31/2017)

Consider the following two alternatives (Both raise \$10,000 at the bond issuance):

- I. Par value = \$10,000, Coupon rate is 6%. The yearly payments of interest are at the end of each year and repayment of principal is at the end of the third year
- II. A single payment of principal and interest at the end of year 3 (Zero coupon bond)

What annual payments are required?

Bonds – Alternative Payment Streams for a bond with \$10,000 proceeds

	I Coupon (6%)	II Zero Coupon
End of Year 1	600	0
End of Year 2	600	0
End of Year 3	10,600	11,910
Total payments	11,800	11,910

$$\begin{aligned} F &= 10,000 * (1.06)^3 \\ &= 11,910 \end{aligned}$$

How much would we have to pay at the end of year 3 to obtain \$10,000 today?

Check – What is value of a bond with this payment stream if market rate is 6%?

	I Coupon (6%)
End of Year 1	600
End of Year 2	600
End of Year 3	10,600
Total payments	11,800

**Value = Annuity of \$600 +
Lump sum of \$10K**

Annuity
 $= \$600 * (\text{PVA}, 3, 6\%)$
 $= \$600 * 2.67301$
 $= \$1,604$

Lump Sum =
 $(\text{PV of } \$1, \text{ 3 years, } 6\%) * 10,000$
 $= 0.83962 * 10,000$
 $= 8,396$

Total value = 10,000 ✓

Accounting for a Par Bond with a 6% coupon rate

At Issuance

	A = L + S/E	RE
	Cash Bond Payable	
2015	10,000 10,000	

Periodic accounting

	Cash	Bond Payable	RE
2015	-600 int. payment		-600 int. exp.
2016	-600 int. payment		-600 int. exp.
2017	-600 int. payment		-600 int. exp.
	-10,000	-10,000	

Coupon rate x par

Market rate at issuance x bond payable

Accounting for a Zero Coupon Bond

Example II (Zero coupon): Raises \$10,000 at issuance

At Issuance

A	=	L		S/E
Cash		Bond Payable – Discount (XL)		RE
2015 10,000		11,910	1,910	

Par Value: Due at maturity (Future value of \$10,000, 3 years, 6%)

Net Bond Payable: Difference between the bond payable and the bond discount represents the amount that is currently owed to creditors

Discount: Par Value minus Capital raised; Gradually flows into RE as an interest expense

Recall Bonds – Summary of accounting

For financial accounting purposes:

Interest expense = market rate at the time the bond is issued × net bond payable

Interest payable = coupon rate × par amount

The difference between interest expense and interest payable is amortized against the bond discount (premium) account.

Accounting for a Zero Coupon Bond

Example II (Zero coupon): Raises \$10,000 at issuance

At Issuance

A	=	L
Cash		Bond Payable
2015 10,000		11,910

Periodic accounting *Coupon rate x par*

	Cash <i>interest payable</i>	Bond Payable
2015	0 int. payment	
2016	0 int. payment	
2017	0 int. payment	
	-11,910	-11,910

similar: Depreciation is a contra asset account

$- \text{Discount (XL)}$ 1,910	$+ \text{contra liability}$	S/E RE	<i>interest expense</i> 1 st year int exp is net bond payable (10,000) $* 0.06 = 600$ $10000+600=10600$ $11910-1310=10600$
			2 nd year int exp is net bond payable (10,600)
		RE	$* 0.06 = 636$ $10600+636=11236$
		-600 int. exp. -636 int. exp. -674 int. exp.	3 rd year int exp is net bond payable (11,236)
			$* 0.06 = 674$ $11236+674=11910$

= Interest expense – interest payable

↑ final net bond payable: $11236+674=11910$

As we reduce the amount of the discount, net bonds payable increases indicating that we owe more to our creditors. The increases reflect the accumulation of interest that has not yet been paid.

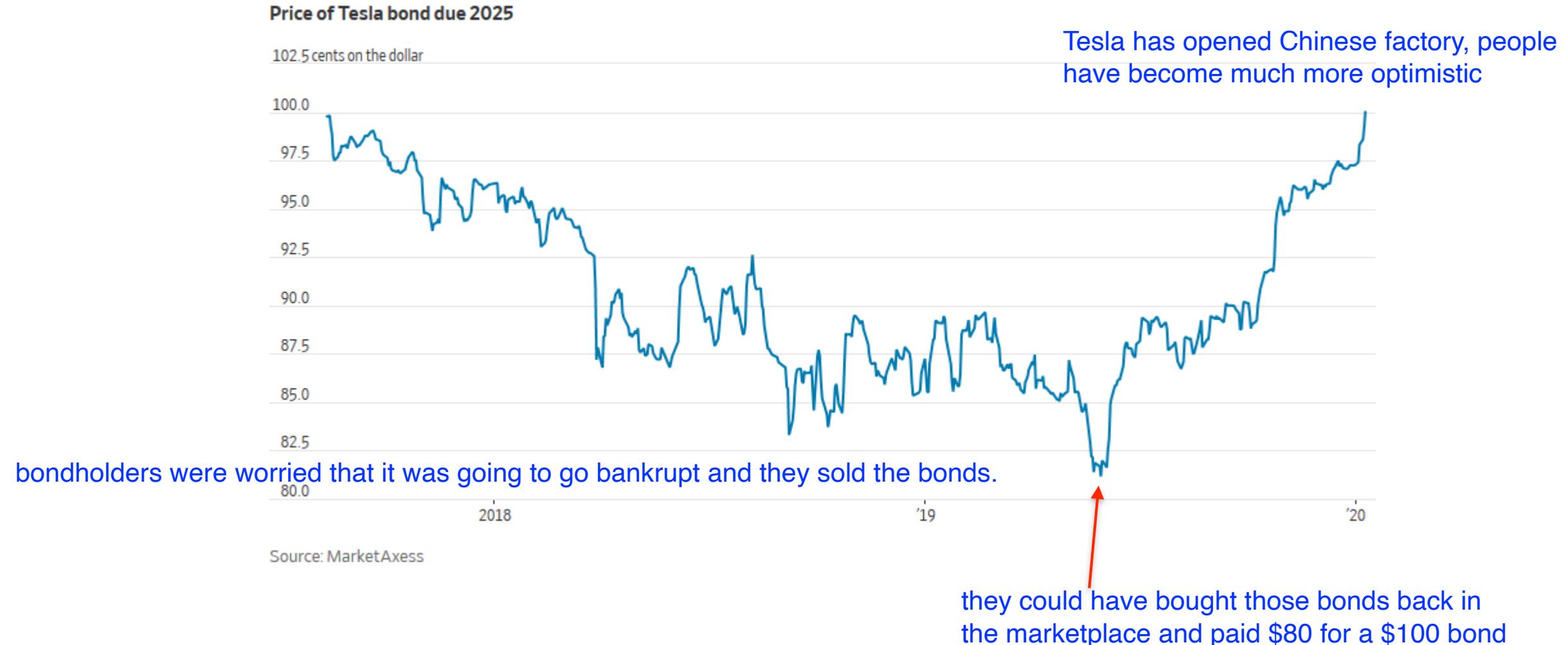
Zero-Coupon Bond Discount Amortization Table

Market interest at issuance	6%
Coupon rate	0%
Face amount	\$11,910

	[A]	[B]	[C]	[D]	[E]	[F]
	(Face × coupon%)	([A] × market%)	([C] - [B])	(Prior bal - [D])	(Face - [E])	
Year	Beginning Balance	Cash Interest Paid	Interest Expense	Discount Amortization	Discount Balance	Net Bond Payable
0					\$1,910	\$10,000
1	\$10,000	\$0	\$600	\$600	\$1,310	\$10,600
2	\$10,600	\$0	\$636	\$636	\$674	\$11,236
3	\$11,236	\$0	\$674	\$674	\$0	\$11,910

Excel spreadsheet for this example is on the site.

Tesla 5.3% Bond Feeling 100: Hits Face Value for First Time Since 2017 (WSJ 1/8/2020)



Early Retirement of Bonds

Sometimes companies will repurchase their bonds from the open market

- The market price of the bond is likely to reflect the firm's economic conditions (**credit quality**) and macroeconomic conditions (**interest rates**)
- Thus the amount that the firm has to pay for the bond is unlikely to be equal to the book value of the bond
 - If the firm pays more than the book value of the bond, then they have a loss
 - If the firm pays less than the book value of the bond, then they have a gain

Early Retirement of Bonds for Less than Book Value

Suppose we repurchase the zero coupon bonds at the end of 2015. Recall at the end of 2015 the balances in the Bond Payable and Discount accounts are:

Bond Payable – Discount

12/31/15	11,910	1,310
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(Net bond payable: 10,600)

The company repurchases the bonds in the open market on 12/31/2015 (2 years to maturity) when the firm's market rate is 7% (increased from 6%)

How much will they have to pay to repurchase the bonds?

bond holders will get \$11,910 in 2 years,

- Qualitatively: The present value of \$11,910 two years from now
- Mathematically: $\$10,403 = [11,910 / (1.07)^2] = [11,910 * 0.87344]$

which is less than the net book value of \$10,600. The market value of the liability went down, meaning that they can pay off their obligations for less than the amount recorded on the books.

market value went down because interest rates went up

Early Retirement of Bonds for Less than Book Value

What transaction will they record when buying back debt for 10,403?

