

# 15.516x Financial Accounting

## Bonds and Long-Term Debt

John Core  
MIT Sloan School of Management

**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%?

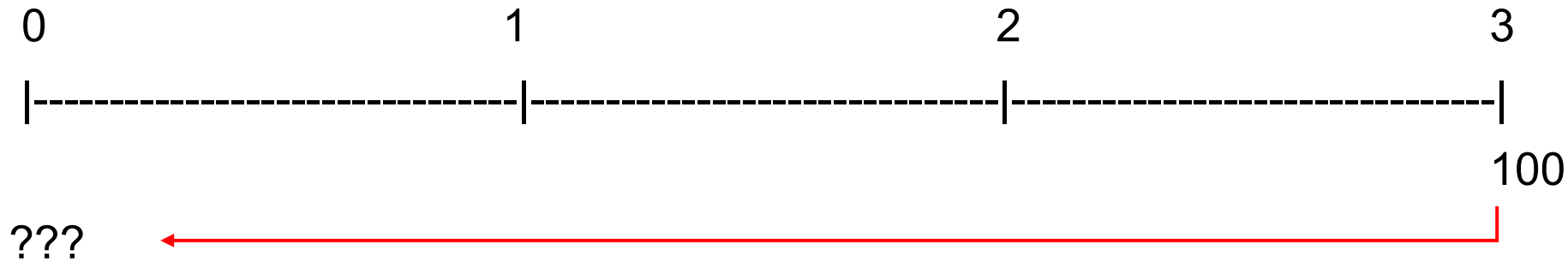
$$1 / (1 + 0.08)^1 = 0.92593$$

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%?



$$100 * [1/(1.08)] = 92.5926$$

$$100 * [1/(1.08)^2] = 85.7339$$

$$100 * [1/(1.08)^3] = 79.3832$$

$$\text{SUM} = 257.71$$

This factor can be found by  
googling "PVOA table";  
Also Excel @NPV function.

$$= \$100 * (\text{PVA}, 3, 8\%) = \$100 * 2.5771$$

# Bonds – Terminology

<b>Par Value</b>	Stated or face value of the bond; the amount due at maturity (usually \$1,000)
<b>Maturity</b>	The date the firm must repay the investors their principal
<b>Coupon Rate</b>	The interest rate stated on the face of the bond. The coupon rate is used to determine the periodic cash payments (if any)
<b>Zero Coupon Bond</b>	A bond that does not make periodic interest payments. Instead there is one lump sum due at maturity

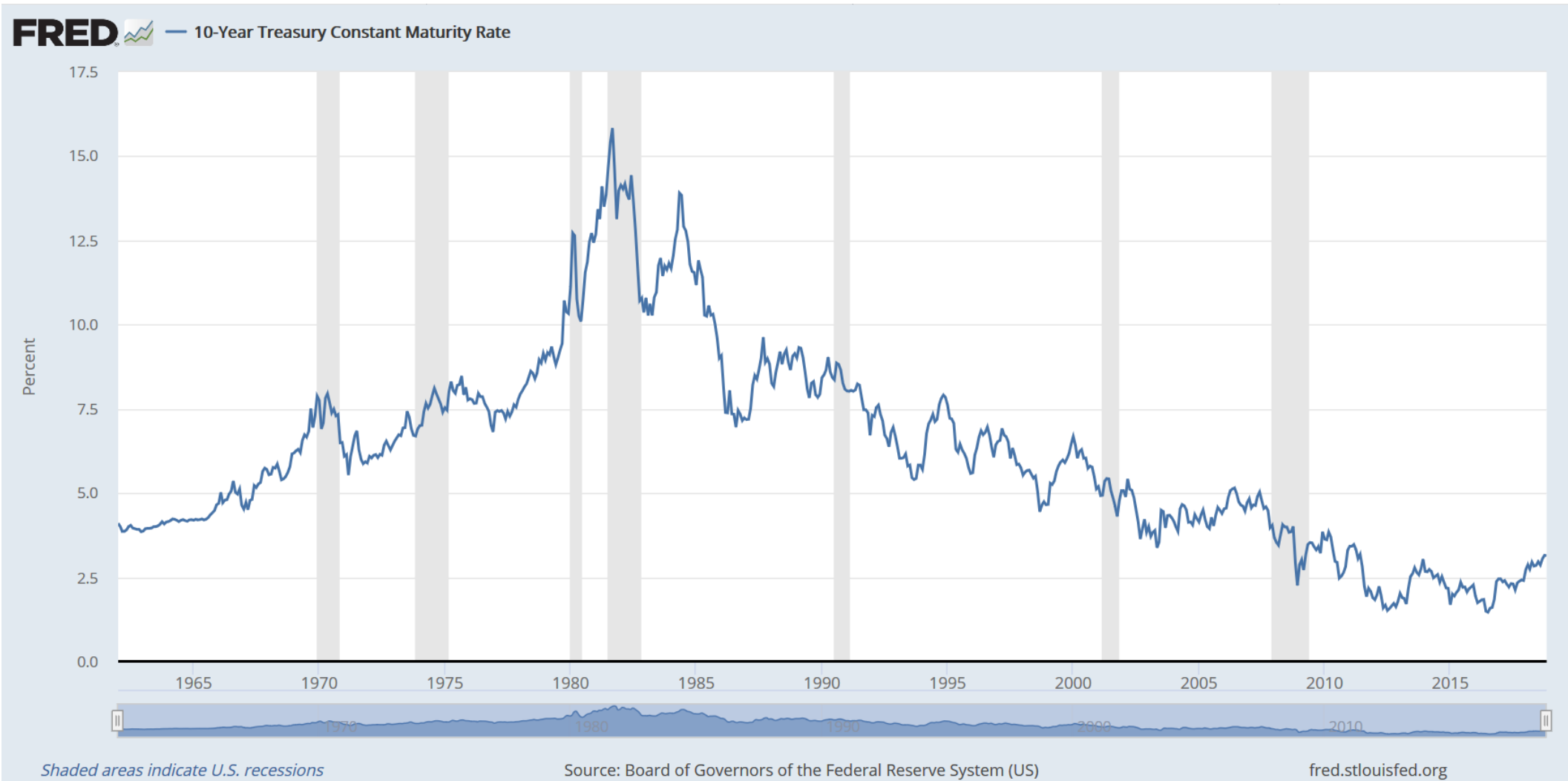
# Bonds – Terminology

Three interest rates are relevant to bond accounting:

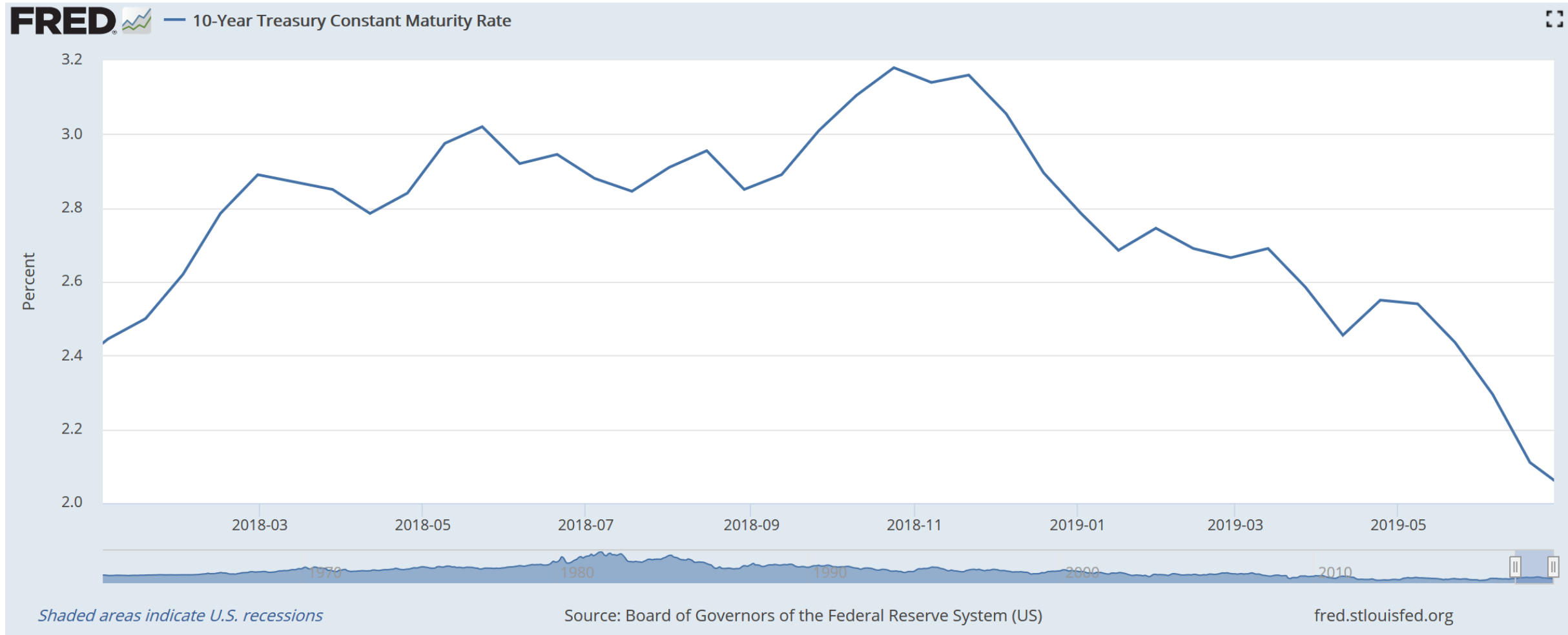
1. **Coupon rate** – the interest rate stated in the bond. The periodic cash payments made to investors will be the coupon rate times the par value of the bond. Coupon payments are typically semi-annual.
2. **Market interest rate (at issuance)** – the rate that determines the interest expense and the book value of the liability 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  $\rightarrow$  “discount bond”


If market rate  $<$  coupon rate  $\rightarrow$  “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)

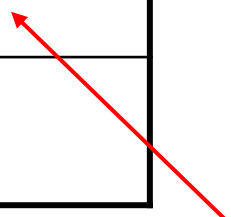
Consider the following two alternatives (Both raise \$10,000 at the bond issuance):

- 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

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



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

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
<b>Total payments</b>	<b>11,800</b>

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

**Annuity**

= \$600 \* (PVA, 3, 6%)

= \$600 \* 2.67301

= \$1,604

**Lump Sum =**

(PV of \$1, 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
	Cash		Bond Payable		RE
2015	10,000		10,000		

Periodic accounting

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

Coupon rate x par

Market rate at issuance x bond payable

RE
-600 int. exp.
-600 int. exp.
-600 int. exp.



# Accounting for a Zero Coupon Bond

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

At Issuance

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

Periodic accounting

	Cash	Bond Payable	- Discount (XL)
2015	0 int. payment		-600
2016	0 int. payment		-636
2017	0 int. payment		-674
	-11,910	-11,910	

*Coupon rate x par* (arrow pointing to Bond Payable)

*= Interest expense - interest payable* (arrow pointing to Discount (XL))

1<sup>st</sup> year int exp is net bond payable (10,000) \* 0.06 = 600

2<sup>nd</sup> year int exp is net bond payable (10,600) \* 0.06 = 636

3<sup>rd</sup> year int exp is net bond payable (11,236) \* 0.06 = 674

-600 int. exp.

-636 int. exp.

-674 int. exp.

