DEPRECIATION AND AMORTIZATION IN DCF ANALYSES

AND

THE IMPACT OF THE NEW TAX LAW

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Topics to Be Discussed

1. The normal relationship between capital expenditures and depreciation – why capex = depreciation is a flawed assumption

2. The appropriate treatment of amortization and other limited life items in a terminal value calculation

3. How changes in the new tax law regarding tax rates, net operating losses, interest deductions, and depreciation write-offs can affect DCF analyses

The Relationship Between Depreciation and Capital Expenditures

TERMINAL VALUE

- Terminal value is the dominant component of most DCF valuations
- The preferred method of academics and most valuation practitioners for determining terminal value is a growth model
- With 5-year projections, terminal value usually accounts for 70% or more of the aggregate value

A Common Error

- When calculating terminal value in the Gordon growth model, it has been common practice for valuators to assume that depreciation equals capital expenditures in perpetuity

> [I]n corporate finance and valuation, once a practice has become established, it becomes difficult to challenge, even if the original reasons for it have long disappeared.
>
> Aswath Damodaran, "The Small Cap Premium: Where is the Beef," 34 *Bus. Val. Rev.* 152 (2015)

THIS ERROR OVERSTATES VALUATIONS

- In fact, due to growth and inflation, capex must be greater than depreciation in a growth model
- The understatement of capex is a common error in calculations of terminal value
  - Some analyses even have capex < depreciation in perpetuity!
- Understating future capex in relation to projected depreciation necessarily results in overstated terminal values

More Practitioners Now Recognize That Capex Should Exceed Depreciation

- Jim Hitchner has asked valuators in a webinar audiences, *"How do you typically handle depreciation and cap ex when calculating cash flows?"* and has published the results in his bi-monthly *Financial Valuation and Litigation Expert*

- The responses in the last three surveys were:

	2013	2015	2017
Capex less than depreciation[!]:	4%	6%	2%
The same or very similar:	68%	55%	45%
Capex more than depreciation:	28%	38%	53%

FCF for Terminal Value Should Be Normalized

- Although capital expenditures in any given year can be less than depreciation, a growing company's *normalized* capex should exceed its depreciation
- The analyst must always review projected capex and depreciation in the terminal year to determine whether normalizing adjustments to free cash flow (FCF) are needed
  - Equipment costs and evolving technology costs may affect the relationship of the depreciation rate to the growth rate
    - To the extent that new equipment is less expensive or more efficient, the ratio of capex to depreciation may decrease
    - If a single-facility company built and equipped a factory, depreciation could exceed capex until major new investments are required

5-YEAR STRAIGHT LINE DEPRECIATION

- Example: a company depreciates its assets on a straight-line basis over a five-year period to zero residual value and is growing at 5% annually

5-Year Straight Line Depreciation with 5% Growth			
Year Purchased	Capital Expenditures	Depreciated in 2023	
		%	Amount
2018	1,000.0	10%	100.0
2019	1,050.0	20%	210.0
2020	1,102.5	20%	220.5
2021	1,157.6	20%	231.5
2022	1,215.5	20%	243.1
2023	1,276.3	10%	127.6
			1,132.8

- Capex in year 6 (2023) is 112.7% of depreciation [1,276.3 ÷ 1,132.8]

Sample calculations of the 15-year relationship between capital expenditures and depreciation using straight line, double declining balance, and sum-of-the-digits depreciation are appended

5-Year Double Declining Depreciation

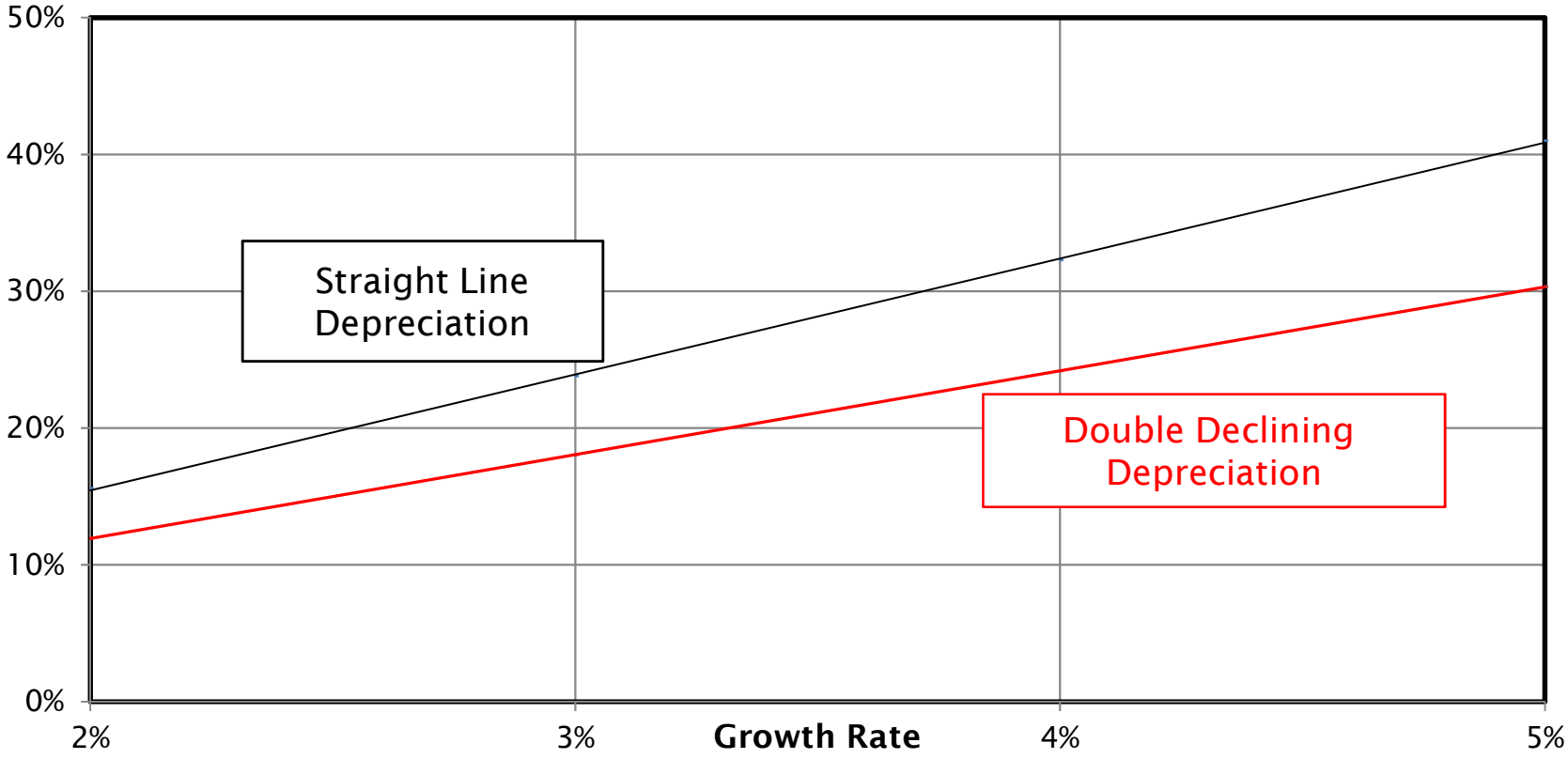
- Five-year double declining depreciation to zero residual value