A	=	L		+ S/E
Cash		Bond Payable	– Discount	RE
–10,403		–11,910	–1,310	197 (gain on retirement of debt)

go away

- The gain or loss on early retirement of debt is reported on the income statement
- Note the similarity of the accounting to a sale of PPE

Early Retirement of Bonds for More than Book Value

Now let's consider the case where you repurchase the bonds in the open market on 12/31/2015 (2 years to maturity) when the market rate is 5%

How much will you have to pay if interest rates are 5%?

\$10,803; that is, $[11,910 / (1.05)^2] = [11,910 * 0.90703]$

What transaction will you record?

A	=	L	+	S/E
Cash		Bond Payable	- Discount	RE
-10,803		-11,910	-1,310	-203 (loss on debt retirement)

Bonds – Financial Statement Presentation

if we have a zero coupon bond, we have interest expense, but we're not paying any cash out for that. we're going to add these interest accruals back to net income to get cash flows.

Balance Sheet

- Long-term debt due in next 12 months ~~in~~ ^{as} current liabilities
- Remainder of L-T debt in non-current liabilities

Income Statement

- Interest expense

Statement of Cash Flows

- *Operations* – add interest accruals not yet paid
- *Financing* – proceeds from issuance, payments for retirement ^{inflow & outflow}
- *Supplemental Disclosure* – of cash paid for interest

Notes

- Details on all of the above

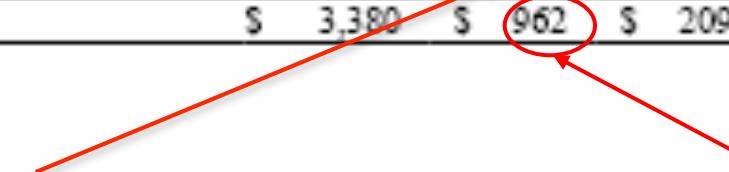
Advanced Micro Devices, Inc.
 Consolidated Balance Sheets
 (In millions, except par value amounts)

	2011	2010
ASSETS		
Total assets		
	4,954	4,964
LIABILITIES AND STOCKHOLDERS EQUITY		
Current liabilities:		
Accounts payable	363	376
Accounts payable to GlobalFoundries	177	205
Accrued liabilities	550	698
Deferred income on shipments to distributors	123	143
Other short-term obligations	in the next year, AMD had to pay down debt of \$489 million.	229
Current portion of long-term debt and capital lease obligations	489	4
Other current liabilities	72	19
Total current liabilities	1,774	1,674
 Long-term debt and capital lease obligations, less current portion	1,527	2,188
Other long-term liabilities	63	89
Commitments and contingencies		
 Total stockholders equity	1,590	1,013
Total liabilities and stockholders equity	4,954	4,964

AMD Contractual Obligations and Debt Maturity footnote

(In millions)	Payment due by period							2017 and beyond
	Total	2012	2013	2014	2015	2016		
5.75% Convertible Senior Notes due 2012	\$ 485	\$ 485	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —
6.00% Convertible Senior Notes due 2015 ⁽¹⁾	580	—	—	—	580	—	—	—
8.125% Senior Notes due 2017 ⁽¹⁾	500	—	—	—	—	—	—	500
7.75% Senior Notes due 2020	500	—	—	—	—	—	—	500
Other long-term liabilities	21	—	19	1	—	—	—	1
Aggregate interest obligation ⁽²⁾	714	133	114	114	94	79	—	180
Capital lease obligations ⁽³⁾	31	6	6	6	6	6	—	1
Operating leases	175	36	32	29	24	17	—	37
Purchase obligations ⁽⁴⁾	374	302	38	21	13	—	—	—
Total contractual obligations	\$ 3,380	\$ 962	\$ 209	\$ 171	\$ 717	\$ 102	\$ 1,219	

AMD has made commitments to pay suppliers 302 million in cash for raw materials



Note: Cash flows are not discounted

Interpretation:

Nearly \$1 billion due in 2012

AMD has cash commitments of nearly a billion dollars.

Should the Balance Sheet Value Represent the Market Value of Debt?

The FASB has offered firms the option to value all financial assets and liabilities at fair values.

Suppose that a firm's debt became riskier due to poor financial performance. How would this affect:

The market interest rate? Go up

The market value of the bond? Go down

The coupon rate? Unchanged coupon rate is fixed at the time of the bond issuance

So if we were to mark debt to market value, and the firm had a deterioration in credit quality, what transaction would you record?

mark the liability down and have a gain in shareholders' equity

Marking Debt to Market

The company has the following information on its balance sheet.

A	=	L	+	S/E
Cash		Bond Payable	- Discount	
12/31/2015		11,910	1,310	
(Net bonds payable: 10,600)				

What transaction will they have to record if they mark debt to market on 12/31/15 (2 years to maturity)? Say interest rates have risen to 7% at 12/31/15. Bond value would fall to 10,403

A	=	L	+	OCI
Cash		Bond Payable	- Discount	Fair Market Value Adj.
12/31/2015			197	197 (Unrealized gain)
(Net bonds payable after entry: 10,403)				increasing other comprehensive income

AMD Fair value of debt footnote

Financial Instruments Not Recorded at Fair Value on a Recurring Basis. Financial instruments that are not recorded at fair value are measured at fair value quarterly for disclosure purposes. The carrying amounts and estimated fair values of financial instruments not recorded at fair value are as follows:

	December 31, 2011		December 25, 2010	
	Carrying amount	Estimated Fair Value	Carrying amount	Estimated Fair Value
(In millions)				
Short-term debt (excluding capital leases)	\$ 485	\$ 490	\$ —	\$ —
Long-term debt (excluding capital leases)	\$ 1,505	\$ 1,619	\$ 2,162	\$ 2,326

AMD Fair value of debt over time

Fiscal year ended	Carrying Amount	Estimated Fair Value	Fair Value / Carrying Amount
December 31, 2011	\$1,990	\$2,109	106%
December 31, 2010	\$2,162	\$2,326	108%
December 31, 2009	\$4,303	\$4,046	94%
December 31, 2008	\$4,551	\$2,071	46%

During the crisis, the market did not expect AMD to make their payments

Post crisis, AMD's bonds rise in value. If recorded at FV, AMD takes a large hit to 2009 income

Banks' Answer to Volatile Italian Debt: Accounting Changes (WSJ 11/8/18)

Italy's expansive borrowing and spending plans have caused **a sharp rise in sovereign bond yields and a corresponding drop in their value**. This hurts Italian banks because they own lots of these bonds.

But banks like UniCredit, Italy's second largest, are making future market moves less costly by changing the bonds' accounting treatment.

The bank will do this is by reinvesting money from maturing Italian debt into new bonds that it will classify as "held to maturity", rather than held for trading or available for sale.

Take Away Slide

- We discussed bond accounting:
 - Accounting at issuance
 - Accounting when interest is accrued (and paid)
 - Accounting at retirement
 - How to compute and account for the fair value of a bond
- Practice some examples.



15.516x Financial Accounting Leases

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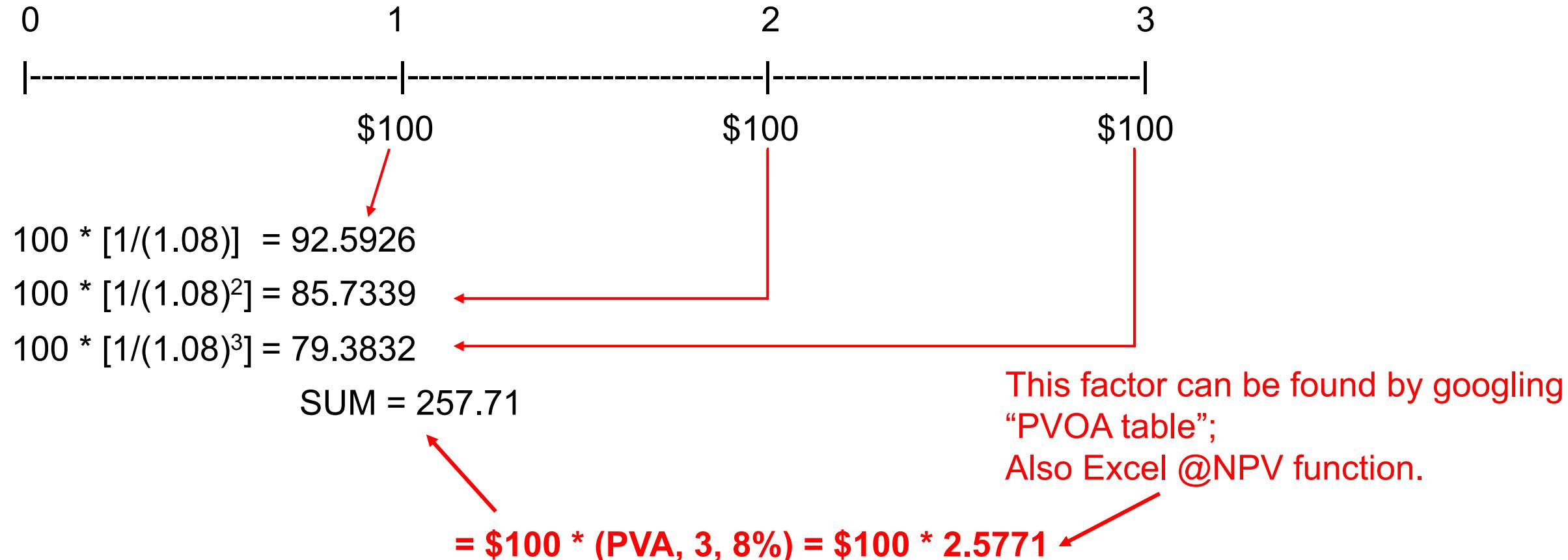
Remaining Agenda