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

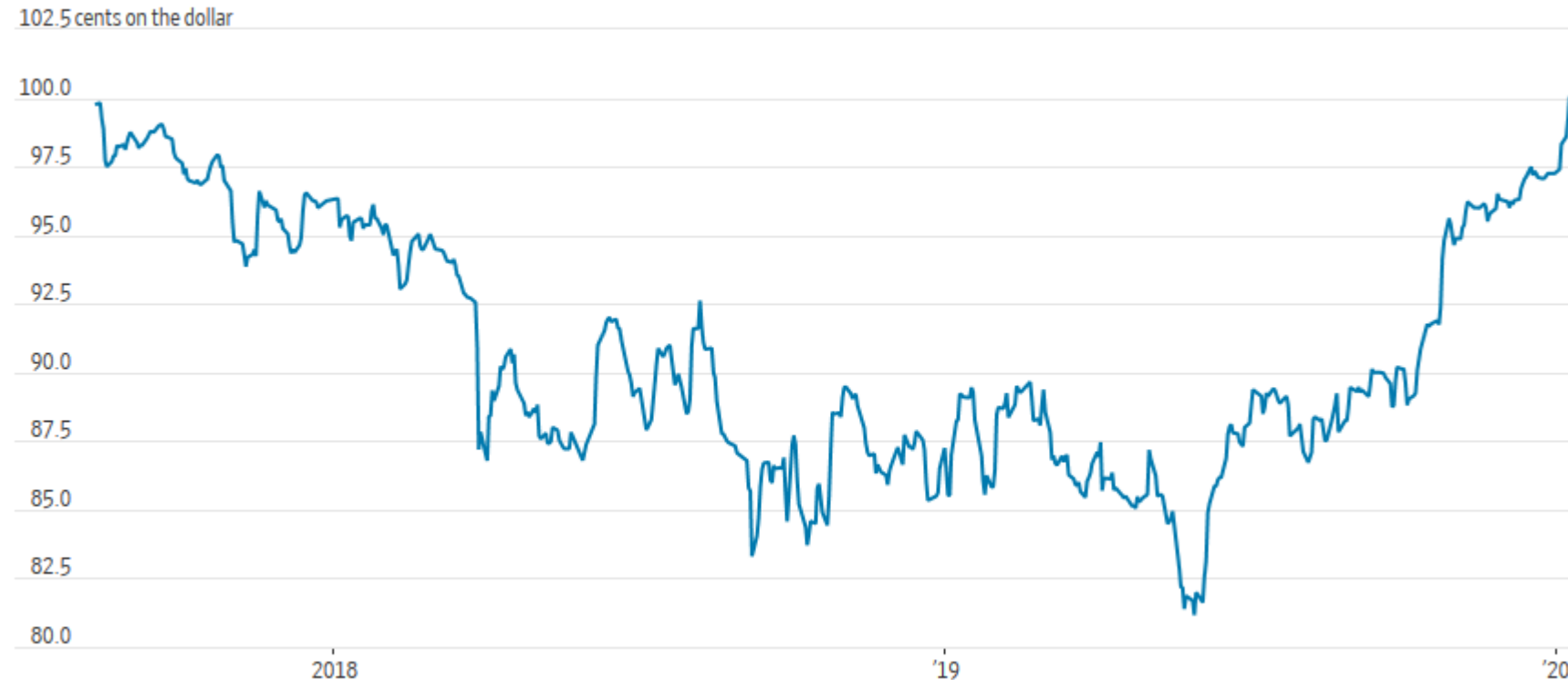
Market interest at issuance	6%
Coupon rate	0%
Face amount	\$11,910

	[A]	[B]	[C]	[D]	[E]	[F]
		(Face × coupon%)	( <i>[A]</i> × market%)	( <i>[C]</i> - <i>[B]</i> )	(Prior bal – <i>[D]</i> )	(Face – <i>[E]</i> )
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)

Price of Tesla bond due 2025



Source: MarketAxess

# 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
----------	--------	-------

(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?

- 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.

# 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
<b>Cash</b>		<b>Bond Payable</b>		<b>RE</b>
–10,403		–11,910		197 (gain on retirement of debt)
		<b>– Discount</b>		
		–1,310		

- 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
<b>Cash</b>		<b>Bond Payable</b>	<b>– Discount</b>	<b>RE</b>
–10,803		–11,910	–1,310	–203 (loss on debt retirement)

# Bonds – Financial Statement Presentation

## Balance Sheet

- Long-term debt due in next 12 months in 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
- *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)

<b>ASSETS</b>	<b>2011</b>	<b>2010</b>
Total assets	4,954	4,964
<b>LIABILITIES AND STOCKHOLDERS' EQUITY</b>		
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		229
<b>Current portion of long-term debt and capital lease obligations</b>	<b>489</b>	<b>4</b>
Other current liabilities	72	19
Total current liabilities	1,774	1,674
<b>Long-term debt and capital lease obligations, less current portion</b>	<b>1,527</b>	<b>2,188</b>
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 <sup>(1)</sup>	580	—	—	—	580	—	—
8.125% Senior Notes due 2017 <sup>(1)</sup>	500	—	—	—	—	—	500
7.75% Senior Notes due 2020	500	—	—	—	—	—	500
Other long-term liabilities	21	—	19	1	—	—	1
Aggregate interest obligation <sup>(2)</sup>	714	133	114	114	94	79	180
Capital lease obligations <sup>(3)</sup>	31	6	6	6	6	6	1
Operating leases	175	36	32	29	24	17	37
Purchase obligations <sup>(4)</sup>	374	302	38	21	13	—	—
Total contractual obligations	\$ 3,380	\$ 962	\$ 209	\$ 171	\$ 717	\$ 102	\$ 1,219

Note: Cash flows are not discounted

Interpretation:  
Nearly \$1 billion due in 2012

# 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

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

# 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	FMV Adj.
12/31/2015			197	197 (Unrealized gain)

(Net bonds payable after entry: 10,403)

# 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, AMDs 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

John Core  
MIT Sloan School of Management

**Finance at MIT**

Where ingenuity drives results

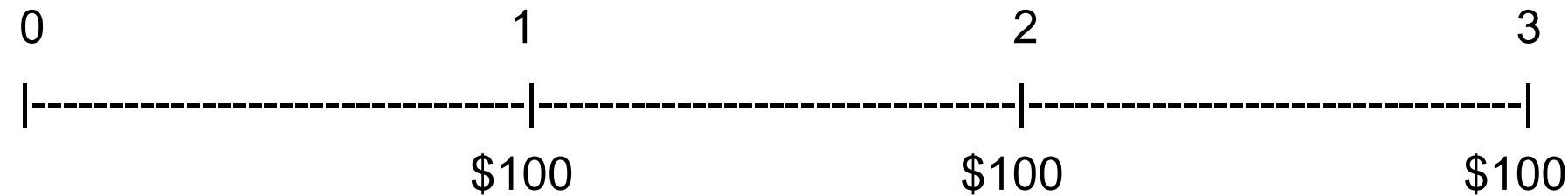
# Remaining Agenda

## 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.
- 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%?



$$100 * [1/(1.08)] = 92.5926$$

$$100 * [1/(1.08)^2] = 85.7339$$

$$100 * [1/(1.08)^3] = 79.3832$$

$$\text{SUM} = 257.71$$

This factor can be found by googling  
“PVOA table”;  
Also Excel @NPV function.

$$= \$100 * (\text{PVA}, 3, 8\%) = \$100 * 2.5771$$

# 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.

“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.