5-Year Double Declining Depreciation with 2% to 5% Growth								
	2% Growth		3% Growth		4% Growth		5% Growth	
Year	Capex	Depreciated in 2023	Capex	Depreciated in 2023	Capex	Depreciated in 2023	Capex	Depreciated in 2023
2018	1,000	57.6	1,000	57.6	1,000	57.6	1,000	57.6
2019	1,020	117.5	1,030	118.7	1,040	119.8	1,050	121.0
2020	1,040	119.9	1,061	122.2	1,082	124.6	1,103	127.0
2021	1,061	203.8	1,093	209.8	1,125	216.0	1,158	222.3
2022	1,082	346.4	1,126	360.2	1,170	374.4	1,216	389.0
2023	1,104	220.8	1,159	231.9	1,217	243.3	1,276	255.3
Depreciation in 2023		1,065.9		1,100.3		1,135.7		1,172.1
Capex in 2023		1,104.1		1,159.3		1,216.7		1,276.3
Difference		38.2		59.0		81.0		104.2
Capex as % of Depreciation		103.6%		105.4%		107.1%		108.9%

Effect of 15-year Depreciation

- With a 15-year depreciable life, capex is always materially greater than depreciation

Excess of Capital Expenditures over Depreciation, Assuming 15-Year Life with No Residual Value



A Summary Table (1)

- The table below summarizes the relationships between capex and depreciation for different lives, growth rates, and depreciation methods (zero residual value)

Excess of Capital Expenditures Over Depreciation					
	Depreciation Method	Growth rate:			
		2%	3%	4%	5%
5-year life	Straight line	5.03%	7.56%	10.11%	12.67%
	Double declining	3.58%	5.36%	7.13%	8.89%
	Sum of the digits	3.66%	5.49%	7.31%	9.12%
10-year life	Straight line	10.22%	15.50%	20.87%	26.35%
	Double declining	7.73%	11.62%	15.52%	19.43%
	Sum of the digits	7.05%	10.60%	14.17%	17.76%
15-year life	Straight line	15.58%	23.79%	32.27%	40.99%
	Double declining	11.95%	18.03%	24.16%	30.34%
	Sum of the digits	10.48%	15.83%	21.24%	26.69%

A Summary Table (2)

- Alternatively, we can look at depreciation as a percent of capital expenditures

Depreciation as % of Capital Expenditures					
	Depreciation Method	Growth rate:			
		2%	3%	4%	5%
5-year life	Straight line	95.2%	93.0%	90.8%	88.8%
	Double declining	96.5%	94.9%	93.3%	91.8%
	Sum of the digits	96.5%	94.8%	93.2%	91.6%
10-year life	Straight line	90.7%	86.6%	82.7%	79.1%
	Double declining	92.8%	89.6%	86.6%	83.7%
	Sum of the digits	93.4%	90.4%	87.6%	84.9%
15-year life	Straight line	86.5%	80.8%	75.6%	70.9%
	Double declining	89.3%	84.7%	80.5%	76.7%
	Sum of the digits	90.5%	86.3%	82.5%	78.9%

Courts Often Have Accepted Capex ≤ Depreciation

- Many federal and Delaware court decisions have accepted DCF valuations in which depreciation = capex
  - In most of these cases, neither side used a projection when capex ≥ depreciation
- Only a handful of decisions have recognized the reality that capex should exceed depreciation
- A few federal and Delaware court decisions have even accepted DCF valuations in which depreciation ≥ capex
  - Two Delaware decisions have accepted DCF valuations where projected capex were less than half of projected depreciation!

COURT USED CAPEX <25% OF D&A

- In a 2004 case, the projection used by the Court of Chancery assumed capex of $100,000 per year and D&A averaging more than $430,000 per year*

	Cash Flow [$000]				
	1991	**1992**	**1993**	**1994**	**1995**
Net Income After Tax	871	905	938	729	759
Additions					
Depreciation & Amort[ization]	487	492	451	389	368
Interest	235	171	107	52	5
Subtractions					
Capital Expenditures	(100)	(100)	(100)	(100)	(100)
[Change in] Working Capital	(53)	(36)	(34)	(2)	(40)
Cash Flow	1,440	1,433	1,362	1,068	991

Lane v. Cancer Treatment Centers of America, Inc., 2004 Del. Ch. LEXIS 108 (Del. Ch. July 30, 2004) at *111

*The Court did not indicate how much was depreciation and how much was amortization

THUS THE EQUITY WAS MASSIVELY OVERVALUED

- The *Cancer Centers* opinion calculated terminal value based on 5% perpetual growth of projected free cash flow
  - This effectively assumed that capex and D&A both would grow at the 5% rate
- The Court valued the company at $5.00 million using DCF
  - Debt was $3.99 million – thus equity was $1.01 million
- If capex = D &A, the calculated DCF value of the equity would have been barely above zero

ANOTHER EXAMPLE

- In another 2004 case, the Court explicitly accepted a terminal value based on a growth model in which capital expenditures in the final year on the projection period were $9.1 million and depreciation was $21.8 million

- The Court wrote:

> Nor is there merit to the defendants' criticism (articulated through [Expert B]) that in [Expert A]'s terminal year (2002), depreciation exceeds CapEx, a state of affairs that cannot go on forever. The flaw in this criticism is that [Expert A] projected cash flows only; he did not forecast the individual components of free cash flow, including CapEx or depreciation. Accordingly, there is no basis to conclude that [Expert A] forecasts perpetual divergent depreciation and CapEx.
>
> *In re Emerging Communications, Inc. Shareholders Litig.*, 2004 Del. Ch. LEXIS 70 (Del. Ch. May 3, 2004), at *57, n.56.