Leasing - Objectives

- Understand the rationale for leasing.
- Learn about two types of leases: *operating and finance leases*.
- Understand the income statement and balance sheet effects of *operating and finance leases* from the lessee's perspective. if you lease a car from a dealer, you're the lessee. The dealer is the lessor.
- There is a new accounting standard on leases:
 - Under the new standard (**effective for fiscal years beginning after 12/15/18**), a liability for leases is put on the balance sheet.
 - Under the old standard, some leases were off-balance sheet.
- Learn how to estimate the liability for off-balance sheet items.

Present Value of Annuity – Review (from bond class)

What is the PV of a 3 year \$100 ordinary annuity at 8%?



Old leasing standard vs. New leasing standard

	Old Standard (2018 and before)	New Standard (2019 and after)
“Rental leases”		
Terminology	Operating leases	Operating leases
Accounting	Off balance sheet	On balance sheet
“Ownership leases”		
Terminology	Capital leases	Finance leases
Accounting	On balance sheet	On balance sheet

WeWork's Mounting Lease Debt Looms Over IPO Plans

WSJ 6/19/19

WeWork leases office space under long-term deals, and sublets the space to tenants under short-term deals.

risky because you have a five-year liability and you have a series of one-month assets. So you've got an asset liability mismatch.

"The risk of entering into long-term leases (supported by short-term tenants) is one of the biggest issues investors have with the WeWork concept" -- analysts at Sanford C. Bernstein & Co.

Following a change in accounting rules that went into effect in January, the company will have to list the current value of its lease obligations as liabilities on its balance sheet. Under the previous rules, only so-called capital leases were listed as liabilities.

off balance sheet

WeWork had a total of about \$35 billion in future lease payments at the end of 2018. The company had \$3.1 billion in liabilities at the end of 2018.

on balance sheet

WeWork's off-balance sheet (OBS) lease debt

WeWork had a total of about \$35 billion in future lease payments at the end of 2018. The company had \$3.1 billion in liabilities at the end of 2018.

Under the new standard, how much will WeWork's liabilities increase?

We need to compute the PV of these lease payments. We have to make an assumption about the pattern of the \$35 billion in future lease payments. Let's assume that:

- the leases are 5 payments of \$7 billion/year, and five-year leases
- the discount rate is 8%.

$$\text{OBS liabilities} = \$7 \text{ billion} * [\text{PVA}, 5, 8\%] = \$7 \text{ billion} * 3.9927 = \$27.9 \text{ billion}$$

OBS liabilities are 9 times the amount of on-balance sheet liabilities ($27.9 / 3.1$)

Why Lease?

a leased car which you don't own is easier for somebody to repossess it when you don't pay loan: less risk

a loaned car which you own is legally more difficult to repossess it when you don't pay lease: more risk

A company needs new a building or piece of equipment. Two options:

1. Purchase using a loan
2. Lease

What are the advantages and disadvantages of each (assume the equipment is same for both)?

	1) Buy with Loan	2) Lease
Down payment required?	Bigger	Smaller most of the lessors are high tax finance companies, so they always get the depreciation tax deduction and they sometimes share that back with the lessee.
Credit quality required?	Higher	Lower
Flexibility - trade up, return, etc.?	No	Yes
Depreciation deduction? <i>In terms of taxes--and this applies only to companies</i>	If company has taxable income	Yes
Accounting treatment?	Long-term debt class	This class

The Nature of Leases

A lease is an agreement conveying the right to use property, plant, or equipment usually for a stated period of time (usually 1 year or more).

The owner of the property is referred to as the **lessor**, and the renter is the **lessee**.

Two questions:

Is there an **economic** difference between leasing equipment versus buying the equipment?

What should be the **accounting** for leases?

What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



3-year lease with
purchase option

What is the Economic Substance of the Arrangement?

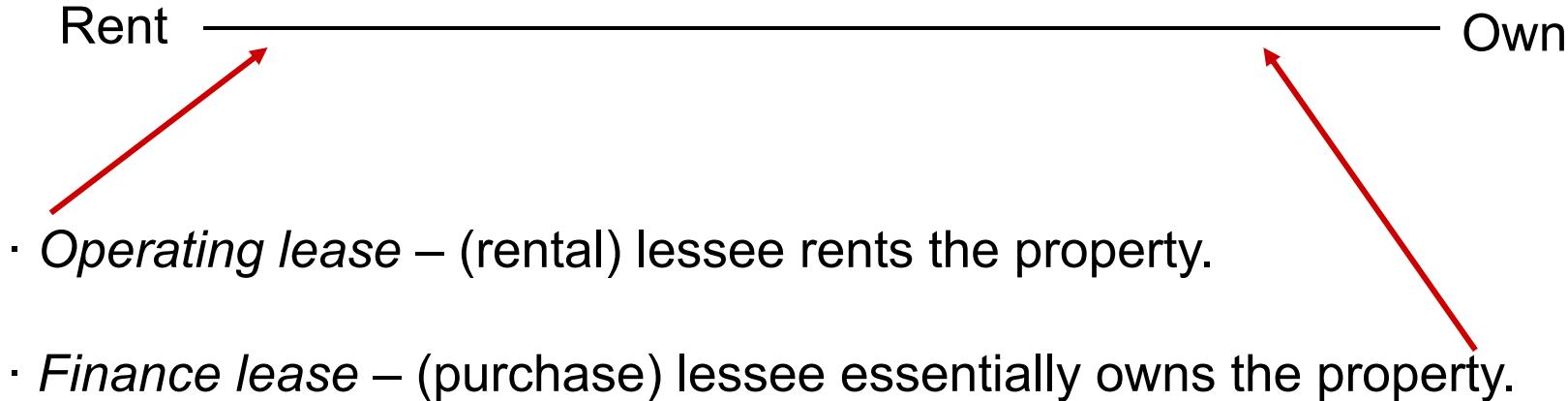
Possible Arrangements between Lessor and Lessee

Rent ————— Own

5-year lease with bargain
purchase option

Accounting Attempts to Reflect the Economic Substance

Possible Arrangements between Lessor and Lessee



Accounting Criteria For Finance Vs. Operating Lease (Not on Exam)

Intuition: does the lessee get almost all of the economic value of the asset?

From ASC 842: if the lessee gets almost all of the economic value out of the asset, then it's a finance lease.

A lease is a **finance lease** if it meets one of these criteria (otherwise it is an **operating lease**):

- a. The lease term is most of the economic life of the underlying asset.
If the present value of the payments under the lease equals or exceeds the fair value of the underlying assets
- b. The PV of the payments equals or exceeds the FV of the underlying asset.
- c. The lease transfers ownership to the lessee by the end of the lease term.
- d. Bargain purchase option.
- e. There is no alternative use to the lessor at the end of the lease term.