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.

## 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
- the discount rate is 8%.

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

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



# Why Lease?

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
Credit quality required?	Higher	Lower
Flexibility - trade up, return, etc.?	No	Yes
Depreciation deduction?	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



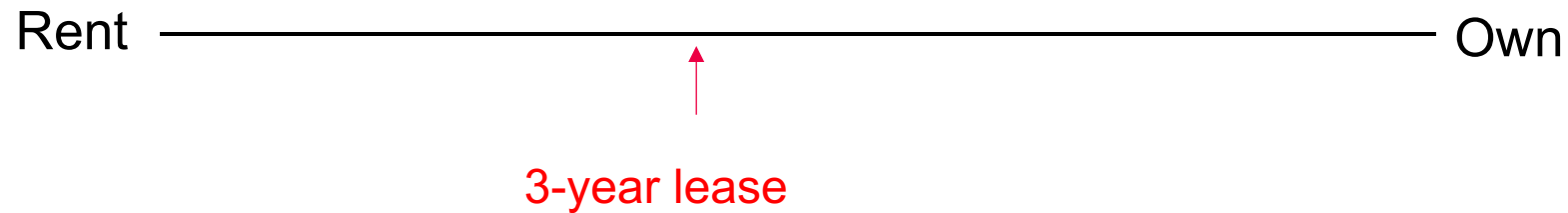
# What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



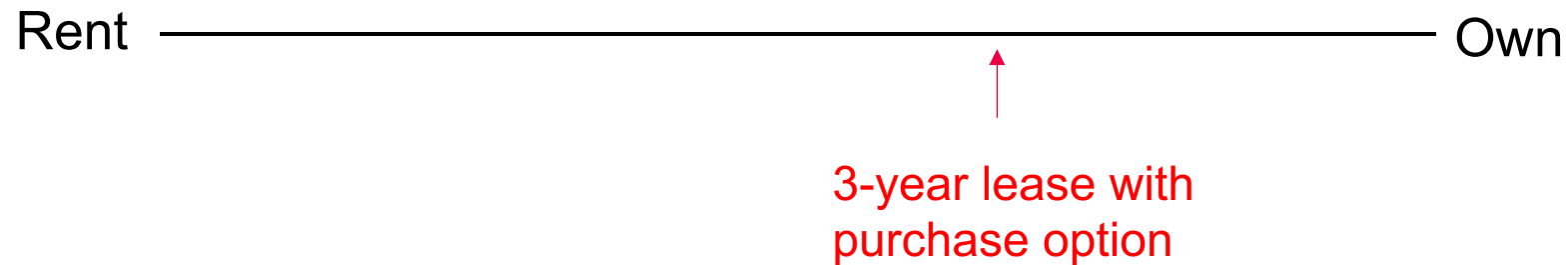
# What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



# What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



# What is the Economic Substance of the Arrangement?

Possible Arrangements between Lessor and Lessee



# Accounting Attempts to Reflect the Economic Substance

## Possible Arrangements between Lessor and Lessee

Rent \_\_\_\_\_ Own

- *Operating lease* – (rental) lessee rents the property.
- *Finance lease* – (purchase) lessee essentially owns the property.



# 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:**

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.
- 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		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		18,578		18,959

### 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		28,001		22,182
Total stockholders' equity		13,687		12,530
Total liabilities and stockholders' equity	\$	60,266	\$	53,671

# Delta 2018 and 2017 Assets (\$millions)

(in millions, except share data)	December 31,	
	2018	2017
<b>ASSETS</b>		
<b>Current Assets:</b>		
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	6,340	7,804
<b>Noncurrent Assets:</b>		
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	53,926	45,867
Total assets	\$ 60,266	\$ 53,671

# 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  $\$21,795K \times 13.765 \approx \$300,000K$

# 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

Net Lease Obligation \* interest rate  
= 300,000 \* 0.06

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)

Straight Line Amort.:  
(300,000/30 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  
 $= [300,000 - 3,795] * 0.06$