ANOTHER OVERVALUATION

- This explanation is puzzling since terminal value was computed by applying a growth rate of 2.9% to FCF, adding depreciation to, and deducting capex from, projected EBIT
- Thus, the calculation of terminal value was, in reality, on a forecast in which depreciation perpetually dwarfed capex, a clear impossibility.
  - This error more than doubled the DCF value
  - The company was unable to appeal the decision

Some Courts Have Accepted Capex > Depreciation

- In a 2010 U.S. District Court case, the Court accepted expert testimony that capex would exceed depreciation and rejected testimony that they would be equal:

> [Expert B] assumes that capital expenditures will equal depreciation in the terminal period. . . . According to [Expert A], [Expert B] 's analysis is flawed because it implicitly assumes revenue growth without additional investment in ATS's asset base. [Expert B] responds that . . . this is a "steady state" business that will grow at the rate of inflation.
>
> [Expert A] assumes capital expenditures of approximately 109% of depreciation. This follows from . . . a belief that capital expenditures must outpace depreciation if the company intends to manufacture the number of units necessary to achieve terminal value revenue assumptions. . . .

Albert Trostel & Sons Co. v. Notz, 2010 U.S. Dist. LEXIS 108778 (E.D. Wisc., Sept 28, 2010) at *41; *aff'd,* 679 F.3d 627 (7th Cir., 2012)

SUMMARY: DEPRECIATION AND AMORTIZATION

- As a general rule, capital expenditures should be greater than depreciation in a terminal value calculation
- The relationship is a function of depreciation rates, company growth rates and technological innovation
- The courts have generally not yet recognized this analytical fact, in part because many experts do not present this point in their testimony and in part because of the limited literature on the subject (see attached bibliography)

The Appropriate Treatment of Amortization in DCF Valuations

AMORTIZATION

- Amortization and depreciation are both *non-cash* charges that reduce reported income
- Most amortizable intangible assets are created through either acquisitions or creation of intellectual property
- Tax-deductible amortization is similar to depreciation in that it reduces both reported net income and taxes
  - Non-tax-deductible amortization reduces only net income

AMORTIZATION HAS A LIMITED LIFE

- An important difference between amortization and depreciation must be recognized by valuators when calculating terminal value: **amortization has a limited life**
- A common error is to project growth of amortization in perpetuity
  - Amortizable intangible assets such as goodwill are not systematically replaced in the ordinary course of business
  - Since amortization, unlike depreciation, does not grow in perpetuity, it must be separately valued in terminal value calculations

The Value of Amortization Is the Present Value of Future Tax Benefits

- Even though amortization should be excluded from the computation of terminal value, any tax benefit it generates has value and should be included in enterprise value
- An appropriate manner to value amortization subsequent to the projection period is to determine the risk-adjusted present value of the future tax benefits of the remaining amortization

Amortization Must Be Separated from Depreciation in D&A

- Companies customarily lump depreciation and amortization ("D&A") as a single line item in their income and cash flow statements
  - For public companies, information re amortization can often be found in footnotes or in the Management Discussion and Analysis
- Because of the different analytical treatment of amortization and depreciation, it is important that valuators determine how much of the projected D&A is amortization
  - If possible, valuators should obtain a schedule of amortization from management when the amount is material

Other Normalizing Adjustments

- FCF must be also be normalized to exclude any other items that are not growing over time or which have a finite term, such as tax-loss carryforwards, limited-life royalties, and non-compete agreements

Benefits of Limited-Life Items Should Be Included in Terminal Value

- The present value of future positive or negative cash flows from limited-life items after the projection period should be included in terminal value
  - The value of tax-loss carryforwards is the risk-adjusted present value of future tax benefits
  - The value of future limited-life income streams is the present value of the income net of taxes
  - The value of future limited-life obligations is the negative present value of the expense net of taxes

A Simple Formula

- These adjustments are achieved by adding the present value of these net cash flows after the terminal year to enterprise value, as shown in the following equation:

$$EV = PV_F + PV_T + PV_A$$

EV = enterprise value at the valuation date;

PV_F = present value of free cash flows from the valuation date through the terminal year of the projection;

PV_T = present value of terminal value based on normalized FCF

PV_A = present value of net benefits (costs) of amortization, tax-loss carryforwards, and limited-life income and expense items after the terminal year of the projection

An Example of Erroneous Treatment of Limited Life Items in Court

- A 2007 Delaware decision exemplified two errors in the treatment of limited life items*
  - The cash benefits of tax loss carryforwards was double counted
  - Amortization projected to grow in perpetuity

* *Crescent/Mach I Partnership, L.P. v. Turner*, 2007 Del. Ch. LEXIS 63 (Del. Ch. May 2, 2007), *modified, Crescent/Mach I P'ship, L.P. v. Dr Pepper Bottling Co.*, 2008 Del. Ch. LEXIS 68 (Del. Ch., June 4, 2008); *modification rev'd on other grounds*, 962 A.2d 205, 2008 Del. LEXIS 541 (Del. 2008)

The Court Double-Counted the Value of Tax-Loss Carryforwards

- The Court included the present value of the carryforwards after the end of the projection period in its valuation
- However, the cash flow benefit of the tax loss carryforward was also included in the forecast on which terminal value was based
  - Thus, the carryforward was capitalized as if were growing in perpetuity
- This error overstated the valuation by about 8%

The Court's DCF Calculation Grew Amortization in Perpetuity

- Since amortization was part of the projected free cash flow that both testifying experts used in their growth models, they (and the Court) effectively assumed that the amortization was perpetual
  - Amortization was about 22% of D&A in the projections
- The error was compounded by effectively assuming that amortization would grow the same growth rate, thereby further overstating terminal value

COURT'S OPINION WAS MODIFIED BUT TOO LATE

- The Court of Chancery agreed to reconsider its opinion at the request of respondent's counsel
- It modified its opinion as to the tax loss carryforwards, but did not discuss the amortization error
  - The Supreme Court reversed the modification, ruling that a post-trial settlement had closed the case

SUMMARY: LIMITED LIFE ASSETS AND LIABILITIES

- Amortization of intangible assets, loss carryforwards, and other limited-life assets (and liabilities) should be excluded from normalized FCF in terminal value and should be separately valued
  - Failure to separate amortization from depreciation results in overvaluations
- Since data supplied by management often lumps depreciation and amortization together, the valuator must obtain the granular information necessary for an appropriate analysis