Delta 2018 and 2017 Liabilities and SE (\$millions)

LIABILITIES AND STOCKHOLDERS' EQUITY			
Current Liabilities:			
Current maturities of long-term debt and finance leases	\$ 1,518	\$ 2,242	
Current maturities of operating leases	b	955	—
Air traffic liability	4,661	4,364	
Accounts payable	2,976	3,634	
Accrued salaries and related benefits	3,287	3,022	
Loyalty program deferred revenue	2,989	2,762	
Fuel card obligation	1,075	1,067	
Other accrued liabilities	1,117	1,868	
Total current liabilities	<u>18,578</u>	<u>18,959</u>	
Noncurrent Liabilities:			
Long-term debt and finance leases	8,253	6,592	
Pension, postretirement and related benefits	9,163	9,810	
Loyalty program deferred revenue	3,652	3,559	
Noncurrent operating leases	5,801	—	
Other noncurrent liabilities	1,132	2,221	
Total noncurrent liabilities	<u>28,001</u>	<u>22,182</u>	
Total stockholders' equity	13,687	12,530	
Total liabilities and stockholders' equity	<u>\$ 60,266</u>	<u>\$ 53,671</u>	

Delta 2018 and 2017 Assets (\$millions)

(in millions, except share data)	December 31,	
	2018	2017
ASSETS		
Current Assets:		
Cash and cash equivalents	\$ 1,565	\$ 1,814
Short-term investments	203	825
Accounts receivable, net of an allowance for uncollectible accounts of \$12 at December 31, 2018 and 2017	2,314	2,377
Fuel inventory	592	916
Expendable parts and supplies inventories, net of an allowance for obsolescence of \$102 and \$113 at December 31, 2018 and 2017, respectively	463	413
Prepaid expenses and other	1,203	1,459
Total current assets	<u>6,340</u>	<u>7,804</u>
Noncurrent Assets:		
Property and equipment, net of accumulated depreciation and amortization of \$15,823 and \$14,097 at December 31, 2018 and 2017, respectively	28,335	26,563
Operating lease right-of-use assets	5,994	—
Goodwill	9,781	9,794
Identifiable intangibles, net of accumulated amortization of \$862 and \$845 at December 31, 2018 and 2017, respectively	4,830	4,847
Cash restricted for airport construction	1,136	—
Deferred income taxes, net	242	1,354
Other noncurrent assets	3,608	3,309
Total noncurrent assets	<u>53,926</u>	<u>45,867</u>
Total assets	<u><u>\$ 60,266</u></u>	<u><u>\$ 53,671</u></u>

Finance Lease: an Example

Delta Airlines leases an airplane

Assume:

1. The airplane has a current cost of **\$300,000K**
2. The expected life of the asset is 30 years
3. The lease term is **30 years**
4. Delta's borrowing rate is 6%
5. The annual lease payment is **\$21,795K** per year

Is this a Finance Lease? (Yes)

Reasons (**criteria for leases not on exam**):

- The lease term is 100% of the asset's useful life
- The present value of lease payments is 100% of fair value (**computed on next slide**)

Finance Lease: An Example

What is the finance lease obligation?

- Present value of 30 lease payments of \$21,795K
- PV of \$1 annuity, 30 years, 6% = 13.765
- Present value of the lease payments is $\$21,795K * 13.765 \approx \$300,000K$

Accounting for finance leases (\$000s)

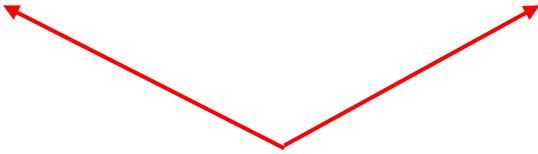
Lessee's Books

- A finance lease is recorded as an acquisition of an asset with 100% debt financing in the financial statements. Both the asset and liability are valued at the PV of lease payments.

When the lease agreement is signed and lessee begins using the asset:

Assets =	Liab	+	S/E
Lease Asset	Lease Obligation		
\$300,000	\$300,000		

PV of Lease = present value of periodic lease payments



Accounting for finance leases (\$000s)

Lessee's Books

Plug: $21,795 - 18,000$; reduces principal like an installment loan

During the lease (as payments are made):

	A	=	L	+	S/E	RE
	Cash	- Acc. Amort.	Lease Obligation			
Year 1	(21,795)		(3,795)		(18,000) (int exp) interest expense	
		10,000			(10,000) (amort exp) amortization expense	

Straight Line Amort.:
 $(300,000/30 \text{ yrs})$

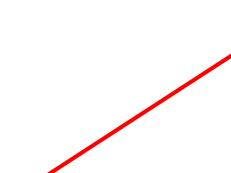
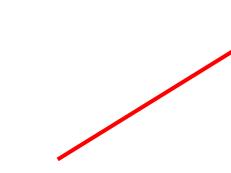
Accounting for finance leases (\$000s)

Lessee's Books

During the lease (as payments are made):

	A	=	L	+	S/E
	Cash	- Acc. Amort.	Lease Obligation		RE
Year 1	(21,795)		(3,795)		(18,000) (int exp)
		10,000			(10,000) (amort exp)
Year 2	(21,795)		(4,022)		(17,772) (int exp)
		10,000			(10,000) (amort exp)

Plug: $21,795 - 17,772 = 109,040$

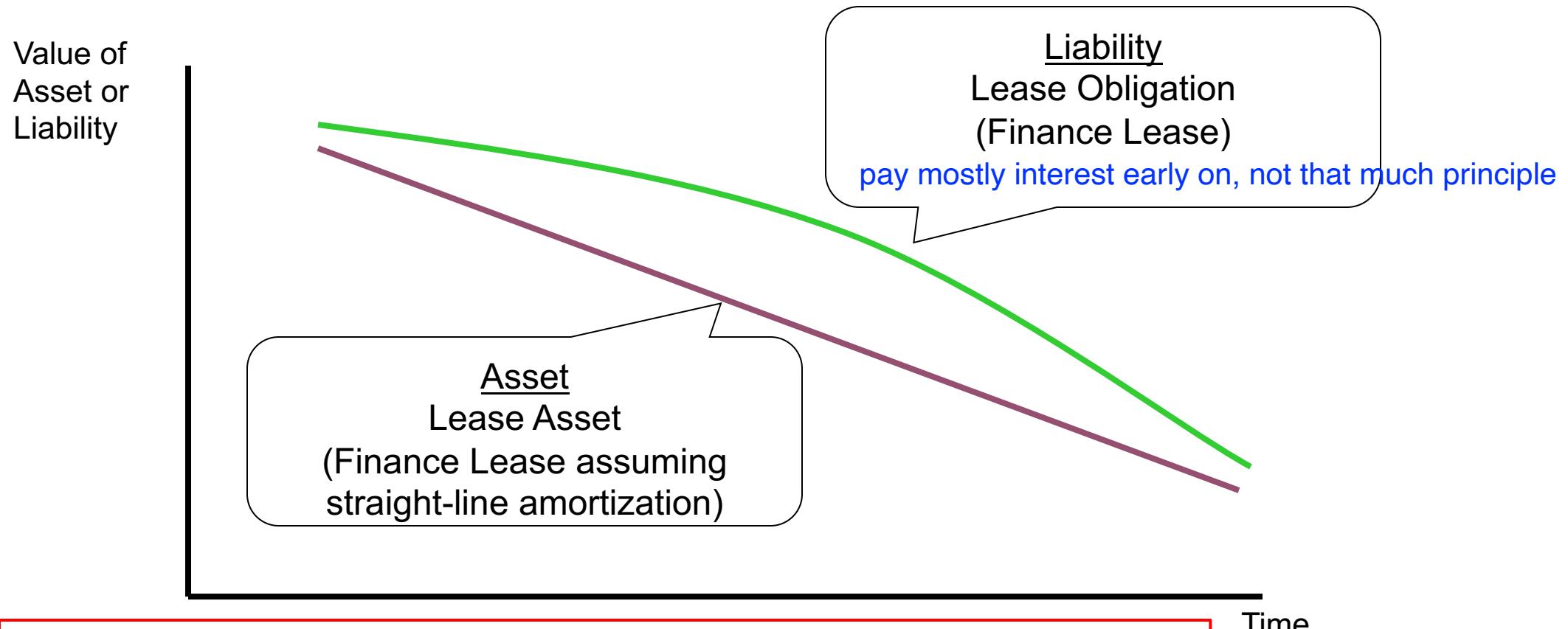
 Net Lease Obligation * interest rate
 $= [300,000 - 3,795] * 0.06$

Finance Lease Amortization Table

A	B	C	D	E	F	G	H
		Interest		Principal	Ending		
	Beginning	Expense	Lease	Reduction	Lease Liability	Straight-line	Ending Net
Year	Lease Liability	(B * 6%)	Payment	(D-C)	(B-E)	Amortization	Lease Asset
1	300,000	\$18,000	\$21,795	\$3,795	\$296,205	\$10,000	\$290,000
2	296,205	17,772	21,795	4,022	292,183	10,000	280,000
3	292,183	17,531	21,795	4,264	287,919	10,000	270,000
4	287,919	17,275	21,795	4,520	283,400	10,000	260,000
5	283,400	17,004	21,795	4,791	278,609	10,000	250,000
6	278,609	16,717	21,795	5,078	273,531	10,000	240,000
7	273,531	16,412	21,795	5,383	268,148	10,000	230,000
8	268,148	16,089	21,795	5,706	262,442	10,000	220,000
29	39,958	2,397	21,795	19,397	20,561	10,000	10,000
30	20,561	1,234	21,795	20,561	-	10,000	(0)