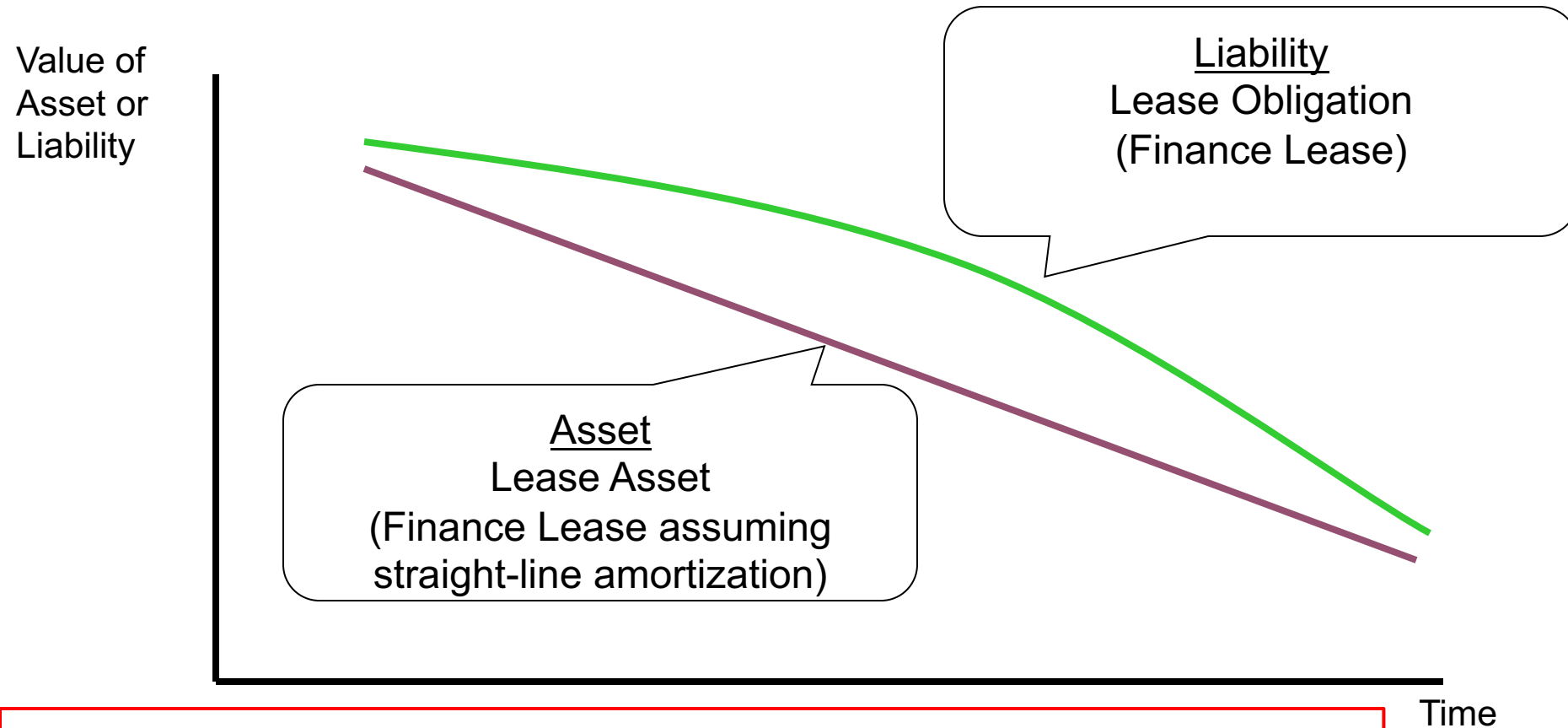


# Finance Lease Amortization Table

A	B	C	D	E	F	G	H
Year	Beginning Lease Liability	Interest Expense (B * 6%)	Lease Payment	Principal Reduction (D-C)	Ending Lease Liability (B-E)	Straight-line Amortization	Ending Net 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)

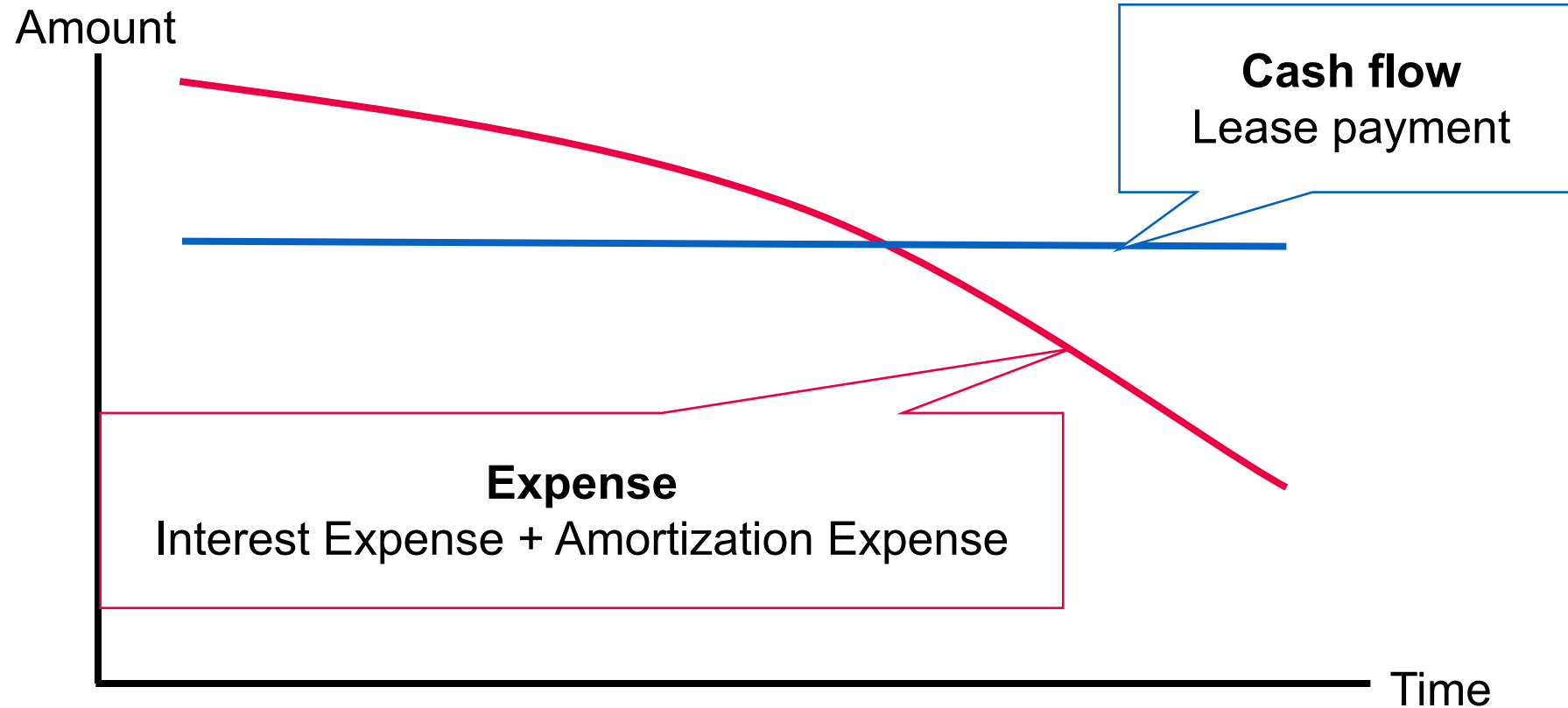
Beginning lease liability = PV of remaining payments. In excel, @NPV(rate, lease payments).  
See spreadsheet on web.