The Impact of the New Tax Law on DCF Analyses

Changes in the New Tax Law

- Several changes in the new tax law passed in December will impact DCF calculations
- We will discuss two substantive changes that have a positive effect on cash flow:
  - C corp tax rate dropped from 35% to 21%
  - Accelerated depreciation
    - This has will have complex effects on DCF analyses and will be discussed last
- We also will discuss two substantive changes that, when relevant, have a negative effect on cash flow:
  - Use of net operating losses (NOLs or tax loss carryforwards) is capped at 80% of net income
  - Deductibility of interest is limited

OTHER CHANGES

- Some of the changes will not be discussed here, *e.g.*:
  - Amortization of R&D over 5 years instead of write-off
  - Higher tax on dividends received
  - End of corporate alternative minimum tax
  - Liberalization of taxes on repatriation of foreign earnings
  - Application of U.S. tax to certain foreign income
  - Certain provisions applying to banks or insurance companies

Tax Rates for C Corps and Flow-Though Entities

- The analytical effect of the lower marginal tax rate is simple –free cash flow (FCF) will increase due to lower taxes
  - The corporate tax rate in FCF calculations (before the effect of loopholes) will be 21% plus 79% of relevant state income tax rate[s]
  - State income taxes will still be deductible expenses for C corps (unlike for persons)
- The tax rate on flow-through entities is in most situations reduced to 80% of the rate on ordinary income through 2025
  - Marginal S corp federal tax rate = 80% x 37% = 29.6%
  - State income taxes will generally no longer be deductible for owners of flow-through entities

CAUTION – GAAP FINANCIAL STATEMENTS ARE NOT SUFFICIENT FOR DCF CALCULATIONS

- The impact of some of the tax changes will not be shown in GAAP income statements
  - For example, depreciation will be based on GAAP rules and not on the accelerated schedule permitted for tax purposes
  - Therefore, the cash savings will not be directly shown
- It will be necessary to ask clients for projections not only on a GAAP basis but also on a tax basis
  - GAAP financials are appropriate for the market method but usually will not suffice for the income method

LIMITATION ON USE OF NOLS

- Under the new law, NOLs arising in tax years beginning after 12/31/17, are limited to offsetting 80% of taxable income, cannot be carried back, but can be carried forward indefinitely

- The prior provision that NOLs could offset 100% taxable income in any year, and that unused NOLs could be carried back 2 years and forward 20 years, has been grandfathered

IMPACT OF NOL CHANGES

- DCF models will have to be tweaked to treat NOLs deriving from tax years beginning before 12/31/17 (old NOLs) differently than those from later tax years (new NOLs)
- Valuators will need information from management as to which NOLs are old and which are new
  - Old NOLs, which are more valuable, will be used first
  - Calculations should be based on tax accounting, not GAAP
  - In a few situations, expiration dates of old NOLs may be relevant

ADJUSTING FOR NOLS

- NOLs that are not applied during the projection period (or in a later stage in a multistage model) should be present-valued and added to terminal value
- If terminal value determined with a growth model is "sanity-checked" by using a P/E ratio, the valuator should normalize net income by excluding the benefits of NOLs
  - Including the benefit of NOLs in a valuation assumes that there will be no ownership change (as defined in the tax law*) since all NOLs are subject to severe limitations in the event of a deemed ownership change

* §382 defines an ownership change as a more than 50% increase in ownership by 5% owners during a three-year period

LIMITATIONS ON DEDUCTIBILITY OF INTEREST (1)

- Under the new tax law, a business's allowable deduction for net business interest expense in a particular tax year is limited to 30% of "adjusted taxable income"
  - "Adjusted taxable income" generally corresponds to EBITDA for tax years beginning before Jan. 1, 2022
  - Thereafter, it generally corresponds to EBIT
  - Regulated utilities are generally exempt from this limitation
- For flow-through entities, this limitation is applied at the entity level rather than at the owner level
  - Taxpayers (other than tax shelters) with average annual gross receipts of $25 million or less for the three previous tax years are exempt from the interest deduction limitation

LIMITATIONS ON DEDUCTIBILITY OF INTEREST (2)

- These limitations on interest deductions have no grandfather provision for existing debt
- Any unused business interest expense can be carried forward indefinitely
- Interest expense carryforwards are not treated as NOLs
  - The entire interest expense carryforward is available in any tax year, subject to the 30% limitation
  - However, they are potentially subject to limitation if there is an ownership change

IMPACT OF LIMIT ON INTEREST DEDUCTIONS

- The limitation on interest deductions should be included a DCF model
  - The limitation is on *net* interest (interest expense minus interest income)
  - The model should reflect the 2022 switch from EBITDA to EBIT in the denominator for the annual interest limit
  - The growth model should be based on EBIT
  - Adjustments for state income tax may differ
    - Some states expressly follow federal law in determining deductions
    - Some states may continue to allow 100% deductibility

ACCELERATED DEPRECIATION (1)

- For qualified tangible property (and certain computer software) placed in service between Sept. 28, 2017 and Dec. 31, 2022 that has a depreciable life of up to 20 years, the first-year bonus depreciation percentage is 100% (up from 50%)
  - This accelerated depreciation will not be permitted under many states' tax laws
- This 100% deduction is allowed for both new and used qualifying property

ACCELERATED DEPRECIATION (2)

- In subsequent *calendar* years, the bonus depreciation will be:

  2023 : 80%

  2024 : 60%

  2025 : 40%

  2026 : 20%

  - For certain property with longer production periods, the 100% write-off extends through 2023 and scales down from 2024 through 2027

Management Projections of CapEx and Depreciation

- The work of the valuator is simplified if management supplies adequate schedules as to capex and depreciation for the projection period
- It is even more helpful if longer-term schedules are made available
- When management has supplied information, the valuator should review the data for reasonableness and internal consistency