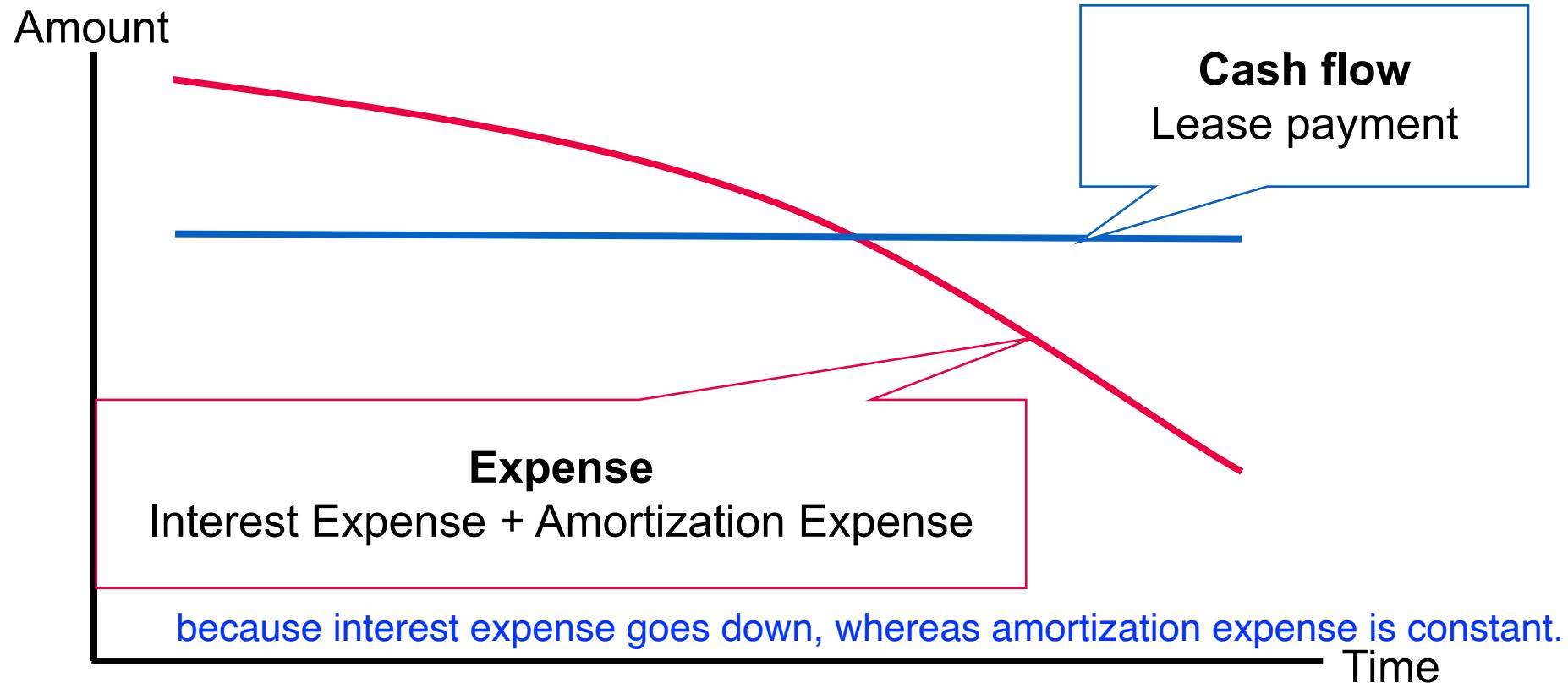
Beginning lease liability = PV of remaining payments. In excel, @NPV(rate, lease payments). See spreadsheet on web.

Finance Lease: Balance-Sheet Effects



All this says is that the asset amortizes faster than the liability is paid off.
Does this make sense?

Finance Lease: Income Statement vs. Cash Flow Effects



Financial Statement Disclosures: Reported Liabilities

Assume this is Delta's only lease.

How would their lease footnote look at the **end of year 8**?

Years Ending	Leases	
Y9	21,795	
Y10	21,795	
Y11	21,795	
Y12	21,795	
Y13	21,795	
Thereafter	\$370,509	$21,795 * 17 \text{ payments}$
Total minimum lease payments	479,483	$\text{Total} = 21,795 * 22$
Less: amounts representing interest	(217,041)	$479,483 - 262,442$ (below)
Present value of future minimum capital lease payments	262,442	$21,795 * [\text{PVA}, 22, 6\%] = 21,795 * 12.0416$

The difference between the cash outflows and the present value of the cash outflows represents the portion attributable to interest

Delta 2018 10-k p. 80

(\$ in millions)

Undiscounted Cash Flows

The table below reconciles the undiscounted cash flows for each of the first five years and total of the remaining years to the finance lease liabilities and operating lease liabilities recorded on the balance sheet.

(in millions)	Operating Leases	Finance Leases
2019	\$ 1,172	\$ 127
2020	1,000	89
2021	819	75
2022	692	33
2023	654	27
Thereafter	4,200	111
Total minimum lease payments	8,537	462
Less: amount of lease payments representing interest	(1,781)	(59)
Present value of future minimum lease payments	6,756	403
Less: current obligations under leases how much is delta going to pay within the next year	(955)	(109)
Long-term lease obligations	\$ 5,801	\$ 294

Initial Accounting for Operating Leases (\$000s) under new standard

Now suppose that the above lease is an operating lease (intuition not on exam: maybe the life of the plane is much greater than 30 years).

Lessee's Books

- At the initiation of an operating lease, the accounting is the same as for a finance lease. Both the asset and liability are valued at the PV of lease payments

When the lease agreement is signed and lessee begins using the asset:

Assets =	Liab	+	S/E
Lease Asset	Lease Obligation		
\$300,000	\$300,000		

Initial PV of Lease = present value of periodic lease payments

Ongoing Accounting for Operating Leases

- In IFRS, operating lease accounting is very similar to finance lease accounting, and lease expense starts high and decreases over life of lease as shown above.

- US firms lobbied FASB so that operating leases have the **same expense** each period.
 - Why do you suppose they did this?
 - A finance lease has **higher expense early on**, and this higher expense is **undesirable**.
they'd rather have a lower expense to start.

 - To have same expense, we have to back into, or plug for, “Amortization expense”

Ongoing Accounting for Operating Leases

Note: We will focus on simple leases:

- Same payment each year
- First payment at end of first year

In a more complicated lease (**not on exam**), the accounting is similar but more complicated.

Ongoing Accounting for Operating Leases

total cost of lease = lease payment * number of payments

1. Compute straight-line expense = total cost of lease / number of payments
 - In simple leases we examine, straight-line expense = lease payment
2. Calculate “interest expense” on liability
3. Plug for “amortization expense” = straight-line expense - “interest expense”

Note: We use “ ” because there is no separate “amortization expense” or “interest expense” for an operating lease. [We're just calculating those as intermediate steps](#)

Accounting For Operating Leases (\$000s)

Lessee's Books

		"interest expense" = 300,000 X 0.06	Lease expense = straight-line expense
During the lease (as payments are made):			
A	=	L	+ S/E
Cash lease payment	Lease Asset	Lease Obligation	RE
Year 1 (21,795)		(21,795)	
	(3,795) ←	18,000	→ contrived
			(21,795) (lease exp)

Reduction in lease asset ("amortization expense") =
 straight-line expense - "interest expense" = $21,795 - 18,000$

Note: There is no amortization expense.

The lease asset does not have an Acc. Amort. contra asset

Accounting For Operating Leases (\$000s)

Alternative – single line BSE

Lessee's Books

Reduction in lease obligation =

Lease payment $21,795 - 18,000$
“interest expense”

During the lease (as payments are made):

A
same, thus E = G and F = H in next slide
Cash

=
Lease Asset L
Lease Obligation

Year 1 (21,795)

(3,795)

(3,795)

Lease expense = straight-line expense

S/E
RE

(21,795) (lease exp)

Reduction in lease asset (“amortization expense”)