# 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	Actual lease payments for next five years
Y10	21,795	
Y11	21,795	
Y12	21,795	
Y13	21,795	
Thereafter	\$370,509	$21,795 * 17 \text{ payments}$
<b>Total minimum lease payments</b>	<b>479,483</b>	$\text{Total} = 21,795 * 22$
Less: amounts representing interest	(217,041)	$479,483 - 262,442 \text{ (below)}$
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	(955)	(109)
Long-term lease obligations	\$ 5,801	\$ 294

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

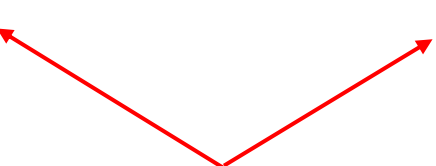
Now suppose that the above lease is an operating lease (intuition not on exam: maybe the life of the plane is much greater than 30 years).

## 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.
- 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

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.

# Accounting For Operating Leases (\$000s)

## Lessee's Books

"interest expense" =  $300,000 \times 0.06$

Lease expense = straight-line expense

During the lease (as payments are made):

A	=	L	+	S/E
Cash	Lease Asset	Lease Obligation		RE
Year 1 (21,795)	(3,795)	(21,795) 18,000		(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”

Lease expense = straight-line expense

During the lease (as payments are made):

A	=	L	+	S/E
Cash	Lease Asset	Lease Obligation		RE
Year 1 (21,795)	(3,795)	(3,795)		(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.

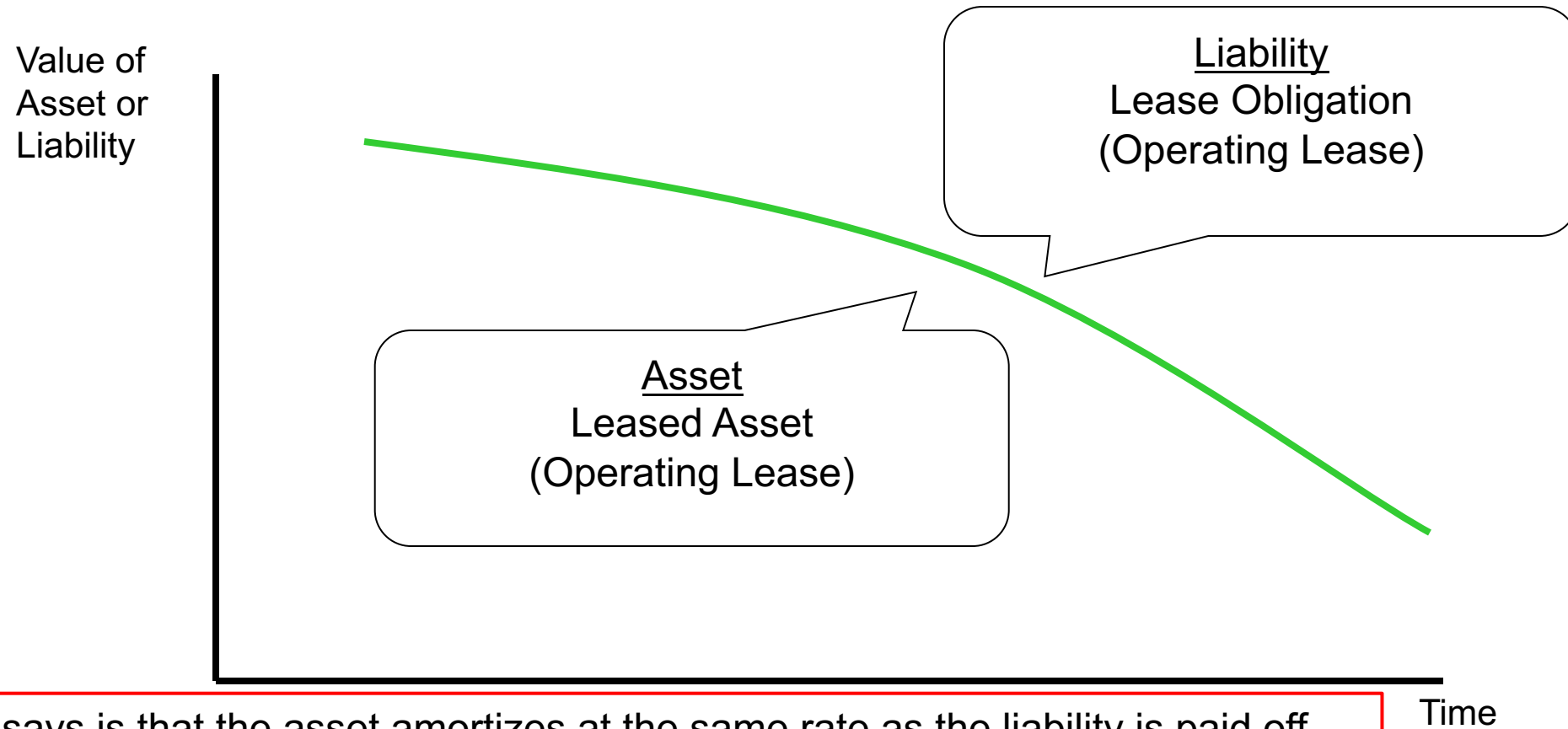
The lease asset does not have an Acc. Amort. contra asset

# Operating Lease Amortization Table

A	B	C	D	E	F	G	H
Year	Beginning Lease Liability	"Interest" Expense (B * 6%)	Lease Payment/ Expense	Principal Reduction (D-C)	Ending Lease Liability (B-E)	"Amortization" (= E)	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	-