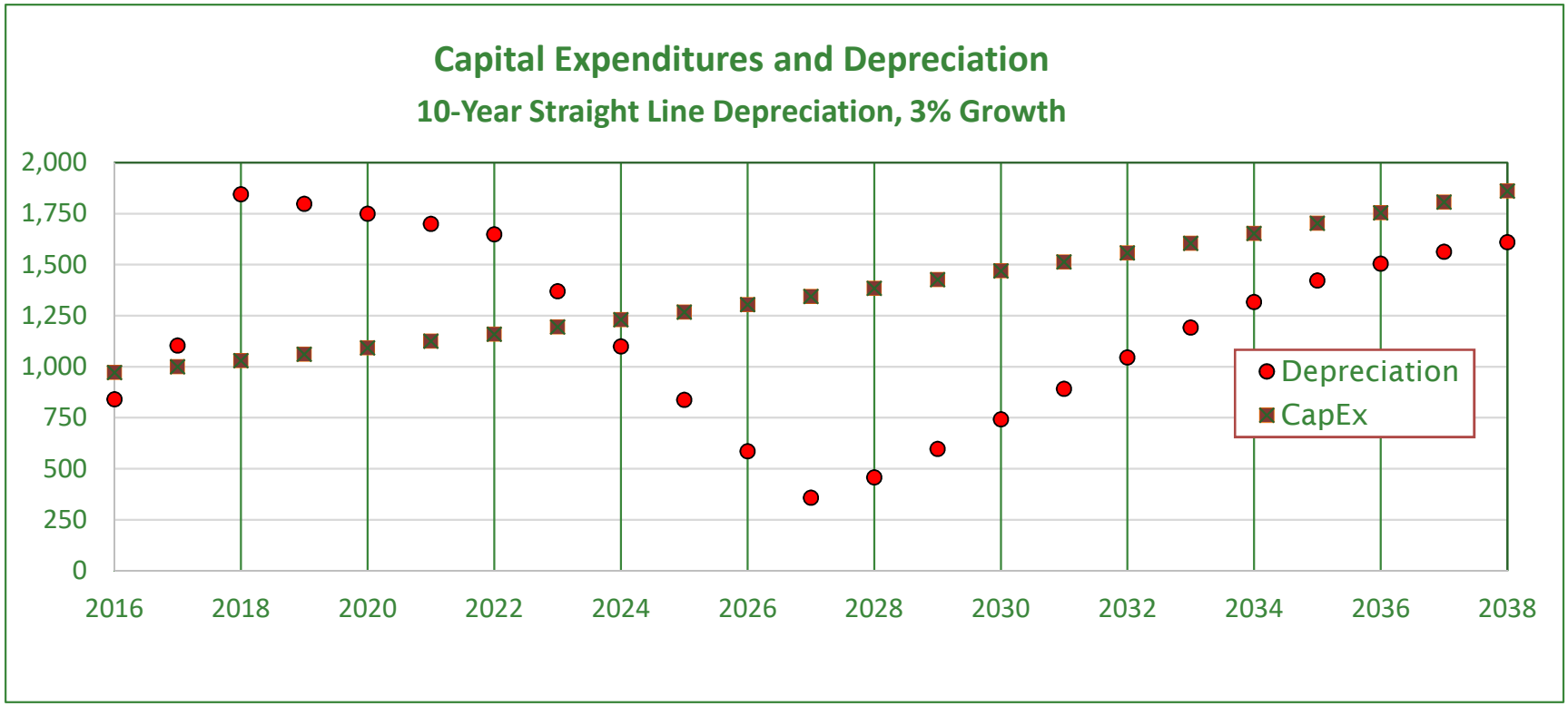
The New Law Materially Changes the CapEx/Depreciation Relationship

- The table below shows the impact of accelerated write-offs on annual depreciation, assuming a straight-line 10-year depreciation and 3% growth in capex

	2016	2017	2018	2019	2020	2021	2022
Depreciation	841	1,103	1,845	1,798	1,750	1,700	1,649
CapEx	971	1,000	1,030	1,061	1,093	1,126	1,159
	2023	2024	2025	2026	2027	2028	2029
Depreciation	1,369	1,099	837	586	358	457	598
CapEx	1,194	1,230	1,267	1,305	1,344	1,384	1,426
	2030	2031	2032	2033	2034	2035	2036
Depreciation	742	891	1,045	1,191	1,317	1,423	1,505
CapEx	1,469	1,513	1,558	1,605	1,653	1,702	1,754

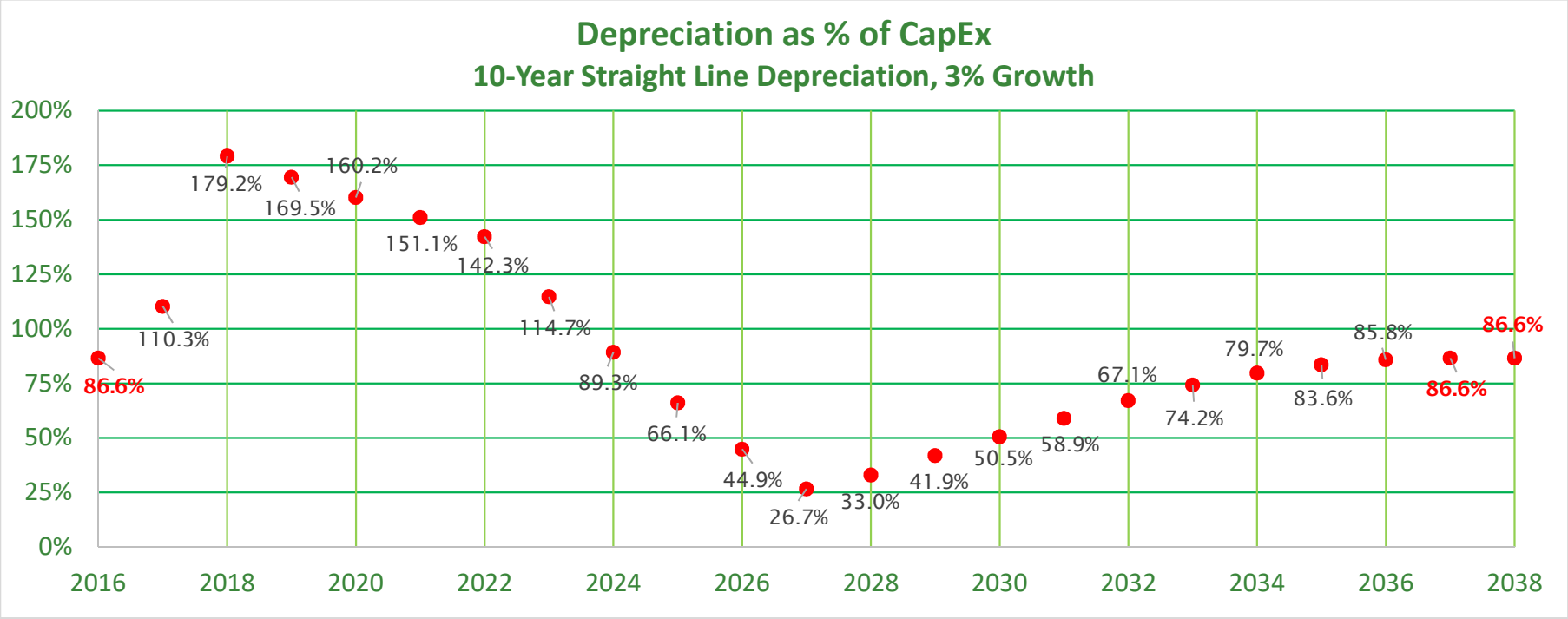
The Change in Graphic Fom

- This chart shows the extreme fluctuation in depreciation even if capex is consistent