= straight-line expense - “interest expense” = $21,795 - 18,000$

normal: exp = int.exp + amort.exp

exp is forced to be fixed as payment

Note: There is no amortization expense. reverse: amort.exp = exp - int.exp

The lease asset does not have an Acc. Amort. contra asset

Operating Lease Amortization Table

same as financial lease

D of financial lease: Lease Payment

D of operating lease: Lease Payment/Expense

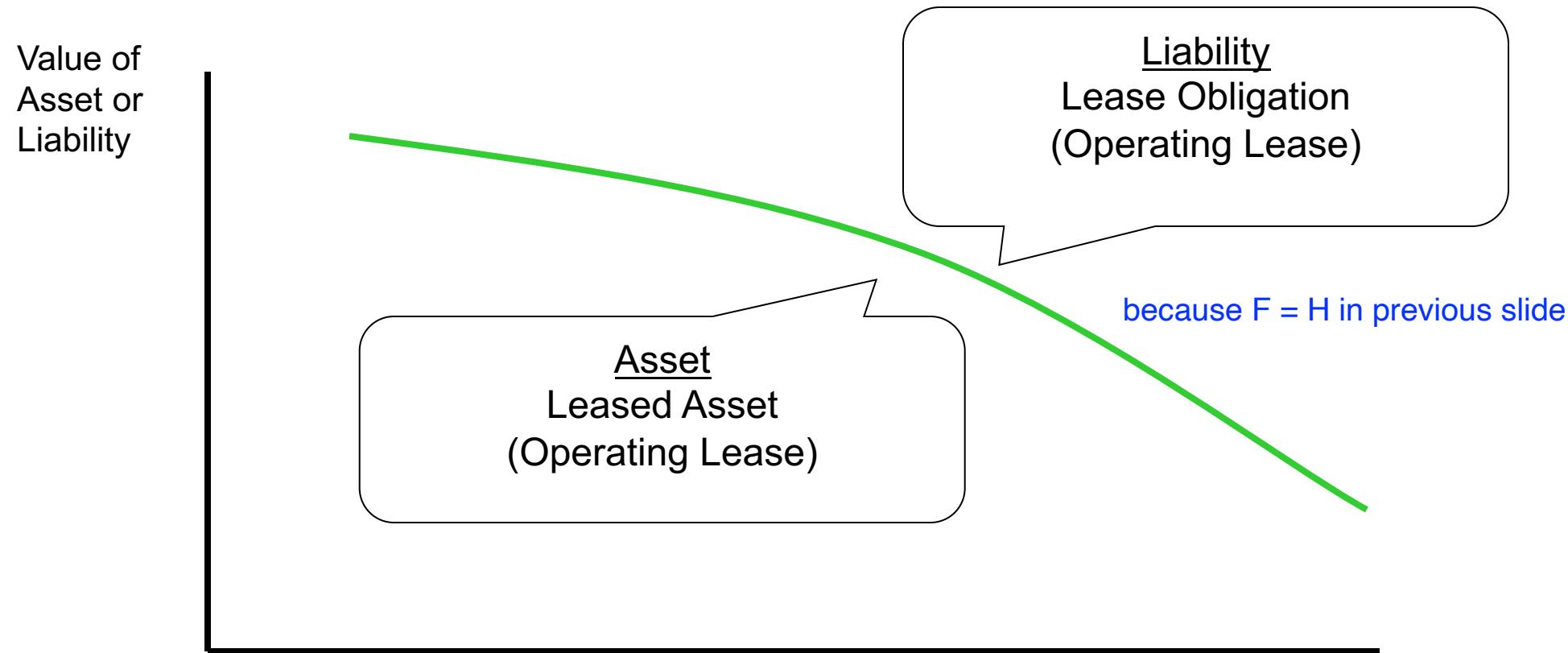
A Year	B Beginning Lease Liability	C "Interest" Expense (B * 6%)	D Lease Payment/ Expense	E Principal Reduction (D-C)	F Ending Lease Liability (B-E)	G "Amortiz- ation" (= E)	H Ending Net Lease Asset
1	300,000	\$18,000	\$21,795	\$3,795	296,205	\$3,795	296,205
2	296,205	17,772	21,795	4,022	292,183	4,022	292,183
3	292,183	17,531	21,795	4,264	287,919	4,264	287,919
4	287,919	17,275	21,795	4,520	283,400	4,520	283,400
5	283,400	17,004	21,795	4,791	278,609	4,791	278,609
6	278,609	16,717	21,795	5,078	273,531	5,078	273,531
7	273,531	16,412	21,795	5,383	268,148	5,383	268,148
8	268,148	16,089	21,795	5,706	262,442	5,706	262,442
29	39,958	2,397	21,795	19,397	20,561	19,397	20,561
30	20,561	1,234	21,795	20,561	-	20,561	-

lease expense is the same every year, equal to lease payment

Two differences from finance lease: (1) straight-line expense, (2) slower amortization of lease asset. The lease liability equals the lease asset due to our assumption that payments are made at the end of the year.

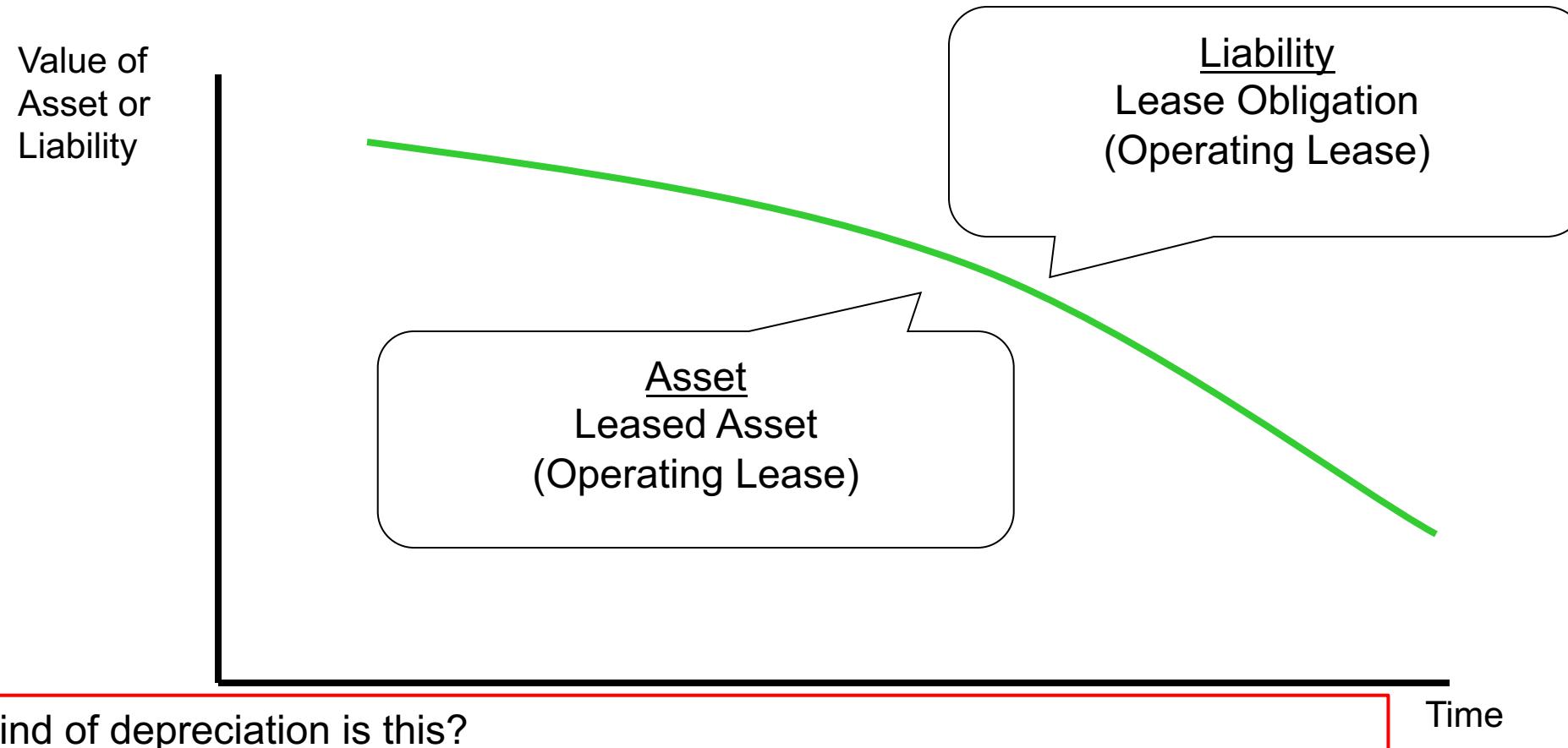
amor.exp is calculated from lease exp and decelerated