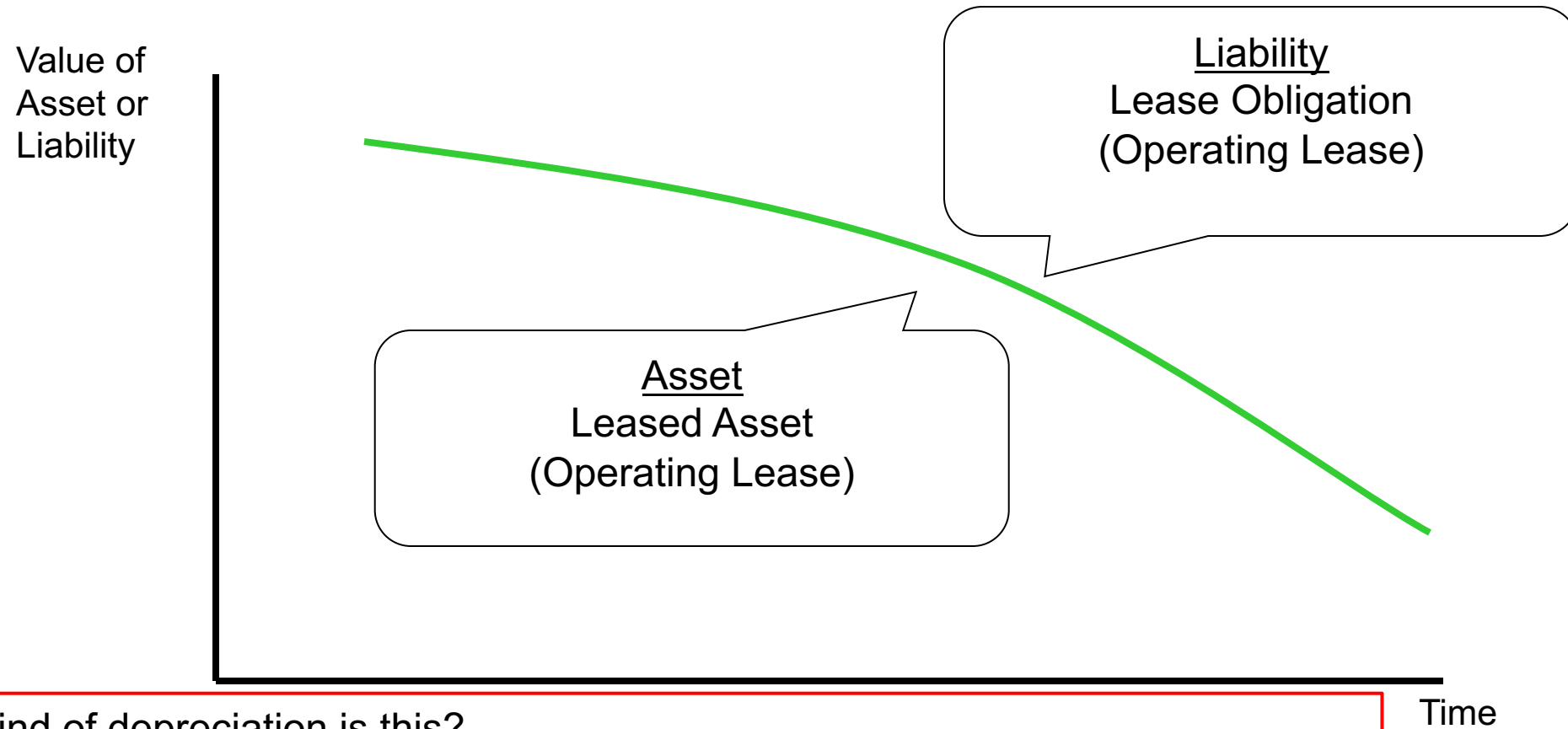
Two differences from finance lease: (1) straight-line expense, (2) slower amortization of lease asset. The lease liability equals the lease asset due to our assumption that payments are made at the end of the year.

# Operating Lease: Balance-Sheet Effects



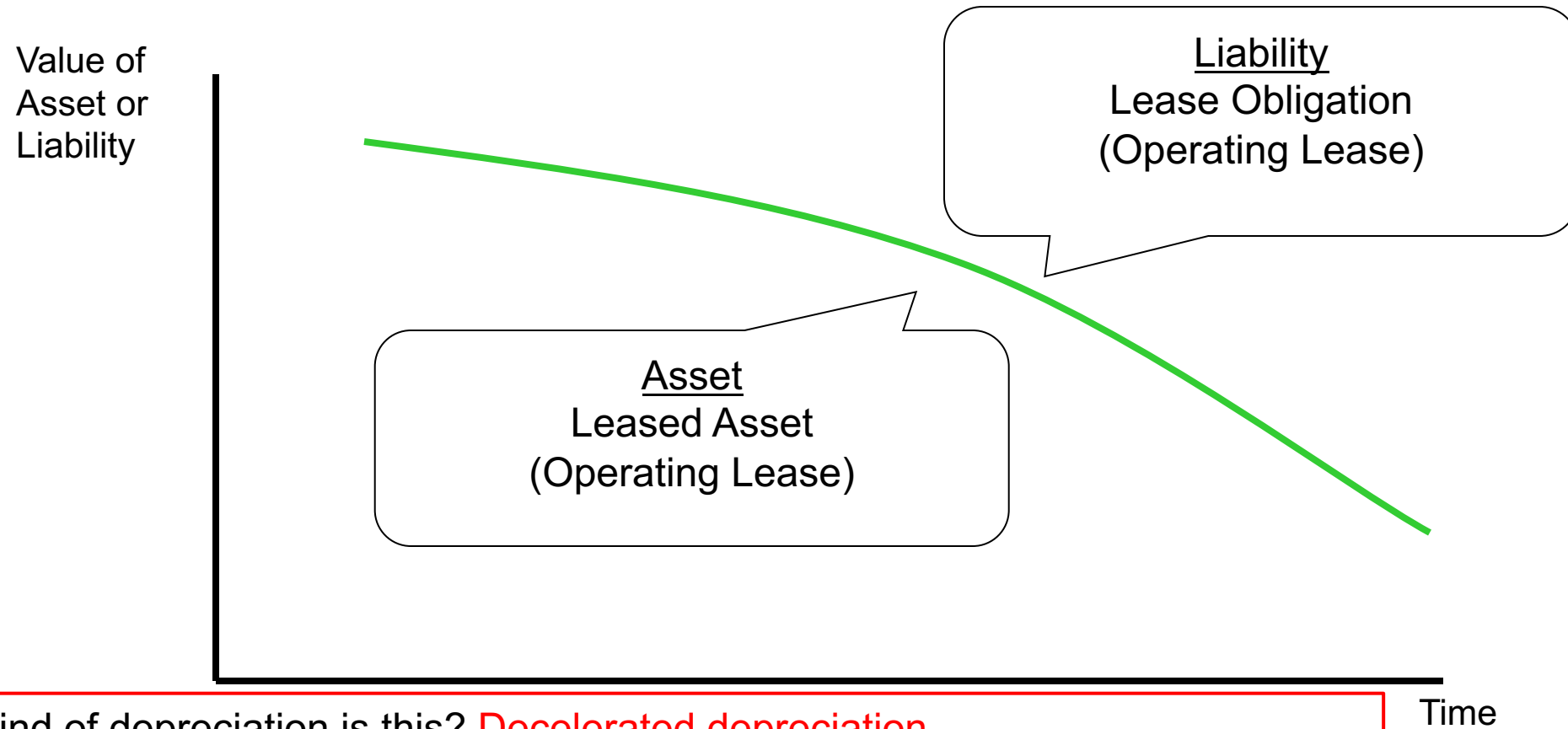
All this says is that the asset amortizes at the same rate as the liability is paid off.  
Does this make sense?