Abnormal Capex/Depreciation Ratios

- With 10-year depreciation, the relationship between capex and depreciation does not normalize until 2037



- If assets are depreciated over a 15-year period, the relationship of depreciation to capex does not normalize until 2042

NORMALIZING FOR TERMINAL VALUE

- For terminal value calculations, capex and depreciation should be normalized
- The ability of companies to write off capital expenditures in the first year rather than depreciating them materially complicates the treatment of capex/depreciation in calculating terminal value

Adjusting For Abnormal Capex/Depreciation Ratios

- The Gordon growth model necessarily assumes that FCF in the base year is normalized and does not include non-recurrent or limited-life items
- The new tax law will cause depreciation to follow an irregular pattern for a period much longer than the length of most management projections
- The basic issue here is the impact of timing differences on present value

CALCULATING TERMINAL VALUE (1)

- There are various ways in which this can be addressed
- One approach is to use a multi-stage model with, *e.g.*, a second stage for declining depreciation, a third stage as it increases, and a final stage when the normal capex/depreciation relationship is restored
  - Because of the scale-down in accelerated depreciation from 80% in 2023 to none in 2027, the second stage should run through 2027, the year in which depreciation is at its low point
  - The length of the third stage would be a function of the depreciation period for the company's assets

CALCULATING TERMINAL VALUE (2)

- Another approach is to calculate terminal value based on normalized data in the year following the end of the projection period, and then to adjust for the present-value of the abnormal capex/depreciation differences in the same manner as discussed earlier for limited-life items

CALCULATING TERMINAL VALUE (3)

- A 3rd alternative is to use a second stage model through 2027, to normalize the data for 2028, to compute terminal value based on the normalized data, then to adjust for the present-value of the remaining capex/depreciation differences
  - If the company's fiscal year is not a calendar year, the second stage should end with the 2027/28 fiscal year
  - Thus, the second stage will include the entire period of declining depreciation

An Example

- Assume we have management projections though 2022
- Let's look at an example of calculating terminal value using the 3rd alternative, using the following assumptions:
  - Projected revenues in 2022 = 200
  - Growth rate = 5% from 2022 to 2027, 3% thereafter
  - Discount rate = 12%
  - EBITD [not EBITDA] margin = 20%
  - No interest
  - Capex = 10, growing at growth rate
  - Accelerated depreciation per new tax law
  - Normalized depreciation = 10-year straight line
  - State income tax = 6% = 4.74% net of federal tax*
  - Δ working capital = 5% of Δ revenues
  - Amortization = 5 per year through mid-2024

*Assuming the state's tax law follows federal law; many states do not

STAGE 2

Present Value of FCFs, 2023–2027						
	2022	2023	2024	2025	2026	2027
Revenues	200.0	210.0	220.5	231.5	243.1	255.3
EBITDA	45.0	47.0	46.6	46.3	48.6	51.1
Depreciation	14.2	12.0	9.8	7.6	5.5	3.4
Amortization	5.0	5.0	2.5	0.0	0.0	0.0
EBIT	25.8	30.0	34.3	38.7	43.2	47.6
Tax at 25.74%	6.6	7.7	8.8	10.0	11.1	12.3
Net income	20.4	23.7	27.1	30.5	34.1	37.6
Capital expenditures	(10.0)	(10.5)	(11.0)	(11.6)	(12.2)	(12.8)
Change in working capital	(1.0)	(1.0)	(1.1)	(1.1)	(1.2)	(1.2)
Free cash flow	27.4	27.8	25.7	23.7	24.2	24.8
Discount Factor @ 12%	0.6005	*0.5362*	*0.4787*	*0.4274*	*0.3816*	*0.3407*
Present Value		14.9	12.3	10.1	9.2	8.5
Sum of Present Values of FCFs, 2023-2027						46.6

Normalized FCF for Growth Model

- Now we determine the normalized FCF for 2027
- As shown earlier, normalized depreciation is 86.6% of capex

Normalized FCF for Growth Model		
	2027	2028
Revenues	255.3	262.9
EBITDA	51.1	52.6
Depreciation (normalized)	11.1	11.4
EBIT	40.0	41.2
Tax @ 25.74%	8.4	8.7
Net income	29.7	30.6
Capital expenditures	(12.8)	(13.1)
Change in working capital	(1.2)	(0.8)
Normalized free cash flow	26.8	28.1

Present Value of Difference Between Actual and Normalized Depreciation

- We can then compare annual depreciation based on the tax law with normalized depreciation and calculate the present value of the differences (net of tax)

Present Value of Underdepreciation									
	2028	2029	2030	2031	2032	2033	2034	2035	2036
Revenues	262.9	270.8	278.9	287.3	295.9	304.8	313.9	323.4	333.1
EBITDA	52.6	54.2	55.8	57.5	59.2	61.0	62.8	64.7	66.6
Depreciation (actual)	4.3	5.7	7.0	8.5	9.9	11.3	12.5	13.5	14.3
Depreciation (normalized)	11.4	11.7	12.1	12.4	12.8	13.2	13.6	14.0	14.4
Difference	(7.0)	(6.0)	(5.0)	(4.0)	(2.9)	(1.9)	(1.1)	(0.5)	(0.1)
Difference net of 25.74% tax	(5.2)	(4.5)	(3.7)	(2.9)	(2.1)	(1.4)	(0.8)	(0.4)	(0.1)
Discount Factor @ 12%	*0.3042*	*0.2716*	*0.2425*	*0.2165*	*0.1933*	*0.1726*	*0.1541*	*0.1376*	*0.1229*
Present Value	(1.6)	(1.2)	(0.9)	(0.6)	(0.4)	(0.2)	(0.1)	(0.1)	(0.0)
Sum of Present Values of Underdepreciation, 2028-2036									(5.2)