Operating Lease: Balance-Sheet Effects



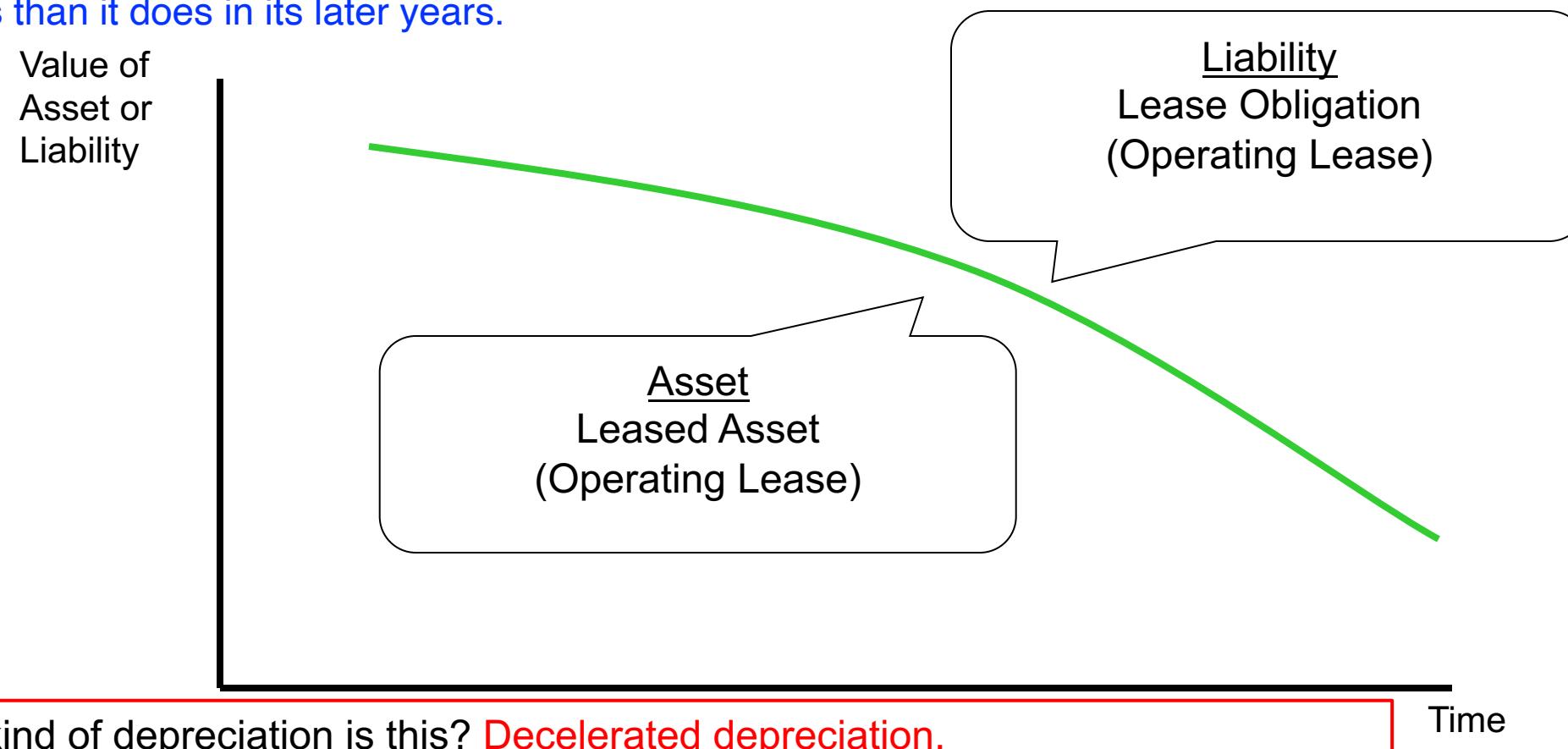
All this says is that the asset amortizes at the same rate as the liability is paid off.
Does this make sense?

Operating Lease: Balance-Sheet Effects

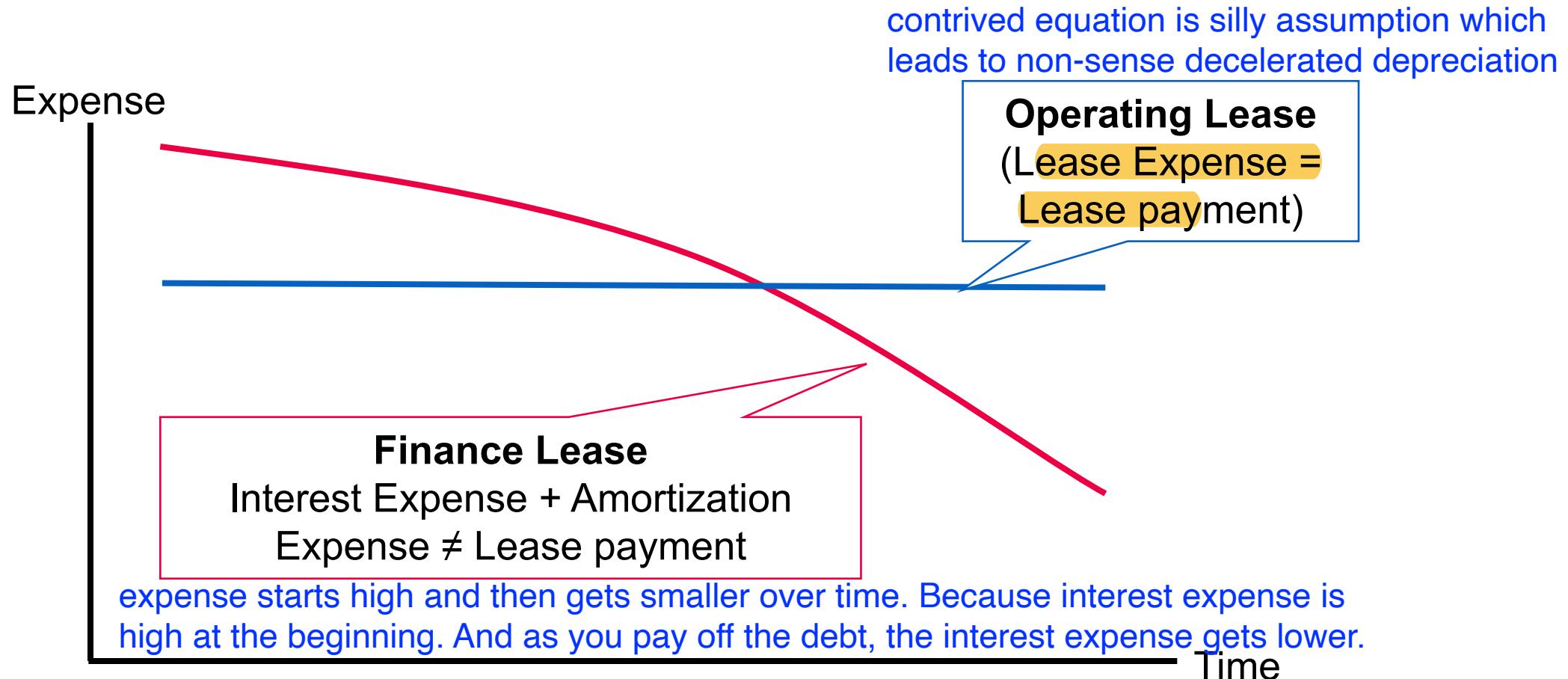


Operating Lease: Balance-Sheet Effects

politicians involved in economics: in order to get this straight line expense (lease payment and the lease expense are the same), we're making an assumption that's kind of silly about the decelerated depreciation of the leased asset or the amortization of these assets. economic depreciation is actually accelerated, so the asset depreciates faster in its early years than it does in its later years.



Operating Lease vs. Finance Lease: Income Statement



Delta's contractual obligations in 2018 10K

Debt and finance leases have always been on-balance sheet.

(in millions)	Contractual Obligations by Year ⁽¹⁾							Total
	2019	2020	2021	2022	2023	Thereafter		
Long-term debt (see Note 7)								
Principal amount	\$ 1,441	\$ 2,048	\$ 1,019	\$ 1,676	\$ 929	\$ 2,195	\$ 9,308	
Interest payments	387	300	248	195	128	643	1,901	
Finance lease obligations (see Note 8)								
Principal amount	109	77	68	28	23	98	403	
Interest payments	17	12	8	5	4	13	59	
Operating lease obligations (see Note 8)	1,185	1,022	845	712	673	4,289	8,726	
Aircraft purchase commitments (see Note 11)	3,290	3,130	3,190	2,760	1,850	1,940	16,160	
Contract carrier obligations (see Note 11)	1,505	1,344	951	872	769	2,862	8,303	
Employee benefit obligations (see Note 10)	146	144	125	119	111	6,027	6,672	
Other obligations	874	709	470	732	566	765	4,116	
Total	\$ 8,954	\$ 8,786	\$ 6,924	\$ 7,099	\$ 5,053	\$ 18,832	\$ 55,648	

Delta's contractual obligations in 2018 10K

Operating leases are on-balance sheet for Delta since 2018.

(in millions)	Contractual Obligations by Year ⁽¹⁾							Total
	2019	2020	2021	2022	2023	Thereafter		
Long-term debt (see Note 7)								
Principal amount	\$ 1,441	\$ 2,048	\$ 1,019	\$ 1,676	\$ 929	\$ 2,195	\$ 9,308	
Interest payments	387	300	248	195	128	643	1,901	
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Operating lease obligations (see Note 8)	1,185	1,022	845	712	673	4,289	8,726	
Aircraft purchase commitments (see Note 11)	3,290	3,130	3,190	2,760	1,850	1,940	16,160	
Contract carrier obligations (see Note 11)	1,505	1,344	951	872	769	2,862	8,303	
Employee benefit obligations (see Note 10)	146	144	125	119	111	6,027	6,672	
Other obligations	874	709	470	732	566	765	4,116	
Total	\$ 8,954	\$ 8,786	\$ 6,924	\$ 7,099	\$ 5,053	\$ 18,832	\$ 55,648	

Delta's contractual obligations in 2018 10K

These other obligations are off-balance sheet. Total undiscounted value = \$35.5 billion.