# Operating Lease: Balance-Sheet Effects



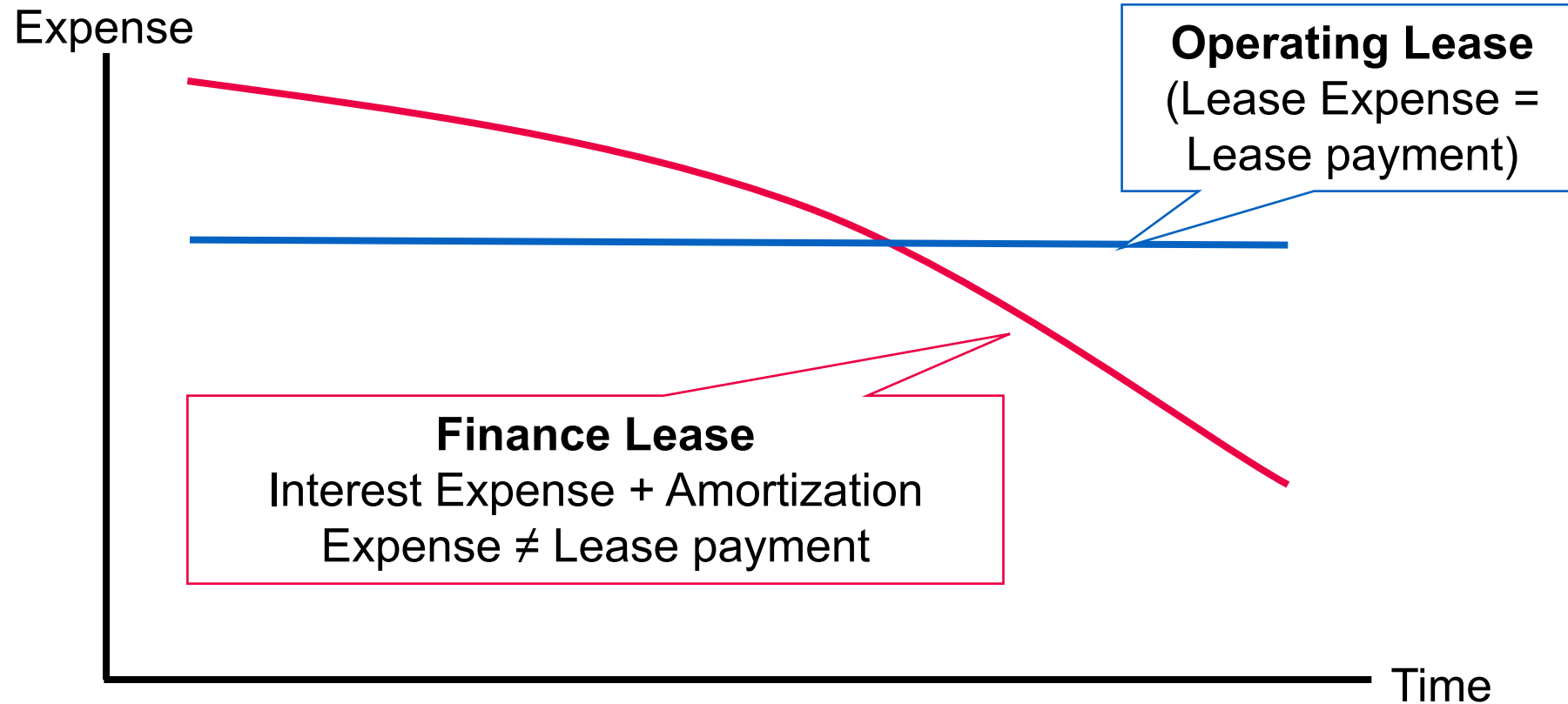
What kind of depreciation is this?

# Operating Lease: Balance-Sheet Effects



What kind of depreciation is this? **Decelerated depreciation.**

# 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 <sup>(1)</sup>						
	2019	2020	2021	2022	2023	Thereafter	Total
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 <sup>(1)</sup>						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

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

(in millions)	Contractual Obligations by Year <sup>(1)</sup>						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

- Common link: Likely requires some future economic sacrifice
- Intuition: Off-balance sheet because they do not clearly reflect a past economic transaction and/or doesn't meet the threshold for "likely/estimable"

**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.
- **Investors:** Want apples-to-apples comparisons across firms, so want to capitalize OBS items.

# 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.”

- 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 (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
  - Implied rate on firm's leases
  - Rule of thumb

# 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
<b>Total</b>	<b>5,815</b>	<b>5,327</b>	<b>4,736</b>	<b>4,483</b>	<b>3,296</b>	<b>11,594</b>	<b>35,251</b>

# 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	$3,865 \times 1/1.04^8 = \$ 2,824$
<b>Total</b>	<b>\$30,083</b>

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

# 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		<u>13,687</u>		<u>12,530</u>
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.

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.

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.