Adjusted Terminal Value

- We then calculate terminal value based on projected 2028 FCF, add the present value of the Stage 2 FCFs, and deduct the present value of overdepreciation to arrive at the appropriate terminal value

Terminal Value at End of Stage 1	
Long-term growth rate	*3.0%*
Discount rate	*12.0%*
Normalized free cash flow in 2028	28.1
Terminal value unadjusted	311.8
Discount Factor @ 12%	*0.3042*
Present value of unadjusted terminal value	94.9
Present value of Stage 2 FCFs	46.6
Adjustment for underdepreciation	(5.2)
Terminal value	136.2

  - The value of the company is the terminal value plus the present value of the FCFs during the projection period ending in 2022

Application of Other Approaches

- This model can be used in three stages by treating 2028-2036 as stage 3 and calculating terminal value with a growth model based on 2037
  - In that case, the adjustment for overdepreciation would not be needed since it would be subsumed that the intermediate stages
- If terminal value is calculated with a growth model based on 2023, a calculation of the present value of overdepreciation in the early years and subsequent underdepreciation would need to be performed

Companies May Accelerate Capex

- Our example assumes that capex will grow steadily
- In practice, companies may accelerate capex to take advantage of accelerated depreciation
- However, given the gradual 20% annual decrease from 2022 through 2027, the impact of accelerated capex is unlikely to be material
  - Valuators should ascertain management's plans for capex as part of their due diligence

SUMMARY: IMPACT OF TAX LAW CHANGES

- The new 21% C Corp tax rate increases earnings and cash flow
- Use of future NOLs will be limited to 80% of taxable net income
- Interest expense for tax purposes will be limited to 30% of EBIT (30% of EBITDA until 2022)
- Accelerated depreciation will add to FCF until about 2024 and then reduce it until the capex/depreciation relationship is normalized
- DCF analyses will have to be modified to account for the present value of cash flow changes deriving from accelerated depreciation
  - The valuator should supplement GAAP data with information from financial statements on a tax basis

Sample Calculations of Relationship between Capital Expenditures and Depreciation

3% Growth – 15 Year Straight Line Depreciation								
Year	Capital Expenditures	2028	2029	2030	2031	2032	2033	2034
2018	1,000.0	50.0						
2019	1,030.0	103.0	51.5					
2020	1,060.9	106.1	106.1	53.0				
2021	1,092.7	109.3	109.3	109.3	54.6			
2022	1,125.5	112.6	112.6	112.6	112.6	56.3		
2023	1,159.3	115.9	115.9	115.9	115.9	115.9	58.0	
2024	1,194.1	119.4	119.4	119.4	119.4	119.4	119.4	59.7
2025	1,229.9	123.0	123.0	123.0	123.0	123.0	123.0	123.0
2026	1,266.8	126.7	126.7	126.7	126.7	126.7	126.7	126.7
2027	1,304.8	130.5	130.5	130.5	130.5	130.5	130.5	130.5
2028	1,343.9	67.2	134.4	134.4	134.4	134.4	134.4	134.4
2029	1,384.2		69.2	138.4	138.4	138.4	138.4	138.4
2030	1,425.8			71.3	142.6	142.6	142.6	142.6
2031	1,468.5				73.4	146.9	146.9	146.9
2032	1,512.6					75.6	151.3	151.3
2033	1,558.0						77.9	155.8
2034	1,604.7							80.2
Annual Depreciation		**1,163.6**	**1,198.5**	**1,234.4**	**1,271.5**	**1,309.6**	**1,348.9**	**1,389.4**
Capital Expenditures		**1,343.9**	**1,384.2**	**1,425.8**	**1,468.5**	**1,512.6**	**1,558.0**	**1,604.7**
Capital Expenditures in Excess of Depreciation		**180.3**	**185.7**	**191.3**	**197.1**	**203.0**	**209.1**	**215.3**
Difference in %		**15.50%**	**15.50%**	**15.50%**	**15.50%**	**15.50%**	**15.50%**	**15.50%**

3% Growth – 15 Year Double Declining Depreciation								
Year	Capital Expenditures	2028	2029	2030	2031	2032	2033	2034
2018	1,000.0	32.8						
2019	1,030.0	67.5	33.8					
2020	1,060.9	69.5	69.5	34.8				
2021	1,092.7	71.6	71.6	71.6	35.8			
2022	1,125.5	73.8	73.8	73.8	73.8	36.9		
2023	1,159.3	85.5	76.0	76.0	76.0	76.0	38.0	
2024	1,194.1	110.0	88.0	78.3	78.3	78.3	78.3	39.1
2025	1,229.9	141.7	113.3	90.7	80.6	80.6	80.6	80.6
2026	1,266.8	182.4	145.9	116.7	93.4	83.0	83.0	83.0
2027	1,304.8	234.9	187.9	150.3	120.2	96.2	85.5	85.5
2028	1,343.9	134.4	241.9	193.5	154.8	123.9	99.1	88.1
2029	1,384.2		138.4	249.2	199.3	159.5	127.6	102.1
2030	1,425.8			142.6	256.6	205.3	164.2	131.4
2031	1,468.5				146.9	264.3	211.5	169.2
2032	1,512.6					151.3	272.3	217.8
2033	1,558.0						155.8	280.4
2034	1,604.7							160.5
Annual Depreciation		**1,204.10**	**1,240.10**	**1,277.50**	**1,315.70**	**1,355.30**	**1,395.90**	**1,437.70**
Capital Expenditures		**1,343.90**	**1,384.20**	**1,425.80**	**1,468.50**	**1,512.60**	**1,558.00**	**1,604.70**
Capital Expenditures in Excess of Depreciation		**139.80**	**144.10**	**148.30**	**152.80**	**157.30**	**162.10**	**167.00**
Difference in %		**11.62%**	**11.62%**	**11.62%**	**11.62%**	**11.62%**	**11.62%**	**11.62%**