(in millions)	Contractual Obligations by Year ⁽¹⁾							Total
	2019	2020	2021	2022	2023	Thereafter		
Long-term debt (see Note 7)								
Principal amount	\$ 1,441	\$ 2,048	\$ 1,019	\$ 1,676	\$ 929	\$ 2,195	\$ 9,308	
Interest payments	387	300	248	195	128	643	1,901	
Finance lease obligations (see Note 8)								
Principal amount	109	77	68	28	23	98	403	
Interest payments	17	12	8	5	4	13	59	
Operating lease obligations (see Note 8)								
	1,185	1,022	845	712	673	4,289	8,726	
Aircraft purchase commitments (see Note 11)	3,290	3,130	3,190	2,760	1,850	1,940	16,160	
Contract carrier obligations (see Note 11)	1,505	1,344	951	872	769	2,862	8,303	
Employee benefit obligations (see Note 10)	146	144	125	119	111	6,027	6,672	
Other obligations	874	709	470	732	566	765	4,116	
Total	\$ 8,954	\$ 8,786	\$ 6,924	\$ 7,099	\$ 5,053	\$ 18,832	\$ 55,648	

Off balance sheet (OBS) items

Examples: Some pre-2019 operating leases, purchase commitments, investment contracts kind of like liabilities:

same: ▪ Common link: Likely requires some future economic sacrifice

different: ▪ Intuition: Off-balance sheet because they do not clearly reflect a past economic transaction and/or doesn't meet the threshold for "likely/estimable" estimable with a reasonable amount of precision

Who cares about OBS items and why?

- **Firms:** Keeping obligations off-balance sheet can be used to keep debt-to-equity (D/E) and leverage ratios low, creating the perception of lower risk.
- **Lenders:** Better understanding of financial position. For example, whether firms will have cash on hand to make contracted payments. competing claims for firm's cash: OBS and lender's debt
- **Investors:** Want apples-to-apples comparisons across firms, so want to capitalize OBS items. do a pro forma balance sheet where we're putting these things back on the balance sheet

Making off balance sheet into on balance sheet

A major credit rating agency (Moody's) says:

"Assessing OBS risk is already an integral part of fundamental credit analysis and could have a direct impact on an issuer's rating, depending on the size and nature of the exposure.

This analysis is important because companies often attempt to **manage risk** through the use of various OBS structures."

minimize the perception of risk

- When do you convert off balance sheet amounts into on balance sheet?
 - It depends on the objective
 - How does firm compare with peers?
 - Often no one exact answer + requires some approximation
- In case you want to, we will teach you simple techniques for doing so

Capitalizing Off Balance Sheet items

- How would we use the above information to estimate the liability associated with OBS items?
 - OBS liability = discounted present value of the OBS items.
 - We need:
 - OBS items in later years (**thereafter after year 5**)
 - discount rate
- For this example, **let's assume a 4% discount rate** (**If we ask you to do capitalize an OBS item, we will give you the discount rate**)
- In the “real world,” how would you estimate the discount rate?
 - Rates on firm’s traded bonds

IRR ▪ Implied rate on firm’s leases reverse calculation of PV and figure out what implied rate is using on their leases.
▪ Rule of thumb always use a 5% discount rate

Delta's other contractual obligations

	2019	2020	2021	2022	2023	Thereafter	Total
Aircraft purchase commitments	3,290	3,130	3,190	2,760	1,850	1,940	16,160
Contract carrier obligations	1,505	1,344	951	872	769	2,862	8,303
Employee benefit obligations	146	144	125	119	111	6,027	6,672
Other obligations	874	709	470	732	566	765	4,116
Total	5,815	5,327	4,736	4,483	3,296	11,594	35,251

Capitalizing Delta's other contractual obligations

To estimate the liability associated with contractual obligations, present value the cash flows:

2019	5,815
2020	5,327
2021	4,736
2022	4,483
2023	3,296
Thereafter	11,594

Need pattern of cash flows after 2020. Rule of thumb: Take last year before "Thereafter" and assume it is paid each year.

How many 2023 payments needed to exhaust the "Thereafter" amount?

$$11,594 / 3,296 = 3.51$$

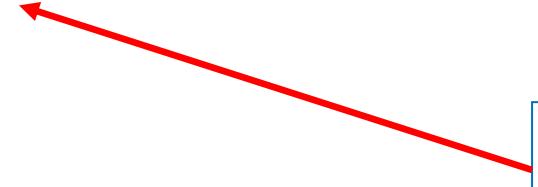
Round down to 3 years

Assuming 3 years to exhaust this amount, the annual payment after 2023 is $11,594 / 3 = 3,865$

Capitalizing Delta's other contractual obligations

To estimate the liability associated with contractual obligations, present value the cash flows:

2019	5,815
2020	5,327
2021	4,736
2022	4,483
2023	3,296
2024	3,865
2025	3,865
2026	3,865



Assuming 3 years to exhaust "Thereafter", the annual payment after 2023 is $11,594 / 3 = 3,865$

Capitalizing Delta's other contractual obligations

To estimate the liability associated with contractual obligations, present value the cash flows:

2019	$5,815 \times 1/1.04^1 = \$ 5,591$
2020	$5,327 \times 1/1.04^2 = \$ 4,925$
2021	$4,736 \times 1/1.04^3 = \$ 4,210$
2022	$4,483 \times 1/1.04^4 = \$ 3,382$
2023	$3,296 \times 1/1.04^5 = \$ 2,709$
2024	$3,865 \times 1/1.04^6 = \$ 3,054$
2025	$3,865 \times 1/1.04^7 = \$ 2,937$
2026	$3,865 \times 1/1.04^8 = \$ 2,824$
Total	\$30,083

To bring on balance sheet,
we add **\$30,083** to both assets and liabilities.

On exams, numbers more straightforward than coming example (Similar to old exam)

The information is provided by Zoltan Corp in its lease footnote. Future minimum payments as of December 31, 2011 for operating leases are as follows:

2012	\$ 600,000
2013	600,000
2014	600,000
2015	600,000
2016	600,000
Thereafter	2,400,000
Total minimum payments	\$ 5,400,000

FOR THIS QUESTION, ASSUME A 0% TAX RATE.

- 1) Describe how Zoltan's assets and liabilities on December 31, 2011 would change if the operating leases are treated as **finance leases** (i.e., capitalize the operating leases). Use the BSE to record this transaction. **For this question, assume that the discount rate is 6% and assume that Zoltan pays the lease payments at the end of the fiscal year. Also, assume that Zoltan makes equal lease payments over a nine-year period.**

Adding in the off balance sheet amounts

Ratio of Assets to Equity for Delta Airlines in 2018

<u>Goes from</u>	60,226/13,687	= 4.40
<u>To</u>	(60,226+30,083)/(13,687)	= 6.60

The new leasing standards make it more difficult to compare a firm with itself over time.

Starting in 2019 firms with operating leases have new liabilities and new assets on their balance sheets. To do an apples to apples comparison with years prior to 2019, we have to capitalize operating leases using the techniques that we discussed above.

Delta 2018 and 2017 Liabilities and SE (\$millions)

LIABILITIES AND STOCKHOLDERS' EQUITY			
Current Liabilities:			
Current maturities of long-term debt and finance leases	\$ 1,518	\$ 2,242	
Current maturities of operating leases	955	—	
Air traffic liability	4,661	4,364	
Accounts payable	2,976	3,634	
Accrued salaries and related benefits	3,287	3,022	
Loyalty program deferred revenue	2,989	2,762	
Fuel card obligation	1,075	1,067	
Other accrued liabilities	1,117	1,868	
Total current liabilities	<u>18,578</u>	<u>18,959</u>	
Noncurrent Liabilities:			
Long-term debt and finance leases	8,253	6,592	
Pension, postretirement and related benefits	9,163	9,810	
Loyalty program deferred revenue	3,652	3,559	
Noncurrent operating leases	5,801	—	
Other noncurrent liabilities	1,132	2,221	
Total noncurrent liabilities	<u>28,001</u>	<u>22,182</u>	
Total stockholders' equity	13,687	12,530	
Total liabilities and stockholders' equity	<u>\$ 60,266</u>	<u>\$ 53,671</u>	

New Lease Accounting Standard May Mislead Investors, Credit Suisse Says (WSJ 7/11/19)

New lease accounting rules have resulted in potentially misleading data feeds.

Delta's leverage ratio jumps in 2018

The sheer magnitude of the standard's impact—trillions of assets and obligations coming onto corporate balance sheets—could distort traditional metrics found in popular investor data sources.

At issue is whether operating leases are automatically included in key financial metrics by data providers, and whether investors are aware that their data feeds have made these adjustments.

- go back and adjust the historical data to put the leases on balance sheet
- adjust the current and future data to remove the operating leases on balance sheet

It's a cautionary tale on the analytical impact, which is particularly big in the retail and transportation industries, where they have lots of leases.

Leases: Take-Aways

- We discussed the rationale for leases
- We discussed the transactions related to Operating and Finance leases.
- Under the old standard,
 - Operating leases are off-balance sheet.
 - Therefore amounts are not comparable.
- We discussed how to use the disclosures related to contractual obligations to estimate the liabilities associated with off-balance sheet items.