3% Growth – 15 Year Sum-of-the-Digits Depreciation								
Year	Capital Expenditures	2028	2029	2030	2031	2032	2033	2034
2018	1,000.0	9.1						
2019	1,030.0	28.1	9.4					
2020	1,060.9	48.2	28.9	9.6				
2021	1,092.7	69.5	49.7	29.8	9.9			
2022	1,125.5	92.1	71.6	51.2	30.7	10.2		
2023	1,159.3	115.9	94.8	73.8	52.7	31.6	10.5	
2024	1,194.1	141.1	119.4	97.7	76.0	54.3	32.6	10.9
2025	1,229.9	167.7	145.3	123.0	100.6	78.3	55.9	33.5
2026	1,266.8	195.8	172.7	149.7	126.7	103.6	80.6	57.6
2027	1,304.8	225.4	201.6	177.9	154.2	130.5	106.8	83.0
2028	1,343.9	122.2	232.1	207.7	183.3	158.8	134.4	110.0
2029	1,384.2		125.8	239.1	213.9	188.8	163.6	138.4
2030	1,425.8			129.6	246.3	220.3	194.4	168.5
2031	1,468.5				133.5	253.7	227.0	200.3
2032	1,512.6					137.5	261.3	233.8
2033	1,558.0						141.6	269.1
2034	1,604.7							145.9
Annual Depreciation		**1,215.1**	**1,251.6**	**1,289.1**	**1,327.8**	**1,367.6**	**1,408.6**	**1,450.9**
Capital Expenditures		**1,343.9**	**1,384.2**	**1,425.8**	**1,468.5**	**1,512.6**	**1,558.0**	**1,604.7**
Capital Expenditures in Excess of Depreciation		**128.8**	**132.7**	**136.7**	**140.8**	**145.0**	**149.3**	**153.8**
Difference in %		**10.60%**	**10.60%**	**10.60%**	**10.60%**	**10.60%**	**10.60%**	**10.60%**

CapEx/Depreciation under New Tax Law – 3% Growth, 5-Year Straight Line Depreciation

			2016	2017	2018	2019	2020	2021	2022	2023	2024
	CapEx	Depreciation	902.6	1,154.7	1,834.6	1,685.1	1,531.2	1,372.6	1,234.3	979.1	834.9
2011-15	4,446.3	4,133.7	805.5	635.5	460.4	280.0	94.3				
2016	970.9	902.6	97.1	194.2	194.2	194.2	194.2	97.1			
2017	1,000.0	1,154.7		325.0	150.0	150.0	150.0	150.0	75.0		
2018	1,030.0	1,834.6			1,030.0						
2019	1,060.9	1,685.1				1,060.9					
2020	1,092.7	1,531.2					1,092.7				
2021	1,125.5	1,372.6						1,125.5			
2022	1,159.3	1,234.3							1,159.3		
2023	1,194.1	979.1								979.1	47.8
2024	1,229.9	834.9									787.1
			2025	2026	2027	2028	2029	2030	2031	2032	2033
	CapEx	Depreciation	728.9	663.5	641.3	890.3	1,098.2	1,262.4	1,380.1	1,448.4	1,491.9
2023	1,194.1	979.1	47.8	47.8	47.8	23.9					
2024	1,229.9	834.9	98.4	98.4	98.4	98.4	49.2				
2025	1,266.8	728.9	582.7	152.0	152.0	152.0	152.0	76.0			
2026	1,304.8	663.5		365.3	208.8	208.8	208.8	208.8	104.4		
2027	1,343.9	641.3			134.4	268.8	268.8	268.8	268.8	134.4	
2028	1,384.2	890.3				138.4	276.8	276.8	276.8	276.8	138.4
2029	1,425.8	1,098.2					142.6	285.2	285.2	285.2	285.2
2030	1,468.5	1,262.4						146.9	293.7	293.7	293.7
2031	1,194.1	979.1							151.3	302.5	302.5
2032	1,229.9	834.9								155.8	311.6
2033	1,266.8	728.9									160.5

CapEx/Depreciation under New Tax Law – 3% Growth, 10-Year Straight Line Depreciation

			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
	CapEx	Depr.	840.6	1,103.3	1,845.3	1,798.4	1,750.1	1,700.4	1,649.1	1,369.5	1,098.5	837.0	585.8	358.2
2006-15	8,281.8	7,170.5	792.1	718.7	643.2	565.4	485.3	402.8	317.8	230.2	140.0	47.1		
2016	970.9	840.6	48.5	97.1	97.1	97.1	97.1	97.1	97.1	97.1	97.1	97.1	48.5	
2017	1,000.0	1,103.3		287.5	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	37.5
2018	1,030.0	1,845.3			1,030.0									
2019	1,060.9	1,798.4				1,060.9								
2020	1,092.7	1,750.1					1,092.7							
2021	1,125.5	1,700.4						1,125.5						
2022	1,159.3	1,649.1							1,159.3					
2023	1,194.1	1,369.5								967.2	23.9	23.9	23.9	23.9
2024	1,229.9	1,098.5									762.5	49.2	49.2	49.2
2025	1,266.8	837.0										544.7	76.0	76.0
2026	1,304.8	585.8											313.1	104.4
2027	1,343.9	358.2												67.2

			2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
	CapEx	Deprec.	457.1	597.6	742.3	891.3	1,044.9	1,191.1	1,317.4	1,422.6	1,505.2	1,563.8	1,610.7
2023	1,194.1	1,369.5	23.9	23.9	23.9	23.9	23.9	11.9					
2024	1,229.9	1,098.5	49.2	49.2	49.2	49.2	49.2	49.2	24.6				
2025	1,266.8	837.0	76.0	76.0	76.0	76.0	76.0	76.0	76.0	38.0			
2026	1,304.8	585.8	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	52.2		
2027	1,343.9	358.2	134.4	134.4	134.4	134.4	134.4	134.4	134.4	134.4	134.4	67.2	
2028	1,384.2	457.1	69.2	138.4	138.4	138.4	138.4	138.4	138.4	138.4	138.4	138.4	69.2
2029	1,425.8	597.6		71.3	142.6	142.6	142.6	142.6	142.6	142.6	142.6	142.6	142.6
2030	1,468.5	742.3			73.4	146.9	146.9	146.9	146.9	146.9	146.9	146.9	146.9
2031	1,512.6	891.3				75.6	151.3	151.3	151.3	151.3	151.3	151.3	151.3
2032	1,558.0	1,044.9					77.9	155.8	155.8	155.8	155.8	155.8	155.8
2033	1,604.7	1,191.1						80.2	160.5	160.5	160.5	160.5	160.5
2034	1,652.8	1,317.4							82.6	165.3	165.3	165.3	165.3
2035	1,702.4	1,422.6								85.1	170.2	170.2	170.2
2036	1,753.5	1,505.2									87.7	175.4	175.4
2037	1,806.1	1,563.8										90.3	180.6
2038	1,860.3	1,610.7											93.0

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